

Falcon Energy

Energy Statement

Discharge of Renewable / Low-Carbon Energy Condition

Tawny Gardens, Angmering, West Sussex, BN16 4UN

Development of 8 dwellings (Plots 1–7)

Local Planning Authority: Arun District Council

Prepared by

Neil Vanson

Falcon Energy

OCDEA M057-0001

July 2026

Contents

Executive Summary 3

1 Introduction..... 3

2 The Planning Condition..... 4

3 Planning Policy Context 4

4 Assessment Methodology 5

5 Build Standards Proposed (Be Lean) 5

6 Low Carbon and Renewable Technologies Considered (Be Clean and Be Green) 6

7 Demonstration of Compliance — Primary Limb..... 6

8 Fabric-First Alternative and Supporting Performance 7

9 Implementation, Timetable and Monitoring..... 8

10 Summary and Conclusion 8

Executive Summary

This Energy Statement has been prepared by Falcon Energy to discharge the planning condition relating to renewable and low-carbon energy attached to the permission for the development of eight dwellings (Plots 1–7) at Tawny Gardens, Angmering, in the area of Arun District Council.

The condition requires that **at least 10% of the energy supply of the development is secured from decentralised and renewable or low-carbon energy sources** (as defined in Annex 2 of the National Planning Policy Framework), **unless it can be demonstrated that a fabric-first approach would achieve an equivalent energy saving**. The condition further requires details, and a timetable, of how this is to be achieved, including the physical works on site.

The scheme has been designed on a fabric-first basis, with insulation and glazing standards exceeding the minimum required by the Building Regulations, and an individual air source heat pump (ASHP) providing space heating and hot water to each dwelling. No on-site electrical generation (such as photovoltaics) is proposed.

An air source heat pump is a low-carbon technology within the meaning of NPPF Annex 2, and the ambient heat it extracts from the outdoor air is renewable energy generated at the point of use. On the basis of the SAP 10.2 assessments for all seven plots, this renewable heat provides approximately **56% of the total energy supply of the development**, against the 10% required by the condition. Every individual dwelling exceeds the threshold, with renewable fractions ranging from 52% to 57%.

The primary limb of the condition is therefore satisfied outright, and no reliance on the fabric-first alternative is necessary. For completeness, this Statement also demonstrates that the fabric-first alternative is independently satisfied: the Dwelling Fabric Energy Efficiency (DFEE) of every plot is better than the notional Target Fabric Energy Efficiency (TFEE), and the scheme performs substantially better than a compliant baseline on both regulated carbon emissions and primary energy.

Section 9 sets out the physical works and the timetable for implementation, together with the proposed mechanism for verification through As-Built SAP assessments.

1 Introduction

This report describes the energy strategy for the development and demonstrates how the renewable and low-carbon energy condition is met. It has been prepared to accompany the submission required by the condition, in advance of any development above damp-proof course (DPC) level.

The development comprises seven new-build dwellings, Plots 1–7+9 Tawny Gardens, Angmering. Each dwelling is all-electric and served by an individual air source heat pump. The energy performance of each plot has been assessed using approved SAP 10.2 software; the design-stage SAP calculations for all seven plots accompany this Statement.

The energy strategy follows the established design hierarchy:

- Be Lean — reduce energy demand through building form, fabric and efficient services;
- Be Clean — supply heat efficiently through low-carbon plant; and
- Be Green — meet demand from renewable and low-carbon sources at the point of use.

Priority has been given first to the building fabric — the element that has the greatest and most enduring influence on energy demand and is the most difficult and costly to alter once built — and thereafter to low-carbon and renewable technology to serve the residual demand.

2 The Planning Condition

The condition to be discharged reads as follows:

“At least 10% of the energy supply of the development shall be secured from decentralised and renewable or low carbon energy sources (as described in the glossary at Annex 2 of the NPPF) unless it can be demonstrated that a fabric-first approach would achieve an equivalent energy saving. Details and a timetable of how this is to be achieved, including details of physical works on site, shall be submitted to and approved in writing by the Local Planning Authority before any development above damp proof course (DPC) level begins. The development shall be implemented in accordance with the approved details and timetable and retained as operational thereafter, unless otherwise agreed in writing by the Local Planning Authority.”

The condition establishes a primary requirement and an alternative:

- Primary limb — at least 10% of the energy supply is secured from decentralised, renewable or low-carbon sources; or
- Alternative limb — a fabric-first approach achieving an equivalent energy saving.

It is important to note that the metric throughout the condition is **energy**, not carbon: the primary limb concerns the proportion of the development’s *energy supply* from qualifying sources, and the alternative concerns an equivalent *energy saving*. The demonstration in this Statement is expressed in energy terms (kWh) accordingly. Regulated carbon and primary-energy performance are provided in Section 8 as supporting context only.

3 Planning Policy Context

The condition refers expressly to the definitions in Annex 2 (Glossary) of the National Planning Policy Framework. The relevant definitions are as follows.

Renewable and low carbon energy

NPPF Annex 2 explains that this “[i]ncludes energy for heating and cooling as well as generating electricity”, and that renewable energy covers energy flows occurring naturally and repeatedly in the environment — from the wind, the fall of water, the movement of the oceans, from the sun and from biomass and deep geothermal heat. Separately, it defines low-carbon technologies as those that can help reduce emissions compared with the conventional use of fossil fuels.

Decentralised energy

NPPF Annex 2 describes decentralised energy as local renewable and local low-carbon energy sources — that is, energy generated close to where it is used, typically at a relatively small scale, rather than supplied from large centralised power stations.

Application to an air source heat pump

An air source heat pump falls within these definitions in two respects. First, it is a low-carbon technology: by delivering several units of useful heat for each unit of electricity consumed, it reduces emissions substantially compared with the conventional use of fossil fuels. Second, the heat it delivers is drawn largely from ambient (aerothermal) energy in the outdoor air — a naturally occurring, renewable energy flow captured at the point of use, and therefore a decentralised renewable source.

Because the condition qualifies “renewable or low carbon” sources, the heat pump is captured under either heading. This is consistent with the standard treatment of heat pumps in energy statements and with the accounting of aerothermal heat as renewable energy under the recognised methodology (SAP and MCS).

4 Assessment Methodology

The energy performance of each of the seven dwellings has been assessed using approved SAP 10.2 software (design stage). For the purpose of the primary limb, the renewable contribution of each dwelling’s heat pump has been calculated directly from the SAP outputs, as follows.

Renewable (aerothermal) heat captured

A heat pump delivers useful heat by consuming electricity and extracting the balance, free of charge, from the outdoor air. The renewable ambient energy captured is therefore the useful heat delivered less the electricity consumed to deliver it:

$$\text{Renewable heat captured} = \text{Heat delivered} - \text{Electricity input} = \text{Heat delivered} \times (1 - 1/\text{SPF})$$

This has been evaluated separately for space heating and hot water in each dwelling, using the heat delivered (SAP space-heating requirement and hot-water output) and the electricity input (SAP fuel used), which already reflect the plant’s seasonal in-use efficiency.

Total energy supply of the development

The renewable fraction is expressed as the captured ambient heat as a proportion of the total energy supplied to meet the dwelling’s regulated energy services (space heating, hot water, lighting and auxiliary power). The total supply is the regulated delivered (grid-drawn) energy reported by SAP plus the ambient renewable heat captured on site:

$$\text{Renewable fraction} = \text{Ambient renewable heat} / (\text{Regulated delivered energy} + \text{Ambient renewable heat})$$

Regulated energy is used as the basis, consistent with SAP and standard energy-statement practice; unregulated loads (domestic appliances, cooking) are excluded, which is the conventional and more robust interpretation of the development’s energy supply.

5 Build Standards Proposed (Be Lean)

The dwellings have been designed to a fabric specification exceeding the minimum backstop values of the Building Regulations, with triple glazing throughout. The principal fabric and services parameters, which are consistent across the seven plots, are summarised below.

Element / parameter	Specification
External wall (U-value)	0.18 W/m ² K
Roof (U-value)	0.11 W/m ² K
Ground floor (U-value)	0.13 W/m ² K
Windows / glazed doors (whole-unit U-value)	1.15 W/m ² K — triple glazed
External / entrance door (U-value)	1.00 W/m ² K
Air permeability (design, at 50 Pa)	4.0 m ³ /(h·m ²)
Thermal bridging	Assessed using Appendix K / approved psi-values
Ventilation	Natural, with intermittent extract to wet rooms
Space heating & hot water	Individual air source heat pump (all-electric)

Element / parameter	Specification
Heat pump seasonal efficiency (space)	Typically 300–334% (SCOP $\approx$ 3.0–3.3)
Lighting	100% low-energy fixed lighting

The high fabric standard reduces the residual heat demand that the heat pump must meet, and underpins the fabric-first position set out in Section 8.

6 Low Carbon and Renewable Technologies Considered (Be Clean and Be Green)

The following low-carbon and renewable technologies were considered for the development. The assessment concluded that individual air source heat pumps are the most appropriate and deliverable solution for a scheme of this type and scale.

Air source heat pumps (selected)

An individual ASHP is proposed for each dwelling, providing both space heating and hot water. Heat pumps are well suited to the highly insulated, low-demand dwellings proposed; they deliver a large renewable (ambient) energy contribution at the point of use, require no on-site fuel storage, and provide a robust, maintainable solution over the life of the buildings. This is the technology on which compliance with the condition is based.

Photovoltaics

Roof-mounted photovoltaics could contribute to on-site generation. However, the development already satisfies the condition through the ambient renewable heat delivered by the heat pumps, and PV is therefore not required for compliance. It remains capable of being added as an enhancement without affecting the conclusions of this Statement.

Solar water heating

Solar thermal collectors could provide a share of hot-water demand, but the additional energy saving is modest given that hot water is already delivered efficiently by the heat pump, and the technology is not necessary to meet the condition.

Ground source heat pumps

Ground source heat pumps could deliver a similar or greater renewable contribution, but the associated ground works make them disproportionately costly for a scheme of this scale relative to the air source alternative, which already achieves compliance.

Wind and combined heat and power

Small-scale wind generation is not suitable given the site context and the limited and intermittent output achievable. A combined heat and power / heat network solution is not viable at this scale. Neither is required for compliance.

7 Demonstration of Compliance — Primary Limb

The table below sets out, for each dwelling, the ambient renewable heat captured by the heat pump, the regulated delivered (grid) energy, the resulting total energy supply, and the renewable fraction, calculated in accordance with Section 4. Figures are in kWh/year and are drawn from the design-stage SAP 10.2 assessments.

Plot	Renewable heat captured (kWh/yr)	Regulated delivered energy (kWh/yr)	Total energy supply (kWh/yr)	Renewable %
P1	4,473	3,383	7,856	56.9%
P2	5,325	4,017	9,342	57.0%
P3	3,489	3,181	6,670	52.3%
P4	3,477	3,178	6,655	52.2%
P5	4,713	3,586	8,298	56.8%
P6	4,136	3,102	7,238	57.1%
P7	4,116	3,094	7,210	57.1%
Development total	29,729	23,541	53,270	55.8%

Across the development, approximately **55.8% of the total energy supply is secured from a renewable, low-carbon and decentralised source** — the ambient heat captured on site by the dwellings' air source heat pumps. This is more than five times the 10% required by the condition. Every individual dwelling independently exceeds the threshold, with renewable fractions between 52% and 57%, so the scheme complies both dwelling-by-dwelling and as a whole.

The primary limb of the condition is therefore satisfied, and no reliance on the fabric-first alternative is required.

8 Fabric-First Alternative and Supporting Performance

Although not necessary for compliance, the fabric-first alternative limb is also independently satisfied. The Dwelling Fabric Energy Efficiency (DFEE) of every plot is better than the notional Target Fabric Energy Efficiency (TFEE) generated by SAP, demonstrating that the fabric-first approach achieves a genuine energy saving relative to a compliant baseline. Lower figures are better; both are expressed in kWh/m²/year.

Plot	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	Fabric improvement vs notional
P1	36.44	38.53	5.4%
P2	36.04	37.07	2.8%
P3	35.35	35.93	1.6%
P4	35.32	36.03	2.0%
P5	37.45	39.21	4.5%
P6	44.96	46.81	4.0%
P7	44.78	46.65	4.0%

As further supporting context — noting that these are carbon and primary-energy metrics rather than the energy-supply metric of the condition — every dwelling also performs substantially better than a compliant baseline on both regulated emissions and primary energy:

Plot	DER vs TER (CO ₂)	DPER vs TPER (primary energy)
P1	59% below target	18% below target
P2	55% below target	11% below target
P3	56% below target	11% below target
P4	56% below target	11% below target
P5	58% below target	15% below target
P6	50% below target	2% below target

Plot	DER vs TER (CO ₂)	DPER vs TPER (primary energy)
P7	50% below target	2% below target

Every plot passes Part L on both the dwelling emission rate and the primary energy rate, confirming that the fabric-first strategy delivers a compliant and low-energy outcome independently of the renewable calculation above.

9 Implementation, Timetable and Monitoring

The condition requires details, and a timetable, of how the renewable / low-carbon provision is to be achieved, including the physical works on site. The following sets out the proposed approach.

Physical works on site

- Installation of the fabric-first specification set out in Section 5 (wall, roof, floor and glazing standards, airtightness and thermal-bridging details) during construction of each dwelling.
- Installation and commissioning of one air source heat pump per dwelling, serving space heating and hot water, as specified in the SAP assessments for Plots 1–7.
- Associated works: hot-water cylinder, heat-emitter circuit, controls (time and temperature zoning), and electrical supply to each heat pump.

Timetable

The renewable / low-carbon measures are integral to the construction of each dwelling and will be delivered on the following indicative programme (to be confirmed against the site build programme):

- Prior to works above DPC — this Statement and supporting SAP assessments submitted for written approval, as required by the condition.
- During construction — fabric measures installed as each dwelling is built; heat pump and associated services installed at first-fix / second-fix as appropriate.
- Prior to first occupation of each dwelling — heat pump commissioned and operational.
- On completion — As-Built SAP assessment produced for each dwelling to confirm the measures have been installed as designed.

Retention and monitoring

The heat pumps and fabric measures will be retained and kept operational thereafter, in accordance with the condition. Compliance will be verified through the As-Built SAP assessments for each plot, which can be provided to the Local Planning Authority on completion to confirm that the approved details have been implemented.

10 Summary and Conclusion

This Energy Statement demonstrates that the development of seven dwellings at Tawny Gardens, Angmering complies with the renewable and low-carbon energy condition.

- The dwellings are designed on a fabric-first basis, with insulation and triple glazing exceeding Building Regulations minima, and each is served by an individual air source heat pump.
- An air source heat pump is a low-carbon technology under NPPF Annex 2, and the ambient heat it captures is decentralised renewable energy generated at the point of use.

- Across the development, approximately 56% of the total energy supply is secured from this renewable, low-carbon source — well in excess of the 10% required. Every dwelling exceeds the threshold individually (52–57%). The primary limb of the condition is satisfied outright.
- The fabric-first alternative is independently satisfied (DFEE better than TFEE on every plot), providing a robust fallback; the scheme also performs well ahead of a compliant baseline on regulated carbon and primary energy.
- The physical works and timetable are set out in Section 9, with verification proposed through As-Built SAP assessments.

On this basis, it is respectfully requested that the condition be discharged.

Appendix A

Design-stage SAP 10.2 calculation printouts for Plots 1–7 (provided separately).

Full SAP Calculation Printout



Plot Reference	P1				Issued on Date	09/07/2026	
Assessment Reference	Design Stage Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	1 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	82 B	DER	3.73	TER	9.15		
Environmental	96 A	% DER < TER				59.23	
CO ₂ Emissions (t/year)	0.46	DFEE	36.44	TFEE	38.53		
Compliance Check	See BREL	% DFEE < TFEE				5.43	
% DPER < TPER	17.83	DPER	39.19	TPER	47.69		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 333.3000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 50.0000 / (5) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3238 (21)

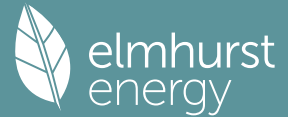
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4128	0.4047	0.3966	0.3561	0.3480	0.3076	0.3076	0.2995	0.3238	0.3480	0.3642	0.3804 (22b)
Effective ac	0.5852	0.5819	0.5787	0.5634	0.5606	0.5473	0.5473	0.5448	0.5524	0.5606	0.5663	0.5724 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.2200	1.0000	2.2200		(26)
Windows			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658	0.0000	0.0000 (28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412	0.0000	0.0000 (29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326	9.0000	599.9400 (30)
Total net area of external elements Aum(A, m ²)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)
Main dwelling							
Internal Wall 1			236.0500			9.0000	2124.4500 (32c)
Internal Floor 1			66.6600			18.0000	1199.8800 (32d)
Internal Ceiling 1			66.6600			9.0000	599.9400 (32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		4524.2100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.9350 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.7700	0.0470	0.8352	
E3 Sill				16.7800	0.0350	0.5873	
E4 Jamb				43.2000	0.0470	2.0304	

Page 2 of 7

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.4582	8.4789	8.4994	8.5968	8.6153	8.7023	8.7023	8.7186	8.6686	8.6153	8.5780	8.5393
alpha	1.5639	1.5653	1.5666	1.5731	1.5744	1.5802	1.5802	1.5812	1.5779	1.5744	1.5719	1.5693
util living area	0.8641	0.8242	0.7714	0.6831	0.5756	0.4558	0.3608	0.3994	0.5592	0.7305	0.8293	0.8729 (86)
Living	17.5879	17.9624	18.5269	19.2637	19.9075	20.3832	20.6075	20.5621	20.1746	19.3290	18.3403	17.5216
Non living	16.1317	16.5806	17.2567	18.1327	18.8781	19.4124	19.6423	19.6048	19.1996	18.2306	17.0495	16.0559
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.2856	17.9624	18.5269	19.2637	19.9075	20.3832	20.6075	20.5621	20.1746	19.3290	18.3403	18.0194 (87)
Th 2	19.9890	19.9913	19.9934	20.0037	20.0056	20.0146	20.0146	20.0162	20.0111	20.0056	20.0017	19.9977 (88)
util rest of house	0.8535	0.8110	0.7538	0.6582	0.5403	0.4059	0.2952	0.3329	0.5108	0.7034	0.8142	0.8629 (89)
MIT 2	18.4070	16.5806	17.2567	18.1327	18.8781	19.4124	19.6423	19.6048	19.1996	18.2306	17.0495	16.7502 (90)
Living area fraction									FLA = Living area / (4) =			0.1282 (91)
MIT	18.5197	16.7578	17.4196	18.2777	19.0101	19.5369	19.7660	19.7275	19.3246	18.3714	17.2149	16.9129 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5197	16.7578	17.4196	18.2777	19.0101	19.5369	19.7660	19.7275	19.3246	18.3714	17.2149	16.9129 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8356	0.7556	0.6979	0.6074	0.5004	0.3794	0.2773	0.3116	0.4726	0.6485	0.7588	0.8231 (94)
Useful gains	729.6853	790.9078	836.0337	843.5204	762.8190	580.5956	404.3604	413.6121	560.6388	650.3546	664.2956	681.5480 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2112.7755	1757.5240	1614.5713	1370.8806	1066.3337	712.9459	457.2171	479.6341	757.4276	1133.6267	1481.8990	1870.9428 (97)
Space heating kWh	1029.0191	649.5661	579.2319	379.6993	225.8149	0.0000	0.0000	0.0000	0.0000	359.5544	588.6745	884.9097 (98a)
Space heating requirement - total per year (kWh/year)												4696.4700
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1029.0191	649.5661	579.2319	379.6993	225.8149	0.0000	0.0000	0.0000	0.0000	359.5544	588.6745	884.9097 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4696.4700
Space heating per m2										(98c) / (4) =		35.2270 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												326.8225 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1029.0191	649.5661	579.2319	379.6993	225.8149	0.0000	0.0000	0.0000	0.0000	359.5544	588.6745	884.9097 (98)
Space heating efficiency (main heating system 1)	326.8225	326.8225	326.8225	326.8225	326.8225	0.0000	0.0000	0.0000	0.0000	326.8225	326.8225	326.8225 (210)
Space heating fuel (main heating system)	314.8557	198.7520	177.2314	116.1791	69.0941	0.0000	0.0000	0.0000	0.0000	110.0152	180.1206	270.7616 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814 (64)
Efficiency of water heater (217)m	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693 (216)
Fuel for water heating, kWh/month	167.8427	148.2753	157.0024	136.6616	131.5683	117.5553	115.2327	120.3269	122.2327	137.5077	147.7112	165.8173 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	34.4661	27.6500	24.8957	18.2397	14.0889	11.5107	12.8523	16.7059	21.6994	28.4707	32.1576	35.4240 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1437.0095 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												172.7693
Water heating fuel used												1667.7340 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	278.1611 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3382.9045 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1437.0095	0.1547	222.2666 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1667.7340	0.1411	235.3335 (264)
Space and water heating			457.6001 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	278.1611	0.1443	40.1472 (268)
Total CO2, kg/year			497.7474 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1437.0095	1.5726	2259.7986 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1667.7340	1.5218	2537.9294 (278)
Space and water heating			4797.7280 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	278.1611	1.5338	426.6527 (282)
Total Primary energy kWh/year			5224.3807 (286)
Dwelling Primary energy Rate (DPER)			39.1900 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	333.3000 (5)

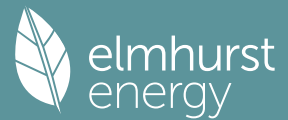
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3423 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4364	0.4278	0.4193	0.3765	0.3679	0.3251	0.3251	0.3166	0.3423	0.3679	0.3850	0.4022 (22b)
Effective ac	0.5952	0.5915	0.5879	0.5709	0.5677	0.5529	0.5529	0.5501	0.5586	0.5677	0.5741	0.5809 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2200	1.0000	2.2200		(26)
TER Opening Type			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658		(28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412		(29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326		(30)
Total net area of external elements Aum(A, m2)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 33.9350 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	17.7700	0.0500	0.8885
E2 Other lintels (including other steel lintels)	16.7800	0.0500	0.8390
E3 Sill	43.2000	0.0500	2.1600
E4 Jamb	35.1200	0.1600	5.6192
E5 Ground floor (normal)	35.1200	0.0000	0.0000
E6 Intermediate floor within a dwelling	25.0000	0.0900	2.2500
E16 Corner (normal)	5.0000	-0.0900	-0.4500
E17 Corner (inverted - internal area greater than external area)	24.1100	0.0600	1.4466
E10 Eaves (insulation at ceiling level)	11.0100	0.0600	0.6606
E12 Gable (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			13.4139 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	88.9239 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	65.4671	65.0604	64.6618	62.7896	62.4393	60.8086	60.8086	60.5066	61.4367	62.4393	63.1479	63.8888
Average = Sum(39)m / 12 =	154.3910	153.9843	153.5857	151.7134	151.3632	149.7325	149.7325	149.4305	150.3606	151.3632	152.0718	152.8126
												151.7118

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1580	1.1550	1.1520	1.1380	1.1353	1.1231	1.1231	1.1208	1.1278	1.1353	1.1407	1.1462
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

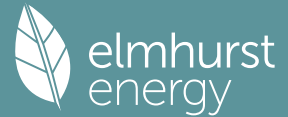
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9031 (42)
Hot water usage for mixer showers	72.8955	71.8000	70.2037	67.1494	64.8954	62.3818	60.9531	62.5373	64.2739	66.9728	70.0927	72.6162	(42a)
Hot water usage for baths	31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643	(42b)
Hot water usage for other uses	44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608	(42c)
Average daily hot water use (litres/day)													136.7135 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	148.7269	145.5510	141.6833	135.8024	131.0266	125.8923	123.9193	127.7702	131.8316	137.2217	143.1933	148.3413	(44)
Energy content (annual)	235.5471	207.2626	217.7620	185.9067	176.3870	154.7992	149.8696	158.2062	162.5615	186.2086	204.0050	232.2666	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 2270.7821
Water storage loss (or HIU loss):	35.3321	31.0894	32.6643	27.8860	26.4580	23.2199	22.4804	23.7309	24.3842	27.9313	30.6008	34.8400	(46)
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	286.4732	253.2604	268.6881	235.1900	227.3130	204.0825	200.7957	209.1323	211.8448	237.1346	253.2883	283.1926	(62)
WWHRS	-33.3248	-29.4727	-30.8621	-25.5551	-23.8164	-20.3799	-19.1029	-20.3140	-21.0858	-24.8578	-28.1609	-32.7077	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	253.1484	223.7877	237.8260	209.6349	203.4967	183.7027	181.6928	188.8183	190.7590	212.2768	225.1275	250.4850	(64)
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2560.7556 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2561 (64)
Heat gains from water heating, kWh/month	119.0603	105.7130	113.1467	101.2406	99.3895	90.8974	90.5725	93.3444	93.4783	102.6552	107.2583	117.9695	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	153.0258	169.4214	153.0258	158.1266	153.0258	158.1266	153.0258	158.1266	153.0258	158.1266	153.0258	153.0258	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	301.6791	304.8096	296.9208	280.1267	258.9271	239.0024	225.6916	222.5611	230.4498	247.2440	268.4436	288.3682	(68)
Pumps, fans	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	(69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Water heating gains (Table 5)	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	(71)
Total internal gains	160.0273	157.3110	152.0789	140.6120	133.5881	126.2464	121.7372	125.4629	129.8310	137.9774	148.9699	158.5611	(72)
	684.2788	701.0887	671.5722	648.4120	615.0876	589.9221	567.0013	567.5965	584.9541	607.7938	645.0868	669.5018	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Northeast					10.3300	11.2829	0.6300		0.7000	0.7700	35.6200 (75)
Southeast					9.4200	36.7938	0.6300		0.7000	0.7700	105.9248 (77)
Southwest					1.7400	36.7938	0.6300		0.7000	0.7700	19.5657 (79)
Northwest					5.5400	11.2829	0.6300		0.7000	0.7700	19.1031 (81)
Solar gains	180.2137	325.1474	493.1618	691.9775	848.9381	875.2900	830.3517	708.2848	561.2290	372.3749	152.0834 (83)
Total gains	864.4925	1026.2361	1164.7340	1340.3895	1464.0257	1465.2122	1397.3530	1275.8812	1146.1832	980.1688	821.5852 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.1399	8.1614	8.1826	8.2835	8.3027	8.3931	8.3931	8.4101	8.3581	8.3027	8.2640	8.2240
alpha	1.5427	1.5441	1.5455	1.5522	1.5535	1.5595	1.5595	1.5607	1.5572	1.5535	1.5509	1.5483
util living area												
	0.8687	0.8321	0.7832	0.6999	0.5964	0.4779	0.3812	0.4197	0.5784	0.7424	0.8355	0.8767 (86)
MIT	16.5787	17.0597	17.8060	18.7988	19.6868	20.3609	20.6874	20.6231	20.0751	18.9205	17.5934	16.4958 (87)
Th 2	19.9537	19.9562	19.9586	19.9699	19.9721	19.9820	19.9820	19.9838	19.9782	19.9721	19.9678	19.9633 (88)
util rest of house												
	0.8581	0.8189	0.7657	0.6749	0.5603	0.4257	0.3111	0.3493	0.5286	0.7152	0.8205	0.8668 (89)
MIT 2	14.9971	15.5729	16.4661	17.6443	18.6735	19.4293	19.7647	19.7107	19.1378	17.8141	16.2298	14.9003 (90)
Living area fraction												
	15.1998	15.7635	16.6379	17.7923	18.8034	19.5487	19.8830	19.8276	fLA = Living area / (4) =	17.9559	16.4046	0.1282 (91)
MIT	15.1998	15.7635	16.6379	17.7923	18.8034	19.5487	19.8830	19.8276	19.2579	17.9559	16.4046	15.1048 (92)
Temperature adjustment												0.0000
adjusted MIT	15.1998	15.7635	16.6379	17.7923	18.8034	19.5487	19.8830	19.8276	19.2579	17.9559	16.4046	15.1048 (93)

8. Space heating requirement

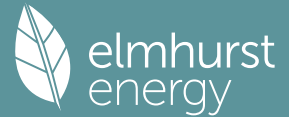
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.7868	0.7445	0.6920	0.6101	0.5130	0.4011	0.3038	0.3374	0.4881	0.6466	0.7468	0.7969 (94)
Ext temp.	680.1513	764.0622	806.0445	817.8382	751.0389	587.7454	424.4627	430.5246	559.4737	633.7954	645.4515	654.7021 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1682.8367	1672.8060	1557.0343	1349.0751	1075.1930	740.9864	491.5645	512.1914	775.5515	1113.4102	1414.9631	1666.3944 (97)
Space heating requirement - total per year (kWh/year)	745.9979	610.6758	558.7364	382.4905	241.1707	0.0000	0.0000	0.0000	0.0000	356.8334	554.0484	752.6991 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	745.9979	610.6758	558.7364	382.4905	241.1707	0.0000	0.0000	0.0000	0.0000	356.8334	554.0484	752.6991 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4202.6522
Space heating per m2										(98c) / (4) =		31.5230 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	745.9979	610.6758	558.7364	382.4905	241.1707	0.0000	0.0000	0.0000	0.0000	356.8334	554.0484	752.6991 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	808.2318	661.6206	605.3483	414.3993	261.2900	0.0000	0.0000	0.0000	0.0000	386.6017	600.2691	815.4919 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	253.1484	223.7877	237.8260	209.6349	203.4967	183.7027	181.6928	188.8183	190.7590	212.2768	225.1275	250.4850 (64)
Efficiency of water heater (217)m	86.3330	86.1930	85.9073	85.3904	84.4417	79.8000	79.8000	79.8000	79.8000	85.2152	85.9977	79.8000 (216)
Fuel for water heating, kWh/month	293.2231	259.6355	276.8404	245.5016	240.9908	230.2038	227.6852	236.6144	239.0464	249.1067	261.7832	290.0211 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	31.7957	25.5077	22.9669	16.8265	12.9973	10.6189	11.8566	15.4116	20.0181	26.2649	29.6661	32.6794 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-58.9456	-81.4126	-114.6469	-126.1542	-133.6856	-123.8472	-122.1892	-116.4046	-105.9840	-91.6508	-64.1476	-51.1515 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-38.6578	-80.6408	-159.0851	-237.2781	-312.2261	-313.2646	-309.6934	-263.0095	-193.7583	-114.9070	-51.4646	-30.6323 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	4553.2527	1.1300	5145.1756 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	3050.6522	1.1300	3447.2370 (278)
Space and water heating			8592.4126 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	256.6098	1.5338	393.5967 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1190.2198	1.4992	-1784.3267
PV Unit electricity exported	-2104.6177	0.4629	-974.1435
Total			-2758.4702 (283)
Total Primary energy kWh/year			6357.6399 (286)
Target Primary Energy Rate (TPER)			47.6900 (287)

Full SAP Calculation Printout



Plot Reference	P1				Issued on Date	09/07/2026	
Assessment Reference	Design Stage Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	1 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	82 B	DER	3.73	TER	9.15		
Environmental	96 A	% DER < TER				59.23	
CO ₂ Emissions (t/year)	0.46	DFEE	36.44	TFEE	38.53		
Compliance Check	See BREL	% DFEE < TFEE				5.43	
% DPER < TPER	17.83	DPER	39.19	TPER	47.69		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 333.3000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3200 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2960 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3774	0.3700	0.3626	0.3256	0.3182	0.2812	0.2812	0.2738	0.2960	0.3182	0.3330	0.3478 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5712	0.5685	0.5657	0.5530	0.5506	0.5395	0.5395	0.5375	0.5438	0.5506	0.5554	0.5605 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.2200	1.0000	2.2200		(26)
Windows			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658	0.0000	0.0000 (28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412	0.0000	0.0000 (29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326	9.0000	599.9400 (30)
Total net area of external elements Aum(A, m ²)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)
Main dwelling							
Internal Wall 1			236.0500			9.0000	2124.4500 (32c)
Internal Floor 1			66.6600			18.0000	1199.8800 (32d)
Internal Ceiling 1			66.6600			9.0000	599.9400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4524.2100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.9350 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.7700	0.0470	0.8352	

Full SAP Calculation Printout



E3 Sill						16.7800		0.0350		0.5873		
E4 Jamb						43.2000		0.0470		2.0304		
E5 Ground floor (normal)						35.1200		0.0150		0.5268		
E6 Intermediate floor within a dwelling						35.1200		0.0100		0.3512		
E16 Corner (normal)						25.0000		0.0430		1.0750		
E17 Corner (inverted - internal area greater than external area)						5.0000		-0.0690		-0.3450		
E10 Eaves (insulation at ceiling level)						24.1100		0.0370		0.8921		
E12 Gable (insulation at ceiling level)						11.0100		0.2500		2.7525		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											8.7055	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss										(33) + (36) + (36a) =	84.2154	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	62.8280	62.5238	62.2257	60.8252	60.5632	59.3434	59.3434	59.1176	59.8133	60.5632	61.0932	61.6474 (38)
Average = Sum(39)m / 12 =	147.0434	146.7393	146.4411	145.0406	144.7786	143.5589	143.5589	143.3330	144.0287	144.7786	145.3087	145.8628 (39)
												145.0394
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1029	1.1007	1.0984	1.0879	1.0859	1.0768	1.0768	1.0751	1.0803	1.0859	1.0899	1.0941 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.9031 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643 (42b)
Hot water usage for other uses												
	44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608 (42c)
Average daily hot water use (litres/day)												69.5063 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	75.8314	73.7509	71.4797	68.6530	66.1312	63.5104	62.9662	65.2329	67.5576	70.2489	73.1006	75.7251 (44)
Energy conte	120.0985	105.0204	109.8616	93.9825	89.0253	78.0935	76.1522	80.7719	83.3053	95.3271	104.1452	118.5671 (45)
Energy content (annual)										Total = Sum(45)m =		1154.3504
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	102.0837	89.2673	93.3823	79.8851	75.6715	66.3795	64.7293	68.6561	70.8095	81.0280	88.5234	100.7821 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	102.0837	89.2673	93.3823	79.8851	75.6715	66.3795	64.7293	68.6561	70.8095	81.0280	88.5234	100.7821 (64)
								Total per year (kWh/year) = Sum(64)m =				981 (64)
12Total per year (kWh/year)												
Electric shower(s)	58.3771	52.0145	56.7979	54.2015	55.2186	52.6732	54.4289	55.2186	54.2015	56.7979	55.7298	58.3771 (64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				664.0366 (64a)
Heat gains from water heating, kWh/month	40.1152	35.3205	37.5450	33.5217	32.7225	29.7632	29.7896	30.9687	31.2528	34.4565	36.0633	39.7898 (65)

5. Internal gains (see Table 5 and 5a)												

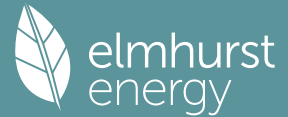
Metabolic gains (Table 5), Watts												
(66)m	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	155.7799	172.4706	155.7799	160.9725	155.7799	160.9725	155.7799	155.7799	160.9725	155.7799	160.9725	155.7799 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	301.6791	304.8096	296.9208	280.1267	258.9271	239.0024	225.6916	222.5611	230.4498	247.2440	268.4436	288.3682 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245 (71)
Water heating gains (Table 5)												
	53.9183	52.5602	50.4638	46.5579	43.9819	41.3377	40.0397	41.6246	43.4066	46.3125	50.0879	53.4809 (72)
Total internal gains	577.9239	596.3870	569.7112	554.2038	525.2355	507.8594	488.0579	486.5122	501.3756	515.8830	546.0507	564.1757 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	10.3300											38.4470 (75)
Southeast	9.4200											114.3316 (77)
Southwest	1.7400											21.1186 (79)
Northwest	5.5400											20.6192 (81)

Solar gains	194.5164	350.9528	532.3016	746.8963	916.3141	944.7575	896.2526	764.4978	605.7710	401.9285	236.5587	164.1536 (83)
Total gains	772.4403	947.3398	1102.0128	1301.1001	1441.5497	1452.6169	1384.3105	1251.0101	1107.1467	917.8115	782.6094	728.3292 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.5466	8.5643	8.5818	8.6646	8.6803	8.7541	8.7541	8.7679	8.7255	8.6803	8.6487	8.6158
alpha	1.5698	1.5710	1.5721	1.5776	1.5787	1.5836	1.5836	1.5845	1.5817	1.5787	1.5766	1.5744
util living area	0.8824	0.8424	0.7895	0.7000	0.5912	0.4703	0.3738	0.4154	0.5793	0.7521	0.8495	0.8912 (86)
MIT	16.5445	17.0646	17.8424	18.8575	19.7441	20.3974	20.7080	20.6423	20.1008	18.9279	17.5663	16.4479 (87)
Th 2	19.9984	20.0003	20.0021	20.0107	20.0123	20.0198	20.0198	20.0212	20.0169	20.0123	20.0091	20.0057 (88)
util rest of house	0.8731	0.8302	0.7729	0.6758	0.5562	0.4200	0.3071	0.3478	0.5312	0.7263	0.8359	0.8825 (89)
MIT 2	15.8947	16.4049	17.1666	18.1525	18.9917	19.5904	19.8513	19.8062	19.3432	18.2434	16.9131	15.8040 (90)
Living area fraction									fLA = Living area /	(4) =		0.1282 (91)
MIT	15.9780	16.4895	17.2532	18.2429	19.0882	19.6939	19.9611	19.9133	19.4403	18.3311	16.9969	15.8866 (92)
Temperature adjustment												0.0000
adjusted MIT	15.9780	16.4895	17.2532	18.2429	19.0882	19.6939	19.9611	19.9133	19.4403	18.3311	16.9969	15.8866 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8199	0.7729	0.7149	0.6244	0.5193	0.4019	0.3028	0.3397	0.4991	0.6715	0.7793	0.8309 (94)
Useful gains	633.3200	732.1638	787.8170	812.4604	748.6514	583.7525	419.1273	424.9405	552.6276	616.3013	609.9132	605.1752 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1717.1671	1700.6311	1574.7168	1355.0972	1069.6485	731.2733	482.5216	503.5775	769.1568	1119.2998	1438.1013	1704.6367 (97)
Space heating kWh	806.3823	650.8100	585.4535	390.6985	238.8218	0.0000	0.0000	0.0000	0.0000	374.2309	596.2955	817.9993 (98a)
Space heating requirement - total per year (kWh/year)												4460.6918
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	806.3823	650.8100	585.4535	390.6985	238.8218	0.0000	0.0000	0.0000	0.0000	374.2309	596.2955	817.9993 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4460.6918
Space heating per m2										(98c) / (4) =		33.4585 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	1349.4534	1062.3357	1089.3307	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6694	0.7229	0.6875	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	903.3028	767.9592	748.8985	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1629.3340	1552.5727	1399.9020	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	522.7424	583.7524	484.3467	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	130.6856	145.9381	121.0867	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												397.7104 (107)
Energy for space heating												33.4585 (99)
Energy for space cooling												2.9831 (108)
Total												36.4417 (109)
Fabric Energy Efficiency (DFEE)												36.4 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

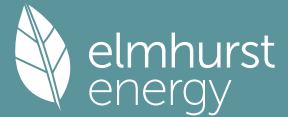
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	333.3000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.1200 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3700 (18)
Number of sides sheltered 1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3423 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4364	0.4278	0.4193	0.3765	0.3679	0.3251	0.3251	0.3166	0.3423	0.3679	0.3850	0.4022	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5952	0.5915	0.5879	0.5709	0.5677	0.5529	0.5529	0.5501	0.5586	0.5677	0.5741	0.5809	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.2200	1.0000	2.2200			(26)
TER Opening Type			27.0300	1.1450	30.9504			(27)
Heatloss Floor 1			66.6600	0.1300	8.6658			(28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412			(29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326			(30)
Total net area of external elements Aum(A, m2)			308.9100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 75.5100			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 33.9350 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	17.7700	0.0500	0.8885	
E3 Sill	16.7800	0.0500	0.8390	
E4 Jamb	43.2000	0.0500	2.1600	
E5 Ground floor (normal)	35.1200	0.1600	5.6192	
E6 Intermediate floor within a dwelling	35.1200	0.0000	0.0000	
E16 Corner (normal)	25.0000	0.0900	2.2500	
E17 Corner (inverted - internal area greater than external area)	5.0000	-0.0900	-0.4500	
E10 Eaves (insulation at ceiling level)	24.1100	0.0600	1.4466	
E12 Gable (insulation at ceiling level)	11.0100	0.0600	0.6606	

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 88.9239 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	65.4671	65.0604	64.6618	62.7896	62.4393	60.8086	60.8086	60.5066	61.4367	62.4393	63.1479	63.8888	(38)
Heat transfer coeff	154.3910	153.9843	153.5857	151.7134	151.3632	149.7325	149.7325	149.4305	150.3606	151.3632	152.0718	152.8126	(39)
Average = Sum(39)m / 12 =												151.7118	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1580	1.1550	1.1520	1.1380	1.1353	1.1231	1.1231	1.1208	1.1278	1.1353	1.1407	1.1462	(40)
HLP (average)												1.1380	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

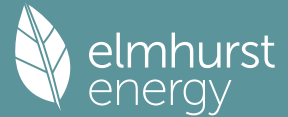
4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9031 (42)

Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643	(42b)
Hot water usage for other uses	44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608	(42c)
Average daily hot water use (litres/day)												69.5063	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	75.8314	73.7509	71.4797	68.6530	66.1312	63.5104	62.9662	65.2329	67.5576	70.2489	73.1006	75.7251	(44)
Energy conte	120.0985	105.0204	109.8616	93.9825	89.0253	78.0935	76.1522	80.7719	83.3053	95.3271	104.1452	118.5671	(45)
Energy content (annual)										Total = Sum(45)m =		1154.3504	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
102.0837	89.2673	93.3823	79.8851	75.6715	66.3795	64.7293	68.6561	70.8095	81.0280	88.5234	100.7821	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	102.0837	89.2673	93.3823	79.8851	75.6715	66.3795	64.7293	68.6561	70.8095	81.0280	88.5234	100.7821	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		981.1979	(64)
Electric shower(s)												981	(64)
58.3771	52.0145	56.7979	54.2015	55.2186	52.6732	54.4289	55.2186	54.2015	56.7979	55.7298	58.3771	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												664.0366	(64a)
Heat gains from water heating, kWh/month	40.1152	35.3205	37.5450	33.5217	32.7225	29.7632	29.7896	30.9687	31.2528	34.4565	36.0633	39.7898	(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	153.0258	169.4214	153.0258	158.1266	153.0258	158.1266	153.0258	153.0258	158.1266	153.0258	158.1266	153.0258	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	301.6791	304.8096	296.9208	280.1267	258.9271	239.0024	225.6916	222.5611	230.4498	247.2440	268.4436	288.3682	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	(71)
Water heating gains (Table 5)	53.9183	52.5602	50.4638	46.5579	43.9819	41.3377	40.0397	41.6246	43.4066	46.3125	50.0879	53.4809	(72)
Total internal gains	575.1698	593.3378	566.9571	551.3579	522.4814	505.0135	485.3038	483.7581	498.5297	513.1289	543.2048	561.4216	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d			Gains W	
Northeast				10.3300	11.2829	0.6300	0.7000	0.7700			35.6200 (75)	
Southeast				9.4200	36.7938	0.6300	0.7000	0.7700			105.9248 (77)	
Southwest				1.7400	36.7938	0.6300	0.7000	0.7700			19.5657 (79)	
Northwest				5.5400	11.2829	0.6300	0.7000	0.7700			19.1031 (81)	
Solar gains	180.2137	325.1474	493.1618	691.9775	848.9381	875.2900	830.3517	708.2848	561.2290	372.3749	219.1646	152.0834 (83)
Total gains	755.3835	918.4852	1060.1189	1243.3354	1371.4195	1380.3035	1315.6555	1192.0429	1059.7588	885.5038	762.3695	713.5050 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.1399	8.1614	8.1826	8.2835	8.3027	8.3931	8.3931	8.4101	8.3581	8.3027	8.2640	8.2240	
alpha	1.5427	1.5441	1.5455	1.5522	1.5535	1.5595	1.5595	1.5607	1.5572	1.5535	1.5509	1.5483	
util living area	0.8887	0.8523	0.8040	0.7203	0.6163	0.4963	0.3983	0.4398	0.6025	0.7675	0.8580	0.8966	(86)
MIT	16.3860	16.8875	17.6606	18.6944	19.6182	20.3232	20.6661	20.5955	20.0147	18.8024	17.4269	16.2993	(87)
Th 2	19.9537	19.9562	19.9586	19.9699	19.9721	19.9820	19.9820	19.9838	19.9782	19.9721	19.9678	19.9633	(88)
util rest of house	0.8794	0.8403	0.7876	0.6961	0.5805	0.4434	0.3264	0.3678	0.5530	0.7418	0.8445	0.8880	(89)
MIT 2	15.7136	16.2066	16.9656	17.9738	18.8519	19.5020	19.7914	19.7429	19.2428	18.1007	16.7537	15.6339	(90)
Living area fraction	15.7998	16.2939	17.0547	18.0661	18.9501	19.6073	19.9035	19.8522	19.3418	18.1907	16.8400	15.7192	(91)
MIT	15.7998	16.2939	17.0547	18.0661	18.9501	19.6073	19.9035	19.8522	19.3418	18.1907	16.8400	15.7192	(92)
Temperature adjustment	15.7998	16.2939	17.0547	18.0661	18.9501	19.6073	19.9035	19.8522	19.3418	18.1907	16.8400	15.7192	(93)
adjusted MIT	15.7998	16.2939	17.0547	18.0661	18.9501	19.6073	19.9035	19.8522	19.3418	18.1907	16.8400	15.7192	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8265	0.7827	0.7283	0.6418	0.5396	0.4220	0.3204	0.3575	0.5174	0.6850	0.7878	0.8367	(94)
Useful gains	624.3360	718.9161	772.1362	798.0064	740.0566	582.4528	421.5335	426.1845	548.2831	606.6061	600.5656	597.0152	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1775.4690	1754.4780	1621.0483	1390.6275	1097.3972	749.7548	494.6431	515.8615	788.1572	1148.9503	1481.1773	1760.2811	(97)
Space heating kWh	856.4430	695.8976	631.5906	426.6871	265.8614	0.0000	0.0000	0.0000	0.0000	403.5041	634.0404	865.4699	(98a)
Space heating requirement - total per year (kWh/year)												4779.4941	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	856.4430	695.8976	631.5906	426.6871	265.8614	0.0000	0.0000	0.0000	0.0000	403.5041	634.0404	865.4699	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4779.4941	
Space heating per m ²										(98c) / (4) =		35.8498	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1407.4852	1108.0203	1135.6717	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6380	0.6933	0.6576	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	897.9544	768.2016	746.8157	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1547.8973	1475.2853	1333.8600	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	467.9589	526.0703	436.7609	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =				(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	116.9897	131.5176	109.1902	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												357.6975	(107)
Energy for space heating												35.8498	(99)
Energy for space cooling												2.6830	(108)
Total												38.5328	(109)
Fabric Energy Efficiency (TFEE)												38.5	(109)

Full SAP Calculation Printout



Plot Reference	P1			Issued on Date	09/07/2026
Assessment Reference	Design Stage Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	1, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	82 B	DER	3.73	TER	9.15
Environmental	96 A	% DER < TER			59.23
CO ₂ Emissions (t/year)	0.46	DFEE	36.44	TFEE	38.53
Compliance Check	See BREL	% DFEE < TFEE			5.43
% DPER < TPER	17.83	DPER	39.19	TPER	47.69
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 333.3000 (5)

2. Ventilation rate

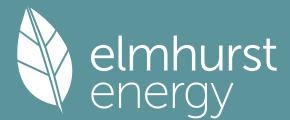
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 50.0000 / (5) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3238 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4128	0.4047	0.3966	0.3561	0.3480	0.3076	0.3076	0.2995	0.3238	0.3480	0.3642	0.3804 (22b)
Effective ac	0.5852	0.5819	0.5787	0.5634	0.5606	0.5473	0.5473	0.5448	0.5524	0.5606	0.5663	0.5724 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.2200	1.0000	2.2200		(26)
Windows			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658	0.0000	0.0000 (28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412	0.0000	0.0000 (29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326	9.0000	599.9400 (30)
Total net area of external elements Aum(A, m ²)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)
Main dwelling							
Internal Wall 1			236.0500			9.0000	2124.4500 (32c)
Internal Floor 1			66.6600			18.0000	1199.8800 (32d)
Internal Ceiling 1			66.6600			9.0000	599.9400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4524.2100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.9350 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.7700	0.0470	0.8352	
E3 Sill				16.7800	0.0350	0.5873	
E4 Jamb				43.2000	0.0470	2.0304	

Full SAP Calculation Printout



E5 Ground floor (normal)						35.1200	0.0150	0.5268				
E6 Intermediate floor within a dwelling						35.1200	0.0100	0.3512				
E16 Corner (normal)						25.0000	0.0430	1.0750				
E17 Corner (inverted - internal area greater than external area)						5.0000	-0.0690	-0.3450				
E10 Eaves (insulation at ceiling level)						24.1100	0.0370	0.8921				
E12 Gable (insulation at ceiling level)						11.0100	0.2500	2.7525				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											8.7055	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss									(33) + (36) + (36a) =		84.2154	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	64.3657	64.0018	63.6451	61.9698	61.6563	60.1971	60.1971	59.9269	60.7592	61.6563	62.2904	62.9534 (38)
Average = Sum(39)m / 12 =	148.5812	148.2173	147.8606	146.1852	145.8718	144.4126	144.4126	144.1424	144.9746	145.8718	146.5059	147.1688 (39)
												146.1837
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1145	1.1117	1.1091	1.0965	1.0941	1.0832	1.0832	1.0812	1.0874	1.0941	1.0989	1.1039 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.9031 (42)
Hot water usage for mixer showers												
	82.0074	80.7750	78.9792	75.5431	73.0074	70.1795	68.5722	70.3545	72.3082	75.3444	78.8543	81.6932 (42a)
Hot water usage for baths												
	31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643 (42b)
Hot water usage for other uses												
	44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608 (42c)
Average daily hot water use (litres/day)												145.1144 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	157.8389	154.5260	150.4588	144.1961	139.1385	133.6900	131.5384	135.5874	139.8658	145.5933	151.9548	157.4183 (44)
Energy conte	249.9782	220.0429	231.2496	197.3972	187.3072	164.3874	159.0843	167.8855	172.4685	197.5687	216.4875	246.4790 (45)
Energy content (annual)										Total = Sum(45)m =		2410.3360
Distribution loss	(46)m = 0.15 x (45)m											
	37.4967	33.0064	34.6874	29.6096	28.0961	24.6581	23.8626	25.1828	25.8703	29.6353	32.4731	36.9718 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814 (64)
12Total per year (kWh/year)												2881.3320 (64)
Electric shower(s)												2881 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	115.1197	102.0692	108.8924	96.6042	94.2816	85.6284	84.8974	87.8238	88.3154	97.6935	102.9517	113.9562 (65)

5. Internal gains (see Table 5 and 5a)												

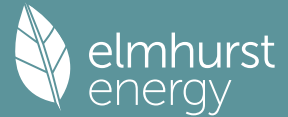
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	155.7799	172.4706	155.7799	160.9725	155.7799	160.9725	155.7799	155.7799	160.9725	155.7799	160.9725	155.7799 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	301.6791	304.8096	296.9208	280.1267	258.9271	239.0024	225.6916	222.5611	230.4498	247.2440	268.4436	288.3682 (68)
Pumps, fans	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245 (71)
Total internal gains	154.7307	151.8887	146.3608	134.1725	126.7225	118.9284	114.1095	118.0428	122.6603	131.3085	142.9885	153.1669 (72)
	678.7364	695.7156	665.6082	641.8184	607.9762	585.4500	562.1276	562.9305	580.6293	600.8790	638.9513	663.8617 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	10.3300				11.2829		0.6800		0.7000		0.7700	38.4470 (75)
Southeast	9.4200				36.7938		0.6800		0.7000		0.7700	114.3316 (77)
Southwest	1.7400				36.7938		0.6800		0.7000		0.7700	21.1186 (79)
Northwest	5.5400				11.2829		0.6800		0.7000		0.7700	20.6192 (81)

Solar gains	194.5164	350.9528	532.3016	746.8963	916.3141	944.7575	896.2526	764.4978	605.7710	401.9285	236.5587	164.1536 (83)
Total gains	873.2528	1046.6683	1197.9098	1388.7147	1524.2903	1530.2075	1458.3803	1327.4283	1186.4003	1002.8075	875.5099	828.0152 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.4582	8.4789	8.4994	8.5968	8.6153	8.7023	8.7023	8.7186	8.6686	8.6153	8.5780	8.5393
alpha	1.5639	1.5653	1.5666	1.5731	1.5744	1.5802	1.5802	1.5812	1.5779	1.5744	1.5719	1.5693
util living area	0.8641	0.8242	0.7714	0.6831	0.5756	0.4558	0.3608	0.3994	0.5592	0.7305	0.8293	0.8729 (86)
Living	17.5879	17.9624	18.5269	19.2637	19.9075	20.3832	20.6075	20.5621	20.1746	19.3290	18.3403	17.5216
Non living	16.1317	16.5806	17.2567	18.1327	18.8781	19.4124	19.6423	19.6048	19.1996	18.2306	17.0495	16.0559
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.2856	17.9624	18.5269	19.2637	19.9075	20.3832	20.6075	20.5621	20.1746	19.3290	18.3403	18.0194 (87)
Th 2	19.9890	19.9913	19.9934	20.0037	20.0056	20.0146	20.0146	20.0162	20.0111	20.0056	20.0017	19.9977 (88)
util rest of house	0.8535	0.8110	0.7538	0.6582	0.5403	0.4059	0.2952	0.3329	0.5108	0.7034	0.8142	0.8629 (89)
MIT 2	18.4070	16.5806	17.2567	18.1327	18.8781	19.4124	19.6423	19.6048	19.1996	18.2306	17.0495	16.7502 (90)
Living area fraction									FLA = Living area / (4) =			0.1282 (91)
MIT	18.5197	16.7578	17.4196	18.2777	19.0101	19.5369	19.7660	19.7275	19.3246	18.3714	17.2149	16.9129 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5197	16.7578	17.4196	18.2777	19.0101	19.5369	19.7660	19.7275	19.3246	18.3714	17.2149	16.9129 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8356	0.7556	0.6979	0.6074	0.5004	0.3794	0.2773	0.3116	0.4726	0.6485	0.7588	0.8231 (94)
Useful gains	729.6853	790.9078	836.0337	843.5204	762.8190	580.5956	404.3604	413.6121	560.6388	650.3546	664.2956	681.5480 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2112.7755	1757.5240	1614.5713	1370.8806	1066.3337	712.9459	457.2171	479.6341	757.4276	1133.6267	1481.8990	1870.9428 (97)
Space heating kWh	1029.0191	649.5661	579.2319	379.6993	225.8149	0.0000	0.0000	0.0000	0.0000	359.5544	588.6745	884.9097 (98a)
Space heating requirement - total per year (kWh/year)												4696.4700
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1029.0191	649.5661	579.2319	379.6993	225.8149	0.0000	0.0000	0.0000	0.0000	359.5544	588.6745	884.9097 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4696.4700
Space heating per m2										(98c) / (4) =		35.2270 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												326.8225 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1029.0191	649.5661	579.2319	379.6993	225.8149	0.0000	0.0000	0.0000	0.0000	359.5544	588.6745	884.9097 (98)
Space heating efficiency (main heating system 1)	326.8225	326.8225	326.8225	326.8225	326.8225	0.0000	0.0000	0.0000	0.0000	326.8225	326.8225	326.8225 (210)
Space heating fuel (main heating system)	314.8557	198.7520	177.2314	116.1791	69.0941	0.0000	0.0000	0.0000	0.0000	110.0152	180.1206	270.7616 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814 (64)
Efficiency of water heater (217)m	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693 (216)
Fuel for water heating, kWh/month	167.8427	148.2753	157.0024	136.6616	131.5683	117.5553	115.2327	120.3269	122.2327	137.5077	147.7112	165.8173 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	34.4661	27.6500	24.8957	18.2397	14.0889	11.5107	12.8523	16.7059	21.6994	28.4707	32.1576	35.4240 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1437.0095 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												172.7693
Water heating fuel used												1667.7340 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												

Full SAP Calculation Printout



Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	278.1611 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3382.9045 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1437.0095	0.1547	222.2666 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1667.7340	0.1411	235.3335 (264)
Space and water heating			457.6001 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	278.1611	0.1443	40.1472 (268)
Total CO2, kg/year			497.7474 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1437.0095	1.5726	2259.7986 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1667.7340	1.5218	2537.9294 (278)
Space and water heating			4797.7280 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	278.1611	1.5338	426.6527 (282)
Total Primary energy kWh/year			5224.3807 (286)
Dwelling Primary energy Rate (DPER)			39.1900 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	333.3000 (5)

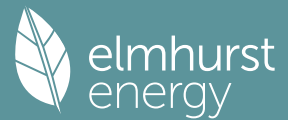
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3423 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4364	0.4278	0.4193	0.3765	0.3679	0.3251	0.3251	0.3166	0.3423	0.3679	0.3850	0.4022 (22b)
Effective ac	0.5952	0.5915	0.5879	0.5709	0.5677	0.5529	0.5529	0.5501	0.5586	0.5677	0.5741	0.5809 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2200	1.0000	2.2200		(26)
TER Opening Type			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658		(28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412		(29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326		(30)
Total net area of external elements Aum(A, m2)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 33.9350 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	17.7700	0.0500	0.8885
E2 Other lintels (including other steel lintels)	16.7800	0.0500	0.8390
E3 Sill	43.2000	0.0500	2.1600
E4 Jamb	35.1200	0.1600	5.6192
E5 Ground floor (normal)	35.1200	0.0000	0.0000
E6 Intermediate floor within a dwelling	25.0000	0.0900	2.2500
E16 Corner (normal)	5.0000	-0.0900	-0.4500
E17 Corner (inverted - internal area greater than external area)	24.1100	0.0600	1.4466
E10 Eaves (insulation at ceiling level)	11.0100	0.0600	0.6606
E12 Gable (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			13.4139 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	88.9239 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	65.4671	65.0604	64.6618	62.7896	62.4393	60.8086	60.8086	60.5066	61.4367	62.4393	63.1479	63.8888
Heat transfer coeff	154.3910	153.9843	153.5857	151.7134	151.3632	149.7325	149.7325	149.4305	150.3606	151.3632	152.0718	152.8126
Average = Sum(39)m / 12 =												151.7118

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1580	1.1550	1.1520	1.1380	1.1353	1.1231	1.1231	1.1208	1.1278	1.1353	1.1407	1.1462
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

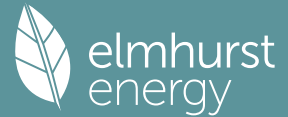
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9031 (42)
Hot water usage for mixer showers	72.8955	71.8000	70.2037	67.1494	64.8954	62.3818	60.9531	62.5373	64.2739	66.9728	70.0927	72.6162 (42a)
Hot water usage for baths	31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643 (42b)
Hot water usage for other uses	44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608 (42c)
Average daily hot water use (litres/day)												136.7135 (43)
Daily hot water use	148.7269	145.5510	141.6833	135.8024	131.0266	125.8923	123.9193	127.7702	131.8316	137.2217	143.1933	148.3413 (44)
Energy conte	235.5471	207.2626	217.7620	185.9067	176.3870	154.7992	149.8696	158.2062	162.5615	186.2086	204.0050	232.2666 (45)
Energy content (annual)										Total = Sum(45)m =		2270.7821
Distribution loss (46)m = 0.15 x (45)m	35.3321	31.0894	32.6643	27.8860	26.4580	23.2199	22.4804	23.7309	24.3842	27.9313	30.6008	34.8400 (46)
Water storage loss (or HIU loss):												200.0000 (47)
Store volume												1.6525 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8924 (55)
Enter (49) or (54) in (55)												
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	286.4732	253.2604	268.6881	235.1900	227.3130	204.0825	200.7957	209.1323	211.8448	237.1346	253.2883	283.1926 (62)
WWHRS	-33.3248	-29.4727	-30.8621	-25.5551	-23.8164	-20.3799	-19.1029	-20.3140	-21.0858	-24.8578	-28.1609	-32.7077 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	253.1484	223.7877	237.8260	209.6349	203.4967	183.7027	181.6928	188.8183	190.7590	212.2768	225.1275	250.4850 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2560.7556 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	119.0603	105.7130	113.1467	101.2406	99.3895	90.8974	90.5725	93.3444	93.4783	102.6552	107.2583	117.9695 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556	145.1556 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	153.0258	169.4214	153.0258	158.1266	153.0258	158.1266	153.0258	158.1266	153.0258	158.1266	153.0258	153.0258 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	301.6791	304.8096	296.9208	280.1267	258.9271	239.0024	225.6916	222.5611	230.4498	247.2440	268.4436	288.3682 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156	37.5156 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245 (71)
Water heating gains (Table 5)	160.0273	157.3110	152.0789	140.6120	133.5881	126.2464	121.7372	125.4629	129.8310	137.9774	148.9699	158.5611 (72)
Total internal gains	684.2788	701.0887	671.5722	648.4120	615.0876	589.9221	567.0013	567.5965	584.9541	607.7938	645.0868	669.5018 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Northeast					10.3300	11.2829	0.6300		0.7000	0.7700	35.6200 (75)
Southeast					9.4200	36.7938	0.6300		0.7000	0.7700	105.9248 (77)
Southwest					1.7400	36.7938	0.6300		0.7000	0.7700	19.5657 (79)
Northwest					5.5400	11.2829	0.6300		0.7000	0.7700	19.1031 (81)
Solar gains	180.2137	325.1474	493.1618	691.9775	848.9381	875.2900	830.3517	708.2848	561.2290	372.3749	152.0834 (83)
Total gains	864.4925	1026.2361	1164.7340	1340.3895	1464.0257	1465.2122	1397.3530	1275.8812	1146.1832	980.1688	821.5852 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	8.1399	8.1614	8.1826	8.2835	8.3027	8.3931	8.3931	8.4101	8.3581	8.3027	8.2640	8.2240
util living area	1.5427	1.5441	1.5455	1.5522	1.5535	1.5595	1.5595	1.5607	1.5572	1.5535	1.5509	1.5483
	0.8687	0.8321	0.7832	0.6999	0.5964	0.4779	0.3812	0.4197	0.5784	0.7424	0.8355	0.8767 (86)
MIT	16.5787	17.0597	17.8060	18.7988	19.6868	20.3609	20.6874	20.6231	20.0751	18.9205	17.5934	16.4958 (87)
Th 2	19.9537	19.9562	19.9586	19.9699	19.9721	19.9820	19.9820	19.9838	19.9782	19.9721	19.9678	19.9633 (88)
util rest of house	0.8581	0.8189	0.7657	0.6749	0.5603	0.4257	0.3111	0.3493	0.5286	0.7152	0.8205	0.8668 (89)
MIT 2	14.9971	15.5729	16.4661	17.6443	18.6735	19.4293	19.7647	19.7107	19.1378	17.8141	16.2298	14.9003 (90)
Living area fraction	15.1998	15.7635	16.6379	17.7923	18.8034	19.5487	19.8830	19.8276	19.2579	17.9559	16.4046	0.1282 (91)
MIT	15.1998	15.7635	16.6379	17.7923	18.8034	19.5487	19.8830	19.8276	19.2579	17.9559	16.4046	15.1048 (92)
Temperature adjustment												0.0000
adjusted MIT	15.1998	15.7635	16.6379	17.7923	18.8034	19.5487	19.8830	19.8276	19.2579	17.9559	16.4046	15.1048 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.7868	0.7445	0.6920	0.6101	0.5130	0.4011	0.3038	0.3374	0.4881	0.6466	0.7468	0.7969 (94)
Ext temp.	680.1513	764.0622	806.0445	817.8382	751.0389	587.7454	424.4627	430.5246	559.4737	633.7954	645.4515	654.7021 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1682.8367	1672.8060	1557.0343	1349.0751	1075.1930	740.9864	491.5645	512.1914	775.5515	1113.4102	1414.9631	1666.3944 (97)
Space heating requirement - total per year (kWh/year)	745.9979	610.6758	558.7364	382.4905	241.1707	0.0000	0.0000	0.0000	0.0000	356.8334	554.0484	752.6991 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	745.9979	610.6758	558.7364	382.4905	241.1707	0.0000	0.0000	0.0000	0.0000	356.8334	554.0484	752.6991 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4202.6522
Space heating per m2										(98c) / (4) =		31.5230 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	745.9979	610.6758	558.7364	382.4905	241.1707	0.0000	0.0000	0.0000	0.0000	356.8334	554.0484	752.6991 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	808.2318	661.6206	605.3483	414.3993	261.2900	0.0000	0.0000	0.0000	0.0000	386.6017	600.2691	815.4919 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	253.1484	223.7877	237.8260	209.6349	203.4967	183.7027	181.6928	188.8183	190.7590	212.2768	225.1275	250.4850 (64)
Efficiency of water heater	86.3330	86.1930	85.9073	85.3904	84.4417	79.8000	79.8000	79.8000	79.8000	85.2152	85.9977	79.8000 (216)
Fuel for water heating, kWh/month	293.2231	259.6355	276.8404	245.5016	240.9908	230.2038	227.6852	236.6144	239.0464	249.1067	261.7832	290.0211 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	31.7957	25.5077	22.9669	16.8265	12.9973	10.6189	11.8566	15.4116	20.0181	26.2649	29.6661	32.6794 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-58.9456	-81.4126	-114.6469	-126.1542	-133.6856	-123.8472	-122.1892	-116.4046	-105.9840	-91.6508	-64.1476	-51.1515 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-38.6578	-80.6408	-159.0851	-237.2781	-312.2261	-313.2646	-309.6934	-263.0095	-193.7583	-114.9070	-51.4646	-30.6323 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

elmhurst
energy

13a. Primary energy - Individual heating systems including micro-CHP			
	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	4553.2527	1.1300	5145.1756 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	3050.6522	1.1300	3447.2370 (278)
Space and water heating			8592.4126 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	256.6098	1.5338	393.5967 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1190.2198	1.4992	-1784.3267
PV Unit electricity exported	-2104.6177	0.4629	-974.1435
Total			-2758.4702 (283)
Total Primary energy kWh/year			6357.6399 (286)
Target Primary Energy Rate (TPER)			47.6900 (287)

Full SAP Calculation Printout



Plot Reference	P1			Issued on Date	09/07/2026	
Assessment Reference	Design Stage Triple Glazed		Plot Type Ref	Design Stage		
Plot Address	1, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2	
SAP Rating	82 B	DER	3.73	TER	9.15	
Environmental	96 A	% DER < TER			59.23	
CO ₂ Emissions (t/year)	0.46	DFEE	36.44	TFEE	38.53	
Compliance Check	See BREL	% DFEE < TFEE			5.43	
% DPER < TPER	17.83	DPER	39.19	TPER	47.69	
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 333.3000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3238 (21)

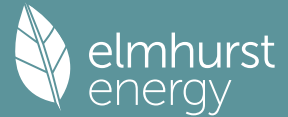
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4128	0.4047	0.3966	0.3561	0.3480	0.3076	0.3076	0.2995	0.3238	0.3480	0.3642	0.3804 (22b)
Effective ac	0.5852	0.5819	0.5787	0.5634	0.5606	0.5473	0.5473	0.5448	0.5524	0.5606	0.5663	0.5724 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.2200	1.0000	2.2200		(26)
Windows			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658	0.0000	0.0000 (28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412	0.0000	0.0000 (29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326	9.0000	599.9400 (30)
Total net area of external elements Aum(A, m ²)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)
Main dwelling							
Internal Wall 1			236.0500			9.0000	2124.4500 (32c)
Internal Floor 1			66.6600			18.0000	1199.8800 (32d)
Internal Ceiling 1			66.6600			9.0000	599.9400 (32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		4524.2100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.9350 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.7700	0.0470	0.8352	
E3 Sill				16.7800	0.0350	0.5873	
E4 Jamb				43.2000	0.0470	2.0304	

Page 2 of 15

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.4582	8.4789	8.4994	8.5968	8.6153	8.7023	8.7023	8.7186	8.6686	8.6153	8.5780	8.5393	
alpha	1.5639	1.5653	1.5666	1.5731	1.5744	1.5802	1.5802	1.5812	1.5779	1.5744	1.5719	1.5693	
util living area	0.8492	0.8130	0.7584	0.6739	0.5686	0.4524	0.3576	0.3951	0.5527	0.7187	0.8168	0.8590 (86)	
Living	17.6891	18.0308	18.5913	19.2973	19.9246	20.3881	20.6102	20.5663	20.1862	19.3684	18.4062	17.6189	
Non living	16.2519	16.6612	17.3313	18.1704	18.8962	19.4170	19.6444	19.6080	19.2110	18.2746	17.1266	16.1718	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.3365	18.0308	18.5913	19.2973	19.9246	20.3881	20.6102	20.5663	20.1862	19.3684	18.4062	18.1028 (87)	
Th 2	19.9890	19.9913	19.9934	20.0037	20.0056	20.0146	20.0146	20.0162	20.0111	20.0056	20.0017	19.9977 (88)	
util rest of house	0.8378	0.7991	0.7403	0.6487	0.5333	0.4027	0.2924	0.3291	0.5043	0.6910	0.8010	0.8482 (89)	
MIT 2	18.4563	16.6612	17.3313	18.1704	18.8962	19.4170	19.6444	19.6080	19.2110	18.2746	17.1266	16.8457 (90)	
Living area fraction									fLA = Living area / (4) =				0.1282 (91)
MIT	18.5692	16.8367	17.4928	18.3149	19.0280	19.5415	19.7682	19.7309	19.3360	18.4148	17.2906	17.0068 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.5692	16.8367	17.4928	18.3149	19.0280	19.5415	19.7682	19.7309	19.3360	18.4148	17.2906	17.0068 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8192	0.7434	0.6848	0.5988	0.4942	0.3765	0.2748	0.3081	0.4668	0.6370	0.7450	0.8070	(94)
Useful gains	780.1271	822.3024	865.3271	858.6604	770.4704	582.6561	405.3552	415.1291	565.5076	667.6769	694.0509	727.5628	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2120.1289	1769.2295	1625.4081	1376.3153	1068.9508	713.6111	457.5299	480.1179	759.0864	1139.9646	1492.9837	1884.7648	(97)
Space heating kWh	996.9613	636.3350	565.5002	372.7115	222.0694	0.0000	0.0000	0.0000	0.0000	351.3821	575.2316	860.9582	(98a)
Space heating requirement - total per year (kWh/year)												4581.1494	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	996.9613	636.3350	565.5002	372.7115	222.0694	0.0000	0.0000	0.0000	0.0000	351.3821	575.2316	860.9582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4581.1494	
Space heating per m2										(98c) / (4) =		34.3621	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													326.8225 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	996.9613	636.3350	565.5002	372.7115	222.0694	0.0000	0.0000	0.0000	0.0000	351.3821	575.2316	860.9582 (98)	
Space heating efficiency (main heating system 1)	326.8225	326.8225	326.8225	326.8225	326.8225	0.0000	0.0000	0.0000	0.0000	326.8225	326.8225	326.8225 (210)	
Space heating fuel (main heating system)	305.0467	194.7036	173.0298	114.0410	67.9480	0.0000	0.0000	0.0000	0.0000	107.5147	176.0074	263.4330 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating													
Water heating requirement	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814 (64)	
Efficiency of water heater	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693 (217)	
Fuel for water heating, kWh/month	167.8427	148.2753	157.0024	136.6616	131.5683	117.5553	115.2327	120.3269	122.2327	137.5077	147.7112	165.8173 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	34.4661	27.6500	24.8957	18.2397	14.0889	11.5107	12.8523	16.7059	21.6994	28.4707	32.1576	35.4240 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													1401.7241 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													172.7693
Water heating fuel used													1667.7340 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	278.1611	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3347.6191	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1401.7241	16.4900	231.1443	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1667.7340	16.4900	275.0093	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	278.1611	16.4900	45.8688	(250)
Additional standing charges			0.0000	(251)
Total energy cost			552.0224	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.1144	(257)
SAP value		81.9348	
SAP rating (Section 12)		82	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1401.7241	0.1546	216.7644	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1667.7340	0.1411	235.3335	(264)
Space and water heating			452.0979	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	278.1611	0.1443	40.1472	(268)
Total CO2, kg/year			492.2452	(272)
CO2 emissions per m2			3.6900	(273)
EI value			96.3010	
EI rating			96	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)	
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	333.3000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	5 * 10 =	50.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) =	0.1500 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.3500	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3238 (21)

Full SAP Calculation Printout



Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000	(22)
Adj infilt rate	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750	(22a)
Effective ac	0.4533	0.4128	0.3885	0.3561	0.3723	0.3400	0.3480	0.3319	0.3561	0.3885	0.3885	0.4128	(22b)
	0.6027	0.5852	0.5755	0.5634	0.5693	0.5578	0.5606	0.5551	0.5634	0.5755	0.5755	0.5852	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Solid Door			2.2200	1.0000	2.2200			(26)
Windows			27.0300	1.1450	30.9504			(27)
Heatloss Floor 1			66.6600	0.1300	8.6658	0.0000	0.0000	(28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412	0.0000	0.0000	(29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326	9.0000	599.9400	(30)
Total net area of external elements Aum(A, m2)			308.9100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	75.5100		(33)
Main dwelling								
Internal Wall 1			236.0500			9.0000	2124.4500	(32c)
Internal Floor 1			66.6600			18.0000	1199.8800	(32d)
Internal Ceiling 1			66.6600			9.0000	599.9400	(32e)
Heat capacity Cm = Sum(A x k)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								(34)
List of Thermal Bridges								(35)
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				17.7700	0.0470		0.8352	
E3 Sill				16.7800	0.0350		0.5873	
E4 Jamb				43.2000	0.0470		2.0304	
E5 Ground floor (normal)				35.1200	0.0150		0.5268	
E6 Intermediate floor within a dwelling				35.1200	0.0100		0.3512	
E16 Corner (normal)				25.0000	0.0430		1.0750	
E17 Corner (inverted - internal area greater than external area)				5.0000	-0.0690		-0.3450	
E10 Eaves (insulation at ceiling level)				24.1100	0.0370		0.8921	
E12 Gable (insulation at ceiling level)				11.0100	0.2500		2.7525	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.7055	(36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	84.2154 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	66.2933	64.3657	63.2957	61.9698	62.6183	61.3501	61.6563	61.0510	61.9698	63.2957	63.2957	64.3657	(38)
Average = Sum(39)m / 12 =	150.5087	148.5812	147.5111	146.1852	146.8337	145.5655	145.8718	145.2665	146.1852	147.5111	147.5111	148.5812	(39)
													147.1760
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1289	1.1145	1.1064	1.0965	1.1014	1.0919	1.0941	1.0896	1.0965	1.1064	1.1064	1.1145	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

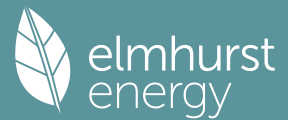
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9031 (42)
Hot water usage for mixer showers	82.0074	80.7750	78.9792	75.5431	73.0074	70.1795	68.5722	70.3545	72.3082	75.3444	78.8543	81.6932	(42a)
Hot water usage for baths	31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643	(42b)
Hot water usage for other uses	44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608	(42c)
Average daily hot water use (litres/day)													145.1144 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	157.8389	154.5260	150.4588	144.1961	139.1385	133.6900	131.5384	135.5874	139.8658	145.5933	151.9548	157.4183	(44)
Distribution loss (46)m = 0.15 x (45)m	249.9782	220.0429	231.2496	197.3972	187.3072	164.3874	159.0843	167.8855	172.4685	197.5687	216.4875	246.4790	(45)
Store volume	37.4967	33.0064	34.6874	29.6096	28.0961	24.6581	23.8626	25.1828	25.8703	29.6353	32.4731	36.9718	(46)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	115.1197	102.0692	108.8924	96.6042	94.2816	85.6284	84.8974	87.8238	88.3154	97.6935	102.9517	113.9562	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

Full SAP Calculation Printout



(66)m	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	39.3766	34.9739	28.4427	21.5330	16.0961	13.5890	14.6834	19.0861	25.6173	32.5271	37.9639	40.4710	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	450.2673	454.9396	443.1654	418.0995	386.4583	356.7201	336.8531	332.1807	343.9549	369.0208	400.6620	430.4003	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	(71)
Water heating gains (Table 5)	154.7307	151.8887	146.3608	134.1725	126.7225	118.9284	114.1095	118.0428	122.6603	131.3085	142.9885	153.1669	(72)
Total internal gains	757.7586	755.1863	731.3529	687.1890	642.6610	602.6215	579.0300	582.6936	605.6165	646.2404	694.9984	737.4222	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	

Northeast					10.3300	15.4678		0.6800	0.7000		0.7700		52.7072 (75)	
Southeast					9.4200	47.5950		0.6800	0.7000		0.7700		147.8946 (77)	
Southwest					1.7400	47.5950		0.6800	0.7000		0.7700		27.3181 (79)	
Northwest					5.5400	15.4678		0.6800	0.7000		0.7700		28.2670 (81)	

Solar gains		256.1868	391.9943	596.8329	872.1315	1042.5513	1157.5084	1085.0141	928.7428	729.7570	480.1782	300.4981	207.9101	(83)
Total gains		1013.9455	1147.1807	1328.1858	1559.3204	1685.2123	1760.1299	1664.0441	1511.4365	1335.3736	1126.4186	995.4966	945.3323	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.3498	8.4582	8.5195	8.5968	8.5588	8.6334	8.6153	8.6512	8.5968	8.5195	8.5195	8.4582	
alpha	1.5567	1.5639	1.5680	1.5731	1.5706	1.5756	1.5744	1.5767	1.5731	1.5680	1.5680	1.5639	
util living area	0.8220	0.7915	0.7290	0.6315	0.5141	0.3824	0.2976	0.3006	0.4704	0.6532	0.7740	0.8319	(86)
Living	18.0954	18.3189	18.8649	19.5258	20.1231	20.5184	20.6759	20.6854	20.3998	19.7585	18.8814	18.0917	
Non living	16.7369	17.0064	17.6572	18.4335	19.1114	19.5400	19.6918	19.7066	19.4302	18.7212	17.6925	16.7402	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.5411	18.3189	18.8649	19.5258	20.1231	20.5184	20.6759	20.6854	20.3998	19.7585	18.8814	18.5080	(87)
Th 2	19.9773	19.9890	19.9956	20.0037	19.9997	20.0075	20.0056	20.0093	20.0037	19.9956	19.9956	19.9890	(88)
util rest of house	0.8078	0.7755	0.7084	0.6037	0.4748	0.3303	0.2320	0.2289	0.4137	0.6169	0.7531	0.8181	(89)
MIT 2	18.6480	17.0064	17.6572	18.4335	19.1114	19.5400	19.6918	19.7066	19.4302	18.7212	17.6925	17.3124	(90)
Living area fraction									fLA = Living area / (4) =			0.1282	(91)
MIT	18.7625	17.1747	17.8120	18.5735	19.2411	19.6654	19.8180	19.8321	19.5545	18.8542	17.8449	17.4657	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7625	17.1747	17.8120	18.5735	19.2411	19.6654	19.8180	19.8321	19.5545	18.8542	17.8449	17.4657	(93)

8. Space heating requirement

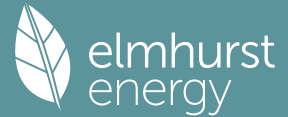
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	799.2881	825.2029	868.9186	869.8925	744.6543	547.5270	364.0988	325.2717	514.5752	639.9415	693.4318	732.2754	(94)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000	(95)
Heat loss rate W	1966.0147	1675.2044	1535.8858	1311.7939	975.1421	635.4580	396.4758	353.2990	636.5571	981.5619	1334.2229	1718.4378	(97)
Space heating kWh	868.0446	571.2010	496.2236	318.1690	171.4829	0.0000	0.0000	0.0000	0.0000	254.1656	461.3696	733.7048	(98a)
Space heating requirement - total per year (kWh/year)												3874.3610	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	868.0446	571.2010	496.2236	318.1690	171.4829	0.0000	0.0000	0.0000	0.0000	254.1656	461.3696	733.7048	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3874.3610	
Space heating per m2										(98c) / (4) =		29.0606	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													326.3171 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (main heating system 1)	868.0446	571.2010	496.2236	318.1690	171.4829	0.0000	0.0000	0.0000	0.0000	254.1656	461.3696	733.7048	(98)
Space heating fuel (main heating system)	326.3171	326.3171	326.3171	326.3171	326.3171	0.0000	0.0000	0.0000	0.0000	326.3171	326.3171	326.3171	(210)
Space heating efficiency (main heating system 2)	266.0126	175.0447	152.0679	97.5030	52.5510	0.0000	0.0000	0.0000	0.0000	77.8891	141.3869	224.8441	(211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

Water heating
Water heating requirement

Full SAP Calculation Printout



Efficiency of water heater	289.9806	256.1741	271.2520	236.1092	227.3096	203.0994	199.0867	207.8879	211.1805	237.5711	255.1995	286.4814	(64)
(217)m	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	(216)
Fuel for water heating, kWh/month	167.9646	148.3829	157.1164	136.7608	131.6638	117.6407	115.3164	120.4142	122.3214	137.6076	147.8184	165.9377	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	34.4661	27.6500	24.8957	18.2397	14.0889	11.5107	12.8523	16.7059	21.6994	28.4707	32.1576	35.4240	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1187.2993	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												172.6439	
Water heating fuel used												1668.9451	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												278.1611	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3134.4055	(238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1187.2993	27.6700	328.5257 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1668.9451	27.6700	461.7971 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	278.1611	27.6700	76.9672 (250)
Additional standing charges			0.0000 (251)
Total energy cost			867.2900 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1187.2993	0.1551	184.1052 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1668.9451	0.1411	235.5044 (264)
Space and water heating			419.6096 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	278.1611	0.1443	40.1472 (268)
Total CO2, kg/year			459.7568 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1187.2993	1.5740	1868.8397 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1668.9451	1.5218	2539.7725 (278)
Space and water heating			4408.6122 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	278.1611	1.5338	426.6527 (282)
Total Primary energy kWh/year			4835.2649 (286)

SAP 10 EPC IMPROVEMENTS

Design Stage Triple Glazed

Current energy efficiency rating:
Current environmental impact rating:

B 82
A 96

N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Full SAP Calculation Printout



Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.7	-£ 117	-53 kg (11.6%)
U Solar photovoltaic panels	+ 5.0	-£ 284	-138 kg (34.0%)

Recommended measures	Typical annual savings		Energy efficiency	Environmental impact
Solar water heating	£117	0.40 kg/m ²	B 84	A 97
Solar photovoltaic panels	£284	1.04 kg/m ²	B 89	A 98
Total Savings	£401	1.44 kg/m ²		

Potential energy efficiency rating: B 89
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 596 TEST (30 Jun 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current	Potential	Saving
Electricity	£867	£750	£117
Space heating	£329	£351	-£22
Water heating	£462	£322	£139
Lighting	£77	£77	£0
Generated (PV)	-£0	-£284	£284
Total cost of fuels	£867	£466	£401
Total cost of uses	£868	£466	£401
Delivered energy	24 kWh/m ²	13 kWh/m ²	11 kWh/m ²
Carbon dioxide emissions	0.5 tonnes	0.3 tonnes	0.2 tonnes
CO2 emissions per m ²	3 kg/m ²	2 kg/m ²	1 kg/m ²
Primary energy	36 kWh/m ²	20 kWh/m ²	16 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	333.3000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

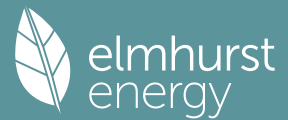
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) =	0.1500 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.3500	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3238 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4128	0.4047	0.3966	0.3561	0.3480	0.3076	0.3076	0.2995	0.3238	0.3480	0.3642	0.3804 (22b)
Effective ac	0.5852	0.5819	0.5787	0.5634	0.5606	0.5473	0.5473	0.5448	0.5524	0.5606	0.5663	0.5724 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.2200	1.0000	2.2200		(26)
Windows			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658	0.0000	(28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412	0.0000	(29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326	9.0000	(30)
Total net area of external elements Aum(A, m ²)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)
Main dwelling							

Full SAP Calculation Printout



Internal Wall 1	236.0500	9.0000	2124.4500 (32c)
Internal Floor 1	66.6600	18.0000	1199.8800 (32d)
Internal Ceiling 1	66.6600	9.0000	599.9400 (32e)

Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 4524.2100 (34)
 Thermal mass parameter (TMP = C_m / TFA) in kJ/m²K 33.9350 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	17.7700	0.0470	0.8352
E3 Sill	16.7800	0.0350	0.5873
E4 Jamb	43.2000	0.0470	2.0304
E5 Ground floor (normal)	35.1200	0.0150	0.5268
E6 Intermediate floor within a dwelling	35.1200	0.0100	0.3512
E16 Corner (normal)	25.0000	0.0430	1.0750
E17 Corner (inverted - internal area greater than external area)	5.0000	-0.0690	-0.3450
E10 Eaves (insulation at ceiling level)	24.1100	0.0370	0.8921
E12 Gable (insulation at ceiling level)	11.0100	0.2500	2.7525
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.7055 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			84.2154 (37) (33) + (36) + (36a) =

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	64.3657	64.0018	63.6451	61.9698	61.6563	60.1971	60.1971	59.9269	60.7592	61.6563	62.2904	62.9534	(38)
Heat transfer coeff	148.5812	148.2173	147.8606	146.1852	145.8718	144.4126	144.4126	144.1424	144.9746	145.8718	146.5059	147.1698	(39)
Average = $\text{Sum}(39)\text{m} / 12 =$												146.1837	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1145	1.1117	1.1091	1.0965	1.0941	1.0832	1.0832	1.0812	1.0874	1.0941	1.0989	1.1039	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

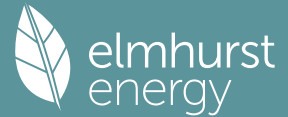
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9031 (42)
Hot water usage for mixer showers	82.0074	80.7750	78.9792	75.5431	73.0074	70.1795	68.5722	70.3545	72.3082	75.3444	78.8543	81.6932	(42a)
Hot water usage for baths	31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643	(42b)
Hot water usage for other uses	44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608	(42c)
Average daily hot water use (litres/day)												145.1144	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	157.8389	154.5260	150.4588	144.1961	139.1385	133.6900	131.5384	135.5874	139.8658	145.5933	151.9548	157.4183	(44)
Energy content (annual)	249.9782	220.0429	231.2496	197.3972	187.3072	164.3874	159.0843	167.8855	172.4685	197.5687	216.4875	246.4790	(45)
Distribution loss (46)m = $0.15 \times (45)\text{m}$	37.4967	33.0064	34.6874	29.6096	28.0961	24.6581	23.8626	25.1828	25.8703	29.6353	32.4731	36.9718	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.5400	(55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	289.9806	256.1741	269.8562	229.3556	214.5153	190.4927	186.0597	195.7914	205.7776	236.1754	255.1995	286.4814	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Aperture area of solar collector												3.0000	(H1)
Zero-loss collector efficiency												0.8000	(H2)
Collector linear heat loss coefficient												1.8000	(H3)
Collector 2nd order heat loss coefficient												0.0000	(H4)
Collector loop efficiency												0.9000	(H5)
Incidence angle modifier												1.0000	(H6)
Overshading factor												0.8000	(H8)
Overall heat loss coefficient of system												6.5000	(H10)
Heat loss coefficient of collector loop												3.9667	(H11)
Dedicated solar storage volume												75.0000	(H12)
Effective solar volume												75.0000	(H14)
Reference volume												225.0000	(H15)
Storage tank correction coefficient												1.3161	(H16)
Heat delivered to hot water												628.6870	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												628.6870	
Solar input	-0.0000	-16.1945	-58.7954	-81.0942	-106.2229	-97.7867	-96.9534	-84.6760	-58.2338	-28.7300	-0.0000	-0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	289.9806	239.9796	211.0608	148.2614	108.2924	92.7061	89.1063	111.1154	147.5439	207.4454	255.1995	286.4814	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = $\text{Sum}(64a)\text{m} =$												0.0000	(64a)
Heat gains from water heating, kWh/month	115.1197	102.0692	107.7758	91.2013	84.0461	75.5430	74.4759	78.1467	83.9931	96.5769	102.9517	113.9562	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	39.3766	34.9739	28.4427	21.5330	16.0961	13.5890	14.6834	19.0861	25.6173	32.5271	37.9639	40.4710	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	450.2673	454.9396	443.1654	418.0995	386.4583	356.7201	336.8531	332.1807	343.9549	369.0208	400.6620	430.4003	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)

	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	(71)
Water heating gains (Table 5)	154.7307	151.8887	144.8600	126.6685	112.9652	104.9209	100.1020	105.0359	116.6571	129.8077	142.9885	153.1669	(72)
Total internal gains	757.7586	755.1863	729.8521	679.6850	628.9037	588.6140	565.0226	569.6867	599.6133	644.7396	694.9984	737.4222	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c				Access factor Table 6d	Gains W
Northeast					10.3300	11.2829	0.6800	0.7000				0.7700	38.4470 (75)
Southeast					9.4200	36.7938	0.6800	0.7000				0.7700	114.3316 (77)
Southwest					1.7400	36.7938	0.6800	0.7000				0.7700	21.1186 (79)
Northwest					5.5400	11.2829	0.6800	0.7000				0.7700	20.6192 (81)
Solar gains	194.5164	350.9528	532.3016	746.8963	916.3141	944.7575	896.2526	764.4978	605.7710	401.9285	236.5587	164.1536	(83)
Total gains	952.2750	1106.1391	1262.1537	1426.5813	1545.2178	1533.3715	1461.2752	1334.1846	1205.3844	1046.6681	931.5571	901.5758	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.4582	8.4789	8.4994	8.5968	8.6153	8.7023	8.7023	8.7186	8.6686	8.6153	8.5780	8.5393	
alpha	1.5639	1.5653	1.5666	1.5731	1.5744	1.5802	1.5802	1.5812	1.5779	1.5744	1.5719	1.5693	
util living area	0.8492	0.8130	0.7587	0.6754	0.5713	0.4552	0.3602	0.3979	0.5543	0.7191	0.8168	0.8590	(86)
Living	17.6891	18.0308	18.5898	19.2918	19.9179	20.3841	20.6079	20.5636	20.1834	19.3671	18.4062	17.6189	
Non living	16.2519	16.6612	17.3297	18.1643	18.8891	19.4133	19.6427	19.6059	19.2083	18.2732	17.1266	16.1718	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.3365	18.0308	18.5898	19.2918	19.9179	20.3841	20.6079	20.5636	20.1834	19.3671	18.4062	18.1028	(87)
Th 2	19.9890	19.9913	19.9934	20.0037	20.0056	20.0146	20.0146	20.0162	20.0111	20.0056	20.0017	19.9977	(88)
util rest of house	0.8378	0.7991	0.7406	0.6503	0.5360	0.4053	0.2947	0.3316	0.5059	0.6914	0.8010	0.8482	(89)
MIT 2	18.4563	16.6612	17.3297	18.1643	18.8891	19.4133	19.6427	19.6059	19.2083	18.2732	17.1266	16.8457	(90)
Living area fraction													
MIT	18.5692	16.8367	17.4912	18.3088	19.0210	19.5377	19.7664	19.7287	19.3333	18.4134	17.2906	17.0068	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5692	16.8367	17.4912	18.3088	19.0210	19.5377	19.7664	19.7287	19.3333	18.4134	17.2906	17.0068	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	780.1271	822.3024	864.6713	856.1881	767.4605	580.9780	404.5323	414.1351	564.3497	667.1142	694.0509	727.5628	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2120.1289	1769.2295	1625.1658	1375.4293	1067.9224	713.0694	457.2712	479.8010	758.6925	1139.7591	1492.9837	1884.7648	(97)
Space heating kWh	996.9613	636.3350	565.8079	373.8536	223.5436	0.0000	0.0000	0.0000	0.0000	351.6478	575.2316	860.9582	(98a)
Space heating requirement - total per year (kWh/year)												4584.3392	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	996.9613	636.3350	565.8079	373.8536	223.5436	0.0000	0.0000	0.0000	0.0000	351.6478	575.2316	860.9582	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4584.3392	
Space heating per m ²										(98c) / (4) =		34.3860	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													326.8225 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	996.9613	636.3350	565.8079	373.8536	223.5436	0.0000	0.0000	0.0000	0.0000	351.6478	575.2316	860.9582	(98)
Space heating efficiency (main heating system 1)	326.8225	326.8225	326.8225	326.8225	326.8225	0.0000	0.0000	0.0000	0.0000	326.8225	326.8225	326.8225	(210)
Space heating fuel (main heating system)	305.0467	194.7036	173.1239	114.3904	68.3991	0.0000	0.0000	0.0000	0.0000	107.5960	176.0074	263.4330	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	289.9806	239.9796	211.0608	148.2614	108.2924	92.7061	89.1063	111.1154	147.5439	207.4454	255.1995	286.4814	(64)
Efficiency of water heater (217)m	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	172.7693	(216)
Fuel for water heating, kWh/month	167.8427	138.9018	122.1634	85.8147	62.6804	53.6589	51.5753	64.3143	85.3994	120.0707	147.7112	165.8173	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)

Full SAP Calculation Printout



Lighting	34.4661	27.6500	24.8957	18.2397	14.0889	11.5107	12.8523	16.7059	21.6994	28.4707	32.1576	35.4240	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.4327	-58.9384	-89.5392	-104.5650	-113.4194	-100.4196	-98.8987	-92.7513	-81.4126	-68.6650	-44.0970	-33.4312	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1402.7001	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												172.7693	
Water heating fuel used												1265.9500	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												278.1611	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-925.5702	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2101.2409	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1402.7001	16.4900	231.3052 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1265.9500	16.4900	208.7551 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	278.1611	16.4900	45.8688 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-925.5702	16.4900	-152.6265
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-152.6265 (252)
Total energy cost			346.4946 (255)

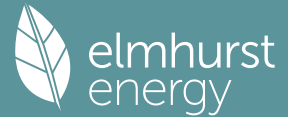
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.6995 (257)
SAP value		88.6608
SAP rating (Section 12)		89 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1402.7001	0.1546	216.8994 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1265.9500	0.1456	184.2670 (264)
Space and water heating			401.1664 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	278.1611	0.1443	40.1472 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-925.5702	0.1343	-124.2763
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-124.2763 (269)
Total CO2, kg/year			328.1343 (272)
CO2 emissions per m2			2.4600 (273)
EI value			97.5342
EI rating			98 (274)
EI band			A

Full SAP Calculation Printout



1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	66.6600 (1b)	x 2.4000 (2b)	= 159.9840 (1b) - (3b)
First floor	66.6600 (1c)	x 2.6000 (2c)	= 173.3160 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	133.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	333.3000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 50.0000 / (5) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3238 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000 (22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750 (22a)
Adj infilt rate	0.4533	0.4128	0.3885	0.3561	0.3723	0.3400	0.3480	0.3319	0.3561	0.3885	0.3885	0.4128 (22b)
Effective ac	0.6027	0.5852	0.5755	0.5634	0.5693	0.5578	0.5606	0.5551	0.5634	0.5755	0.5755	0.5852 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.2200	1.0000	2.2200		(26)
Windows			27.0300	1.1450	30.9504		(27)
Heatloss Floor 1			66.6600	0.1300	8.6658	0.0000	0.0000 (28a)
External Wall 1	175.5900	29.2500	146.3400	0.1800	26.3412	0.0000	0.0000 (29a)
External Roof 1	66.6600		66.6600	0.1100	7.3326	9.0000	599.9400 (30)
Total net area of external elements Aum(A, m ²)			308.9100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.5100		(33)
Main dwelling							
Internal Wall 1			236.0500			9.0000	2124.4500 (32c)
Internal Floor 1			66.6600			18.0000	1199.8800 (32d)
Internal Ceiling 1			66.6600			9.0000	599.9400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4524.2100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.9350 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.7700	0.0470	0.8352	
E3 Sill				16.7800	0.0350	0.5873	
E4 Jamb				43.2000	0.0470	2.0304	
E5 Ground floor (normal)				35.1200	0.0150	0.5268	
E6 Intermediate floor within a dwelling				35.1200	0.0100	0.3512	
E16 Corner (normal)				25.0000	0.0430	1.0750	
E17 Corner (inverted - internal area greater than external area)				5.0000	-0.0690	-0.3450	
E10 Eaves (insulation at ceiling level)				24.1100	0.0370	0.8921	
E12 Gable (insulation at ceiling level)				11.0100	0.2500	2.7525	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.7055 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	84.2154 (37)

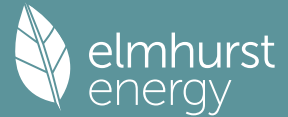
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	66.2933	64.3657	63.2957	61.9698	62.6183	61.3501	61.6563	61.0510	61.9698	63.2957	63.2957	64.3657 (38)
Heat transfer coeff	150.5087	148.5812	147.5111	146.1852	146.8337	145.5655	145.8718	145.2665	146.1852	147.5111	147.5111	148.5812 (39)
Average = Sum(39)m / 12 =												147.1760
HLP	1.1289	1.1145	1.1064	1.0965	1.1014	1.0919	1.0941	1.0896	1.0965	1.1064	1.1064	1.1145 (40)
HLP (average)												1.1039
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9031 (42)
Hot water usage for mixer showers												
82.0074	80.7750	78.9792	75.5431	73.0074	70.1795	68.5722	70.3545	72.3082	75.3444	78.8543	81.6932 (42a)	
Hot water usage for baths												
31.4707	31.0033	30.3451	29.1316	28.2229	27.2153	26.6710	27.3246	28.0362	29.1144	30.3529	31.3643 (42b)	
Hot water usage for other uses												
44.3608	42.7477	41.1345	39.5214	37.9083	36.2952	36.2952	37.9083	39.5214	41.1345	42.7477	44.3608 (42c)	
Average daily hot water use (litres/day)												145.1144 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

Full SAP Calculation Printout



Daily hot water use	157.8389	154.5260	150.4588	144.1961	139.1385	133.6900	131.5384	135.5874	139.8658	145.5933	151.9548	157.4183 (44)
Energy conte	249.9782	220.0429	231.2496	197.3972	187.3072	164.3874	159.0843	167.8855	172.4685	197.5687	216.4875	246.4790 (45)
Energy content (annual)										Total = Sum(45)m =		2410.3360
Distribution loss (46)m = 0.15 x (45)m												
	37.4967	33.0064	34.6874	29.6096	28.0961	24.6581	23.8626	25.1828	25.8703	29.6353	32.4731	36.9718 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	289.9806	256.1741	269.8562	229.3556	214.5153	190.4927	186.0597	195.7914	205.7776	236.1754	255.1995	286.4814 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												803.8487 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												803.8487
Solar input	-6.7413	-24.2161	-71.3300	-98.9872	-122.4197	-121.1841	-118.5144	-106.8974	-77.5412	-45.1450	-10.8723	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	283.2393	231.9580	198.5263	130.3684	92.0955	69.3086	67.5454	88.8940	128.2364	191.0304	244.3272	286.4814 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month												
	115.1197	102.0692	107.7758	91.2013	84.0461	75.5430	74.4759	78.1467	83.9931	96.5769	102.9517	113.9562 (65)
Total per year (kWh/year) = Sum(64)m =												2012.0109 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868	174.1868 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	39.3766	34.9739	28.4427	21.5330	16.0961	13.5890	14.6834	19.0861	25.6173	32.5271	37.9639	40.4710 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	450.2673	454.9396	443.1654	418.0995	386.4583	356.7201	336.8531	332.1807	343.9549	369.0208	400.6620	430.4003 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218	55.3218 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245	-116.1245 (71)
Water heating gains (Table 5)												
	154.7307	151.8887	144.8600	126.6685	112.9652	104.9209	100.1020	105.0359	116.6571	129.8077	142.9885	153.1669 (72)
Total internal gains												
	757.7586	755.1863	729.8521	679.6850	628.9037	588.6140	565.0226	569.6867	599.6133	644.7396	694.9984	737.4222 (73)

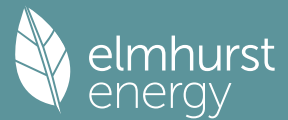
6. Solar gains

[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northeast	10.3300	15.4678	0.6800	0.7000	0.7700	52.7072 (75)						
Southeast	9.4200	47.5950	0.6800	0.7000	0.7700	147.8946 (77)						
Southwest	1.7400	47.5950	0.6800	0.7000	0.7700	27.3181 (79)						
Northwest	5.5400	15.4678	0.6800	0.7000	0.7700	28.2670 (81)						
Solar gains	256.1868	391.9943	596.8329	872.1315	1042.5513	1157.5084	1085.0141	928.7428	729.7570	480.1782	300.4981	207.9101 (83)
Total gains	1013.9455	1147.1807	1326.6850	1551.8164	1671.4550	1746.1225	1650.0367	1498.4295	1329.3704	1124.9178	995.4966	945.3323 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.3498	8.4582	8.5195	8.5968	8.5588	8.6334	8.6153	8.6512	8.5968	8.5195	8.5195	8.4582
alpha	1.5567	1.5639	1.5680	1.5731	1.5706	1.5756	1.5744	1.5767	1.5731	1.5680	1.5680	1.5639
util living area												
	0.8220	0.7915	0.7293	0.6330	0.5166	0.3846	0.2996	0.3027	0.4717	0.6536	0.7740	0.8319 (86)
Living	18.0954	18.3189	18.8636	19.5211	20.1179	20.5157	20.6745	20.6841	20.3979	19.7575	18.8814	18.0917
Non living	16.7369	17.0064	17.6557	18.4283	19.1061	19.5377	19.6908	19.7057	19.4285	18.7201	17.6925	16.7402
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.5411	18.3189	18.8636	19.5211	20.1179	20.5157	20.6745	20.6841	20.3979	19.7575	18.8814	18.5080 (87)
Th 2	19.9773	19.9890	19.9956	20.0037	19.9997	20.0075	20.0056	20.0093	20.0037	19.9956	19.9956	19.9890 (88)
util rest of house												
	0.8078	0.7755	0.7087	0.6052	0.4773	0.3324	0.2337	0.2307	0.4150	0.6173	0.7531	0.8181 (89)
MIT 2	18.6480	17.0064	17.6557	18.4283	19.1061	19.5377	19.6908	19.7057	19.4285	18.7201	17.6925	17.3124 (90)

Full SAP Calculation Printout



Living area fraction									fLA = Living area / (4) =		0.1282 (91)	
MIT	18.7625	17.1747	17.8105	18.5684	19.2358	19.6631	19.8169	19.8311	19.5528	18.8531	17.8449	17.4657 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7625	17.1747	17.8105	18.5684	19.2358	19.6631	19.8169	19.8311	19.5528	18.8531	17.8449	17.4657 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7883	0.7193	0.6545	0.5592	0.4441	0.3129	0.2204	0.2168	0.3865	0.5685	0.6966	0.7746	(94)
Useful gains	799.2881	825.2029	868.3229	867.7662	742.2942	546.4362	363.6112	324.8353	513.8153	639.4988	693.4318	732.2754	(95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000	(96)
Heat loss rate W	1966.0147	1675.2044	1535.6676	1311.0458	974.3565	635.1165	396.3242	353.1617	636.3078	981.4036	1334.2229	1718.4378	(97)
Space heating kWh	868.0446	571.2010	496.5045	319.1614	172.6543	0.0000	0.0000	0.0000	0.0000	254.3772	461.3696	733.7048	(98a)
Space heating requirement - total per year (kWh/year)												3877.0173	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	868.0446	571.2010	496.5045	319.1614	172.6543	0.0000	0.0000	0.0000	0.0000	254.3772	461.3696	733.7048	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3877.0173	
Space heating per m2										(98c) / (4) =		29.0805	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													326.3171 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	868.0446	571.2010	496.5045	319.1614	172.6543	0.0000	0.0000	0.0000	0.0000	254.3772	461.3696	733.7048	(98)
Space heating efficiency (main heating system 1)	326.3171	326.3171	326.3171	326.3171	326.3171	0.0000	0.0000	0.0000	0.0000	326.3171	326.3171	326.3171	(210)
Space heating fuel (main heating system)	266.0126	175.0447	152.1540	97.8071	52.9100	0.0000	0.0000	0.0000	0.0000	77.9540	141.3869	224.8441	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	283.2393	231.9580	198.5263	130.3684	92.0955	69.3086	67.5454	88.8940	128.2364	191.0304	244.3272	286.4814	(64)
Efficiency of water heater	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	172.6439	(216)
Fuel for water heating, kWh/month	164.0598	134.3563	114.9918	75.5129	53.3442	40.1454	39.1241	51.4898	74.2780	110.6500	141.5209	165.9377	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	34.4661	27.6500	24.8957	18.2397	14.0889	11.5107	12.8523	16.7059	21.6994	28.4707	32.1576	35.4240	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-50.1204	-64.3679	-96.5433	-113.7253	-119.3799	-109.6259	-107.4023	-101.8641	-90.6919	-77.4261	-53.6597	-41.2174	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1188.1133	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												172.6439	
Water heating fuel used												1165.4109	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												278.1611	(232)

Energy saving/generation technologies (Appendices M ,N and Q)

PV generation													-1026.0241 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													1685.6612 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1188.1133	27.6700	328.7510	(240)
Total CO2 associated with community systems			0.0000	(473)

Full SAP Calculation Printout



Water heating (other fuel)	1165.4109	27.6700	322.4692 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	27.6700	22.1360 (249)
Energy for lighting	278.1611	27.6700	76.9672 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1026.0241	27.6700	-283.9009
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-283.9009 (252)
Total energy cost			466.4225 (255)

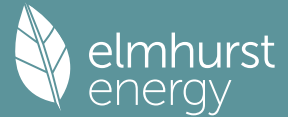
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1188.1133	0.1551	184.2180 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1165.4109	0.1468	171.1272 (264)
Space and water heating			355.3452 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	278.1611	0.1443	40.1472 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1026.0241	0.1347	-138.1614
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-138.1614 (269)
Total CO2, kg/year			268.4280 (272)

----- 13a. Primary energy - Individual heating systems including micro-CHP -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1188.1133	1.5740	1870.0713 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1165.4109	1.5432	1798.4877 (278)
Space and water heating			3668.5590 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	278.1611	1.5338	426.6527 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1026.0241	1.4977	-1536.6464
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1536.6464 (283)
Total Primary energy kWh/year			2679.5894 (286)

Full SAP Calculation Printout



Plot Reference	P2				Issued on Date	09/07/2026	
Assessment Reference	Design Stage- Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	2 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	82 B	DER	3.44	TER	7.69		
Environmental	96 A	% DER < TER				55.27	
CO ₂ Emissions (t/year)	0.54	DFEE	36.04	TFEE	37.07		
Compliance Check	See BREL	% DFEE < TFEE				2.78	
% DPER < TPER	10.60	DPER	35.97	TPER	40.23		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 431.2340 (5)

2. Ventilation rate

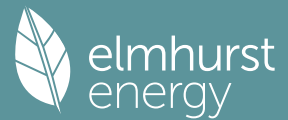
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 50.0000 / (5) = 0.1159 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3159 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2686 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3424	0.3357	0.3290	0.2954	0.2887	0.2551	0.2551	0.2484	0.2686	0.2887	0.3021	0.3156 (22b)
Effective ac	0.5586	0.5563	0.5541	0.5436	0.5417	0.5325	0.5325	0.5309	0.5361	0.5417	0.5456	0.5498 (25)

3. Heat losses and heat loss parameter

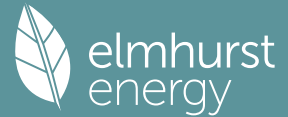
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144	0.0000	0.0000 (28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898	0.0000	0.0000 (29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167	9.0000	737.7300 (30)
Flat	8.9300		8.9300	0.1600	1.4288	9.0000	80.3700 (30)
Total net area of external elements Aum(A, m ²)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	92.0239		(33)
Main dwelling							
Internal Wall 1			305.5500			9.0000	2749.9500 (32c)
Internal Floor 1			81.9700			18.0000	1475.4600 (32d)
Internal Ceiling 1			81.9700			9.0000	737.7300 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5781.2400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.4466 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.9600	0.0470	1.0791	
E3 Sill				22.0600	0.0350	0.7721	

Full SAP Calculation Printout



E4 Jamb						49.9400	0.0470	2.3472					
E5 Ground floor (normal)						39.4000	0.0150	0.5910					
E6 Intermediate floor within a dwelling						36.3000	0.0100	0.3630					
E16 Corner (normal)						22.4000	0.0430	0.9632					
E17 Corner (inverted - internal area greater than external area)						2.4000	-0.0690	-0.1656					
E10 Eaves (insulation at ceiling level)						25.1500	0.0370	0.9305					
E12 Gable (insulation at ceiling level)						28.7200	0.2500	7.1800					
E14 Flat roof						8.9300	0.0800	0.7144					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												14.7749	(36)
Point Thermal bridges												0.0000	
Total fabric heat loss												106.7988	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	79.4958	79.1719	78.8544	77.3630	77.0839	75.7850	75.7850	75.5444	76.2853	77.0839	77.6484	78.2386	(38)
Average = Sum(39)m / 12 =	186.2947	185.9707	185.6532	184.1618	183.8828	182.5838	182.5838	182.3433	183.0842	183.8828	184.4473	185.0374	(39)
												184.1605	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0778	1.0759	1.0741	1.0654	1.0638	1.0563	1.0563	1.0549	1.0592	1.0638	1.0671	1.0705	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	
4. Water heating energy requirements (kWh/year)													
Assumed occupancy												2.9664	(42)
Hot water usage for mixer showers													
	83.2007	81.9504	80.1284	76.6423	74.0697	71.2007	69.5700	71.3782	73.3603	76.4407	80.0017	82.8819	(42a)
Hot water usage for baths													
	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189	(42b)
Hot water usage for other uses													
	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086	(42c)
Average daily hot water use (litres/day)												147.2264	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	160.1362	156.7750	152.6486	146.2947	141.1635	135.6357	133.4528	137.5607	141.9015	147.7124	154.1665	159.7095	(44)
Energy content (annual)	253.6165	223.2455	234.6152	200.2701	190.0333	166.7799	161.3996	170.3289	174.9787	200.4443	219.6384	250.0664	(45)
Distribution loss (46)m = 0.15 x (45)m													
	38.0425	33.4868	35.1923	30.0405	28.5050	25.0170	24.2099	25.5493	26.2468	30.0666	32.9458	37.5100	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.5400	(55)
Total storage loss													
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage													
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688	(64)
12Total per year (kWh/year)												2916.4130	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
	116.3294	103.1341	110.0115	97.5594	95.1880	86.4239	85.6673	88.6363	89.1500	98.6496	103.9994	115.1490	(65)
5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.6269	196.6583	177.6269	183.5478	177.6269	183.5478	177.6269	177.6269	183.5478	177.6269	183.5478	177.6269	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	344.4452	348.0195	339.0124	319.8375	295.6327	272.8835	257.6857	254.1114	263.1184	282.2933	306.4982	329.2474	(68)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	(71)
Water heating gains (Table 5)	156.3567	153.4733	147.8649	135.4992	127.9408	120.0332	115.1442	119.1348	123.8195	132.5936	144.4436	154.7702	(72)
Total internal gains	745.9245	765.6468	731.9998	706.3801	668.6960	643.9601	617.9524	618.3687	637.9813	660.0095	701.9852	729.1400	(73)
6. Solar gains													
[Jan]													
	Area												
	m2												
	Solar flux												
	Table 6a												
	W/m2												
	Specific data												
	or Table 6b												
	Specific data												
	or Table 6c												
	Access												
	factor												
	Table 6d												
	Gains												
	W												
Northeast	1.9900												(75)
Southeast	17.6000												(77)
Southwest	0.8000												(79)
Northwest	14.9400												(81)
Solar gains	286.3342	508.6630	751.5683	1024.4127	1232.4809	1260.9803	1200.1503	1039.2025	845.1543	577.1704	346.7739	242.5761	(83)

Full SAP Calculation Printout



Total gains 1032.2587 1274.3097 1483.5682 1730.7929 1901.1769 1904.9404 1818.1027 1657.5713 1483.1356 1237.1798 1048.7591 971.7161 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.6202	8.6352	8.6500	8.7200	8.7333	8.7954	8.7954	8.8070	8.7714	8.7333	8.7066	8.6788	21.0000 (85)
alpha	1.5747	1.5757	1.5767	1.5813	1.5822	1.5864	1.5864	1.5871	1.5848	1.5822	1.5804	1.5786	
util living area	0.8751	0.8319	0.7764	0.6875	0.5800	0.4612	0.3651	0.4037	0.5633	0.7375	0.8402	0.8846	(86)
Living	17.5400	17.9425	18.5248	19.2620	19.9062	20.3798	20.6063	20.5609	20.1734	19.3180	18.3008	17.4620	
Non living	16.0910	16.5741	17.2722	18.1487	18.8960	19.4281	19.6616	19.6230	19.2169	18.2352	17.0186	15.9998	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.2608	17.9425	18.5248	19.2620	19.9062	20.3798	20.6063	20.5609	20.1734	19.3180	18.3008	17.9680	(87)
Th 2	20.0190	20.0206	20.0221	20.0292	20.0305	20.0367	20.0367	20.0378	20.0343	20.0305	20.0278	20.0250	(88)
util rest of house	0.8655	0.8194	0.7595	0.6633	0.5456	0.4122	0.3005	0.3383	0.5161	0.7113	0.8262	0.8756	(89)
MIT 2	18.4087	16.5741	17.2722	18.1487	18.8960	19.4281	19.6616	19.6230	19.2169	18.2352	17.0186	16.7089	(90)
Living area fraction									fLA = Living area / (4) =				0.2092 (91)
MIT	18.5869	16.8604	17.5343	18.3816	19.1073	19.6272	19.8592	19.8192	19.4170	18.4617	17.2868	16.9723	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5869	16.8604	17.5343	18.3816	19.1073	19.6272	19.8592	19.8192	19.4170	18.4617	17.2868	16.9723	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8491	0.7669	0.7063	0.6153	0.5088	0.3895	0.2877	0.3221	0.4819	0.6596	0.7740	0.8389	(94)
Useful gains	876.4575	977.3057	1047.8375	1064.9676	967.3342	741.8985	522.9999	533.9348	714.6494	816.0093	811.7394	815.2212	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2661.5787	2224.2832	2048.5462	1746.1441	1362.0784	917.8841	595.0782	623.4661	973.4561	1445.6329	1878.9351	2363.3606	(97)
Space heating kWh	1328.1302	837.9689	744.5273	490.4471	293.6896	0.0000	0.0000	0.0000	0.0000	468.4399	768.3809	1151.8157	(98a)
Space heating requirement - total per year (kWh/year)												6083.3996	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1328.1302	837.9689	744.5273	490.4471	293.6896	0.0000	0.0000	0.0000	0.0000	468.4399	768.3809	1151.8157	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6083.3996	
Space heating per m2										(98c) / (4) =		35.1947	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)	0.0000 (201)
Efficiency of main space heating system 1 (in %)	1.0000 (202)
Efficiency of main space heating system 2 (in %)	312.0424 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (207)
	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1328.1302	837.9689	744.5273	490.4471	293.6896	0.0000	0.0000	0.0000	0.0000	468.4399	768.3809	1151.8157	(98)
Space heating efficiency (main heating system 1)	312.0424	312.0424	312.0424	312.0424	312.0424	0.0000	0.0000	0.0000	0.0000	312.0424	312.0424	312.0424	(210)
Space heating fuel (main heating system)	425.6249	268.5432	238.5981	157.1732	94.1185	0.0000	0.0000	0.0000	0.0000	150.1206	246.2424	369.1215	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688	(64)
Efficiency of water heater (217)m	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	(216)
Fuel for water heating, kWh/month	173.7234	153.4635	162.4810	141.3968	136.1035	121.5819	119.1621	124.4452	126.4328	142.2633	152.8563	171.6229	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	42.4244	34.0344	30.6442	22.4513	17.3420	14.1686	15.8200	20.5634	26.7098	35.0447	39.5829	43.6035	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1949.5424	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												169.0152	
Water heating fuel used												1725.5327	(219)
Space cooling fuel												0.0000	(221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	342.3891 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	4017.4642 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1949.5424	0.1547	301.5145 (261)
Total CO2 associated with community systems			0.0000 (262)
Water heating (other fuel)	1725.5327	0.1411	243.4992 (264)
Space and water heating			545.0137 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	342.3891	0.1443	49.4173 (268)
Total CO2, kg/year			594.4310 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1949.5424	1.5725	3065.6894 (275)
Total CO2 associated with community systems			0.0000 (276)
Water heating (other fuel)	1725.5327	1.5218	2625.9230 (278)
Space and water heating			5691.6124 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	342.3891	1.5338	525.1678 (282)
Total Primary energy kWh/year			6216.7802 (286)
Dwelling Primary energy Rate (DPER)			35.9700 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	431.2340 (5)

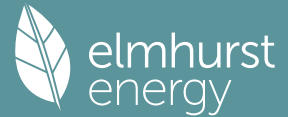
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0928 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000 (17)	
Infiltration rate		0.3428 (18)	
Number of sides sheltered		2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2913 (21)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3715	0.3642	0.3569	0.3205	0.3132	0.2768	0.2768	0.2695	0.2913	0.3132	0.3278	0.3423 (22b)
Effective ac	0.5690	0.5663	0.5637	0.5514	0.5490	0.5383	0.5383	0.5363	0.5424	0.5490	0.5537	0.5586 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.0200	1.0000	2.0200		(26)
TER Opening Type			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144		(28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898		(29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167		(30)
Flat	8.9300		8.9300	0.1100	0.9823		(30)
Total net area of external elements Aum(A, m2)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		91.5774		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

33.4466 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	22.9600	0.0500	1.1480
E2 Other lintels (including other steel lintels)	22.0600	0.0500	1.1030
E3 Sill	49.9400	0.0500	2.4970
E4 Jamb	39.4000	0.1600	6.3040
E5 Ground floor (normal)	36.3000	0.0000	0.0000
E6 Intermediate floor within a dwelling	22.4000	0.0900	2.0160
E16 Corner (normal)	2.4000	-0.0900	-0.2160
E17 Corner (inverted - internal area greater than external area)	25.1500	0.0600	1.5090
E10 Eaves (insulation at ceiling level)	28.7200	0.0600	1.7232
E12 Gable (insulation at ceiling level)	8.9300	0.0800	0.7144
E14 Flat roof			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

16.7986 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 108.3760 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	80.9717	80.5905	80.2168	78.4615	78.1331	76.6043	76.6043	76.3212	77.1932	78.1331	78.7975	79.4920
Heat transfer coeff	189.3477	188.9665	188.5928	186.8375	186.5091	184.9803	184.9803	184.6972	185.5692	186.5091	187.1735	187.8680
Average = Sum(39)m / 12 =												

186.8359 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0954	1.0932	1.0911	1.0809	1.0790	1.0702	1.0702	1.0685	1.0736	1.0790	1.0829	1.0869
HLP (average)												
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

1.0809 (40)

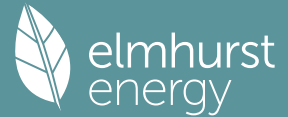
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9664 (42)
Hot water usage for mixer showers	73.9562	72.8448	71.2252	68.1265	65.8397	63.2895	61.8400	63.4473	65.2092	67.9473	71.1126	73.6728	(42a)
Hot water usage for baths	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189	(42b)
Hot water usage for other uses	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086	(42c)
Average daily hot water use (litres/day)													138.7033 (43)
Daily hot water use	150.8916	147.6694	143.7454	137.7789	132.9336	127.7245	125.7228	129.6298	133.7503	139.2190	145.2774	150.5004	(44)
Energy conte	238.9755	210.2792	220.9314	188.6124	178.9541	157.0522	152.0509	160.5088	164.9276	188.9188	206.9743	235.6472	(45)
Energy content (annual)													Total = Sum(45)m = 2303.8324
Distribution loss (46)m = 0.15 x (45)m	35.8463	31.5419	33.1397	28.2919	26.8431	23.5578	22.8076	24.0763	24.7391	28.3378	31.0461	35.3471	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	289.9016	256.2770	271.8575	237.8957	229.8802	206.3355	202.9769	211.4349	214.2108	239.8449	256.2576	286.5733	(62)
WWHRS	-33.8097	-29.9016	-31.3112	-25.9269	-24.1629	-20.6764	-19.3808	-20.6096	-21.3926	-25.2195	-28.5707	-33.1836	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	256.0919	226.3754	240.5463	211.9688	205.7173	185.6591	183.5961	190.8253	192.8182	214.6254	227.6869	253.3897	(64)
Total per year (kWh/year)													2589.3003 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	120.2002	106.7160	114.2005	102.1403	100.2431	91.6465	91.2978	94.1100	94.2650	103.5564	108.2456	119.0935	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	174.5875	193.2934	174.5875	180.4071	174.5875	180.4071	174.5875	174.5875	180.4071	174.5875	180.4071	174.5875	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	344.4452	348.0195	339.0124	319.8375	295.6327	272.8835	257.6857	254.1114	263.1184	282.2933	306.4982	329.2474	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	(71)
Water heating gains (Table 5)	161.5594	158.8036	153.4954	141.8615	134.7354	127.2868	122.7121	126.4920	130.9237	139.1887	150.3411	160.0720	(72)
Total internal gains	751.0878	770.6121	737.5909	712.6018	675.4512	648.0730	622.4809	622.6866	641.9449	666.5652	707.7420	734.4025	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	1.9900		11.2829		0.6300	0.7000	0.7700	6.8619	(75)
Southeast	17.6000		36.7938		0.6300	0.7000	0.7700	197.9063	(77)
Southwest	0.8000		36.7938		0.6300	0.7000	0.7700	8.9957	(79)
Northwest	14.9400		11.2829		0.6300	0.7000	0.7700	51.5163	(81)
Solar gains	265.2802	471.2613	696.3060	949.0883	1141.8573	1168.2611	1111.9040	962.7906	783.0106
Total gains	1016.3680	1241.8733	1433.8969	1661.6900	1817.3085	1816.3342	1734.3849	1585.4772	1424.9555

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.4812	8.4983	8.5152	8.5952	8.6103	8.6815	8.6815	8.6948	8.6539	8.6103	8.5797	8.5480
alpha	1.5654	1.5666	1.5677	1.5730	1.5740	1.5788	1.5788	1.5797	1.5769	1.5740	1.5720	1.5699
util living area	0.8786	0.8384	0.7864	0.7016	0.5972	0.4790	0.3813	0.4198	0.5789	0.7473	0.8451	0.8874 (86)
MIT	16.5661	17.0837	17.8504	18.8387	19.7167	20.3759	20.6967	20.6337	20.0963	18.9405	17.5857	16.4690 (87)
Th 2	20.0046	20.0064	20.0081	20.0164	20.0180	20.0253	20.0253	20.0266	20.0225	20.0180	20.0149	20.0116 (88)
util rest of house	0.8691	0.8261	0.7698	0.6777	0.5626	0.4288	0.3142	0.3523	0.5312	0.7214	0.8312	0.8786 (89)
MIT 2	15.0000	15.6211	16.5407	17.7153	18.7360	19.4772	19.8091	19.7549	19.1901	17.8614	16.2405	14.8850 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	15.3277	15.9271	16.8147	17.9503	18.9411	19.6652	19.9948	19.9388	19.3797	18.0872	16.5219	15.2164 (92)
Temperature adjustment												0.0000
adjusted MIT	15.3277	15.9271	16.8147	17.9503	18.9411	19.6652	19.9948	19.9388	19.3797	18.0872	16.5219	15.2164 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8026	0.7557	0.6999	0.6167	0.5192	0.4086	0.3120	0.3457	0.4954	0.6567	0.7618	0.8138 (94)
Useful gains	815.7291	938.4593	1003.5801	1024.7229	943.6155	742.0776	541.0720	548.1250	705.8807	788.9238	783.9400	780.5231 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2088.0610	2083.7482	1945.2693	1690.9403	1350.5368	936.9657	627.9628	653.6013	979.7513	1396.4276	1763.5260	2069.6312 (97)
Space heating kWh	946.6150	769.6341	700.6167	479.6765	302.7495	0.0000	0.0000	0.0000	0.0000	451.9828	705.3019	959.0964 (98a)
Space heating requirement - total per year (kWh/year)												5315.6730
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	946.6150	769.6341	700.6167	479.6765	302.7495	0.0000	0.0000	0.0000	0.0000	451.9828	705.3019	959.0964 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5315.6730
Space heating per m ²										(98c) / (4) =		30.7531 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	946.6150	769.6341	700.6167	479.6765	302.7495	0.0000	0.0000	0.0000	0.0000	451.9828	705.3019	959.0964 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	1025.5850	833.8398	759.0647	519.6929	328.0059	0.0000	0.0000	0.0000	0.0000	489.6888	764.1408	1039.1077 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	256.0919	226.3754	240.5463	211.9688	205.7173	185.6591	183.5961	190.8253	192.8182	214.6254	227.6869	253.3897 (64)
Efficiency of water heater	86.7175	86.5806	86.3120	85.8332	84.9249	79.8000	79.8000	79.8000	79.8000	85.6885	86.4214	79.8000 (216)
Fuel for water heating, kWh/month	295.3174	261.4619	278.6938	246.9543	242.2343	232.6555	230.0703	239.1295	241.6269	250.4717	263.4613	292.0743 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	36.2758	29.1018	26.2030	19.1974	14.8286	12.1151	13.5272	17.5831	22.8388	29.9657	33.8462	37.2841 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-76.4364	-103.6574	-143.3389	-154.7558	-161.5324	-148.7194	-146.6549	-140.8586	-130.1364	-115.1778	-82.4613	-66.5555 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-56.6298	-117.2759	-229.8499	-340.7246	-446.3953	-447.2110	-442.1464	-376.4104	-278.5132	-166.4299	-75.1570	-44.9433 (233b)

Full SAP Calculation Printout



Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													5759.1257	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													3074.1510	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													292.7668	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-4491.9717	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													4720.0718	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5759.1257	0.2100	1209.4164 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3074.1510	0.2100	645.5717 (264)
Space and water heating			1854.9881 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	292.7668	0.1443	42.2553 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1470.2850	0.1355	-199.1698
PV Unit electricity exported	-3021.6867	0.1263	-381.5686
Total			-580.7384 (269)
Total CO2, kg/year			1328.4343 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.6900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5759.1257	1.1300	6507.8120 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3074.1510	1.1300	3473.7906 (278)
Space and water heating			9981.6027 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	292.7668	1.5338	449.0555 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1470.2850	1.5007	-2206.4542
PV Unit electricity exported	-3021.6867	0.4635	-1400.6684
Total			-3607.1225 (283)
Total Primary energy kWh/year			6953.6365 (286)
Target Primary Energy Rate (TPER)			40.2300 (287)

Full SAP Calculation Printout



Plot Reference	P2			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	2, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	82 B	DER	3.44	TER	7.69
Environmental	96 A	% DER < TER			55.27
CO ₂ Emissions (t/year)	0.54	DFEE	36.04	TFEE	37.07
Compliance Check	See BREL	% DFEE < TFEE			2.78
% DPER < TPER	10.60	DPER	35.97	TPER	40.23
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 431.2340 (5)

2. Ventilation rate

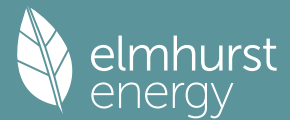
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0928 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2928 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2488 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3173	0.3111	0.3048	0.2737	0.2675	0.2364	0.2364	0.2302	0.2488	0.2675	0.2799	0.2924 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5503	0.5484	0.5465	0.5375	0.5358	0.5279	0.5279	0.5265	0.5310	0.5358	0.5392	0.5427 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144	0.0000	0.0000 (28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898	0.0000	0.0000 (29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167	9.0000	737.7300 (30)
Flat	8.9300		8.9300	0.1600	1.4288	9.0000	80.3700 (30)
Total net area of external elements Aum(A, m ²)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	92.0239	(33)
Main dwelling							
Internal Wall 1			305.5500			9.0000	2749.9500 (32c)
Internal Floor 1			81.9700			18.0000	1475.4600 (32d)
Internal Ceiling 1			81.9700			9.0000	737.7300 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 5781.2400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.4466 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)									22.9600	0.0470	1.0791	
E3 Sill									22.0600	0.0350	0.7721	
E4 Jamb									49.9400	0.0470	2.3472	
E5 Ground floor (normal)									39.4000	0.0150	0.5910	
E6 Intermediate floor within a dwelling									36.3000	0.0100	0.3630	
E16 Corner (normal)									22.4000	0.0430	0.9632	
E17 Corner (inverted - internal area greater than external area)									2.4000	-0.0690	-0.1656	
E10 Eaves (insulation at ceiling level)									25.1500	0.0370	0.9305	
E12 Gable (insulation at ceiling level)									28.7200	0.2500	7.1800	
E14 Flat roof									8.9300	0.0800	0.7144	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												14.7749 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 106.7988 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	78.3162	78.0381	77.7654	76.4849	76.2454	75.1301	75.1301	74.9235	75.5597	76.2454	76.7300	77.2367 (38)
Average = Sum(39)m / 12 =	185.1150	184.8369	184.5643	183.2838	183.0442	181.9289	181.9289	181.7224	182.3585	183.0442	183.5289	184.0356 (39)
												183.2826
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0710	1.0693	1.0678	1.0604	1.0590	1.0525	1.0525	1.0513	1.0550	1.0590	1.0618	1.0647 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.0604
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.9664 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189 (42b)
Hot water usage for other uses												
	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086 (42c)
Average daily hot water use (litres/day)												70.5181 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	76.9354	74.8246	72.5202	69.6524	67.0939	64.4350	63.8828	66.1825	68.5412	71.2716	74.1648	76.8275 (44)
Energy content (annual)	121.8469	106.5492	111.4609	95.3506	90.3212	79.2303	77.2607	81.9478	84.5181	96.7149	105.6614	120.2933 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1171.1555
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	103.5699	90.5669	94.7417	81.0481	76.7730	67.3458	65.6716	69.6556	71.8404	82.2077	89.8122	102.2493 (62)
WWHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	103.5699	90.5669	94.7417	81.0481	76.7730	67.3458	65.6716	69.6556	71.8404	82.2077	89.8122	102.2493 (64)
12Total per year (kWh/year)												995.4822 (64)
Electric shower(s)												995 (64)
	59.2266	52.7714	57.6243	54.9902	56.0221	53.4396	55.2209	56.0221	54.9902	57.6243	56.5408	59.2266 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												673.6990 (64a)
Heat gains from water heating, kWh/month												
	40.6991	35.8346	38.0915	34.0096	33.1988	30.1963	30.2231	31.4194	31.7076	34.9580	36.5882	40.3690 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.6269	196.6583	177.6269	183.5478	177.6269	177.6269	177.6269	177.6269	183.5478	177.6269	183.5478	177.6269 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	344.4452	348.0195	339.0124	319.8375	295.6327	272.8835	257.6857	254.1114	263.1184	282.2933	306.4982	329.2474 (68)
Pumps, fans	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550 (71)
Total internal gains	54.7031	53.3252	51.1983	47.2355	44.6220	41.9394	40.6225	42.2304	44.0384	46.9866	50.8170	54.2594 (72)
	644.2708	665.4987	635.3332	618.1164	585.3772	565.8663	543.4307	541.4643	558.2002	574.4024	608.3586	628.6292 (73)
6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	1.9900											7.4065 (75)
Southeast	17.6000											213.6131 (77)
Southwest	0.8000											9.7097 (79)
Northwest	14.9400											55.6049 (81)
Solar gains	286.3342	508.6630	751.5683	1024.4127	1232.4809	1260.9803	1200.1503	1039.2025	845.1543	577.1704	346.7739	242.5761 (83)
Total gains	930.6051	1174.1616	1386.9016	1642.5292	1817.8580	1826.8465	1743.5810	1580.6669	1403.3545	1151.5728	955.1325	871.2053 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)											
Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	8.6751	8.6882	8.7010	8.7618	8.7733	8.8271	8.8271	8.8371	8.8063	8.7733	8.7501
alpha	1.5783	1.5792	1.5801	1.5841	1.5849	1.5885	1.5885	1.5891	1.5871	1.5849	1.5833
util living area	0.8899	0.8467	0.7912	0.7013	0.5929	0.4732	0.3759	0.4168	0.5797	0.7551	0.8566
MIT	16.5012	17.0563	17.8545	18.8655	19.7480	20.3960	20.7079	20.6429	20.1059	18.9269	17.5330
Th 2	20.0246	20.0259	20.0272	20.0333	20.0345	20.0398	20.0398	20.0408	20.0377	20.0345	20.0322
util rest of house	0.8813	0.8350	0.7751	0.6777	0.5587	0.4238	0.3103	0.3504	0.5326	0.7300	0.8437
MIT 2	15.8687	16.4133	17.1949	18.1761	19.0122	19.6061	19.8691	19.8237	19.3636	18.2577	16.8959
Living area fraction	fLA = Living area / (4) =										
MIT	16.0010	16.5478	17.3329	18.3203	19.1661	19.7713	20.0446	19.9951	19.5189	18.3977	17.0292
Temperature adjustment	0.0000										
adjusted MIT	16.0010	16.5478	17.3329	18.3203	19.1661	19.7713	20.0446	19.9951	19.5189	18.3977	17.0292

8. Space heating requirement											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Utilisation	0.8305	0.7793	0.7186	0.6282	0.5242	0.4089	0.3106	0.3470	0.5040	0.6772	0.7892
Useful gains	772.8366	914.9913	996.6516	1031.9030	952.9252	747.0110	541.6391	548.5443	707.2705	779.8285	753.7493
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	2166.0282	2152.9404	1999.3585	1726.5903	1366.6351	940.8179	626.6645	653.3118	988.1826	1427.3281	1822.2962
Space heating kWh	1036.5346	831.9018	746.0139	500.1748	307.8001	0.0000	0.0000	0.0000	0.0000	481.7397	769.3538
Space heating requirement - total per year (kWh/year)	5728.8178										
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar heating contribution - total per year (kWh/year)	0.0000										
Space heating kWh	1036.5346	831.9018	746.0139	500.1748	307.8001	0.0000	0.0000	0.0000	0.0000	481.7397	769.3538
Space heating requirement after solar contribution - total per year (kWh/year)	5728.8178										
Space heating per m2	(98c) / (4) = 33.1433										

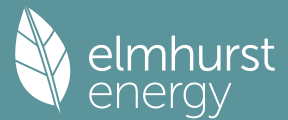
8c. Space cooling requirement											
Calculated for June, July and August. See Table 10b											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1710.1318	1346.2740	1381.0901	0.0000	0.0000	0.0000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6686	0.7227	0.6880	0.0000	0.0000	0.0000
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1143.3938	972.9083	950.1323	0.0000	0.0000	0.0000
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2053.7350	1959.8865	1773.0742	0.0000	0.0000	0.0000
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	655.4457	734.3118	612.2688	0.0000	0.0000	0.0000
Cooled fraction	fc = cooled area / (4) =										
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	163.8614	183.5779	153.0672	0.0000	0.0000	0.0000
Space cooling requirement	500.5066										
Energy for space heating	33.1433										
Energy for space cooling	2.8956										
Total	36.0389										
Fabric Energy Efficiency (DFEE)	36.0										

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics									
Main dwelling	Area (m2)		Storey height (m)			Volume (m3)			
Ground floor	90.8800 (1b)	x	2.4000 (2b)	=		218.1120 (1b) - (3b)			
First floor	81.9700 (1c)	x	2.6000 (2c)	=		213.1220 (1c) - (3c)			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500								
Dwelling volume	(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =					431.2340	(5)		

2. Ventilation rate											
m3 per hour											
Number of open chimneys	0 * 80 = 0.0000										
Number of open flues	0 * 20 = 0.0000										
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000										
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000										
Number of flues attached to other heater	0 * 35 = 0.0000										
Number of blocked chimneys	0 * 20 = 0.0000										
Number of intermittent extract fans	4 * 10 = 40.0000										
Number of passive vents	0 * 10 = 0.0000										

Full SAP Calculation Printout



Number of flueless gas fires

0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
40.0000 / (5) = 0.0928 (8)
Yes
Blower Door
5.0000 (17)
0.3428 (18)
2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2913 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3715	0.3642	0.3569	0.3205	0.3132	0.2768	0.2768	0.2695	0.2913	0.3132	0.3278	0.3423 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5690	0.5663	0.5637	0.5514	0.5490	0.5383	0.5383	0.5363	0.5424	0.5490	0.5537	0.5586 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.0200	1.0000	2.0200		(26)
TER Opening Type			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144		(28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898		(29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167		(30)
Flat	8.9300		8.9300	0.1100	0.9823		(30)
Total net area of external elements Aum(A, m2)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 91.5774		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 33.4466 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	22.9600	0.0500	1.1480
E2 Other lintels (including other steel lintels)	22.0600	0.0500	1.1030
E3 Sill	49.9400	0.0500	2.4970
E4 Jamb	39.4000	0.1600	6.3040
E5 Ground floor (normal)	36.3000	0.0000	0.0000
E6 Intermediate floor within a dwelling	22.4000	0.0900	2.0160
E16 Corner (normal)	2.4000	-0.0900	-0.2160
E17 Corner (inverted - internal area greater than external area)	25.1500	0.0600	1.5090
E10 Eaves (insulation at ceiling level)	28.7200	0.0600	1.7232
E12 Gable (insulation at ceiling level)	8.9300	0.0800	0.7144
E14 Flat roof			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 16.7986 (36)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 108.3760 (37)

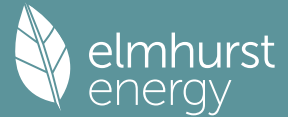
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	80.9717	80.5905	80.2168	78.4615	78.1331	76.6043	76.6043	76.3212	77.1932	78.1331	78.7975	79.4920 (38)
Heat transfer coeff	189.3477	188.9665	188.5928	186.8375	186.5091	184.9803	184.9803	184.6972	185.5692	186.5091	187.1735	187.8680 (39)
Average = Sum(39)m / 12 =												186.8359

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0954	1.0932	1.0911	1.0809	1.0790	1.0702	1.0702	1.0685	1.0736	1.0790	1.0829	1.0869 (40)
HLP (average)												1.0809
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9664 (42)
Hot water usage for mixer showers												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189	(42b)
Hot water usage for other uses												
45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086	(42c)
Average daily hot water use (litres/day)												70.5181 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	76.9354	74.8246	72.5202	69.6524	67.0939	64.4350	63.8828	66.1825	68.5412	71.2716	74.1648	76.8275 (44)
Energy conte	121.8469	106.5492	111.4609	95.3506	90.3212	79.2303	77.2607	81.9478	84.5181	96.7149	105.6614	120.2933 (45)
Energy content (annual)										Total = Sum(45)m =		1171.1555
Distribution loss (46)m = 0.15 x (45)m												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
103.5699	90.5669	94.7417	81.0481	76.7730	67.3458	65.6716	69.6556	71.8404	82.2077	89.8122	102.2493	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
103.5699	90.5669	94.7417	81.0481	76.7730	67.3458	65.6716	69.6556	71.8404	82.2077	89.8122	102.2493	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		995.4822 (64)
Electric shower(s)												995 (64)
59.2266	52.7714	57.6243	54.9902	56.0221	53.4396	55.2209	56.0221	54.9902	57.6243	56.5408	59.2266	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												673.6990 (64a)
Heat gains from water heating, kWh/month												

Full SAP Calculation Printout



40.6991 35.8346 38.0915 34.0096 33.1988 30.1963 30.2231 31.4194 31.7076 34.9580 36.5882 40.3690 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	174.5875	193.2934	174.5875	180.4071	174.5875	180.4071	174.5875	174.5875	180.4071	174.5875	180.4071	174.5875	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	344.4452	348.0195	339.0124	319.8375	295.6327	272.8835	257.6857	254.1114	263.1184	282.2933	306.4982	329.2474	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	(71)
Water heating gains (Table 5)	54.7031	53.3252	51.1983	47.2355	44.6220	41.9394	40.6225	42.2304	44.0384	46.9866	50.8170	54.2594	(72)
Total internal gains	641.2315	662.1337	632.2939	614.9758	582.3378	562.7256	540.3913	538.4250	555.0596	571.3631	605.2179	625.5899	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				1.9900	11.2829		0.6300		0.7000		0.7700		6.8619 (75)
Southeast				17.6000	36.7938		0.6300		0.7000		0.7700		197.9063 (77)
Southwest				0.8000	36.7938		0.6300		0.7000		0.7700		8.9957 (79)
Northwest				14.9400	11.2829		0.6300		0.7000		0.7700		51.5163 (81)
Solar gains	265.2802	471.2613	696.3060	949.0883	1141.8573	1168.2611	1111.9040	962.7906	783.0106	534.7314	321.2759	224.7396	(83)
Total gains	906.5117	1133.3949	1328.5998	1564.0640	1724.1951	1730.9867	1652.2953	1501.2156	1338.0702	1106.0944	926.4938	850.3295	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil _m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	8.4812	8.4983	8.5152	8.5952	8.6103	8.6815	8.6815	8.6948	8.6539	8.6103	8.5797	8.5480	
alpha	1.5654	1.5666	1.5677	1.5730	1.5740	1.5788	1.5788	1.5797	1.5769	1.5740	1.5720	1.5699	
util living area	0.8948	0.8549	0.8034	0.7181	0.6133	0.4939	0.3952	0.4361	0.5984	0.7678	0.8634	0.9035	(86)
MIT	16.4063	16.9423	17.7323	18.7546	19.6618	20.3459	20.6799	20.6118	20.0482	18.8447	17.4482	16.3060	(87)
Th 2	20.0046	20.0064	20.0081	20.0164	20.0180	20.0253	20.0253	20.0266	20.0225	20.0180	20.0149	20.0116	(88)
util rest of house	0.8863	0.8435	0.7876	0.6948	0.5789	0.4433	0.3266	0.3673	0.5509	0.7431	0.8508	0.8956	(89)
MIT 2	15.7641	16.2909	17.0661	18.0619	18.9246	19.5553	19.8384	19.7908	19.3044	18.1707	16.8035	15.6695	(90)
Living area fraction	15.8984	16.4272	17.2055	18.2068	19.0788	19.7207	20.0144	19.9625	19.4600	18.3117	16.9384	15.8027	(91)
MIT	15.8984	16.4272	17.2055	18.2068	19.0788	19.7207	20.0144	19.9625	19.4600	18.3117	16.9384	15.8027	(92)
Temperature adjustment	15.8984	16.4272	17.2055	18.2068	19.0788	19.7207	20.0144	19.9625	19.4600	18.3117	16.9384	15.8027	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8361	0.7880	0.7306	0.6434	0.5416	0.4260	0.3258	0.3624	0.5197	0.6891	0.7964	0.8473	(94)
Useful gains	757.9287	893.0932	970.6095	1006.2551	933.7606	737.3285	538.3048	543.9844	695.3731	762.1984	737.9057	720.4544	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2196.1357	2178.2472	2018.9743	1738.8575	1376.2178	947.2326	631.6044	657.9891	994.6582	1438.2933	1841.4884	2179.7747	(97)
Space heating kWh	1070.0260	863.6235	779.9835	527.4738	329.1882	0.0000	0.0000	0.0000	0.0000	503.0146	794.5796	1085.7343	(98a)
Space heating requirement - total per year (kWh/year)												5953.6233	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1070.0260	863.6235	779.9835	527.4738	329.1882	0.0000	0.0000	0.0000	0.0000	503.0146	794.5796	1085.7343	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5953.6233	
Space heating per m ²										(98c) / (4) =		34.4439	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1738.8152	1368.8545	1403.6990	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6461	0.7017	0.6668	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1123.4616	960.4854	935.9459	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1945.0960	1856.4541	1683.3880	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	591.5768	666.6007	556.0969	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	147.8942	166.6502	139.0242	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												453.5686	(107)
Energy for space heating												34.4439	(99)
Energy for space cooling												2.6241	(108)

Total
Fabric Energy Efficiency (TFEE)

37.0679 (109)
37.1 (109)

Full SAP Calculation Printout



Plot Reference	P2			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	2, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	82 B	DER	3.44	TER	7.69
Environmental	96 A	% DER < TER			55.27
CO ₂ Emissions (t/year)	0.54	DFEE	36.04	TFEE	37.07
Compliance Check	See BREL	% DFEE < TFEE			2.78
% DPER < TPER	10.60	DPER	35.97	TPER	40.23
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 431.2340 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1159 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3159 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2686 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3424	0.3357	0.3290	0.2954	0.2887	0.2551	0.2551	0.2484	0.2686	0.2887	0.3021	0.3156 (22b)
Effective ac	0.5586	0.5563	0.5541	0.5436	0.5417	0.5325	0.5325	0.5309	0.5361	0.5417	0.5456	0.5498 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144	0.0000	0.0000 (28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898	0.0000	0.0000 (29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167	9.0000	737.7300 (30)
Flat	8.9300		8.9300	0.1600	1.4288	9.0000	80.3700 (30)
Total net area of external elements Aum(A, m ²)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	92.0239		(33)
Main dwelling							
Internal Wall 1			305.5500			9.0000	2749.9500 (32c)
Internal Floor 1			81.9700			18.0000	1475.4600 (32d)
Internal Ceiling 1			81.9700			9.0000	737.7300 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5781.2400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.4466 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.9600	0.0470	1.0791	
E3 Sill				22.0600	0.0350	0.7721	

Full SAP Calculation Printout



E4 Jamb						49.9400	0.0470	2.3472				
E5 Ground floor (normal)						39.4000	0.0150	0.5910				
E6 Intermediate floor within a dwelling						36.3000	0.0100	0.3630				
E16 Corner (normal)						22.4000	0.0430	0.9632				
E17 Corner (inverted - internal area greater than external area)						2.4000	-0.0690	-0.1656				
E10 Eaves (insulation at ceiling level)						25.1500	0.0370	0.9305				
E12 Gable (insulation at ceiling level)						28.7200	0.2500	7.1800				
E14 Flat roof						8.9300	0.0800	0.7144				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											14.7749	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	106.7988 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	79.4958	79.1719	78.8544	77.3630	77.0839	75.7850	75.7850	75.5444	76.2853	77.0839	77.6484	78.2386 (38)
Average = Sum(39)m / 12 =	186.2947	185.9707	185.6532	184.1618	183.8828	182.5838	182.5838	182.3433	183.0842	183.8828	184.4473	185.0374 (39)
												184.1605
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0778	1.0759	1.0741	1.0654	1.0638	1.0563	1.0563	1.0549	1.0592	1.0638	1.0671	1.0705 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31
												1.0654

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.9664 (42)
Hot water usage for mixer showers												
	83.2007	81.9504	80.1284	76.6423	74.0697	71.2007	69.5700	71.3782	73.3603	76.4407	80.0017	82.8819 (42a)
Hot water usage for baths												
	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189 (42b)
Hot water usage for other uses												
	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086 (42c)
Average daily hot water use (litres/day)												147.2264 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	160.1362	156.7750	152.6486	146.2947	141.1635	135.6357	133.4528	137.5607	141.9015	147.7124	154.1665	159.7095 (44)
Energy content (annual)	253.6165	223.2455	234.6152	200.2701	190.0333	166.7799	161.3996	170.3289	174.9787	200.4443	219.6384	250.0664 (45)
Distribution loss (46)m = 0.15 x (45)m												
	38.0425	33.4868	35.1923	30.0405	28.5050	25.0170	24.2099	25.5493	26.2468	30.0666	32.9458	37.5100 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688 (64)
12Total per year (kWh/year)												2916.4130 (64)
Electric shower(s)												2916 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	116.3294	103.1341	110.0115	97.5594	95.1880	86.4239	85.6673	88.6363	89.1500	98.6496	103.9994	115.1490 (65)

5. Internal gains (see Table 5 and 5a)												

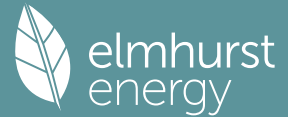
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	177.6269	196.6583	177.6269	183.5478	177.6269	177.6269	177.6269	177.6269	183.5478	177.6269	183.5478	177.6269 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	344.4452	348.0195	339.0124	319.8375	295.6327	272.8835	257.6857	254.1114	263.1184	282.2933	306.4982	329.2474 (68)
Pumps, fans	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550 (71)
Total internal gains	156.3567	153.4733	147.8649	135.4992	127.9408	120.0332	115.1442	119.1348	123.8195	132.5936	144.4436	154.7702 (72)
	745.9245	765.6468	731.9998	706.3801	668.6960	643.9601	617.9524	618.3687	637.9813	660.0095	701.9852	729.1400 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	1.9900											7.4065 (75)
Southeast	17.6000											213.6131 (77)
Southwest	0.8000											9.7097 (79)
Northwest	14.9400											55.6049 (81)

Solar gains	286.3342	508.6630	751.5683	1024.4127	1232.4809	1260.9803	1200.1503	1039.2025	845.1543	577.1704	346.7739	242.5761 (83)

Full SAP Calculation Printout



Total gains 1032.2587 1274.3097 1483.5682 1730.7929 1901.1769 1904.9404 1818.1027 1657.5713 1483.1356 1237.1798 1048.7591 971.7161 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.6202	8.6352	8.6500	8.7200	8.7333	8.7954	8.7954	8.8070	8.7714	8.7333	8.7066	8.6788	21.0000 (85)
alpha	1.5747	1.5757	1.5767	1.5813	1.5822	1.5864	1.5864	1.5871	1.5848	1.5822	1.5804	1.5786	
util living area	0.8751	0.8319	0.7764	0.6875	0.5800	0.4612	0.3651	0.4037	0.5633	0.7375	0.8402	0.8846	(86)
Living	17.5400	17.9425	18.5248	19.2620	19.9062	20.3798	20.6063	20.5609	20.1734	19.3180	18.3008	17.4620	
Non living	16.0910	16.5741	17.2722	18.1487	18.8960	19.4281	19.6616	19.6230	19.2169	18.2352	17.0186	15.9998	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.2608	17.9425	18.5248	19.2620	19.9062	20.3798	20.6063	20.5609	20.1734	19.3180	18.3008	17.9680	(87)
Th 2	20.0190	20.0206	20.0221	20.0292	20.0305	20.0367	20.0367	20.0378	20.0343	20.0305	20.0278	20.0250	(88)
util rest of house	0.8655	0.8194	0.7595	0.6633	0.5456	0.4122	0.3005	0.3383	0.5161	0.7113	0.8262	0.8756	(89)
MIT 2	18.4087	16.5741	17.2722	18.1487	18.8960	19.4281	19.6616	19.6230	19.2169	18.2352	17.0186	16.7089	(90)
Living area fraction									fLA = Living area / (4) =				0.2092 (91)
MIT	18.5869	16.8604	17.5343	18.3816	19.1073	19.6272	19.8592	19.8192	19.4170	18.4617	17.2868	16.9723	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5869	16.8604	17.5343	18.3816	19.1073	19.6272	19.8592	19.8192	19.4170	18.4617	17.2868	16.9723	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8491	0.7669	0.7063	0.6153	0.5088	0.3895	0.2877	0.3221	0.4819	0.6596	0.7740	0.8389	(94)
Useful gains	876.4575	977.3057	1047.8375	1064.9676	967.3342	741.8985	522.9999	533.9348	714.6494	816.0093	811.7394	815.2212	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2661.5787	2224.2832	2048.5462	1746.1441	1362.0784	917.8841	595.0782	623.4661	973.4561	1445.6329	1878.9351	2363.3606	(97)
Space heating kWh	1328.1302	837.9689	744.5273	490.4471	293.6896	0.0000	0.0000	0.0000	0.0000	468.4399	768.3809	1151.8157	(98a)
Space heating requirement - total per year (kWh/year)												6083.3996	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1328.1302	837.9689	744.5273	490.4471	293.6896	0.0000	0.0000	0.0000	0.0000	468.4399	768.3809	1151.8157	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6083.3996	
Space heating per m2										(98c) / (4) =		35.1947	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)	0.0000 (201)
Efficiency of main space heating system 1 (in %)	1.0000 (202)
Efficiency of main space heating system 2 (in %)	312.0424 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (207)
	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1328.1302	837.9689	744.5273	490.4471	293.6896	0.0000	0.0000	0.0000	0.0000	468.4399	768.3809	1151.8157	(98)
Space heating efficiency (main heating system 1)	312.0424	312.0424	312.0424	312.0424	312.0424	0.0000	0.0000	0.0000	0.0000	312.0424	312.0424	312.0424	(210)
Space heating fuel (main heating system)	425.6249	268.5432	238.5981	157.1732	94.1185	0.0000	0.0000	0.0000	0.0000	150.1206	246.2424	369.1215	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688	(64)
Efficiency of water heater (217)m	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	(216)
Fuel for water heating, kWh/month	173.7234	153.4635	162.4810	141.3968	136.1035	121.5819	119.1621	124.4452	126.4328	142.2633	152.8563	171.6229	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	42.4244	34.0344	30.6442	22.4513	17.3420	14.1686	15.8200	20.5634	26.7098	35.0447	39.5829	43.6035	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1949.5424	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												169.0152	
Water heating fuel used												1725.5327	(219)
Space cooling fuel												0.0000	(221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	342.3891 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	4017.4642 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1949.5424	0.1547	301.5145 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1725.5327	0.1411	243.4992 (264)
Space and water heating			545.0137 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	342.3891	0.1443	49.4173 (268)
Total CO2, kg/year			594.4310 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1949.5424	1.5725	3065.6894 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1725.5327	1.5218	2625.9230 (278)
Space and water heating			5691.6124 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	342.3891	1.5338	525.1678 (282)
Total Primary energy kWh/year			6216.7802 (286)
Dwelling Primary energy Rate (DPER)			35.9700 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	431.2340 (5)

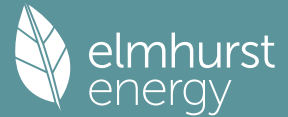
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0928 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000 (17)	
Infiltration rate		0.3428 (18)	
Number of sides sheltered		2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2913 (21)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3715	0.3642	0.3569	0.3205	0.3132	0.2768	0.2768	0.2695	0.2913	0.3132	0.3278	0.3423 (22b)
Effective ac	0.5690	0.5663	0.5637	0.5514	0.5490	0.5383	0.5383	0.5363	0.5424	0.5490	0.5537	0.5586 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.0200	1.0000	2.0200		(26)
TER Opening Type			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144		(28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898		(29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167		(30)
Flat	8.9300		8.9300	0.1100	0.9823		(30)
Total net area of external elements Aum(A, m2)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		91.5774		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

33.4466 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	22.9600	0.0500	1.1480
E3 Sill	22.0600	0.0500	1.1030
E4 Jamb	49.9400	0.0500	2.4970
E5 Ground floor (normal)	39.4000	0.1600	6.3040
E6 Intermediate floor within a dwelling	36.3000	0.0000	0.0000
E16 Corner (normal)	22.4000	0.0900	2.0160
E17 Corner (inverted - internal area greater than external area)	2.4000	-0.0900	-0.2160
E10 Eaves (insulation at ceiling level)	25.1500	0.0600	1.5090
E12 Gable (insulation at ceiling level)	28.7200	0.0600	1.7232
E14 Flat roof	8.9300	0.0800	0.7144

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

16.7986 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 108.3760 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	80.9717	80.5905	80.2168	78.4615	78.1331	76.6043	76.6043	76.3212	77.1932	78.1331	78.7975	79.4920
Heat transfer coeff	189.3477	188.9665	188.5928	186.8375	186.5091	184.9803	184.9803	184.6972	185.5692	186.5091	187.1735	187.8680
Average = Sum(39)m / 12 =												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0954	1.0932	1.0911	1.0809	1.0790	1.0702	1.0702	1.0685	1.0736	1.0790	1.0829	1.0869
HLP (average)												
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

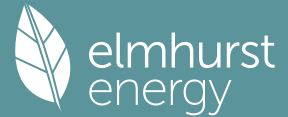
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9664 (42)
Hot water usage for mixer showers	73.9562	72.8448	71.2252	68.1265	65.8397	63.2895	61.8400	63.4473	65.2092	67.9473	71.1126	73.6728	(42a)
Hot water usage for baths	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189	(42b)
Hot water usage for other uses	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086	(42c)
Average daily hot water use (litres/day)													138.7033 (43)
Daily hot water use	150.8916	147.6694	143.7454	137.7789	132.9336	127.7245	125.7228	129.6298	133.7503	139.2190	145.2774	150.5004	(44)
Energy conte	238.9755	210.2792	220.9314	188.6124	178.9541	157.0522	152.0509	160.5088	164.9276	188.9188	206.9743	235.6472	(45)
Energy content (annual)										Total = Sum(45)m =		2303.8324	
Distribution loss (46)m = 0.15 x (45)m	35.8463	31.5419	33.1397	28.2919	26.8431	23.5578	22.8076	24.0763	24.7391	28.3378	31.0461	35.3471	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	289.9016	256.2770	271.8575	237.8957	229.8802	206.3355	202.9769	211.4349	214.2108	239.8449	256.2576	286.5733	(62)
WWHRS	-33.8097	-29.9016	-31.3112	-25.9269	-24.1629	-20.6764	-19.3808	-20.6096	-21.3926	-25.2195	-28.5707	-33.1836	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	256.0919	226.3754	240.5463	211.9688	205.7173	185.6591	183.5961	190.8253	192.8182	214.6254	227.6869	253.3897	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2589.3003	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	120.2002	106.7160	114.2005	102.1403	100.2431	91.6465	91.2978	94.1100	94.2650	103.5564	108.2456	119.0935	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	148.3187	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	174.5875	193.2934	174.5875	180.4071	174.5875	180.4071	174.5875	174.5875	180.4071	174.5875	180.4071	174.5875	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	344.4452	348.0195	339.0124	319.8375	295.6327	272.8835	257.6857	254.1114	263.1184	282.2933	306.4982	329.2474	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	37.8319	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	(71)
Water heating gains (Table 5)	161.5594	158.8036	153.4954	141.8615	134.7354	127.2868	122.7121	126.4920	130.9237	139.1887	150.3411	160.0720	(72)
Total internal gains	751.0878	770.6121	737.5909	712.6018	675.4512	648.0730	622.4809	622.6866	641.9449	666.5652	707.7420	734.4025	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	1.9900		11.2829		0.6300	0.7000	0.7700	6.8619	(75)
Southeast	17.6000		36.7938		0.6300	0.7000	0.7700	197.9063	(77)
Southwest	0.8000		36.7938		0.6300	0.7000	0.7700	8.9957	(79)
Northwest	14.9400		11.2829		0.6300	0.7000	0.7700	51.5163	(81)
Solar gains	265.2802	471.2613	696.3060	949.0883	1141.8573	1168.2611	1111.9040	962.7906	783.0106
Total gains	1016.3680	1241.8733	1433.8969	1661.6900	1817.3085	1816.3342	1734.3849	1585.4772	1424.9555

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.4812	8.4983	8.5152	8.5952	8.6103	8.6815	8.6815	8.6948	8.6539	8.6103	8.5797	8.5480
alpha	1.5654	1.5666	1.5677	1.5730	1.5740	1.5788	1.5788	1.5797	1.5769	1.5740	1.5720	1.5699
util living area	0.8786	0.8384	0.7864	0.7016	0.5972	0.4790	0.3813	0.4198	0.5789	0.7473	0.8451	0.8874 (86)
MIT	16.5661	17.0837	17.8504	18.8387	19.7167	20.3759	20.6967	20.6337	20.0963	18.9405	17.5857	16.4690 (87)
Th 2	20.0046	20.0064	20.0081	20.0164	20.0180	20.0253	20.0253	20.0266	20.0225	20.0180	20.0149	20.0116 (88)
util rest of house	0.8691	0.8261	0.7698	0.6777	0.5626	0.4288	0.3142	0.3523	0.5312	0.7214	0.8312	0.8786 (89)
MIT 2	15.0000	15.6211	16.5407	17.7153	18.7360	19.4772	19.8091	19.7549	19.1901	17.8614	16.2405	14.8850 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	15.3277	15.9271	16.8147	17.9503	18.9411	19.6652	19.9948	19.9388	19.3797	18.0872	16.5219	15.2164 (92)
Temperature adjustment	0.0000											
adjusted MIT	15.3277	15.9271	16.8147	17.9503	18.9411	19.6652	19.9948	19.9388	19.3797	18.0872	16.5219	15.2164 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8026	0.7557	0.6999	0.6167	0.5192	0.4086	0.3120	0.3457	0.4954	0.6567	0.7618	0.8138 (94)
Useful gains	815.7291	938.4593	1003.5801	1024.7229	943.6155	742.0776	541.0720	548.1250	705.8807	788.9238	783.9400	780.5231 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2088.0610	2083.7482	1945.2693	1690.9403	1350.5368	936.9657	627.9628	653.6013	979.7513	1396.4276	1763.5260	2069.6312 (97)
Space heating kWh	946.6150	769.6341	700.6167	479.6765	302.7495	0.0000	0.0000	0.0000	0.0000	451.9828	705.3019	959.0964 (98a)
Space heating requirement - total per year (kWh/year)	5315.6730											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	946.6150	769.6341	700.6167	479.6765	302.7495	0.0000	0.0000	0.0000	0.0000	451.9828	705.3019	959.0964 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	5315.6730											
Space heating per m ²	(98c) / (4) = 30.7531 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	946.6150	769.6341	700.6167	479.6765	302.7495	0.0000	0.0000	0.0000	0.0000	451.9828	705.3019	959.0964 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	1025.5850	833.8398	759.0647	519.6929	328.0059	0.0000	0.0000	0.0000	0.0000	489.6888	764.1408	1039.1077 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	256.0919	226.3754	240.5463	211.9688	205.7173	185.6591	183.5961	190.8253	192.8182	214.6254	227.6869	253.3897 (64)
Efficiency of water heater	86.7175	86.5806	86.3120	85.8332	84.9249	79.8000	79.8000	79.8000	79.8000	85.6885	86.4214	79.8000 (216)
Fuel for water heating, kWh/month	295.3174	261.4619	278.6938	246.9543	242.2343	232.6555	230.0703	239.1295	241.6269	250.4717	263.4613	292.0743 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	36.2758	29.1018	26.2030	19.1974	14.8286	12.1151	13.5272	17.5831	22.8388	29.9657	33.8462	37.2841 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-76.4364	-103.6574	-143.3389	-154.7558	-161.5324	-148.7194	-146.6549	-140.8586	-130.1364	-115.1778	-82.4613	-66.5555 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-56.6298	-117.2759	-229.8499	-340.7246	-446.3953	-447.2110	-442.1464	-376.4104	-278.5132	-166.4299	-75.1570	-44.9433 (233b)

Full SAP Calculation Printout



Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													5759.1257	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													3074.1510	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													292.7668	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-4491.9717	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													4720.0718	(238)

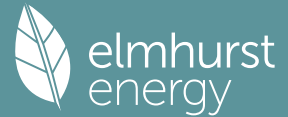
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5759.1257	0.2100	1209.4164 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3074.1510	0.2100	645.5717 (264)
Space and water heating			1854.9881 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	292.7668	0.1443	42.2553 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1470.2850	0.1355	-199.1698
PV Unit electricity exported	-3021.6867	0.1263	-381.5686
Total			-580.7384 (269)
Total CO2, kg/year			1328.4343 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.6900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5759.1257	1.1300	6507.8120 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3074.1510	1.1300	3473.7906 (278)
Space and water heating			9981.6027 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	292.7668	1.5338	449.0555 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1470.2850	1.5007	-2206.4542
PV Unit electricity exported	-3021.6867	0.4635	-1400.6684
Total			-3607.1225 (283)
Total Primary energy kWh/year			6953.6365 (286)
Target Primary Energy Rate (TPER)			40.2300 (287)

Full SAP Calculation Printout



Plot Reference	P2				Issued on Date	09/07/2026	
Assessment Reference	Design Stage- Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	2 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	82 B	DER	3.44	TER	7.69		
Environmental	96 A	% DER < TER				55.27	
CO ₂ Emissions (t/year)	0.54	DFEE	36.04	TFEE	37.07		
Compliance Check	See BREL	% DFEE < TFEE				2.78	
% DPER < TPER	10.60	DPER	35.97	TPER	40.23		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 431.2340 (5)

2. Ventilation rate

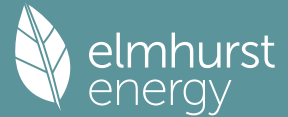
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 50.0000 / (5) = 0.1159 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3159 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2686 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3424	0.3357	0.3290	0.2954	0.2887	0.2551	0.2551	0.2484	0.2686	0.2887	0.3021	0.3156 (22b)
Effective ac	0.5586	0.5563	0.5541	0.5436	0.5417	0.5325	0.5325	0.5309	0.5361	0.5417	0.5456	0.5498 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144	0.0000	0.0000 (28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898	0.0000	0.0000 (29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167	9.0000	737.7300 (30)
Flat	8.9300		8.9300	0.1600	1.4288	9.0000	80.3700 (30)
Total net area of external elements Aum(A, m ²)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	92.0239		(33)
Main dwelling							
Internal Wall 1			305.5500			9.0000	2749.9500 (32c)
Internal Floor 1			81.9700			18.0000	1475.4600 (32d)
Internal Ceiling 1			81.9700			9.0000	737.7300 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5781.2400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							33.4466 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.9600	0.0470	1.0791	
E3 Sill				22.0600	0.0350	0.7721	

Full SAP Calculation Printout



E4 Jamb						49.9400	0.0470	2.3472				
E5 Ground floor (normal)						39.4000	0.0150	0.5910				
E6 Intermediate floor within a dwelling						36.3000	0.0100	0.3630				
E16 Corner (normal)						22.4000	0.0430	0.9632				
E17 Corner (inverted - internal area greater than external area)						2.4000	-0.0690	-0.1656				
E10 Eaves (insulation at ceiling level)						25.1500	0.0370	0.9305				
E12 Gable (insulation at ceiling level)						28.7200	0.2500	7.1800				
E14 Flat roof						8.9300	0.0800	0.7144				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											14.7749	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	106.7988 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	79.4958	79.1719	78.8544	77.3630	77.0839	75.7850	75.7850	75.5444	76.2853	77.0839	77.6484	78.2386 (38)
Average = Sum(39)m / 12 =	186.2947	185.9707	185.6532	184.1618	183.8828	182.5838	182.5838	182.3433	183.0842	183.8828	184.4473	185.0374 (39)
												184.1605
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0778	1.0759	1.0741	1.0654	1.0638	1.0563	1.0563	1.0549	1.0592	1.0638	1.0671	1.0705 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.9664 (42)
Hot water usage for mixer showers												
	83.2007	81.9504	80.1284	76.6423	74.0697	71.2007	69.5700	71.3782	73.3603	76.4407	80.0017	82.8819 (42a)
Hot water usage for baths												
	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189 (42b)
Hot water usage for other uses												
	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086 (42c)
Average daily hot water use (litres/day)												147.2264 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	160.1362	156.7750	152.6486	146.2947	141.1635	135.6357	133.4528	137.5607	141.9015	147.7124	154.1665	159.7095 (44)
Energy content (annual)	253.6165	223.2455	234.6152	200.2701	190.0333	166.7799	161.3996	170.3289	174.9787	200.4443	219.6384	250.0664 (45)
Distribution loss (46)m = 0.15 x (45)m												
	38.0425	33.4868	35.1923	30.0405	28.5050	25.0170	24.2099	25.5493	26.2468	30.0666	32.9458	37.5100 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688 (64)
												2916.4130 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	116.3294	103.1341	110.0115	97.5594	95.1880	86.4239	85.6673	88.6363	89.1500	98.6496	103.9994	115.1490 (65)

5. Internal gains (see Table 5 and 5a)												

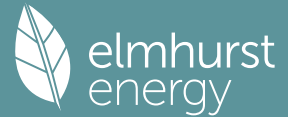
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825 (66)
	48.4687	43.0495	35.0102	26.5050	19.8128	16.7268	18.0739	23.4931	31.5324	40.0376	46.7298	49.8158 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	514.0973	519.4320	505.9887	477.3695	441.2428	407.2888	384.6055	379.2708	392.7141	421.3333	457.4600	491.4140 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550 (71)
Water heating gains (Table 5)												
	156.3567	153.4733	147.8649	135.4992	127.9408	120.0332	115.1442	119.1348	123.8195	132.5936	144.4436	154.7702 (72)
Total internal gains	834.0149	831.0470	803.9559	754.4657	704.0885	659.1409	632.9157	636.9908	663.1581	709.0567	763.7255	811.0921 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	1.9900				11.2829		0.6800		0.7000		0.7700	7.4065 (75)
Southeast	17.6000				36.7938		0.6800		0.7700		0.7700	213.6131 (77)
Southwest	0.8000				36.7938		0.6800		0.7700		0.7700	9.7097 (79)
Northwest	14.9400				11.2829		0.6800		0.7000		0.7700	55.6049 (81)

Solar gains	286.3342	508.6630	751.5683	1024.4127	1232.4809	1260.9803	1200.1503	1039.2025	845.1543	577.1704	346.7739	242.5761 (83)
Total gains	1120.3491	1339.7099	1555.5242	1778.8785	1936.5694	1920.1212	1833.0660	1676.1933	1508.3124	1286.2271	1110.4994	1053.6682 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.6202	8.6352	8.6500	8.7200	8.7333	8.7954	8.7954	8.8070	8.7714	8.7333	8.7066	8.6788
alpha	1.5747	1.5757	1.5767	1.5813	1.5822	1.5864	1.5864	1.5871	1.5848	1.5822	1.5804	1.5786
util living area	0.8619	0.8219	0.7650	0.6797	0.5743	0.4588	0.3628	0.4004	0.5581	0.7273	0.8292	0.8723 (86)
Living	17.6325	18.0035	18.5816	19.2907	19.9203	20.3833	20.6083	20.5640	20.1828	19.3525	18.3601	17.5509
Non living	16.2013	16.6463	17.3382	18.1809	18.9109	19.4314	19.6631	19.6255	19.2262	18.2739	17.0884	16.1059
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.3073	18.0035	18.5816	19.2907	19.9203	20.3833	20.6083	20.5640	20.1828	19.3525	18.3601	18.0442 (87)
Th 2	20.0190	20.0206	20.0221	20.0292	20.0305	20.0367	20.0367	20.0378	20.0343	20.0305	20.0278	20.0250 (88)
util rest of house	0.8515	0.8089	0.7476	0.6553	0.5398	0.4098	0.2985	0.3353	0.5108	0.7006	0.8145	0.8626 (89)
MIT 2	18.4539	16.6463	17.3382	18.1809	18.9109	19.4314	19.6631	19.6255	19.2262	18.2739	17.0884	16.7964 (90)
Living area fraction	18.6324	16.9302	17.5984	18.4131	19.1221	19.6305	19.8608	19.8218	19.4263	18.4996	17.3544	17.0574 (91)
MIT	18.6324	16.9302	17.5984	18.4131	19.1221	19.6305	19.8608	19.8218	19.4263	18.4996	17.3544	17.0574 (92)
Temperature adjustment	18.6324	16.9302	17.5984	18.4131	19.1221	19.6305	19.8608	19.8218	19.4263	18.4996	17.3544	0.0000
adjusted MIT	18.6324	16.9302	17.5984	18.4131	19.1221	19.6305	19.8608	19.8218	19.4263	18.4996	17.3544	17.0574 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8345	0.7561	0.6947	0.6079	0.5037	0.3874	0.2858	0.3195	0.4772	0.6495	0.7618	0.8245 (94)
Useful gains	934.8855	1012.9062	1080.6792	1081.4216	975.3957	743.8194	523.9512	535.4669	719.7473	835.3926	845.9239	868.7365 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2670.0484	2237.2666	2060.4448	1751.9410	1364.7889	918.4948	595.3723	623.9466	975.1636	1452.5933	1891.3973	2379.1090 (97)
Space heating kWh	1290.9612	822.7702	728.9456	482.7740	289.7085	0.0000	0.0000	0.0000	0.0000	459.1973	752.7409	1123.7171 (98a)
Space heating requirement - total per year (kWh/year)												5950.8149
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1290.9612	822.7702	728.9456	482.7740	289.7085	0.0000	0.0000	0.0000	0.0000	459.1973	752.7409	1123.7171 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5950.8149
Space heating per m2										(98c) / (4) =		34.4276 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												312.0424 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1290.9612	822.7702	728.9456	482.7740	289.7085	0.0000	0.0000	0.0000	0.0000	459.1973	752.7409	1123.7171 (98)
Space heating efficiency (main heating system 1)	312.0424	312.0424	312.0424	312.0424	312.0424	0.0000	0.0000	0.0000	0.0000	312.0424	312.0424	312.0424 (210)
Space heating fuel (main heating system)	413.7134	263.6725	233.6046	154.7142	92.8427	0.0000	0.0000	0.0000	0.0000	147.1586	241.2303	360.1168 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688 (64)
Efficiency of water heater (217)m	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152 (216)
Fuel for water heating, kWh/month	173.7234	153.4635	162.4810	141.3968	136.1035	121.5819	119.1621	124.4452	126.4328	142.2633	152.8563	171.6229 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	42.4244	34.0344	30.6442	22.4513	17.3420	14.1686	15.8200	20.5634	26.7098	35.0447	39.5829	43.6035 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1907.0531 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												169.0152
Water heating fuel used												1725.5327 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:
 Total electricity for the above, kWh/year 0.0000 (231)
 Electricity for lighting (calculated in Appendix L) 342.3891 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 3974.9749 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1907.0531	16.4900	314.4731 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1725.5327	16.4900	284.5403 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	342.3891	16.4900	56.4600 (250)
Additional standing charges			0.0000 (251)
Total energy cost			655.4734 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.3600 (256)
 Energy cost factor (ECF) 1.0832 (257)

$$[(255) \times (256)] / [(4) + 45.0] = 82.4417$$

 SAP value 82 (258)
 SAP rating (Section 12) B
 SAP band B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1907.0531	0.1546	294.8821 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1725.5327	0.1411	243.4992 (264)
Space and water heating			538.3813 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	342.3891	0.1443	49.4173 (268)
Total CO2, kg/year			587.7987 (272)
CO2 emissions per m2			3.4000 (273)
EI value			96.3844
EI rating			96 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
 CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

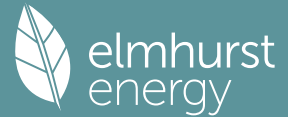
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 431.2340 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1159 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3159 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.2686 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000	(22)
Adj infilt rate	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750	(22a)
Effective ac	0.3760	0.3424	0.3223	0.2954	0.3088	0.2820	0.2887	0.2753	0.2954	0.3223	0.3223	0.3424	(22b)
	0.5707	0.5586	0.5519	0.5436	0.5477	0.5398	0.5417	0.5379	0.5436	0.5519	0.5519	0.5586	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Solid Door			2.0200	1.0000	2.0200			(26)
Windows			35.3300	1.1450	40.4542			(27)
Heatloss Floor 1			90.8800	0.1300	11.8144	0.0000	0.0000	(28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898	0.0000	0.0000	(29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167	9.0000	737.7300	(30)
Flat	8.9300		8.9300	0.1600	1.4288	9.0000	80.3700	(30)
Total net area of external elements Aum(A, m2)			370.7400					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	92.0239		(33)
Main dwelling								
Internal Wall 1			305.5500			9.0000	2749.9500	(32c)
Internal Floor 1			81.9700			18.0000	1475.4600	(32d)
Internal Ceiling 1			81.9700			9.0000	737.7300	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5781.2400 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 33.4466 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	22.9600	0.0470	1.0791
E2 Other lintels (including other steel lintels)	22.0600	0.0350	0.7721
E3 Sill	49.9400	0.0470	2.3472
E4 Jamb	39.4000	0.0150	0.5910
E5 Ground floor (normal)	36.3000	0.0100	0.3630
E6 Intermediate floor within a dwelling	22.4000	0.0430	0.9632
E16 Corner (normal)	2.4000	-0.0690	-0.1656
E17 Corner (inverted - internal area greater than external area)	25.1500	0.0370	0.9305
E10 Eaves (insulation at ceiling level)	28.7200	0.2500	7.1800
E12 Gable (insulation at ceiling level)	8.9300	0.0800	0.7144
E14 Flat roof			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.7749 (36)

Point Thermal Bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 106.7988 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	81.2117	79.4958	78.5433	77.3630	77.9403	76.8113	77.0839	76.5451	77.3630	78.5433	78.5433	79.4958	(38)
Average = Sum(39)m / 12 =	188.0106	186.2947	185.3421	184.1618	184.7391	183.6102	183.8828	183.3440	184.1618	185.3421	185.3421	186.2947	(39)
												185.0438	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0877	1.0778	1.0723	1.0654	1.0688	1.0623	1.0638	1.0607	1.0654	1.0723	1.0723	1.0778	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9664 (42)
Hot water usage for mixer showers													
Hot water usage for baths	83.2007	81.9504	80.1284	76.6423	74.0697	71.2007	69.5700	71.3782	73.3603	76.4407	80.0017	82.8819	(42a)
Hot water usage for other uses	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189	(42b)
Average daily hot water use (litres/day)	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086	(42c)
												147.2264	(43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	160.1362	156.7750	152.6486	146.2947	141.1635	135.6357	133.4528	137.5607	141.9015	147.7124	154.1665	159.7095	(44)
Energy content (annual)	253.6165	223.2455	234.6152	200.2701	190.0333	166.7799	161.3996	170.3289	174.9787	200.4443	219.6384	250.0664	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU loss):	38.0425	33.4868	35.1923	30.0405	28.5050	25.0170	24.2099	25.5493	26.2468	30.0666	32.9458	37.5100	(46)

Store volume 200.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.0000 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.5400 (55)

Total storage loss													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	(56)
If cylinder contains dedicated solar storage													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688	(64)
												2916.4130	(64)

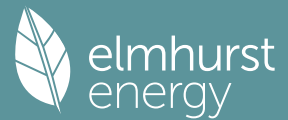
Electric shower(s) 0.0000 (64a)

0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month													
116.3294	103.1341	110.0115	97.5594	95.1880	86.4239	85.6673	88.6363	89.1500	98.6496	103.9994	115.1490		(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.4687	43.0495	35.0102	26.5050	19.8128	16.7268	18.0739	23.4931	31.5324	40.0376	46.7298	49.8158 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	514.0973	519.4320	505.9887	477.3695	441.2428	407.2888	384.6055	379.2708	392.7141	421.3333	457.4600	491.4140 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550 (71)
Water heating gains (Table 5)	156.3567	153.4733	147.8649	135.4992	127.9408	120.0332	115.1442	119.1348	123.8195	132.5936	144.4436	154.7702 (72)
Total internal gains	834.0149	831.0470	803.9559	754.4657	704.0885	659.1409	632.9157	636.9908	663.1581	709.0567	763.7255	811.0921 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W		

Northeast				1.9900	15.4678		0.6800		0.7000		0.7700		10.1537 (75)		
Southeast				17.6000	47.5950		0.6800		0.7000		0.7700		276.3211 (77)		
Southwest				0.8000	47.5950		0.6800		0.7000		0.7700		12.5601 (79)		
Northwest				14.9400	15.4678		0.6800		0.7000		0.7700		76.2289 (81)		

Solar gains				375.2638	564.7355	836.9277	1188.6988	1395.3149	1538.4054	1446.2938	1255.1976	1011.2319	685.0944	438.1912	305.8350 (83)
Total gains				1209.2787	1395.7825	1640.8836	1943.1645	2099.4034	2197.5464	2079.2095	1892.1883	1674.3900	1394.1510	1201.9167	1116.9271 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.5415	8.6202	8.6645	8.7200	8.6928	8.7462	8.7333	8.7589	8.7200	8.6645	8.6645	8.6202
alpha	1.5694	1.5747	1.5776	1.5813	1.5795	1.5831	1.5822	1.5839	1.5813	1.5776	1.5776	1.5747
util living area	0.8332	0.8000	0.7351	0.6361	0.5182	0.3859	0.3001	0.3030	0.4727	0.6592	0.7850	0.8448 (86)
Living	18.0616	18.2987	18.8581	19.5241	20.1236	20.5185	20.6767	20.6862	20.4022	19.7555	18.8533	18.0420
Non living	16.7164	17.0010	17.6678	18.4502	19.1335	19.5617	19.7158	19.7294	19.4539	18.7383	17.6780	16.6989
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.5233	18.2987	18.8581	19.5241	20.1236	20.5185	20.6767	20.6862	20.4022	19.7555	18.8533	18.4652 (87)
Th 2	20.0109	20.0190	20.0235	20.0292	20.0264	20.0318	20.0305	20.0330	20.0292	20.0235	20.0235	20.0190 (88)
util rest of house	0.8200	0.7849	0.7152	0.6090	0.4799	0.3348	0.2358	0.2326	0.4174	0.6240	0.7652	0.8322 (89)
MIT 2	18.6600	17.0010	17.6678	18.4502	19.1335	19.5617	19.7158	19.7294	19.4539	18.7383	17.6780	17.2838 (90)
Living area fraction	18.8406	17.2725	17.9168	18.6749	19.3406	19.7619	19.9168	19.9296	19.6523	18.9511	17.9239	17.5310 (92)
MIT	18.8406	17.2725	17.9168	18.6749	19.3406	19.7619	19.9168	19.9296	19.6523	18.9511	17.9239	17.5310 (92)
Temperature adjustment	18.8406	17.2725	17.9168	18.6749	19.3406	19.7619	19.9168	19.9296	19.6523	18.9511	17.9239	17.5310 (93)

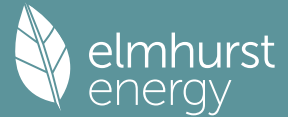
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8021	0.7314	0.6637	0.5659	0.4502	0.3196	0.2278	0.2246	0.3937	0.5787	0.7116	0.7915 (94)
Useful gains	969.9142	1020.9369	1089.0036	1099.6270	945.2465	702.3537	473.5977	424.9992	659.1956	806.7430	855.2845	884.0236 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	2470.5735	2118.6311	1949.2144	1671.2428	1245.2535	819.2454	517.9592	463.7785	819.9448	1251.2595	1691.0397	2166.7845 (97)
Space heating kWh	1116.4905	737.6505	639.9968	411.5634	223.2052	0.0000	0.0000	0.0000	0.0000	330.7203	601.7437	954.3741 (98a)
Space heating requirement - total per year (kWh/year)												5015.7446
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1116.4905	737.6505	639.9968	411.5634	223.2052	0.0000	0.0000	0.0000	0.0000	330.7203	601.7437	954.3741 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5015.7446
Space heating per m2										(98c) / (4) =		29.0179 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												311.7833 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1116.4905	737.6505	639.9968	411.5634	223.2052	0.0000	0.0000	0.0000	0.0000	330.7203	601.7437	954.3741 (98)
Space heating efficiency (main heating system 1)	311.7833	311.7833	311.7833	311.7833	311.7833	0.0000	0.0000	0.0000	0.0000	311.7833	311.7833	311.7833 (210)
Space heating fuel (main heating system)	358.0982	236.5907	205.2697	132.0030	71.5898	0.0000	0.0000	0.0000	0.0000	106.0737	193.0006	306.1017 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)												

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	293.6189	259.3767	274.6176	238.9821	230.0357	205.4919	201.4020	210.3313	213.6907	240.4467	258.3504	290.0688	(64)
Efficiency of water heater													(216)
(217)m	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	(217)
Fuel for water heating, kWh/month	173.7927	153.5248	162.5459	141.4533	136.1579	121.6304	119.2096	124.4949	126.4833	142.3201	152.9173	171.6914	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	42.4244	34.0344	30.6442	22.4513	17.3420	14.1686	15.8200	20.5634	26.7098	35.0447	39.5829	43.6035	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1608.7276	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												168.9478	
Water heating fuel used												1726.2217	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												342.3891	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3677.3384	(238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1608.7276	27.6700	445.1349	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1726.2217	27.6700	477.6455	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	342.3891	27.6700	94.7391	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1017.5195	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1608.7276	0.1550	249.4208	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1726.2217	0.1411	243.5964	(264)
Space and water heating			493.0172	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	342.3891	0.1443	49.4173	(268)
Total CO2, kg/year			542.4345	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1608.7276	1.5740	2532.0610	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1726.2217	1.5218	2626.9714	(278)
Space and water heating			5159.0325	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	342.3891	1.5338	525.1678	(282)
Total Primary energy kWh/year			5684.2003	(286)

SAP 10 EPC IMPROVEMENTS

Design Stage- Triple Glazed

Current energy efficiency rating: B 82
Current environmental impact rating: A 96

Full SAP Calculation Printout



N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:
N Solar water heating
U Solar photovoltaic panels

SAP change
+ 1.5
+ 4.3

Cost change
-£ 120
-£ 297

CO2 change
-55 kg (10.1%)
-144 kg (29.6%)

Recommended measures
Solar water heating
Solar photovoltaic panels

Typical annual savings
£120
£297
£417

Energy efficiency
B 84
B 88

Environmental impact
A 97
A 97

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 596 TEST (30 Jun 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current £1018	Potential £897	Saving £120
Electricity			
Space heating	£445	£468	-£22
Water heating	£478	£335	£143
Lighting	£95	£95	£0
Generated (PV)	-£0	-£297	£297
Total cost of fuels	£1018	£600	£417
Total cost of uses	£1018	£601	£418
Delivered energy	21 kWh/m²	13 kWh/m²	9 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.3 tonnes	0.2 tonnes
CO2 emissions per m²	3 kg/m²	2 kg/m²	1 kg/m²
Primary energy	33 kWh/m²	20 kWh/m²	13 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling			
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	431.2340 (5)

2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1159 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3159 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2686 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3424	0.3357	0.3290	0.2954	0.2887	0.2551	0.2551	0.2484	0.2686	0.2887	0.3021	0.3156 (22b)
Effective ac	0.5586	0.5563	0.5541	0.5436	0.5417	0.5325	0.5325	0.5309	0.5361	0.5417	0.5456	0.5498 (25)

3. Heat losses and heat loss parameter

Element	Gross m²	Openings m²	NetArea m²	U-value W/m²K	A x U W/K	K-value kJ/m²K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144	0.0000	(28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898	0.0000	(29a)

Full SAP Calculation Printout



External Roof 1	81.9700	81.9700	0.1100	9.0167	9.0000	737.7300	(30)
Flat	8.9300	8.9300	0.1600	1.4288	9.0000	80.3700	(30)
Total net area of external elements Aum(A, m2)		370.7400					(31)
Fabric heat loss, W/K = Sum (A x U)		(26)...(30) + (32) =	92.0239				(33)
Main dwelling							
Internal Wall 1		305.5500			9.0000	2749.9500	(32c)
Internal Floor 1		81.9700			18.0000	1475.4600	(32d)
Internal Ceiling 1		81.9700			9.0000	737.7300	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5781.2400 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 33.4466 (35)

List of Thermal Bridges							
K1 Element	Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)	22.9600	0.0470	1.0791				
E3 Sill	22.0600	0.0350	0.7721				
E4 Jamb	49.9400	0.0470	2.3472				
E5 Ground floor (normal)	39.4000	0.0150	0.5910				
E6 Intermediate floor within a dwelling	36.3000	0.0100	0.3630				
E16 Corner (normal)	22.4000	0.0430	0.9632				
E17 Corner (inverted - internal area greater than external area)	2.4000	-0.0690	-0.1656				
E10 Eaves (insulation at ceiling level)	25.1500	0.0370	0.9305				
E12 Gable (insulation at ceiling level)	28.7200	0.2500	7.1800				
E14 Flat roof	8.9300	0.0800	0.7144				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.7749	(36)			
Point Thermal bridges			0.0000	(36a)			
Total fabric heat loss			106.7988	(33) + (36) + (36a) =			(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	79.4958	79.1719	78.8544	77.3630	77.0839	75.7850	75.7850	75.5444	76.2853	77.0839	77.6484	78.2386	(38)
Average = Sum(39)m / 12 =	186.2947	185.9707	185.6532	184.1618	183.8828	182.5838	182.5838	182.3433	183.0842	183.8828	184.4473	185.0374	(39)
												184.1605	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0778	1.0759	1.0741	1.0654	1.0638	1.0563	1.0563	1.0549	1.0592	1.0638	1.0671	1.0705	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

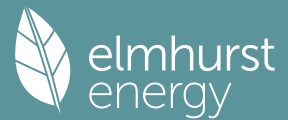
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9664	(42)
Hot water usage for mixer showers														
Hot water usage for baths														
Hot water usage for other uses														
Average daily hot water use (litres/day)													45.0086	(42c)
													147.2264	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	160.1362	156.7750	152.6486	146.2947	141.1635	135.6357	133.4528	137.5607	141.9015	147.7124	154.1665	159.7095	(44)	
Energy content (annual)	253.6165	223.2455	234.6152	200.2701	190.0333	166.7799	161.3996	170.3289	174.9787	200.4443	219.6384	250.0664	(45)	
Distribution loss (46)m = 0.15 x (45)m														
Water storage loss (or HIU loss):	38.0425	33.4868	35.1923	30.0405	28.5050	25.0170	24.2099	25.5493	26.2468	30.0666	32.9458	37.5100	(46)	
Store volume													200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.5400	(55)
Total storage loss														
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)	
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(57)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(58)	
Total heat required for water heating calculated for each month	293.6189	259.3767	273.2219	232.2285	217.2413	192.8852	188.3751	198.2349	208.2879	239.0509	258.3504	290.0688	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Aperture area of solar collector													3.0000	(H1)
Zero-loss collector efficiency													0.8000	(H2)
Collector linear heat loss coefficient													1.8000	(H3)
Collector 2nd order heat loss coefficient													0.0000	(H4)
Collector loop efficiency													0.9000	(H5)
Incidence angle modifier													1.0000	(H6)
Overshading factor													0.8000	(H8)
Overall heat loss coefficient of system													6.5000	(H10)
Heat loss coefficient of collector loop													3.9667	(H11)
Dedicated solar storage volume													75.0000	(H12)
Effective solar volume													75.0000	(H14)
Reference volume													225.0000	(H15)
Storage tank correction coefficient													1.3161	(H16)
Heat delivered to hot water													630.3779	(H24)
Heat delivered to space heating													0.0000	(H29)
Solar input													630.3779	
Solar input	-0.0000	-16.1921	-58.8790	-81.2827	-106.5756	-98.1307	-97.3055	-84.9268	-58.3433	-28.7423	-0.0000	-0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	293.6189	243.1846	214.3429	150.9459	110.6657	94.7545	91.0696	113.3081	149.9446	210.3086	258.3504	290.0688	(64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month	116.3294	103.1341	108.8949	92.1565	84.9525	76.3385	75.2457	78.9591	84.8277	97.5331	103.9994	115.1490	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	(66)	

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	48.4687	43.0495	35.0102	26.5050	19.8128	16.7268	18.0739	23.4931	31.5324	40.0376	46.7298	49.8158 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	514.0973	519.4320	505.9887	477.3695	441.2428	407.2888	384.6055	379.2708	392.7141	421.3333	457.4600	491.4140 (68)
Pumps, fans	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550 (71)
Total internal gains	156.3567	153.4733	146.3641	127.9952	114.1835	106.0258	101.1367	106.1279	117.8163	131.0928	144.4436	154.7702 (72)
	834.0149	831.0470	802.4551	746.9617	690.3312	645.1335	618.9082	623.9839	657.1549	707.5559	763.7255	811.0921 (73)

6. Solar gains

[Jan]													
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W

Northeast				1.9900	11.2829		0.6800		0.7000		0.7700		7.4065 (75)
Southeast				17.6000	36.7938		0.6800		0.7000		0.7700		213.6131 (77)
Southwest				0.8000	36.7938		0.6800		0.7000		0.7700		9.7097 (79)
Northwest				14.9400	11.2829		0.6800		0.7000		0.7700		55.6049 (81)

Solar gains	286.3342	508.6630	751.5683	1024.4127	1232.4809	1260.9803	1200.1503	1039.2025	845.1543	577.1704	346.7739	242.5761	(83)
Total gains	1120.3491	1339.7099	1554.0234	1771.3745	1922.8120	1906.1137	1819.0586	1663.1864	1502.3092	1284.7263	1110.4994	1053.6682	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.6202	8.6352	8.6500	8.7200	8.7333	8.7954	8.7954	8.8070	8.7714	8.7333	8.7066	8.6788
alpha	1.5747	1.5757	1.5767	1.5813	1.5822	1.5864	1.5864	1.5871	1.5848	1.5822	1.5804	1.5786
util living area	0.8619	0.8219	0.7653	0.6809	0.5765	0.4610	0.3649	0.4027	0.5593	0.7276	0.8292	0.8723 (86)
Living	17.6325	18.0035	18.5804	19.2863	19.9148	20.3801	20.6065	20.5618	20.1806	19.3514	18.3601	17.5509
Non living	16.2013	16.6463	17.3369	18.1759	18.9051	19.4284	19.6617	19.6237	19.2240	18.2728	17.0884	16.1059
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.3073	18.0035	18.5804	19.2863	19.9148	20.3801	20.6065	20.5618	20.1806	19.3514	18.3601	18.0442 (87)
Th 2	20.0190	20.0206	20.0221	20.0292	20.0305	20.0367	20.0367	20.0378	20.0343	20.0305	20.0278	20.0250 (88)
util rest of house	0.8515	0.8089	0.7479	0.6565	0.5420	0.4120	0.3003	0.3374	0.5120	0.7009	0.8145	0.8626 (89)
MIT 2	18.4539	16.6463	17.3369	18.1759	18.9051	19.4284	19.6617	19.6237	19.2240	18.2728	17.0884	16.7964 (90)
Living area fraction	18.6324	16.9302	17.5970	18.4082	19.1164	19.6275	19.8593	19.8200	19.4241	18.4984	17.3544	17.0574 (92)
MIT	18.6324	16.9302	17.5970	18.4082	19.1164	19.6275	19.8593	19.8200	19.4241	18.4984	17.3544	17.0574 (93)
Temperature adjustment	18.6324	16.9302	17.5970	18.4082	19.1164	19.6275	19.8593	19.8200	19.4241	18.4984	17.3544	17.0574 (93)
adjusted MIT	18.6324	16.9302	17.5970	18.4082	19.1164	19.6275	19.8593	19.8200	19.4241	18.4984	17.3544	17.0574 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8345	0.7561	0.6950	0.6091	0.5057	0.3893	0.2875	0.3213	0.4783	0.6498	0.7618	0.8245 (94)
Ext temp.	934.8855	1012.9062	1080.0058	1078.8816	972.2834	742.0478	523.0611	534.3998	718.5416	834.8088	845.9239	868.7365 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	2670.0484	2237.2666	2060.2011	1751.0474	1363.7434	917.9316	595.0971	623.6120	974.7602	1452.3840	1891.3973	2379.1090 (97)
Space heating requirement - total per year (kWh/year)	1290.9612	822.7702	729.2653	483.9594	291.2463	0.0000	0.0000	0.0000	0.0000	459.4759	752.7409	1123.7171 (98a)
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	1290.9612	822.7702	729.2653	483.9594	291.2463	0.0000	0.0000	0.0000	0.0000	459.4759	752.7409	1123.7171 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1290.9612	822.7702	729.2653	483.9594	291.2463	0.0000	0.0000	0.0000	0.0000	459.4759	752.7409	1123.7171 (98c)
Space heating per m2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	312.0424 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	1290.9612	822.7702	729.2653	483.9594	291.2463	0.0000	0.0000	0.0000	0.0000	459.4759	752.7409	1123.7171 (98)
Space heating fuel (main heating system)	312.0424	312.0424	312.0424	312.0424	312.0424	0.0000	0.0000	0.0000	0.0000	312.0424	312.0424	312.0424 (210)
Space heating efficiency (main heating system 2)	413.7134	263.6725	233.7071	155.0941	93.3355	0.0000	0.0000	0.0000	0.0000	147.2479	241.2303	360.1168 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Efficiency of water heater	293.6189	243.1846	214.3429	150.9459	110.6657	94.7545	91.0696	113.3081	149.9446	210.3086	258.3504	290.0688 (64)
												169.0152 (216)

Full SAP Calculation Printout



(217)m	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	169.0152	(217)
Fuel for water heating, kWh/month	173.7234	143.8833	126.8187	89.3090	65.4768	56.0627	53.8825	67.0401	88.7166	124.4318	152.8563	171.6229	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	42.4244	34.0344	30.6442	22.4513	17.3420	14.1686	15.8200	20.5634	26.7098	35.0447	39.5829	43.6035	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-40.2659	-60.6273	-92.8760	-109.4645	-119.5335	-105.2595	-103.6849	-96.7832	-84.3389	-70.9343	-45.1633	-34.0888	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1908.1175	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												169.0152	
Water heating fuel used												1313.8240	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												342.3891	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-963.0201	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2681.3105	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1908.1175	16.4900	314.6486 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1313.8240	16.4900	216.6496 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	342.3891	16.4900	56.4600 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-963.0201	16.4900	-158.8020
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-158.8020 (252)
Total energy cost			442.1481 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	0.7307 (257)
SAP value	88.1561
SAP rating (Section 12)	88 (258)
SAP band	B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1908.1175	0.1546	295.0293 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1313.8240	0.1455	191.1746 (264)
Space and water heating			486.2039 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	342.3891	0.1443	49.4173 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-963.0201	0.1342	-129.1980
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-129.1980 (269)
Total CO2, kg/year			417.5202 (272)
CO2 emissions per m2			2.4200 (273)
EI value			97.4318
EI rating			97 (274)
EI band			A

Full SAP Calculation Printout



CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	90.8800 (1b)	x 2.4000 (2b)	= 218.1120 (1b) - (3b)
First floor	81.9700 (1c)	x 2.6000 (2c)	= 213.1220 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	172.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 431.2340 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	5 * 10 =	50.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) =	0.1159 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.3159	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2686 (21)
Wind speed	Jan 5.6000 Feb 5.1000 Mar 4.8000 Apr 4.4000 May 4.6000 Jun 4.2000 Jul 4.3000 Aug 4.1000 Sep 4.4000 Oct 4.8000 Nov 4.8000 Dec 5.1000	(22)
Wind factor	1.4000 1.2750 1.2000 1.1000 1.1500 1.0500 1.0750 1.0250 1.1000 1.2000 1.2000 1.2750	(22a)
Adj infilt rate	0.3760 0.3424 0.3223 0.2954 0.3088 0.2820 0.2887 0.2753 0.2954 0.3223 0.3223 0.3424	(22b)
Effective ac	0.5707 0.5586 0.5519 0.5436 0.5477 0.5398 0.5417 0.5379 0.5436 0.5519 0.5519 0.5586	(25)

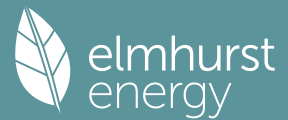
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			35.3300	1.1450	40.4542		(27)
Heatloss Floor 1			90.8800	0.1300	11.8144	0.0000	0.0000 (28a)
External Wall 1	188.9600	37.3500	151.6100	0.1800	27.2898	0.0000	0.0000 (29a)
External Roof 1	81.9700		81.9700	0.1100	9.0167	9.0000	737.7300 (30)
Flat	8.9300		8.9300	0.1600	1.4288	9.0000	80.3700 (30)
Total net area of external elements Aum(A, m ²)			370.7400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	92.0239	(33)
Main dwelling							
Internal Wall 1			305.5500			9.0000	2749.9500 (32c)
Internal Floor 1			81.9700			18.0000	1475.4600 (32d)
Internal Ceiling 1			81.9700			9.0000	737.7300 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							5781.2400 (34)
List of Thermal Bridges							33.4466 (35)
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.9600	0.0470	1.0791	
E3 Sill				22.0600	0.0350	0.7721	
E4 Jamb				49.9400	0.0470	2.3472	
E5 Ground floor (normal)				39.4000	0.0150	0.5910	
E6 Intermediate floor within a dwelling				36.3000	0.0100	0.3630	
E16 Corner (normal)				22.4000	0.0430	0.9632	
E17 Corner (inverted - internal area greater than external area)				2.4000	-0.0690	-0.1656	
E10 Eaves (insulation at ceiling level)				25.1500	0.0370	0.9305	
E12 Gable (insulation at ceiling level)				28.7200	0.2500	7.1800	
E14 Flat roof				8.9300	0.0800	0.7144	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.7749 (36)
Point Thermal bridges							(36a) =
Total fabric heat loss							(33) + (36) + (36a) =
							106.7988 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	Jan 81.2117 Feb 79.4958 Mar 78.5433 Apr 77.3630 May 77.9403 Jun 76.8113 Jul 77.0839 Aug 76.5451 Sep 77.3630 Oct 78.5433 Nov 78.5433 Dec 79.4958						(38)
Heat transfer coeff	188.0106 186.2947 185.3421 184.1618 184.7391 183.6102 183.8828 183.3440 184.1618 185.3421 185.3421 186.2947						(39)
Average = Sum(39)m / 12 =							185.0438
HLP	Jan 1.0877 Feb 1.0778 Mar 1.0723 Apr 1.0654 May 1.0688 Jun 1.0623 Jul 1.0638 Aug 1.0607 Sep 1.0654 Oct 1.0723 Nov 1.0723 Dec 1.0778						(40)
HLP (average)							1.0705
Days in mont	31 28 31 30 31 30 31 31 30 31 30 31						

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.9664 (42)
Hot water usage for mixer showers	

Full SAP Calculation Printout



Hot water usage for baths	83.2007	81.9504	80.1284	76.6423	74.0697	71.2007	69.5700	71.3782	73.3603	76.4407	80.0017	82.8819 (42a)
Hot water usage for other uses	31.9268	31.4526	30.7849	29.5538	28.6319	27.6097	27.0576	27.7206	28.4426	29.5363	30.7928	31.8189 (42b)
Average daily hot water use (litres/day)	45.0086	43.3720	41.7353	40.0986	38.4619	36.8253	36.8253	38.4619	40.0986	41.7353	43.3720	45.0086 (42c)
												147.2264 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	160.1362	156.7750	152.6486	146.2947	141.1635	135.6357	133.4528	137.5607	141.9015	147.7124	154.1665	159.7095 (44)
Distribution loss (46)m = 0.15 x (45)m	253.6165	223.2455	234.6152	200.2701	190.0333	166.7799	161.3996	170.3289	174.9787	200.4443	219.6384	250.0664 (45)
Water storage loss (or HIU loss):	38.0425	33.4868	35.1923	30.0405	28.5050	25.0170	24.2099	25.5493	26.2468	30.0666	32.9458	37.5100 (46)
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	293.6189	259.3767	273.2219	232.2285	217.2413	192.8852	188.3751	198.2349	208.2879	239.0509	258.3504	290.0688 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												806.3748 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												806.3748
Solar input	-6.7256	-24.2269	-71.4494	-99.2604	-122.8815	-121.7091	-119.0403	-107.2902	-77.7333	-45.1995	-10.8586	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	286.8933	235.1497	201.7725	132.9682	94.3598	71.1761	69.3348	90.9447	130.5546	193.8514	247.4919	290.0688 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	116.3294	103.1341	108.8949	92.1565	84.9525	76.3385	75.2457	78.9591	84.8277	97.5331	103.9994	115.1490 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825	177.9825 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	48.4687	43.0495	35.0102	26.5050	19.8128	16.7268	18.0739	23.4931	31.5324	40.0376	46.7298	49.8158 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	514.0973	519.4320	505.9887	477.3695	441.2428	407.2888	384.6055	379.2708	392.7141	421.3333	457.4600	491.4140 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646	55.7646 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550	-118.6550 (71)
Water heating gains (Table 5)	156.3567	153.4733	146.3641	127.9952	114.1835	106.0258	101.1367	106.1279	117.8163	131.0928	144.4436	154.7702 (72)
Total internal gains	834.0149	831.0470	802.4551	746.9617	690.3312	645.1335	618.9082	623.9839	657.1549	707.5559	763.7255	811.0921 (73)

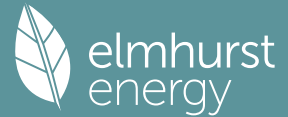
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				1.9900	15.4678		0.6800		0.7000		0.7700		10.1537 (75)
Southeast				17.6000	47.5950		0.6800		0.7000		0.7700		276.3211 (77)
Southwest				0.8000	47.5950		0.6800		0.7000		0.7700		12.5601 (79)
Northwest				14.9400	15.4678		0.6800		0.7000		0.7700		76.2289 (81)
Solar gains	375.2638	564.7355	836.9277	1188.6988	1395.3149	1538.4054	1446.2938	1255.1976	1011.2319	685.0944	438.1912	305.8350	(83)
Total gains	1209.2787	1395.7825	1639.3828	1935.6605	2085.6461	2183.5389	2065.2020	1879.1814	1668.3868	1392.6502	1201.9167	1116.9271	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	8.5415	8.6202	8.6645	8.7200	8.6928	8.7462	8.7333	8.7589	8.7200	8.6645	8.6645	8.6202
alpha	1.5694	1.5747	1.5776	1.5813	1.5795	1.5831	1.5822	1.5839	1.5813	1.5776	1.5776	1.5747
util living area	0.8332	0.8000	0.7353	0.6373	0.5203	0.3877	0.3018	0.3047	0.4738	0.6595	0.7850	0.8448 (86)
Living	18.0616	18.2987	18.8571	19.5203	20.1193	20.5163	20.6756	20.6851	20.4007	19.7547	18.8533	18.0420
Non living	16.7164	17.0010	17.6666	18.4460	19.1291	19.5599	19.7150	19.7287	19.4526	18.7374	17.6780	16.6989

Full SAP Calculation Printout



24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	0
MIT	19.5233	18.2987	18.8571	19.5203	20.1193	20.5163	20.6756	20.6851	20.4007	19.7547	18.8533	18.4652	(87)
Th 2	20.0109	20.0190	20.0235	20.0292	20.0264	20.0318	20.0305	20.0330	20.0292	20.0235	20.0235	20.0190	(88)
util rest of house													
	0.8200	0.7849	0.7155	0.6102	0.4820	0.3365	0.2372	0.2340	0.4184	0.6244	0.7652	0.8322	(89)
MIT 2	18.6600	17.0010	17.6666	18.4460	19.1291	19.5599	19.7150	19.7287	19.4526	18.7374	17.6780	17.2838	(90)
Living area fraction									FLA = Living area / (4) =			0.2092	(91)
MIT	18.8406	17.2725	17.9157	18.6708	19.3363	19.7600	19.9159	19.9288	19.6509	18.9502	17.9239	17.5310	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8406	17.2725	17.9157	18.6708	19.3363	19.7600	19.9159	19.9288	19.6509	18.9502	17.9239	17.5310	(93)

8. Space heating requirement													

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.8021	0.7314	0.6639	0.5670	0.4520	0.3211	0.2291	0.2259	0.3946	0.5790	0.7116	0.7915	(94)
Useful gains	969.9142	1020.9369	1088.3922	1097.4478	942.8098	701.2072	473.0707	424.5245	658.4065	806.2854	855.2845	884.0236	(95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000	(96)
Heat loss rate W	2470.5735	2118.6311	1948.9949	1670.4901	1244.4565	818.8926	517.7984	463.6320	819.6907	1251.0989	1691.0397	2166.7845	(97)
Space heating kWh	1116.4905	737.6505	640.2884	412.5905	224.4252	0.0000	0.0000	0.0000	0.0000	330.9413	601.7437	954.3741	(98a)
Space heating requirement - total per year (kWh/year)												5018.5042	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1116.4905	737.6505	640.2884	412.5905	224.4252	0.0000	0.0000	0.0000	0.0000	330.9413	601.7437	954.3741	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5018.5042	
Space heating per m2										(98c) / (4) =		29.0339	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP													

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												311.7833	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1116.4905	737.6505	640.2884	412.5905	224.4252	0.0000	0.0000	0.0000	0.0000	330.9413	601.7437	954.3741	(98)
Space heating efficiency (main heating system 1)	311.7833	311.7833	311.7833	311.7833	311.7833	0.0000	0.0000	0.0000	0.0000	311.7833	311.7833	311.7833	(210)
Space heating fuel (main heating system)	358.0982	236.5907	205.3632	132.3324	71.9811	0.0000	0.0000	0.0000	0.0000	106.1446	193.0006	306.1017	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	286.8933	235.1497	201.7725	132.9682	94.3598	71.1761	69.3348	90.9447	130.5546	193.8514	247.4919	290.0688	(64)
Efficiency of water heater (217)m	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	168.9478	(216)
Fuel for water heating, kWh/month	169.8118	139.1849	119.4289	78.7037	55.8515	42.1291	41.0392	53.8301	77.2751	114.7404	146.4902	171.6914	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	42.4244	34.0344	30.6442	22.4513	17.3420	14.1686	15.8200	20.5634	26.7098	35.0447	39.5829	43.6035	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-51.3220	-66.3151	-100.3626	-119.5159	-126.2202	-115.7657	-113.3854	-106.9721	-94.4108	-80.1722	-55.1029	-42.1159	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1609.6127	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												168.9478	
Water heating fuel used												1210.1763	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												342.3891	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1071.6609	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2170.5172	(238)

Full SAP Calculation Printout



10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1609.6127	27.6700	445.3798 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1210.1763	27.6700	334.8558 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	27.6700	22.1360 (249)
Energy for lighting	342.3891	27.6700	94.7391 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1071.6609	27.6700	-296.5286
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-296.5286 (252)
Total energy cost			600.5821 (255)

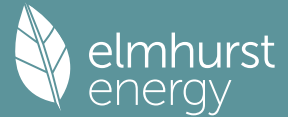
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1609.6127	0.1550	249.5435 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1210.1763	0.1468	177.6263 (264)
Space and water heating			427.1698 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	342.3891	0.1443	49.4173 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1071.6609	0.1345	-144.1487
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-144.1487 (269)
Total CO2, kg/year			343.5354 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1609.6127	1.5739	2533.4001 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1210.1763	1.5430	1867.2935 (278)
Space and water heating			4400.6936 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	342.3891	1.5338	525.1678 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1071.6609	1.4971	-1604.4031
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1604.4031 (283)
Total Primary energy kWh/year			3442.4824 (286)

Full SAP Calculation Printout



Plot Reference	P3				Issued on Date	09/07/2026	
Assessment Reference	Design Stage - Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	3 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	80 C	DER	4.36	TER	9.88		
Environmental	96 A	% DER < TER				55.87	
CO ₂ Emissions (t/year)	0.43	DFEE	35.35	TFEE	35.93		
Compliance Check	See BREL	% DFEE < TFEE				1.61	
% DPER < TPER	10.79	DPER	45.88	TPER	51.43		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2972 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3790	0.3715	0.3641	0.3269	0.3195	0.2824	0.2824	0.2749	0.2972	0.3195	0.3344	0.3492 (22b)
Effective ac	0.5718	0.5690	0.5663	0.5534	0.5510	0.5399	0.5399	0.5378	0.5442	0.5510	0.5559	0.5610 (25)

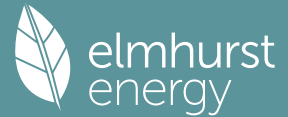
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600			9.0000	1761.8400 (32c)
Internal Floor 1			53.4500			18.0000	962.1000 (32d)
Internal Ceiling 1			53.4500			9.0000	481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				14.0400	0.0470		0.6599
E3 Sill				13.1500	0.0350		0.4603

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy content (annual)												
	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Distribution loss (46)m = 0.15 x (45)m												
	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss												
	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (62)
WWHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Total per year (kWh/year) = Sum(64)m =												2821.3131 (64a)
12Total per year (kWh/year)												2821 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	113.0500	100.2474	106.9778	94.9699	92.7308	84.2674	83.5803	86.4338	86.8874	96.0577	101.1593	111.9154 (6

6. Solar gains						
[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data g or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	3.1600	11.2829	0.6800	0.7000	0.7700	11.7611 (75)
Southeast	9.7600	36.7938	0.6800	0.7000	0.7700	118.4582 (77)
Northwest	7.3000	11.2829	0.6800	0.7000	0.7700	27.1697 (81)

Full SAP Calculation Printout



Solar gains	157.3891	281.0230	418.8557	576.5547	698.3384	716.4030	681.0697	586.6797	472.9105	319.8514	190.8707	133.1684 (83)
Total gains	780.8830	919.4735	1029.9765	1165.5789	1256.6806	1254.1625	1197.6952	1104.3698	1006.7388	872.3242	778.1503	743.3556 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.9223	8.9415	8.9603	9.0500	9.0670	9.1468	9.1468	9.1618	9.1159	9.0670	9.0327	8.9971
alpha	1.5948	1.5961	1.5974	1.6033	1.6045	1.6098	1.6098	1.6108	1.6077	1.6045	1.6022	1.5998
util living area	0.8432	0.8024	0.7503	0.6644	0.5600	0.4418	0.3470	0.3815	0.5345	0.7039	0.8055	0.8525 (86)
Living	17.8131	18.1724	18.6995	19.3832	19.9807	20.4235	20.6313	20.5926	20.2435	19.4637	18.5313	17.7463
Non living	16.4114	16.8418	17.4732	18.2860	18.9783	19.4752	19.6880	19.6557	19.2912	18.3997	17.2871	16.3346
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.3967	18.1724	18.6995	19.3832	19.9807	20.4235	20.6313	20.5926	20.2435	19.4637	18.5313	18.2111 (87)
Th 2	20.0225	20.0244	20.0263	20.0350	20.0366	20.0442	20.0442	20.0456	20.0413	20.0366	20.0333	20.0299 (88)
util rest of house	0.8317	0.7884	0.7323	0.6396	0.5255	0.3937	0.2848	0.3185	0.4875	0.6761	0.7894	0.8416 (89)
MIT 2	18.5431	16.8418	17.4732	18.2860	18.9783	19.4752	19.6880	19.6557	19.2912	18.3997	17.2871	16.9861 (90)
Living area fraction	18.8546	17.3273	17.9207	18.6864	19.3441	19.8213	20.0323	19.9976	19.6387	18.7880	17.7412	17.4331 (92)
MIT	18.8546	17.3273	17.9207	18.6864	19.3441	19.8213	20.0323	19.9976	19.6387	18.7880	17.7412	17.4331 (93)
Temperature adjustment												0.0000
adjusted MIT	18.8546	17.3273	17.9207	18.6864	19.3441	19.8213	20.0323	19.9976	19.6387	18.7880	17.7412	17.4331 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8160	0.7401	0.6855	0.6000	0.4982	0.3817	0.2840	0.3151	0.4657	0.6339	0.7416	0.8053 (94)
Useful gains	637.2314	680.5482	706.0947	699.3270	626.1225	478.7546	340.0896	347.9735	468.7909	552.9401	577.0538	598.6012 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1670.2496	1423.0751	1305.0519	1107.2171	863.2224	584.4737	384.2091	402.0575	622.1099	924.6377	1206.2290	1505.9691 (97)
Space heating kWh	768.5655	498.9781	445.6242	293.6809	176.4023	0.0000	0.0000	0.0000	0.0000	276.5431	453.0062	675.0817 (98a)
Space heating requirement - total per year (kWh/year)												3587.8820
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	768.5655	498.9781	445.6242	293.6809	176.4023	0.0000	0.0000	0.0000	0.0000	276.5431	453.0062	675.0817 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3587.8820
Space heating per m2										(98c) / (4) =		33.5630 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												299.7948 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	768.5655	498.9781	445.6242	293.6809	176.4023	0.0000	0.0000	0.0000	0.0000	276.5431	453.0062	675.0817 (98)
Space heating efficiency (main heating system 1)	299.7948	299.7948	299.7948	299.7948	299.7948	0.0000	0.0000	0.0000	0.0000	299.7948	299.7948	299.7948 (210)
Space heating fuel (main heating system)	256.3638	166.4399	148.6430	97.9606	58.8410	0.0000	0.0000	0.0000	0.0000	92.2441	151.1054	225.1812 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108 (216)
Fuel for water heating, kWh/month	173.3275	153.1328	162.1725	141.2210	135.9994	121.5596	119.1891	124.4312	126.3728	142.1112	152.5915	171.2433 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1196.7791 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7108
Water heating fuel used												1723.3519 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	261.1023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3181.2333 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1196.7791	0.1546	185.0021 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1723.3519	0.1411	243.1646 (264)
Space and water heating			428.1667 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Total CO2, kg/year			465.8518 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1196.7791	1.5722	1881.6302 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.3519	1.5217	2622.5034 (278)
Space and water heating			4504.1336 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	261.1023	1.5338	400.4875 (282)
Total Primary energy kWh/year			4904.6210 (286)
Dwelling Primary energy Rate (DPER)			45.8800 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

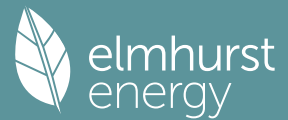
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	267.2500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3997 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3397 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4331	0.4247	0.4162	0.3737	0.3652	0.3227	0.3227	0.3142	0.3397	0.3652	0.3822	0.3992 (22b)
Effective ac	0.5938	0.5902	0.5866	0.5698	0.5667	0.5521	0.5521	0.5494	0.5577	0.5667	0.5730	0.5797 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.9900	1.0000	1.9900			(26)
TER Opening Type			20.2200	1.1450	23.1527			(27)
Heatloss Floor 1			53.4500	0.1300	6.9485			(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124			(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795			(30)
Total net area of external elements Aum(A, m2)			210.2900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831			(33)
Main dwelling								
Party Wall 1			53.1900	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

34.4812 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	14.0400	0.0500	0.7020	
E2 Other lintels (including other steel lintels)	13.1500	0.0500	0.6575	
E3 Sill	33.7000	0.0500	1.6850	
E4 Jamb	20.6800	0.1600	3.3088	
E5 Ground floor (normal)	20.6800	0.0000	0.0000	
E6 Intermediate floor within a dwelling	10.0000	0.0900	0.9000	
E16 Corner (normal)	10.0000	0.0600	0.6000	
E18 Party wall between dwellings	10.0400	0.0600	0.6024	
E10 Eaves (insulation at ceiling level)	10.6400	0.0600	0.6384	
E12 Gable (insulation at ceiling level)	10.6400	0.0800	0.8512	
P1 Party wall - Ground floor	10.6400	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.1200	1.2768	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.2221 (36)
Point Thermal Bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	63.8052 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	52.3694	52.0481	51.7332	50.2542	49.9774	48.6892	48.6892	48.4507	49.1854	49.9774	50.5372	51.1225	(38)
Heat transfer coeff	116.1745	115.8533	115.5384	114.0593	113.7826	112.4944	112.4944	112.2559	112.9906	113.7826	114.3424	114.9277	(39)
Average = Sum(39)m / 12 =												114.0580	
HLP	1.0868	1.0838	1.0808	1.0670	1.0644	1.0523	1.0523	1.0501	1.0570	1.0644	1.0696	1.0751	(40)
HLP (average)												1.0670	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

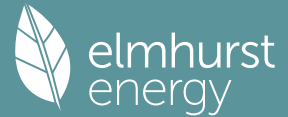
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7949 (42)
Hot water usage for mixer showers	71.0808	70.0126	68.4560	65.4777	63.2799	60.8288	59.4356	60.9804	62.6738	65.3055	68.3477	70.8084	(42a)
Hot water usage for baths	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865	(42b)
Hot water usage for other uses	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524	(42c)
Average daily hot water use (litres/day)													133.3092 (43)
Daily hot water use	145.0234	141.9266	138.1554	132.4208	127.7640	122.7575	120.8336	124.5886	128.5487	133.8047	139.6275	144.6473	(44)
Energy conte	229.6817	202.1016	212.3396	181.2775	171.9949	150.9447	146.1378	154.2667	158.5135	181.5717	198.9250	226.4828	(45)
Energy content (annual)										Total = Sum(45)m =		2214.2373	
Distribution loss (46)m = 0.15 x (45)m	34.4522	30.3152	31.8509	27.1916	25.7992	22.6417	21.9207	23.1400	23.7770	27.2358	29.8388	33.9724	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	280.6077	248.0993	263.2657	230.5608	222.9210	200.2280	197.0638	205.1927	207.7968	232.4977	248.2083	277.4088	(62)
WWHRS	-32.4952	-28.7390	-30.0938	-24.9189	-23.2235	-19.8725	-18.6273	-19.8083	-20.5609	-24.2390	-27.4598	-31.8934	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2511.9193	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	117.1100	103.9970	111.3438	99.7014	97.9292	89.6157	89.3317	92.0345	92.1324	101.1134	105.5692	116.0464	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.5506	151.1810	136.5506	141.1022	136.5506	141.1022	136.5506	136.5506	141.1022	136.5506	141.1022	136.5506	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)

Full SAP Calculation Printout



Water heating gains (Table 5)	157.4059	154.7574	149.6556	138.4742	131.6252	124.4663	120.0694	123.7023	127.9616	135.9052	146.6239	155.9763 (72)
Total internal gains	628.9043	643.6570	616.9423	595.4476	565.2826	542.0395	521.3091	522.1711	537.9646	559.2215	593.2562	615.6928 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northeast				3.1600	11.2829	0.6300	0.7000	0.7700	10.8964 (75)			
Southeast				9.7600	36.7938	0.6300	0.7000	0.7700	109.7480 (77)			
Northwest				7.3000	11.2829	0.6300	0.7000	0.7700	25.1720 (81)			
Solar gains	145.8163	260.3596	388.0575	534.1609	646.9900	663.7263	630.9910	543.5415	438.1377	296.3329	176.8361	123.3766 (83)
Total gains	774.7206	904.0166	1004.9999	1129.6085	1212.2726	1205.7658	1152.3001	1065.7126	976.1023	855.5543	770.0923	739.0695 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.8135	8.8379	8.8620	8.9769	8.9987	9.1018	9.1018	9.1211	9.0618	8.9987	8.9547	8.9091
alpha	1.5876	1.5892	1.5908	1.5985	1.5999	1.6068	1.6068	1.6081	1.6041	1.5999	1.5970	1.5939
util living area	0.8458	0.8075	0.7582	0.6752	0.5731	0.4550	0.3587	0.3928	0.5457	0.7106	0.8088	0.8544 (86)
MIT	16.9463	17.4109	18.1066	19.0253	19.8354	20.4463	20.7361	20.6835	20.2045	19.1563	17.9143	16.8674 (87)
Th 2	20.0117	20.0141	20.0165	20.0279	20.0300	20.0400	20.0400	20.0418	20.0361	20.0300	20.0257	20.0212 (88)
util rest of house	0.8343	0.7936	0.7403	0.6505	0.5384	0.4062	0.2948	0.3284	0.4983	0.6830	0.7928	0.8435 (89)
MIT 2	15.4465	16.0028	16.8364	17.9281	18.8683	19.5545	19.8522	19.8078	19.3065	18.1065	16.6241	15.3545 (90)
Living area fraction	15.9938	16.5166	17.2999	18.3285	19.2212	19.8799	20.1748	20.1273	19.6342	18.4896	17.0949	15.9066 (92)
Temperature adjustment	15.9938	16.5166	17.2999	18.3285	19.2212	19.8799	20.1748	20.1273	19.6342	18.4896	17.0949	15.9066 (93)
adjusted MIT	15.9938	16.5166	17.2999	18.3285	19.2212	19.8799	20.1748	20.1273	19.6342	18.4896	17.0949	15.9066 (93)

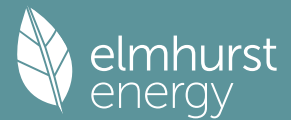
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.7701	0.7288	0.6786	0.6000	0.5063	0.3975	0.3043	0.3345	0.4764	0.6301	0.7292	0.7801 (94)
Ext temp.	596.5822	658.8189	682.0362	677.7241	613.7461	479.2380	350.5907	356.4983	465.0471	539.0773	561.5759	576.5128 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1358.5236	1345.8248	1247.8061	1075.4085	855.7814	593.9620	402.1404	418.4163	625.3077	897.6979	1142.8412	1345.4103 (97)
Space heating requirement - total per year (kWh/year)	566.8844	461.6680	420.9328	286.3328	180.0743	0.0000	0.0000	0.0000	0.0000	266.8137	418.5110	572.0598 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	566.8844	461.6680	420.9328	286.3328	180.0743	0.0000	0.0000	0.0000	0.0000	266.8137	418.5110	572.0598 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)
Space heating per m ²	(98c) / (4) = 29.6845 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
566.8844	461.6680	420.9328	286.3328	180.0743	0.0000	0.0000	0.0000	0.0000	0.0000	266.8137	418.5110	572.0598 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	614.1760	500.1820	456.0485	310.2197	195.0967	0.0000	0.0000	0.0000	0.0000	289.0723	453.4247	619.7830 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154 (64)
Water heating requirement	85.8523	85.6872	85.3679	84.8022	83.8286	79.8000	79.8000	79.8000	79.8000	84.6165	85.4713	85.8910 (217)
Efficiency of water heater (217)m	288.9993	256.0013	273.1378	242.4959	238.2213	226.0094	223.6047	232.3114	234.6315	246.1207	258.2722	285.8452 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Pumps and Fa	28.3725	22.7615	20.4942	15.0149	11.5980	9.4756	10.5800	13.7523	17.8629	23.4371	26.4722	29.1611 (232)
Lighting	-48.5532	-67.7194	-96.3011	-107.0602	-114.3908	-106.3424	-104.9605	-99.5560	-89.9274	-76.7913	-53.0907	-42.0577 (233a)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												

Full SAP Calculation Printout



(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-29.7082	-62.2200	-123.1855	-184.3508	-243.1547	-244.1470	-241.3361	-204.6697	-150.4150	-88.8330	-39.6106	-23.5190	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3438.0030	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												3005.6505	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												228.9824	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2641.9002	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4116.7357	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3438.0030	0.2100	721.9806 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3005.6505	0.2100	631.1866 (264)
Space and water heating			1353.1672 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	228.9824	0.1443	33.0492 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	0.1348	-135.7414
PV Unit electricity exported	-1635.1495	0.1260	-206.0235
Total			-341.7649 (269)
Total CO2, kg/year			1056.3809 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.8800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3438.0030	1.1300	3884.9434 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3005.6505	1.1300	3396.3851 (278)
Space and water heating			7281.3285 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	228.9824	1.5338	351.2208 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	1.4983	-1508.4416
PV Unit electricity exported	-1635.1495	0.4625	-756.2547
Total			-2264.6963 (283)
Total Primary energy kWh/year			5497.9538 (286)
Target Primary Energy Rate (TPER)			51.4300 (287)

Full SAP Calculation Printout



Plot Reference	P3			Issued on Date	09/07/2026
Assessment Reference	Design Stage - Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	3, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	80 C	DER	4.36	TER	9.88
Environmental	96 A	% DER < TER			55.87
CO ₂ Emissions (t/year)	0.43	DFEE	35.35	TFEE	35.93
Compliance Check	See BREL	% DFEE < TFEE			1.61
% DPER < TPER	10.79	DPER	45.88	TPER	51.43
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

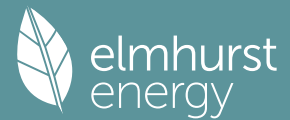
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2972 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3790	0.3715	0.3641	0.3269	0.3195	0.2824	0.2824	0.2749	0.2972	0.3195	0.3344	0.3492 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5718	0.5690	0.5663	0.5534	0.5510	0.5399	0.5399	0.5378	0.5442	0.5510	0.5559	0.5610 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600			9.0000	1761.8400 (32c)
Internal Floor 1			53.4500			18.0000	962.1000 (32d)
Internal Ceiling 1			53.4500			9.0000	481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						14.0400		0.0470		0.6599		
E3 Sill						13.1500		0.0350		0.4603		
E4 Jamb						33.7000		0.0470		1.5839		
E5 Ground floor (normal)						20.6800		0.0150		0.3102		
E6 Intermediate floor within a dwelling						20.6800		0.0100		0.2068		
E16 Corner (normal)						10.0000		0.0430		0.4300		
E18 Party wall between dwellings						10.0000		0.0690		0.6900		
E10 Eaves (insulation at ceiling level)						10.0400		0.0370		0.3715		
E12 Gable (insulation at ceiling level)						10.6400		0.2500		2.6600		
P1 Party wall - Ground floor						10.6400		0.1310		1.3938		
P2 Party wall - Intermediate floor within a dwelling						10.6400		0.0400		0.4256		
P4 Party wall - Roof (insulation at ceiling level)						10.6400		0.2400		2.5536		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											11.7455	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	64.3286 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	50.4289	50.1830	49.9419	48.8098	48.5980	47.6119	47.6119	47.4293	47.9917	48.5980	49.0265	49.4745 (38)
Average = Sum(39)m / 12 =	114.7575	114.5116	114.2705	113.1384	112.9266	111.9406	111.9406	111.7580	112.3204	112.9266	113.3551	113.8031 (39)
												113.1374
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0735	1.0712	1.0689	1.0584	1.0564	1.0472	1.0472	1.0454	1.0507	1.0564	1.0604	1.0646 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.0583
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												67.7751 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	73.9427	71.9140	69.6994	66.9431	64.4841	61.9287	61.3979	63.6081	65.8749	68.4992	71.2798	73.8389 (44)
Energy conte	117.1071	102.4046	107.1254	91.6418	86.8080	76.1486	74.2555	78.7601	81.2303	92.9527	101.5511	115.6139 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	99.5410	87.0439	91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718 (62)
WWHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	99.5410	87.0439	91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718 (64)
12Total per year (kWh/year)												
Electric shower(s)												
	56.9238	50.7196	55.3839	52.8522	53.8439	51.3619	53.0739	53.8439	52.8522	55.3839	54.3425	56.9238 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												647.5055 (64a)
Heat gains from water heating, kWh/month												
	39.1162	34.4409	36.6101	32.6869	31.9077	29.0220	29.0478	30.1975	30.4745	33.5984	35.1652	38.7989 (65)

5. Internal gains (see Table 5 and 5a)												

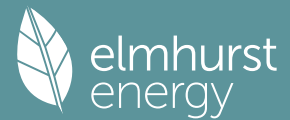
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	139.5973	154.5541	139.5973	144.2505	139.5973	144.2505	139.5973	139.5973	144.2505	139.5973	144.2505	139.5973 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744 (69)
Pumps, fans												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Water heating gains (Table 5)												
	52.5756	51.2513	49.2071	45.3985	42.8867	40.3084	39.0427	40.5880	42.3257	45.1592	48.8406	52.1491 (72)
Total internal gains												
	524.1206	540.5241	516.5405	502.5202	476.5908	461.0299	443.3291	442.1036	455.4770	468.5222	495.6212	511.9123 (73)

6. Solar gains												

[Jan]												
				Area	Solar flux	g	FF	Access				Gains
				m2	Table 6a	or Table 6b	Specific data	factor				W
					W/m2		or Table 6c	Table 6d				
Northeast				3.1600	11.2829	0.6800	0.7000	0.7700				11.7611 (75)
Southeast				9.7600	36.7938	0.6800	0.7000	0.7700				118.4582 (77)
Northwest				7.3000	11.2829	0.6800	0.7000	0.7700				27.1697 (81)

Solar gains	157.3891	281.0230	418.8557	576.5547	698.3384	716.4030	681.0697	586.6797	472.9105	319.8514	190.8707	133.1684 (83)
Total gains	681.5097	821.5471	935.3963	1079.0748	1174.9291	1177.4328	1124.3988	1028.7833	928.3875	788.3735	686.4919	645.0807 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.9223	8.9415	8.9603	9.0500	9.0670	9.1468	9.1468	9.1618	9.1159	9.0670	9.0327	8.9971
alpha	1.5948	1.5961	1.5974	1.6033	1.6045	1.6098	1.6098	1.6108	1.6077	1.6045	1.6022	1.5998
util living area	0.8670	0.8261	0.7741	0.6869	0.5811	0.4611	0.3643	0.4019	0.5601	0.7315	0.8315	0.8761 (86)
MIT	16.7793	17.2848	18.0205	18.9799	19.8161	20.4372	20.7311	20.6734	20.1749	19.0739	17.7713	16.6853 (87)
Th 2	20.0225	20.0244	20.0263	20.0350	20.0366	20.0442	20.0442	20.0456	20.0413	20.0366	20.0333	20.0299 (88)
util rest of house	0.8568	0.8132	0.7571	0.6627	0.5467	0.4122	0.3000	0.3370	0.5129	0.7050	0.8169	0.8666 (89)
MIT 2	16.1369	16.6317	17.3512	18.2821	19.0730	19.6418	19.8880	19.8483	19.4228	18.3937	17.1245	16.0492 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	16.3714	16.8700	17.5955	18.5368	19.3441	19.9321	20.1956	20.1494	19.6973	18.6419	17.3605	16.2813 (92)
Temperature adjustment	0.0000											
adjusted MIT	16.3714	16.8700	17.5955	18.5368	19.3441	19.9321	20.1956	20.1494	19.6973	18.6419	17.3605	16.2813 (93)

8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8052	0.7593	0.7046	0.6191	0.5194	0.4061	0.3108	0.3445	0.4941	0.6589	0.7641	0.8161 (94)
Useful gains	548.7350	623.7919	659.0775	668.0084	610.2315	478.1207	349.4202	354.3893	458.7493	519.4387	524.5548	526.4541 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1385.2782	1370.7041	1267.8852	1090.2868	863.2276	596.8731	402.4984	419.0290	628.6860	908.1462	1163.0799	1374.8898 (97)
Space heating kWh	622.3882	501.9250	452.9529	304.0405	188.2291	0.0000	0.0000	0.0000	0.0000	289.1984	459.7381	631.2361 (98a)
Space heating requirement - total per year (kWh/year)	3449.7083											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	622.3882	501.9250	452.9529	304.0405	188.2291	0.0000	0.0000	0.0000	0.0000	289.1984	459.7381	631.2361 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3449.7083											
Space heating per m2	(98c) / (4) = 32.2704 (99)											

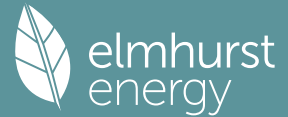
8c. Space cooling requirement												
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1052.2412	828.3601	849.3605	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6838	0.7372	0.7060	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	719.5404	610.7000	599.6407	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1316.0814	1256.9159	1147.9569	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	429.5095	480.7847	407.9473	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	107.3774	120.1962	101.9868	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement	329.5604 (107)											
Energy for space heating	32.2704 (99)											
Energy for space cooling	3.0829 (108)											
Total	35.3533 (109)											
Fabric Energy Efficiency (DFEE)	35.4 (109)											

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics									
		Area (m2)		Storey height (m)		Volume (m3)			
Main dwelling									
Ground floor		53.4500 (1b)	x	2.4000 (2b)	=	128.2800 (1b) - (3b)			
First floor		53.4500 (1c)	x	2.6000 (2c)	=	138.9700 (1c) - (3c)			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000						(4)		
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	267.2500 (5)			

2. Ventilation rate												
											m3 per hour	
Number of open chimneys	0 * 80 =										0.0000 (6a)	
Number of open flues	0 * 20 =										0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =										0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =										0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =										0.0000 (6e)	
Number of blocked chimneys	0 * 20 =										0.0000 (6f)	
Number of intermittent extract fans	4 * 10 =										40.0000 (7a)	

Full SAP Calculation Printout



Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
40.0000 / (5) = 0.1497 (8)
Yes
Blower Door
5.0000 (17)
0.3997 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.3397 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4331	0.4247	0.4162	0.3737	0.3652	0.3227	0.3227	0.3142	0.3397	0.3652	0.3822	0.3992 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5938	0.5902	0.5866	0.5698	0.5667	0.5521	0.5521	0.5494	0.5577	0.5667	0.5730	0.5797 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			1.9900	1.0000	1.9900		(26)
TER Opening Type			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485		(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124		(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795		(30)
Total net area of external elements Aum(A, m2)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)					52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							34.4812 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	14.0400	0.0500	0.7020
E3 Sill	13.1500	0.0500	0.6575
E4 Jamb	33.7000	0.0500	1.6850
E5 Ground floor (normal)	20.6800	0.1600	3.3088
E6 Intermediate floor within a dwelling	20.6800	0.0000	0.0000
E16 Corner (normal)	10.0000	0.0900	0.9000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E10 Eaves (insulation at ceiling level)	10.0400	0.0600	0.6024
E12 Gable (insulation at ceiling level)	10.6400	0.0600	0.6384
P1 Party wall - Ground floor	10.6400	0.0800	0.8512
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.1200	1.2768
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.2221 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 63.8052 (37)

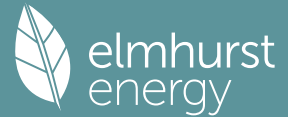
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	52.3694	52.0481	51.7332	50.2542	49.9774	48.6892	48.6892	48.4507	49.1854	49.9774	50.5372	51.1225 (38)
Heat transfer coeff	116.1745	115.8533	115.5384	114.0593	113.7826	112.4944	112.4944	112.2559	112.9906	113.7826	114.3424	114.9277 (39)
Average = Sum(39)m / 12 =												114.0580
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.0868	1.0838	1.0808	1.0670	1.0644	1.0523	1.0523	1.0501	1.0570	1.0644	1.0696	1.0751 (40)
HLP (average)												1.0670
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												0.0000 (42a)
0.0000 0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Hot water usage for baths												30.5865 (42b)
30.6903 30.2345			29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	
Hot water usage for other uses												43.2524 (42c)
43.2524 41.6796			40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	
Average daily hot water use (litres/day)												67.7751 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	73.9427	71.9140	69.6994	66.9431	64.4841	61.9287	61.3979	63.6081	65.8749	68.4992	71.2798	73.8389 (44)
Energy conte	117.1071	102.4046	107.1254	91.6418	86.8080	76.1486	74.2555	78.7601	81.2303	92.9527	101.5511	115.6139 (45)
Energy content (annual)										Total = Sum(45)m =		1125.5991
Distribution loss (46)m = 0.15 x (45)m												0.0000 (46)
0.0000 0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Water storage loss (or HIU loss):												0.0000 (47)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	99.5410	87.0439	91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	99.5410	87.0439	91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718 (64)
Total per year (kWh/year) = Sum(64)m =												956.7593 (64)
12Total per year (kWh/year)												957 (64)

Full SAP Calculation Printout



Electric shower(s)	56.9238	50.7196	55.3839	52.8522	53.8439	51.3619	53.0739	53.8439	52.8522	55.3839	54.3425	56.9238 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												647.5055 (64a)
Heat gains from water heating, kWh/month	39.1162	34.4409	36.6101	32.6869	31.9077	29.0220	29.0478	30.1975	30.4745	33.5984	35.1652	38.7989 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.5506	151.1810	136.5506	141.1022	136.5506	141.1022	136.5506	136.5506	141.1022	136.5506	141.1022	136.5506	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)
Water heating gains (Table 5)	52.5756	51.2513	49.2071	45.3985	42.8867	40.3084	39.0427	40.5880	42.3257	45.1592	48.8406	52.1491	(72)
Total internal gains	521.0739	537.1510	513.4938	499.3719	473.5440	457.8816	440.2824	439.0569	452.3287	465.4755	492.4729	508.8656	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
Northeast				3.1600	11.2829	0.6300	0.7000	0.7700	10.8964	(75)			
Southeast				9.7600	36.7938	0.6300	0.7000	0.7700	109.7480	(77)			
Northwest				7.3000	11.2829	0.6300	0.7000	0.7700	25.1720	(81)			
Solar gains	145.8163	260.3596	388.0575	534.1609	646.9900	663.7263	630.9910	543.5415	438.1377	296.3329	176.8361	123.3766	(83)
Total gains	666.8902	797.5105	901.5514	1033.5328	1120.5340	1121.6079	1071.2734	982.5984	890.4664	761.8084	669.3090	632.2422	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.8135	8.8379	8.8620	8.9769	8.9987	9.1018	9.1018	9.1211	9.0618	8.9987	8.9547	8.9091
alpha	1.5876	1.5892	1.5908	1.5985	1.5999	1.6068	1.6068	1.6081	1.6041	1.5999	1.5970	1.5939
util living area	0.8714	0.8332	0.7843	0.7006	0.5977	0.4773	0.3791	0.4166	0.5746	0.7417	0.8373	0.8799 (86)
MIT	16.7125	17.2037	17.9328	18.9017	19.7552	20.4035	20.7128	20.6535	20.1369	19.0188	17.7150	16.6284 (87)
Th 2	20.0117	20.0141	20.0165	20.0279	20.0300	20.0400	20.0400	20.0418	20.0361	20.0300	20.0257	20.0212 (88)
util rest of house	0.8614	0.8205	0.7676	0.6767	0.5632	0.4276	0.3129	0.3500	0.5272	0.7156	0.8230	0.8705 (89)
MIT 2	16.0654	16.5471	17.2616	18.2052	19.0151	19.6124	19.8726	19.8319	19.3878	18.3387	17.0657	15.9886 (90)
Living area fraction	16.3015	16.7867	17.5066	18.4594	19.2852	19.9011	20.1792	20.1317	19.6611	18.5869	17.3026	16.2221 (92)
MIT	16.3015	16.7867	17.5066	18.4594	19.2852	19.9011	20.1792	20.1317	19.6611	18.5869	17.3026	16.2221 (92)
Temperature adjustment												0.0000
adjusted MIT	16.3015	16.7867	17.5066	18.4594	19.2852	19.9011	20.1792	20.1317	19.6611	18.5869	17.3026	16.2221 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8100	0.7666	0.7145	0.6315	0.5337	0.4199	0.3230	0.3567	0.5066	0.6685	0.7702	0.8203	(94)
Useful gains	540.2097	611.3703	644.1592	652.6959	598.0241	470.9777	346.0660	350.4943	451.1476	509.2475	515.4863	518.6573	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1394.2742	1377.1131	1271.6805	1090.3367	863.0626	596.3420	402.6409	418.9043	628.3573	908.7713	1166.5918	1381.6711	(97)
Space heating kWh	635.4239	514.5792	466.8759	315.1014	197.1886	0.0000	0.0000	0.0000	0.0000	297.2457	468.7959	642.0823	(98a)
Space heating requirement - total per year (kWh/year)												3537.2929	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	635.4239	514.5792	466.8759	315.1014	197.1886	0.0000	0.0000	0.0000	0.0000	297.2457	468.7959	642.0823	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3537.2929	
Space heating per m2											(98c) / (4) =	33.0897	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

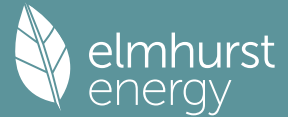
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1057.4475	832.4586	853.1445	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6679	0.7226	0.6915	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	706.2478	601.5536	589.9684	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1254.2447	1198.0944	1097.1612	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	394.5578	443.8263	377.3515	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	98.6394	110.9566	94.3379	0.0000	0.0000	0.0000	0.0000 (107)

Full SAP Calculation Printout



Space cooling requirement	303.9339	(107)
Energy for space heating	33.0897	(99)
Energy for space cooling	2.8432	(108)
Total	35.9329	(109)
Fabric Energy Efficiency (TFEE)	35.9	(109)

Full SAP Calculation Printout



Plot Reference	P3				Issued on Date	09/07/2026	
Assessment Reference	Design Stage - Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	3 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	80 C	DER	4.36	TER	9.88		
Environmental	96 A	% DER < TER				55.87	
CO ₂ Emissions (t/year)	0.43	DFEE	35.35	TFEE	35.93		
Compliance Check	See BREL	% DFEE < TFEE				1.61	
% DPER < TPER	10.79	DPER	45.88	TPER	51.43		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

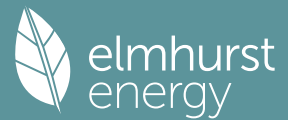
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2972 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3790	0.3715	0.3641	0.3269	0.3195	0.2824	0.2824	0.2749	0.2972	0.3195	0.3344	0.3492 (22b)
Effective ac	0.5718	0.5690	0.5663	0.5534	0.5510	0.5399	0.5399	0.5378	0.5442	0.5510	0.5559	0.5610 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600			9.0000	1761.8400 (32c)
Internal Floor 1			53.4500			18.0000	962.1000 (32d)
Internal Ceiling 1			53.4500			9.0000	481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				14.0400	0.0470		0.6599
E3 Sill				13.1500	0.0350		0.4603

Full SAP Calculation Printout



E4 Jamb	33.7000	0.0470	1.5839
E5 Ground floor (normal)	20.6800	0.0150	0.3102
E6 Intermediate floor within a dwelling	20.6800	0.0100	0.2068
E16 Corner (normal)	10.0000	0.0430	0.4300
E18 Party wall between dwellings	10.0000	0.0690	0.6900
E10 Eaves (insulation at ceiling level)	10.0400	0.0370	0.3715
E12 Gable (insulation at ceiling level)	10.6400	0.2500	2.6600
P1 Party wall - Ground floor	10.6400	0.1310	1.3938
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0400	0.4256
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.2400	2.5536
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.7455 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	64.3286 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 50.4289	Feb 50.1830	Mar 49.9419	Apr 48.8098	May 48.5980	Jun 47.6119	Jul 47.6119	Aug 47.4293	Sep 47.9917	Oct 48.5980	Nov 49.0265	Dec 49.4745 (38)
Heat transfer coeff	114.7575	114.5116	114.2705	113.1384	112.9266	111.9406	111.9406	111.7580	112.3204	112.9266	113.3551	113.8031 (39)
Average = Sum(39)m / 12 =												113.1374
HLP	Jan 1.0735	Feb 1.0712	Mar 1.0689	Apr 1.0584	May 1.0564	Jun 1.0472	Jul 1.0472	Aug 1.0454	Sep 1.0507	Oct 1.0564	Nov 1.0604	Dec 1.0646 (40)
HLP (average)												1.0583
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

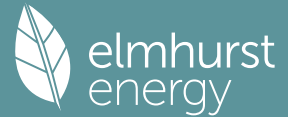
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy content												
	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2350.3171
	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss												
	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (62)
WWHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2821.3131 (64)
Electric shower(s)												2821 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	113.0500	100.2474	106.9778	94.9699	92.7308	84.2674	83.5803	86.4338	86.8874	96.0577	101.1593	111.9154 (65)

5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	139.5973	154.5541	139.5973	144.2505	139.5973	144.2505	139.5973	139.5973	144.2505	139.5973	144.2505	139.5973 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Water heating gains (Table 5)	151.9489	149.1777	143.7874	131.9026	124.6382	117.0381	112.3392	116.1745	120.6770	129.1098	140.4990	150.4240 (72)
Total internal gains	623.4939	638.4505	611.1208	589.0243	558.3423	537.7596	516.6255	517.6900	533.8282	552.4729	587.2796	610.1872 (73)

6. Solar gains												
[Jan]		Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
Northeast		3.1600	11.2829	0.6800	0.7000	0.7700	11.7611 (75)					
Southeast		9.7600	36.7938	0.6800	0.7000	0.7700	118.4582 (77)					
Northwest		7.3000	11.2829	0.6800	0.7000	0.7700	27.1697 (81)					

Full SAP Calculation Printout



Solar gains	157.3891	281.0230	418.8557	576.5547	698.3384	716.4030	681.0697	586.6797	472.9105	319.8514	190.8707	133.1684 (83)
Total gains	780.8830	919.4735	1029.9765	1165.5789	1256.6806	1254.1625	1197.6952	1104.3698	1006.7388	872.3242	778.1503	743.3556 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.9223	8.9415	8.9603	9.0500	9.0670	9.1468	9.1468	9.1618	9.1159	9.0670	9.0327	8.9971
alpha	1.5948	1.5961	1.5974	1.6033	1.6045	1.6098	1.6098	1.6108	1.6077	1.6045	1.6022	1.5998
util living area	0.8432	0.8024	0.7503	0.6644	0.5600	0.4418	0.3470	0.3815	0.5345	0.7039	0.8055	0.8525 (86)
Living	17.8131	18.1724	18.6995	19.3832	19.9807	20.4235	20.6313	20.5926	20.2435	19.4637	18.5313	17.7463
Non living	16.4114	16.8418	17.4732	18.2860	18.9783	19.4752	19.6880	19.6557	19.2912	18.3997	17.2871	16.3346
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.3967	18.1724	18.6995	19.3832	19.9807	20.4235	20.6313	20.5926	20.2435	19.4637	18.5313	18.2111 (87)
Th 2	20.0225	20.0244	20.0263	20.0350	20.0366	20.0442	20.0442	20.0456	20.0413	20.0366	20.0333	20.0299 (88)
util rest of house	0.8317	0.7884	0.7323	0.6396	0.5255	0.3937	0.2848	0.3185	0.4875	0.6761	0.7894	0.8416 (89)
MIT 2	18.5431	16.8418	17.4732	18.2860	18.9783	19.4752	19.6880	19.6557	19.2912	18.3997	17.2871	16.9861 (90)
Living area fraction	18.8546	17.3273	17.9207	18.6864	19.3441	19.8213	20.0323	19.9976	19.6387	18.7880	17.7412	17.4331 (92)
MIT	18.8546	17.3273	17.9207	18.6864	19.3441	19.8213	20.0323	19.9976	19.6387	18.7880	17.7412	17.4331 (93)
Temperature adjustment												0.0000
adjusted MIT	18.8546	17.3273	17.9207	18.6864	19.3441	19.8213	20.0323	19.9976	19.6387	18.7880	17.7412	17.4331 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8160	0.7401	0.6855	0.6000	0.4982	0.3817	0.2840	0.3151	0.4657	0.6339	0.7416	0.8053 (94)
Useful gains	637.2314	680.5482	706.0947	699.3270	626.1225	478.7546	340.0896	347.9735	468.7909	552.9401	577.0538	598.6012 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1670.2496	1423.0751	1305.0519	1107.2171	863.2224	584.4737	384.2091	402.0575	622.1099	924.6377	1206.2290	1505.9691 (97)
Space heating kWh	768.5655	498.9781	445.6242	293.6809	176.4023	0.0000	0.0000	0.0000	0.0000	276.5431	453.0062	675.0817 (98a)
Space heating requirement - total per year (kWh/year)												3587.8820
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	768.5655	498.9781	445.6242	293.6809	176.4023	0.0000	0.0000	0.0000	0.0000	276.5431	453.0062	675.0817 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3587.8820
Space heating per m2										(98c) / (4) =		33.5630 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												299.7948 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	768.5655	498.9781	445.6242	293.6809	176.4023	0.0000	0.0000	0.0000	0.0000	276.5431	453.0062	675.0817 (98)
Space heating efficiency (main heating system 1)	299.7948	299.7948	299.7948	299.7948	299.7948	0.0000	0.0000	0.0000	0.0000	299.7948	299.7948	299.7948 (210)
Space heating fuel (main heating system)	256.3638	166.4399	148.6430	97.9606	58.8410	0.0000	0.0000	0.0000	0.0000	92.2441	151.1054	225.1812 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108 (216)
Fuel for water heating, kWh/month	173.3275	153.1328	162.1725	141.2210	135.9994	121.5596	119.1891	124.4312	126.3728	142.1112	152.5915	171.2433 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1196.7791 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7108
Water heating fuel used												1723.3519 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	261.1023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3181.2333 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1196.7791	0.1546	185.0021 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1723.3519	0.1411	243.1646 (264)
Space and water heating			428.1667 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Total CO2, kg/year			465.8518 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1196.7791	1.5722	1881.6302 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.3519	1.5217	2622.5034 (278)
Space and water heating			4504.1336 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	261.1023	1.5338	400.4875 (282)
Total Primary energy kWh/year			4904.6210 (286)
Dwelling Primary energy Rate (DPER)			45.8800 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

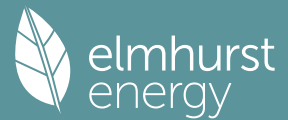
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	267.2500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3997 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3397 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4331	0.4247	0.4162	0.3737	0.3652	0.3227	0.3227	0.3142	0.3397	0.3652	0.3822	0.3992 (22b)
Effective ac	0.5938	0.5902	0.5866	0.5698	0.5667	0.5521	0.5521	0.5494	0.5577	0.5667	0.5730	0.5797 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.9900	1.0000	1.9900			(26)
TER Opening Type			20.2200	1.1450	23.1527			(27)
Heatloss Floor 1			53.4500	0.1300	6.9485			(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124			(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795			(30)
Total net area of external elements Aum(A, m2)			210.2900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831			(33)
Main dwelling								
Party Wall 1			53.1900	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

34.4812 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	14.0400	0.0500	0.7020	
E2 Other lintels (including other steel lintels)	13.1500	0.0500	0.6575	
E3 Sill	33.7000	0.0500	1.6850	
E4 Jamb	20.6800	0.1600	3.3088	
E5 Ground floor (normal)	20.6800	0.0000	0.0000	
E6 Intermediate floor within a dwelling	10.0000	0.0900	0.9000	
E16 Corner (normal)	10.0000	0.0600	0.6000	
E18 Party wall between dwellings	10.0400	0.0600	0.6024	
E10 Eaves (insulation at ceiling level)	10.6400	0.0600	0.6384	
E12 Gable (insulation at ceiling level)	10.6400	0.0800	0.8512	
P1 Party wall - Ground floor	10.6400	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.1200	1.2768	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.2221 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	63.8052 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	52.3694	52.0481	51.7332	50.2542	49.9774	48.6892	48.6892	48.4507	49.1854	49.9774	50.5372	51.1225	(38)
Heat transfer coeff	116.1745	115.8533	115.5384	114.0593	113.7826	112.4944	112.4944	112.2559	112.9906	113.7826	114.3424	114.9277	(39)
Average = Sum(39)m / 12 =												114.0580	
HLP	1.0868	1.0838	1.0808	1.0670	1.0644	1.0523	1.0523	1.0501	1.0570	1.0644	1.0696	1.0751	(40)
HLP (average)												1.0670	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

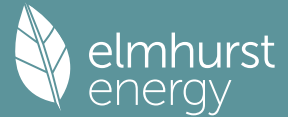
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7949 (42)
Hot water usage for mixer showers	71.0808	70.0126	68.4560	65.4777	63.2799	60.8288	59.4356	60.9804	62.6738	65.3055	68.3477	70.8084	(42a)
Hot water usage for baths	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865	(42b)
Hot water usage for other uses	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524	(42c)
Average daily hot water use (litres/day)													133.3092 (43)
Daily hot water use	145.0234	141.9266	138.1554	132.4208	127.7640	122.7575	120.8336	124.5886	128.5487	133.8047	139.6275	144.6473	(44)
Energy conte	229.6817	202.1016	212.3396	181.2775	171.9949	150.9447	146.1378	154.2667	158.5135	181.5717	198.9250	226.4828	(45)
Energy content (annual)										Total = Sum(45)m =		2214.2373	
Distribution loss (46)m = 0.15 x (45)m	34.4522	30.3152	31.8509	27.1916	25.7992	22.6417	21.9207	23.1400	23.7770	27.2358	29.8388	33.9724	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	280.6077	248.0993	263.2657	230.5608	222.9210	200.2280	197.0638	205.1927	207.7968	232.4977	248.2083	277.4088	(62)
WWHRS	-32.4952	-28.7390	-30.0938	-24.9189	-23.2235	-19.8725	-18.6273	-19.8083	-20.5609	-24.2390	-27.4598	-31.8934	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2511.9193	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	117.1100	103.9970	111.3438	99.7014	97.9292	89.6157	89.3317	92.0345	92.1324	101.1134	105.5692	116.0464	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.5506	151.1810	136.5506	141.1022	136.5506	141.1022	136.5506	136.5506	141.1022	136.5506	141.1022	136.5506	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)

Full SAP Calculation Printout



Water heating gains (Table 5)	157.4059	154.7574	149.6556	138.4742	131.6252	124.4663	120.0694	123.7023	127.9616	135.9052	146.6239	155.9763 (72)
Total internal gains	628.9043	643.6570	616.9423	595.4476	565.2826	542.0395	521.3091	522.1711	537.9646	559.2215	593.2562	615.6928 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Northeast				3.1600	11.2829	0.6300	0.7000	0.7700	10.8964 (75)			
Southeast				9.7600	36.7938	0.6300	0.7000	0.7700	109.7480 (77)			
Northwest				7.3000	11.2829	0.6300	0.7000	0.7700	25.1720 (81)			
Solar gains	145.8163	260.3596	388.0575	534.1609	646.9900	663.7263	630.9910	543.5415	438.1377	296.3329	176.8361	123.3766 (83)
Total gains	774.7206	904.0166	1004.9999	1129.6085	1212.2726	1205.7658	1152.3001	1065.7126	976.1023	855.5543	770.0923	739.0695 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.8135	8.8379	8.8620	8.9769	8.9987	9.1018	9.1018	9.1211	9.0618	8.9987	8.9547	8.9091
alpha	1.5876	1.5892	1.5908	1.5985	1.5999	1.6068	1.6068	1.6081	1.6041	1.5999	1.5970	1.5939
util living area	0.8458	0.8075	0.7582	0.6752	0.5731	0.4550	0.3587	0.3928	0.5457	0.7106	0.8088	0.8544 (86)
MIT	16.9463	17.4109	18.1066	19.0253	19.8354	20.4463	20.7361	20.6835	20.2045	19.1563	17.9143	16.8674 (87)
Th 2	20.0117	20.0141	20.0165	20.0279	20.0300	20.0400	20.0400	20.0418	20.0361	20.0300	20.0257	20.0212 (88)
util rest of house	0.8343	0.7936	0.7403	0.6505	0.5384	0.4062	0.2948	0.3284	0.4983	0.6830	0.7928	0.8435 (89)
MIT 2	15.4465	16.0028	16.8364	17.9281	18.8683	19.5545	19.8522	19.8078	19.3065	18.1065	16.6241	15.3545 (90)
Living area fraction									fLA = Living area / (4) =			0.3649 (91)
MIT	15.9938	16.5166	17.2999	18.3285	19.2212	19.8799	20.1748	20.1273	19.6342	18.4896	17.0949	15.9066 (92)
Temperature adjustment												0.0000
adjusted MIT	15.9938	16.5166	17.2999	18.3285	19.2212	19.8799	20.1748	20.1273	19.6342	18.4896	17.0949	15.9066 (93)

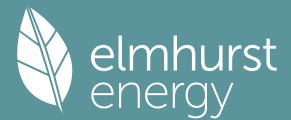
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.7701	0.7288	0.6786	0.6000	0.5063	0.3975	0.3043	0.3345	0.4764	0.6301	0.7292	0.7801 (94)
Ext temp.	596.5822	658.8189	682.0362	677.7241	613.7461	479.2380	350.5907	356.4983	465.0471	539.0773	561.5759	576.5128 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1358.5236	1345.8248	1247.8061	1075.4085	855.7814	593.9620	402.1404	418.4163	625.3077	897.6979	1142.8412	1345.4103 (97)
Space heating requirement - total per year (kWh/year)	566.8844	461.6680	420.9328	286.3328	180.0743	0.0000	0.0000	0.0000	0.0000	266.8137	418.5110	572.0598 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	566.8844	461.6680	420.9328	286.3328	180.0743	0.0000	0.0000	0.0000	0.0000	266.8137	418.5110	572.0598 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3173.2767 (99)
Space heating per m ²										(98c) / (4) =		29.6845 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	566.8844	461.6680	420.9328	286.3328	180.0743	0.0000	0.0000	0.0000	0.0000	266.8137	418.5110	572.0598 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	614.1760	500.1820	456.0485	310.2197	195.0967	0.0000	0.0000	0.0000	0.0000	289.0723	453.4247	619.7830 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154 (64)
Efficiency of water heater (217)m	85.8523	85.6872	85.3679	84.8022	83.8286	79.8000	79.8000	79.8000	79.8000	84.6165	85.4713	79.8000 (216)
Fuel for water heating, kWh/month	288.9993	256.0013	273.1378	242.4959	238.2213	226.0094	223.6047	232.3114	234.6315	246.1207	258.2722	285.8452 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	28.3725	22.7615	20.4942	15.0149	11.5980	9.4756	10.5800	13.7523	17.8629	23.4371	26.4722	29.1611 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-48.5532	-67.7194	-96.3011	-107.0602	-114.3908	-106.3424	-104.9605	-99.5560	-89.9274	-76.7913	-53.0907	-42.0577 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												

Full SAP Calculation Printout



(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-29.7082	-62.2200	-123.1855	-184.3508	-243.1547	-244.1470	-241.3361	-204.6697	-150.4150	-88.8330	-39.6106	-23.5190	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3438.0030	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												3005.6505	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												228.9824	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2641.9002	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4116.7357	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3438.0030	0.2100	721.9806 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3005.6505	0.2100	631.1866 (264)
Space and water heating			1353.1672 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	228.9824	0.1443	33.0492 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	0.1348	-135.7414
PV Unit electricity exported	-1635.1495	0.1260	-206.0235
Total			-341.7649 (269)
Total CO2, kg/year			1056.3809 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.8800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3438.0030	1.1300	3884.9434 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3005.6505	1.1300	3396.3851 (278)
Space and water heating			7281.3285 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	228.9824	1.5338	351.2208 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	1.4983	-1508.4416
PV Unit electricity exported	-1635.1495	0.4625	-756.2547
Total			-2264.6963 (283)
Total Primary energy kWh/year			5497.9538 (286)
Target Primary Energy Rate (TPER)			51.4300 (287)

Full SAP Calculation Printout



Plot Reference	P3			Issued on Date	09/07/2026	
Assessment Reference	Design Stage - Triple Glazed		Plot Type Ref	Design Stage		
Plot Address	3, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2	
SAP Rating	80 C	DER	4.36	TER	9.88	
Environmental	96 A	% DER < TER			55.87	
CO ₂ Emissions (t/year)	0.43	DFEE	35.35	TFEE	35.93	
Compliance Check	See BREL	% DFEE < TFEE			1.61	
% DPER < TPER	10.79	DPER	45.88	TPER	51.43	
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2972 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3790	0.3715	0.3641	0.3269	0.3195	0.2824	0.2824	0.2749	0.2972	0.3195	0.3344	0.3492 (22b)
Effective ac	0.5718	0.5690	0.5663	0.5534	0.5510	0.5399	0.5399	0.5378	0.5442	0.5510	0.5559	0.5610 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600			9.0000	1761.8400 (32c)
Internal Floor 1			53.4500			18.0000	962.1000 (32d)
Internal Ceiling 1			53.4500			9.0000	481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				14.0400	0.0470		0.6599
E3 Sill				13.1500	0.0350		0.4603

Full SAP Calculation Printout



E4 Jamb	33.7000	0.0470	1.5839
E5 Ground floor (normal)	20.6800	0.0150	0.3102
E6 Intermediate floor within a dwelling	20.6800	0.0100	0.2068
E16 Corner (normal)	10.0000	0.0430	0.4300
E18 Party wall between dwellings	10.0000	0.0690	0.6900
E10 Eaves (insulation at ceiling level)	10.0400	0.0370	0.3715
E12 Gable (insulation at ceiling level)	10.6400	0.2500	2.6600
P1 Party wall - Ground floor	10.6400	0.1310	1.3938
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0400	0.4256
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.2400	2.5536

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.7455 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 64.3286 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	50.4289	50.1830	49.9419	48.8098	48.5980	47.6119	47.6119	47.4293	47.9917	48.5980	49.0265	49.4745 (38)
Average = Sum(39)m / 12 =	114.7575	114.5116	114.2705	113.1384	112.9266	111.9406	111.9406	111.7580	112.3204	112.9266	113.3551	113.8031 (39)
												113.1374

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0735	1.0712	1.0689	1.0584	1.0564	1.0472	1.0472	1.0454	1.0507	1.0564	1.0604	1.0646 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.7949 (42)											
Hot water usage for mixer showers	79.9659 78.7641 77.0130 73.6625 71.1898 68.4324 66.8651 68.6030 70.5081 73.4687 76.8912 79.6595 (42a)											
Hot water usage for baths	30.6903 30.2345 29.5926 28.4092 27.5230 26.5404 26.0096 26.6470 27.3410 28.3924 29.6002 30.5865 (42b)											
Hot water usage for other uses	43.2524 41.6796 40.1067 38.5339 36.9611 35.3883 35.3883 36.9611 38.5339 40.1067 41.6796 43.2524 (42c)											
Average daily hot water use (litres/day)	141.5009 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy content (annual)	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Distribution loss (46)m = 0.15 x (45)m	36.5630 32.1846 33.8237 28.8723 27.3965 24.0441 23.2685 24.5557 25.2261 28.8974 31.6645 36.0512 (46)											
Water storage loss (or HIU loss):	200.0000 (47)											
Store volume	1.0000 (48)											
a) If manufacturer declared loss factor is known (kWh/day):	0.5400 (49)											
Temperature factor from Table 2b	0.5400 (55)											
Enter (49) or (54) in (55)	0.5400 (55)											
Total storage loss	16.7400 15.1200 16.7400 16.2000 16.7400 16.2000 16.7400 16.7400 16.2000 16.7400 16.2000 16.7400 (56)											
If cylinder contains dedicated solar storage	16.7400 15.1200 16.7400 16.2000 16.7400 16.2000 16.7400 16.7400 16.2000 16.7400 16.2000 16.7400 (57)											
Primary loss	23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 (59)											
Combi loss	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)											
Total heat required for water heating calculated for each month	283.7559 250.6949 265.4938 231.1940 222.6456 199.0062 195.1254 203.7074 206.8859 232.6514 249.8088 280.3438 (62)											
WWHRS	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)											
PV diverter	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)											
Solar input	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)											
FGHRS	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)											
Output from w/h	283.7559 250.6949 265.4938 231.1940 222.6456 199.0062 195.1254 203.7074 206.8859 232.6514 249.8088 280.3438 (64)											
Electric shower(s)	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)											
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)											
Heat gains from water heating, kWh/month	113.0500 100.2474 106.9778 94.9699 92.7308 84.2674 83.5803 86.4338 86.8874 96.0577 101.1593 111.9154 (65)											

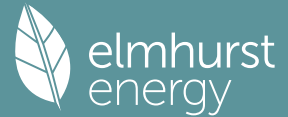
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.9617 32.8291 26.6984 20.2124 15.1090 12.7557 13.7829 17.9156 24.0463 30.5323 35.6357 37.9890 (67)											
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441 402.6798 392.2581 370.0716 342.0651 315.7429 298.1581 294.0224 304.4441 326.6306 354.6372 380.9593 (68)											
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642 54.5642 54.5642 54.5642 54.5642 54.5642 54.5642 54.5642 54.5642 54.5642 54.5642 54.5642 (69)											
Pumps, fans	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (70)											
Losses e.g. evaporation (negative values) (Table 5)	-111.7952 -111.7952 -111.7952 -111.7952 -111.7952 -111.7952 -111.7952 -111.7952 -111.7952 -111.7952 -111.7952 -111.7952 (71)											
Water heating gains (Table 5)	151.9489 149.1777 143.7874 131.9026 124.6382 117.0381 112.3392 116.1745 120.6770 129.1098 140.4990 150.4240 (72)											
Total internal gains	697.9165 695.1483 673.2057 632.6484 592.2740 555.9984 534.7420 538.5743 559.6291 596.7346 641.2336 679.8341 (73)											

6. Solar gains

[Jan]												
				Area	Solar flux	g		FF		Access		Gains
				m2	Table 6a	or Table 6b		or Table 6c		factor		W
					W/m2					Table 6d		
Northeast				3.1600	11.2829	0.6800		0.7000		0.7700		11.7611 (75)
Southeast				9.7600	36.7938	0.6800		0.7000		0.7700		118.4582 (77)
Northwest				7.3000	11.2829	0.6800		0.7000		0.7700		27.1697 (81)
Solar gains	157.3891	281.0230	418.8557	576.5547	698.3384	716.4030	681.0697	586.6797	472.9105	319.8514	190.8707	133.1684 (83)

Full SAP Calculation Printout



Total gains 855.3056 976.1714 1092.0614 1209.2030 1290.6124 1272.4014 1215.8116 1125.2541 1032.5397 916.5859 832.1043 813.0025 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.9223	8.9415	8.9603	9.0500	9.0670	9.1468	9.1468	9.1618	9.1159	9.0670	9.0327	8.9971
alpha	1.5948	1.5961	1.5974	1.6033	1.6045	1.6098	1.6098	1.6108	1.6077	1.6045	1.6022	1.5998
util living area	0.8256	0.7890	0.7352	0.6535	0.5516	0.4374	0.3430	0.3762	0.5265	0.6899	0.7906	0.8359 (86)
Living	17.9270	18.2498	18.7714	19.4213	20.0005	20.4296	20.6347	20.5974	20.2569	19.5080	18.6060	17.8565
Non living	16.5464	16.9328	17.5564	18.3287	18.9991	19.4809	19.6906	19.6595	19.3044	18.4490	17.3744	16.4656
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.4539	18.2498	18.7714	19.4213	20.0005	20.4296	20.6347	20.5974	20.2569	19.5080	18.6060	18.3056 (87)
Th 2	20.0225	20.0244	20.0263	20.0350	20.0366	20.0442	20.0442	20.0456	20.0413	20.0366	20.0333	20.0299 (88)
util rest of house	0.8131	0.7743	0.7165	0.6284	0.5171	0.3896	0.2812	0.3137	0.4796	0.6616	0.7736	0.8241 (89)
MIT 2	18.5984	16.9328	17.5564	18.3287	18.9991	19.4809	19.6906	19.6595	19.3044	18.4490	17.3744	17.0940 (90)
Living area fraction									fLA = Living area / (4) =			0.3649 (91)
MIT	18.9106	17.4134	17.9998	18.7274	19.3645	19.8271	20.0351	20.0018	19.6520	18.8355	17.8238	17.5361 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9106	17.4134	17.9998	18.7274	19.3645	19.8271	20.0351	20.0018	19.6520	18.8355	17.8238	17.5361 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7972	0.7262	0.6706	0.5898	0.4907	0.3779	0.2806	0.3106	0.4586	0.6205	0.7259	0.7869 (94)
Useful gains	681.8403	708.8636	732.3403	713.2354	633.3447	480.8968	341.1651	349.5481	473.5168	568.7536	604.0158	639.7503 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1676.6792	1432.9313	1314.0899	1111.8611	865.5254	585.1204	384.5254	402.5260	623.6036	930.0028	1215.6029	1517.6937 (97)
Space heating kWh	740.1601	486.5735	432.8217	287.0105	172.7425	0.0000	0.0000	0.0000	0.0000	268.7694	440.3428	653.1899 (98a)
Space heating requirement - total per year (kWh/year)												3481.6104
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	740.1601	486.5735	432.8217	287.0105	172.7425	0.0000	0.0000	0.0000	0.0000	268.7694	440.3428	653.1899 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3481.6104
Space heating per m2										(98c) / (4) =		32.5689 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												299.7948 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	740.1601	486.5735	432.8217	287.0105	172.7425	0.0000	0.0000	0.0000	0.0000	268.7694	440.3428	653.1899 (98)
Space heating efficiency (main heating system 1)	299.7948	299.7948	299.7948	299.7948	299.7948	0.0000	0.0000	0.0000	0.0000	299.7948	299.7948	299.7948 (210)
Space heating fuel (main heating system)	246.8889	162.3022	144.3726	95.7356	57.6202	0.0000	0.0000	0.0000	0.0000	89.6511	146.8814	217.8790 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108 (216)
Fuel for water heating, kWh/month	173.3275	153.1328	162.1725	141.2210	135.9994	121.5596	119.1891	124.4312	126.3728	142.1112	152.5915	171.2433 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1161.3310 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7108
Water heating fuel used												1723.3519 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	261.1023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3145.7851 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1161.3310	16.4900	191.5035 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.3519	16.4900	284.1807 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	261.1023	16.4900	43.0558 (250)
Additional standing charges			0.0000 (251)
Total energy cost			518.7400 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2294 (257)
SAP value		80.0714
SAP rating (Section 12)		80 (258)
SAP band		C

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1161.3310	0.1545	179.4822 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1723.3519	0.1411	243.1646 (264)
Space and water heating			422.6468 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Total CO2, kg/year			460.3319 (272)
CO2 emissions per m2			4.3100 (273)
EI value			95.9391
EI rating			96 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

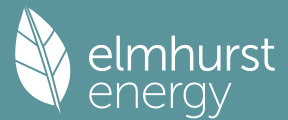
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	267.2500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	2 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2972 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000	(22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750	(22a)
Adj infilt rate													
Effective ac	0.4161	0.3790	0.3567	0.3269	0.3418	0.3121	0.3195	0.3047	0.3269	0.3567	0.3567	0.3790	(22b)
	0.5866	0.5718	0.5636	0.5534	0.5584	0.5487	0.5510	0.5464	0.5534	0.5636	0.5636	0.5718	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Solid Door			1.9900	1.0000	1.9900			(26)
Windows			20.2200	1.1450	23.1527			(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000	(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000	(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500	(30)
Total net area of external elements Aum(A, m2)			210.2900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.5831			(33)
Main dwelling								
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000	(32)
Internal Wall 1			195.7600			9.0000	1761.8400	(32c)
Internal Floor 1			53.4500			18.0000	962.1000	(32d)
Internal Ceiling 1			53.4500			9.0000	481.0500	(32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
List of Thermal Bridges (34.4812 (35))

	Length	Psi-value	Total	
K1 Element	14.0400	0.0470	0.6599	
E2 Other lintels (including other steel lintels)	13.1500	0.0350	0.4603	
E3 Sill	33.7000	0.0470	1.5839	
E4 Jamb	20.6800	0.0150	0.3102	
E5 Ground floor (normal)	20.6800	0.0100	0.2068	
E6 Intermediate floor within a dwelling	10.0000	0.0430	0.4300	
E16 Corner (normal)	10.0000	0.0690	0.6900	
E18 Party wall between dwellings	10.0400	0.0370	0.3715	
E10 Eaves (insulation at ceiling level)	10.6400	0.2500	2.6600	
E12 Gable (insulation at ceiling level)	10.6400	0.1310	1.3938	
P1 Party wall - Ground floor	10.6400	0.0400	0.4256	
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.2400	2.5536	
P4 Party wall - Roof (insulation at ceiling level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.7455 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 64.3286 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	51.7314	50.4289	49.7058	48.8098	49.2480	48.3910	48.5980	48.1890	48.8098	49.7058	49.7058	50.4289	(38)
Average = Sum(39)m / 12 =	116.0600	114.7575	114.0344	113.1384	113.5767	112.7197	112.9266	112.5176	113.1384	114.0344	114.0344	114.7575	(39)
												113.8080	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0857	1.0735	1.0667	1.0584	1.0625	1.0544	1.0564	1.0525	1.0584	1.0667	1.0667	1.0735	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy content (annual)	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											2350.3171
	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Total per year (kWh/year) = Sum(64)m =											2821.3131 (64)	
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	
Heat gains from water heating, kWh/month												
	113.0500	100.2474	106.9778	94.9699	92.7308	84.2674	83.5803	86.4338	86.8874	96.0577	101.1593	111.9154 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.9617	32.8291	26.6984	20.2124	15.1090	12.7557	13.7829	17.9156	24.0463	30.5323	35.6357	37.9890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441	402.6798	392.2581	370.0716	342.0651	315.7429	298.1581	294.0224	304.4441	326.6306	354.6372	380.9593 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Water heating gains (Table 5)	151.9489	149.1777	143.7874	131.9026	124.6382	117.0381	112.3392	116.1745	120.6770	129.1098	140.4990	150.4240 (72)
Total internal gains	697.9165	695.1483	673.2057	632.6484	592.2740	555.9984	534.7420	538.5743	559.6291	596.7346	641.2336	679.8341 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W				
Northeast					3.1600	15.4678	0.6800	0.7000			0.7700	16.1234 (75)				
Southeast					9.7600	47.5950	0.6800	0.7000			0.7700	153.2326 (77)				
Northwest					7.3000	15.4678	0.6800	0.7000			0.7700	37.2471 (81)				
Solar gains					206.6031	312.6236	467.5038	670.4582	791.9691	875.3107	822.0593	710.0316	567.1474	380.4770	241.6051	168.1467 (83)
Total gains					904.5196	1007.7719	1140.7095	1303.1066	1384.2431	1431.3091	1356.8013	1248.6060	1126.7765	977.2116	882.8387	847.9807 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, n _l ,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.8222	8.9223	8.9789	9.0500	9.0151	9.0836	9.0670	9.0999	9.0500	8.9789	8.9789	8.9223
alpha	1.5881	1.5948	1.5986	1.6033	1.6010	1.6056	1.6045	1.6067	1.6033	1.5986	1.5986	1.5948
util living area	0.7964	0.7665	0.7056	0.6127	0.4989	0.3708	0.2865	0.2865	0.4470	0.6233	0.7452	0.8063 (86)
Living	18.3177	18.5239	19.0279	19.6321	20.1838	20.5478	20.6932	20.7035	20.4499	19.8713	19.0582	18.3120
Non living	17.0133	17.2613	17.8617	18.5716	19.1983	19.5932	19.7334	19.7476	19.5021	18.8640	17.9124	17.0136
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.6509	18.5239	19.0279	19.6321	20.1838	20.5478	20.6932	20.7035	20.4499	19.8713	19.0582	18.6962 (87)
Th 2	20.0125	20.0225	20.0281	20.0350	20.0316	20.0382	20.0366	20.0398	20.0350	20.0281	20.0281	20.0225 (88)
util rest of house	0.7811	0.7498	0.6847	0.5852	0.4609	0.3211	0.2246	0.2194	0.3930	0.5871	0.7233	0.7915 (89)
MIT 2	18.7835	17.2613	17.8617	18.5716	19.1983	19.5932	19.7334	19.7476	19.5021	18.8640	17.9124	17.5439 (90)
Living area fraction	19.1000	17.7221	18.2872	18.9586	19.5579	19.9415	20.0836	20.0964	19.8480	FLA = Living area / (4) = 19.2316	18.3305	17.9644 (91)
MIT	19.1000	17.7221	18.2872	18.9586	19.5579	19.9415	20.0836	20.0964	19.8480	19.2316	18.3305	17.9644 (92)
Temperature adjustment	19.1000	17.7221	18.2872	18.9586	19.5579	19.9415	20.0836	20.0964	19.8480	19.2316	18.3305	0.0000
adjusted MIT	19.1000	17.7221	18.2872	18.9586	19.5579	19.9415	20.0836	20.0964	19.8480	19.2316	18.3305	17.9644 (93)

8. Space heating requirement

Utilisation	0.7654	0.7023	0.6410	0.5510	0.4408	0.3158	0.2278	0.2236	0.3817	0.5535	0.6774	0.7536 (94)
Useful gains	692.2961	707.7296	731.1720	718.0000	610.1156	452.0579	309.0944	279.1293	430.0457	540.8502	598.0618	639.0731 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	1555.2092	1356.6704	1241.5206	1058.8163	790.2571	523.1901	336.9300	303.3927	525.8667	801.8458	1086.8081	1384.4809 (97)
Space heating kWh	642.0074	436.0882	379.6993	245.3878	134.0253	0.0000	0.0000	0.0000	0.0000	194.1807	351.8973	554.5834 (98a)
Space heating requirement - total per year (kWh/year)												2937.8693
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	642.0074	436.0882	379.6993	245.3878	134.0253	0.0000	0.0000	0.0000	0.0000	194.1807	351.8973	554.5834 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2937.8693
Space heating per m ²										(98c) / (4) =		27.4824 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												299.4490 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	642.0074	436.0882	379.6993	245.3878	134.0253	0.0000	0.0000	0.0000	0.0000	194.1807	351.8973	554.5834 (98)
Space heating efficiency (main heating system 1)	299.4490	299.4490	299.4490	299.4490	299.4490	0.0000	0.0000	0.0000	0.0000	299.4490	299.4490	299.4490 (210)
Space heating fuel (main heating system)	214.3962	145.6302	126.7993	81.9464	44.7573	0.0000	0.0000	0.0000	0.0000	64.8460	117.5149	185.2013 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)												

Full SAP Calculation Printout



Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187 (216)
Fuel for water heating, kWh/month	173.3191	153.1254	162.1646	141.2141	135.9928	121.5537	119.1833	124.4252	126.3666	142.1043	152.5841	171.2350 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												981.0918 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7187
Water heating fuel used												1723.2683 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												261.1023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
FV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2965.4624 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	981.0918	27.6700	271.4681 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.2683	27.6700	476.8283 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	261.1023	27.6700	72.2470 (250)
Additional standing charges			0.0000 (251)
Total energy cost			820.5434 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	981.0918	0.1550	152.0257 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1723.2683	0.1411	243.1528 (264)
Space and water heating			395.1784 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Total CO2, kg/year			432.8635 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	981.0918	1.5736	1543.8848 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.2683	1.5217	2622.3762 (278)
Space and water heating			4166.2610 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	261.1023	1.5338	400.4875 (282)
Total Primary energy kWh/year			4566.7485 (286)

SAP 10 EPC IMPROVEMENTS

Design Stage - Triple Glazed

Current energy efficiency rating:
Current environmental impact rating:

C 80
A 96

Full SAP Calculation Printout



N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:
N Solar water heating
U Solar photovoltaic panels

SAP change
+ 2.2
+ 5.7

Cost change
-£ 124
-£ 275

CO2 change
-56 kg (13.0%)
-134 kg (35.5%)

Recommended measures
Solar water heating
Solar photovoltaic panels

Typical annual savings
£124
£275
£398

Energy efficiency
B 82
B 88

Environmental impact
A 96
A 97

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 596 TEST (30 Jun 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current	Potential	Saving
Electricity	£821	£697	£124
Space heating	£271	£294	-£22
Water heating	£477	£331	£146
Lighting	£72	£72	£0
Generated (PV)	-£0	-£275	£275
Total cost of fuels	£821	£422	£399
Total cost of uses	£820	£422	£399
Delivered energy	28 kWh/m²	14 kWh/m²	13 kWh/m²
Carbon dioxide emissions	0.4 tonnes	0.2 tonnes	0.2 tonnes
CO2 emissions per m²	4 kg/m²	2 kg/m²	2 kg/m²
Primary energy	43 kWh/m²	23 kWh/m²	20 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.1497 (8)

Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
Blower Door
4.0000 (17)
0.3497 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.2972 (21)

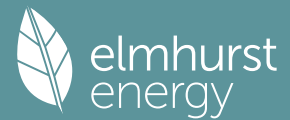
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3790	0.3715	0.3641	0.3269	0.3195	0.2824	0.2824	0.2749	0.2972	0.3195	0.3344	0.3492 (22b)
Effective ac	0.5718	0.5690	0.5663	0.5534	0.5510	0.5399	0.5399	0.5378	0.5442	0.5510	0.5559	0.5610 (25)

3. Heat losses and heat loss parameter

Element	Gross m²	Openings m²	NetArea m²	U-value W/m²K	A x U W/K	K-value kJ/m²K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)

5. Internal gains (see Table 5 and 5a)

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.9617	32.8291	26.6984	20.2124	15.1090	12.7557	13.7829	17.9156	24.0463	30.5323	35.6357	37.9890	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441	402.6798	392.2581	370.0716	342.0651	315.7429	298.1581	294.0224	304.4441	326.6306	354.6372	380.9593	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)
Water heating gains (Table 5)	151.9489	149.1777	142.2866	124.3986	110.8808	103.0306	98.3317	103.1676	114.6738	127.6090	140.4990	150.4240	(72)
Total internal gains	697.9165	695.1483	671.7049	625.1444	578.5167	541.9910	520.7345	525.5674	553.6259	595.2338	641.2336	679.8341	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				3.1600	11.2829		0.6800		0.7000		0.7700		11.7611 (75)
Southeast				9.7600	36.7938		0.6800		0.7000		0.7700		118.4582 (77)
Northwest				7.3000	11.2829		0.6800		0.7000		0.7700		27.1697 (81)
Solar gains	157.3891	281.0230	418.8557	576.5547	698.3384	716.4030	681.0697	586.6797	472.9105	319.8514	190.8707		133.1684 (83)
Total gains	855.3056	976.1714	1090.5606	1201.6990	1276.8551	1258.3940	1201.8042	1112.2471	1026.5365	915.0851	832.1043		813.0025 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	8.9223	8.9415	8.9603	9.0500	9.0670	9.1468	9.1468	9.1618	9.1159	9.0670	9.0327	8.9971	8.9971	
alpha	1.5948	1.5961	1.5974	1.6033	1.6045	1.6098	1.6098	1.6108	1.6077	1.6045	1.6022	1.5998	1.5998	
util living area	0.8256	0.7890	0.7355	0.6554	0.5550	0.4407	0.3461	0.3795	0.5284	0.6904	0.7906	0.8359	0.8359	(86)
Living	17.9270	18.2498	18.7697	19.4149	19.9925	20.4249	20.6321	20.5944	20.2539	19.5065	18.6060	17.8565	17.8565	
Non living	16.5464	16.9328	17.5545	18.3215	18.9907	19.4766	19.6886	19.6571	19.3014	18.4474	17.3744	16.4656	16.4656	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	10	
MIT	19.4539	18.2498	18.7697	19.4149	19.9925	20.4249	20.6321	20.5944	20.2539	19.5065	18.6060	18.3056	18.3056	(87)
Th 2	20.0225	20.0244	20.0263	20.0350	20.0366	20.0442	20.0442	20.0456	20.0413	20.0366	20.0333	20.0299	20.0299	(88)
util rest of house	0.8131	0.7743	0.7169	0.6303	0.5205	0.3928	0.2840	0.3167	0.4814	0.6621	0.7736	0.8241	0.8241	(89)
MIT 2	18.5984	16.9328	17.5545	18.3215	18.9907	19.4766	19.6886	19.6571	19.3014	18.4474	17.3744	17.0940	17.0940	(90)
Living area fraction									flA = Living area / (4) =			0.3649	0.3649	(91)
MIT	18.9106	17.4134	17.9979	18.7205	19.3563	19.8226	20.0329	19.9992	19.6490	18.8339	17.8238	17.5361	17.5361	(92)
Temperature adjustment												0.0000	0.0000	
adjusted MIT	18.9106	17.4134	17.9979	18.7205	19.3563	19.8226	20.0329	19.9992	19.6490	18.8339	17.8238	17.5361	17.5361	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7972	0.7262	0.6710	0.5916	0.4937	0.3808	0.2832	0.3134	0.4602	0.6210	0.7259	0.7869	(94)
Useful gains	681.8403	708.8636	731.7203	710.8793	630.4457	479.2559	340.3362	348.5736	472.4316	568.2292	604.0158	639.7503	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1676.6792	1432.9313	1313.8768	1111.0759	864.6022	584.6252	384.2816	402.2362	623.2611	929.8253	1215.6029	1517.6937	(97)
Space heating kWh	740.1601	486.5735	433.1244	288.1416	174.2124	0.0000	0.0000	0.0000	0.0000	269.0275	440.3428	653.1899	(98a)
Space heating requirement - total per year (kWh/year)												3484.7723	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	740.1601	486.5735	433.1244	288.1416	174.2124	0.0000	0.0000	0.0000	0.0000	269.0275	440.3428	653.1899	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3484.7723	
Space heating per m2										(98c) / (4) =		32.5984	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													299.7948	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	740.1601	486.5735	433.1244	288.1416	174.2124	0.0000	0.0000	0.0000	0.0000	269.0275	440.3428	653.1899	(98)	
Space heating efficiency (main heating system 1)	299.7948	299.7948	299.7948	299.7948	299.7948	0.0000	0.0000	0.0000	0.0000	299.7948	299.7948	299.7948	(210)	
Space heating fuel (main heating system)	246.8889	162.3022	144.4736	96.1129	58.1105	0.0000	0.0000	0.0000	0.0000	89.7372	146.8814	217.8790	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	

Water heating

Full SAP Calculation Printout



Water heating requirement	283.7559	234.4960	205.4502	143.6789	104.2507	89.2193	85.7653	107.3771	143.4422	202.5472	249.8088	280.3438 (64)
Efficiency of water heater												163.7108 (216)
(217)m	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108	163.7108 (217)
Fuel for water heating, kWh/month	173.3275	143.2379	125.4958	87.7638	63.6798	54.4981	52.3883	65.5895	87.6193	123.7225	152.5915	171.2433 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.8709	-57.8783	-87.3638	-101.2868	-109.1688	-96.5736	-95.1123	-89.6923	-79.3298	-67.2545	-43.4597	-33.0249 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1162.3856 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7108
Water heating fuel used												1301.1575 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
pump for solar water heating												80.0000 (230g)
Total electricity for the above, kWh/year												80.0000 (231)
Electricity for lighting (calculated in Appendix L)												261.1023 (232)

Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-899.0157 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1905.6297 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1162.3856	16.4900	191.6774 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1301.1575	16.4900	214.5609 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	261.1023	16.4900	43.0558 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-899.0157	16.4900	-148.2477
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-148.2477 (252)
Total energy cost			314.2383 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7447 (257)
SAP value		87.9278
SAP rating (Section 12)		88 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1162.3856	0.1545	179.6281 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1301.1575	0.1456	189.4980 (264)
Space and water heating			369.1260 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-899.0157	0.1344	-120.8196
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-120.8196 (269)
Total CO2, kg/year			297.0885 (272)
CO2 emissions per m2			2.7800 (273)
EI value			97.3792
EI rating			97 (274)
EI band			A

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	267.2500 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2972 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000 (22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750 (22a)
Adj infilt rate	0.4161	0.3790	0.3567	0.3269	0.3418	0.3121	0.3195	0.3047	0.3269	0.3567	0.3567	0.3790 (22b)
Effective ac	0.5866	0.5718	0.5636	0.5534	0.5584	0.5487	0.5510	0.5464	0.5534	0.5636	0.5636	0.5718 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	(30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	52.5831	(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	(32)
Internal Wall 1			195.7600		9.0000	1761.8400	(32c)
Internal Floor 1			53.4500			18.0000	(32d)
Internal Ceiling 1			53.4500			9.0000	(32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
34.4812 (35)

List of Thermal Bridges

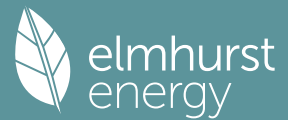
K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	14.0400	0.0470	0.6599
E3 Sill	13.1500	0.0350	0.4603
E4 Jamb	33.7000	0.0470	1.5839
E5 Ground floor (normal)	20.6800	0.0150	0.3102
E6 Intermediate floor within a dwelling	20.6800	0.0100	0.2068
E16 Corner (normal)	10.0000	0.0430	0.4300
E18 Party wall between dwellings	10.0000	0.0690	0.6900
E10 Eaves (insulation at ceiling level)	10.0400	0.0370	0.3715
E12 Gable (insulation at ceiling level)	10.6400	0.2500	2.6600
P1 Party wall - Ground floor	10.6400	0.1310	1.3938
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0400	0.4256
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.2400	2.5536

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
(36a) = 0.0000
Total fabric heat loss
(33) + (36) + (36a) = 64.3286 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	51.7314	50.4289	49.7058	48.8098	49.2480	48.3910	48.5980	48.1890	48.8098	49.7058	49.7058	50.4289 (38)
Average = Sum(39)m / 12 =	116.0600	114.7575	114.0344	113.1384	113.5767	112.7197	112.9266	112.5176	113.1384	114.0344	114.0344	114.7575 (39)
												113.8080

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0857	1.0735	1.0667	1.0584	1.0625	1.0544	1.0564	1.0525	1.0584	1.0667	1.0667	1.0735 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy content (annual)	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Distribution loss (46)m = 0.15 x (45)m	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	283.7559	250.6949	264.0981	224.4404	209.8513	186.3995	182.0985	191.6109	201.4830	231.2557	249.8088	280.3438 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												799.3970 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												799.3970
Solar input	-6.7691	-24.1970	-71.1191	-98.5050	-121.6054	-120.2593	-117.5885	-106.2053	-77.2027	-45.0488	-10.8968	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	276.9868	226.4980	192.9790	125.9353	88.2459	66.1402	64.5100	85.4056	124.2803	186.2069	238.9120	280.3438 (64)
	Total per year (kWh/year) = Sum(64)m =											1956.4437 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	113.0500	100.2474	105.8612	89.5670	82.4953	74.1820	73.1588	76.7567	82.5651	94.9411	101.1593	111.9154 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.9617	32.8291	26.6984	20.2124	15.1090	12.7557	13.7829	17.9156	24.0463	30.5323	35.6357	37.9890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441	402.6798	392.2581	370.0716	342.0651	315.7429	298.1581	294.0224	304.4441	326.6306	354.6372	380.9593 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Water heating gains (Table 5)	151.9489	149.1777	142.2866	124.3986	110.8808	103.0306	98.3317	103.1676	114.6738	127.6090	140.4990	150.4240 (72)
Total internal gains	697.9165	695.1483	671.7049	625.1444	578.5167	541.9910	520.7345	525.5674	553.6259	595.2338	641.2336	679.8341 (73)

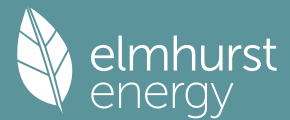
6. Solar gains

[Jan]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
-------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.8222	8.9223	8.9789	9.0500	9.0151	9.0836	9.0670	9.0999	9.0500	8.9789	8.9789	8.9223
alpha	1.5881	1.5948	1.5986	1.6033	1.6010	1.6056	1.6045	1.6067	1.6033	1.5986	1.5986	1.5948
util living area												

Full SAP Calculation Printout



	0.7964	0.7665	0.7060	0.6145	0.5020	0.3736	0.2890	0.2890	0.4487	0.6238	0.7452	0.8063 (86)
Living	18.3177	18.5239	19.0263	19.6266	20.1776	20.5447	20.6915	20.7019	20.4478	19.8702	19.0582	18.3120
Non living	17.0133	17.2613	17.8599	18.5655	19.1920	19.5905	19.7322	19.7466	19.5003	18.8628	17.9124	17.0136
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.6509	18.5239	19.0263	19.6266	20.1776	20.5447	20.6915	20.7019	20.4478	19.8702	19.0582	18.6962 (87)
Th 2	20.0125	20.0225	20.0281	20.0350	20.0316	20.0382	20.0366	20.0398	20.0350	20.0281	20.0281	20.0225 (88)
util rest of house												
	0.7811	0.7498	0.6851	0.5870	0.4639	0.3236	0.2267	0.2214	0.3945	0.5876	0.7233	0.7915 (89)
MIT 2	18.7835	17.2613	17.8599	18.5655	19.1920	19.5905	19.7322	19.7466	19.5003	18.8628	17.9124	17.5439 (90)
Living area fraction									FLA = Living area /		(4) =	0.3649 (91)
MIT	19.1000	17.7221	18.2856	18.9527	19.5517	19.9387	20.0823	20.0952	19.8461	19.2304	18.3305	17.9644 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1000	17.7221	18.2856	18.9527	19.5517	19.9387	20.0823	20.0952	19.8461	19.2304	18.3305	17.9644 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7654	0.7023	0.6413	0.5526	0.4435	0.3182	0.2298	0.2255	0.3831	0.5539	0.6774	0.7536	(94)
Useful gains	692.2961	707.7296	730.6092	715.9678	607.8287	450.9694	308.5840	278.6755	429.3257	540.4396	598.0618	639.0731	(95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000	(96)
Heat loss rate W	1555.2092	1356.6704	1241.3290	1058.1509	789.5462	522.8705	336.7813	303.2593	525.6470	801.7100	1086.8081	1384.4809	(97)
Space heating kWh	642.0074	436.0882	379.9755	246.3719	135.1978	0.0000	0.0000	0.0000	0.0000	194.3851	351.8973	554.5834	(98a)
Space heating requirement - total per year (kWh/year)												2940.5066	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	642.0074	436.0882	379.9755	246.3719	135.1978	0.0000	0.0000	0.0000	0.0000	194.3851	351.8973	554.5834	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2940.5066	
Space heating per m2										(98c) / (4) =		27.5071	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													299.4490 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	642.0074	436.0882	379.9755	246.3719	135.1978	0.0000	0.0000	0.0000	0.0000	194.3851	351.8973	554.5834	(98)
Space heating efficiency (main heating system 1)	299.4490	299.4490	299.4490	299.4490	299.4490	0.0000	0.0000	0.0000	0.0000	299.4490	299.4490	299.4490	(210)
Space heating fuel (main heating system)	214.3962	145.6302	126.8916	82.2751	45.1489	0.0000	0.0000	0.0000	0.0000	64.9143	117.5149	185.2013	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	276.9868	226.4980	192.9790	125.9353	88.2459	66.1402	64.5100	85.4056	124.2803	186.2069	238.9120	280.3438	(64)
Efficiency of water heater	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	163.7187	(216)
Fuel for water heating, kWh/month	169.1846	138.3458	117.8723	76.9218	53.9009	40.3987	39.4029	52.1661	75.9108	113.7358	145.9283	171.2350	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-49.2901	-63.1250	-94.0150	-109.7531	-114.4607	-104.6041	-102.5391	-97.8712	-87.9688	-75.6562	-52.7717	-40.6523	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												981.9725	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												163.7187	
Water heating fuel used												1195.0029	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												261.1023	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-992.7075	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)

Full SAP Calculation Printout



Energy used	0.0000 (237)
Total delivered energy for all uses	1525.3703 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	981.9725	27.6700	271.7118 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1195.0029	27.6700	330.6573 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	27.6700	22.1360 (249)
Energy for lighting	261.1023	27.6700	72.2470 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-992.7075	27.6700	-274.6822
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-274.6822 (252)
Total energy cost			422.0699 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	981.9725	0.1549	152.1477 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1195.0029	0.1469	175.6014 (264)
Space and water heating			327.7492 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-992.7075	0.1348	-133.8343
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-133.8343 (269)
Total CO2, kg/year			242.6970 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	981.9725	1.5736	1545.2172 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1195.0029	1.5436	1844.6371 (278)
Space and water heating			3389.8543 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	261.1023	1.5338	400.4875 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-992.7075	1.4983	-1487.3469
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1487.3469 (283)
Total Primary energy kWh/year			2424.0189 (286)

Full SAP Calculation Printout



Plot Reference	P4			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	4, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	80 C	DER	4.35	TER	9.89
Environmental	96 A	% DER < TER			56.02
CO ₂ Emissions (t/year)	0.43	DFEE	35.32	TFEE	36.03
Compliance Check	See BREL	% DFEE < TFEE			1.96
% DPER < TPER	10.97	DPER	45.83	TPER	51.48
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

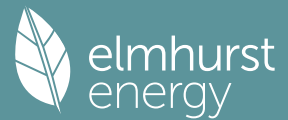
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3234 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4124	0.4043	0.3962	0.3558	0.3477	0.3073	0.3073	0.2992	0.3234	0.3477	0.3639	0.3801 (22b)
Effective ac	0.5850	0.5817	0.5785	0.5633	0.5604	0.5472	0.5472	0.5448	0.5523	0.5604	0.5662	0.5722 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600			9.0000	1761.8400 (32c)
Internal Floor 1			53.4500			18.0000	962.1000 (32d)
Internal Ceiling 1			53.4500			9.0000	481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				14.0400	0.0470	0.6599	
E3 Sill				13.1500	0.0350	0.4603	

Full SAP Calculation Printout



E4 Jamb						33.7000		0.0470		1.5839		
E5 Ground floor (normal)						20.6800		0.0150		0.3102		
E6 Intermediate floor within a dwelling						20.6800		0.0100		0.2068		
E16 Corner (normal)						10.0000		0.0430		0.4300		
E18 Party wall between dwellings						10.0000		0.0690		0.6900		
E10 Eaves (insulation at ceiling level)						10.0400		0.0370		0.3715		
E12 Gable (insulation at ceiling level)						10.6400		0.2500		2.6600		
P1 Party wall - Ground floor						10.6400		0.1310		1.3938		
P2 Party wall - Intermediate floor within a dwelling						10.6400		0.0400		0.4256		
P4 Party wall - Roof (insulation at ceiling level)						10.6400		0.2400		2.5536		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											11.7455	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	64.3286 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	51.5957	51.3045	51.0190	49.6783	49.4275	48.2597	48.2597	48.0435	48.7095	49.4275	49.9349	50.4654 (38)
Average = Sum(39)m / 12 =	115.9243	115.6331	115.3477	114.0069	113.7561	112.5883	112.5883	112.3721	113.0381	113.7561	114.2635	114.7941 (39)
												114.0057
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0844	1.0817	1.0790	1.0665	1.0641	1.0532	1.0532	1.0512	1.0574	1.0641	1.0689	1.0738 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.0665
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy content (annual)	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2350.3171
Water storage loss (or HIU loss):	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
12Total per year (kWh/year)												2821.3131 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month	113.0500	100.2474	106.9778	94.9699	92.7308	84.2674	83.5803	86.4338	86.8874	96.0577	101.1593	111.9154 (65)

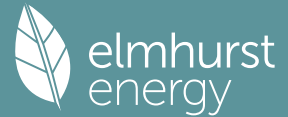
5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	139.5973	154.5541	139.5973	144.2505	139.5973	144.2505	139.5973	139.5973	144.2505	139.5973	144.2505	139.5973 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427 (68)
Pumps, fans	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Total internal gains	151.9489	149.1777	143.7874	131.9026	124.6382	117.0381	112.3392	116.1745	120.6770	129.1098	140.4990	150.4240 (72)
	623.4939	638.4505	611.1208	589.0243	558.3423	537.7596	516.6255	517.6900	533.8282	552.4729	587.2796	610.1872 (73)

6. Solar gains												

[Jan]												
		Area		Solar flux		g		FF		Access		Gains
		m2		Table 6a		W/m2		Specific data		factor		W
				or Table 6b				or Table 6c		Table 6d		
Southeast		9.7600		36.7938		0.6800		0.7000		0.7700		118.4582 (77)
Southwest		3.1600		36.7938		0.6800		0.7000		0.7700		38.3533 (79)
Northwest		7.3000		11.2829		0.6800		0.7000		0.7700		27.1697 (81)

Full SAP Calculation Printout



Solar gains	183.9812	322.4127	465.1103	616.4736	727.1756	738.0487	704.8444	619.7895	517.1401	362.7979	222.0105	156.3861 (83)
Total gains	807.4751	960.8631	1076.2311	1205.4978	1285.5179	1275.8082	1221.4700	1137.4795	1050.9684	915.2708	809.2901	766.5733 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.8325	8.8547	8.8766	8.9810	9.0008	9.0942	9.0942	9.1117	9.0580	9.0008	8.9609	8.9195	
alpha	1.5888	1.5903	1.5918	1.5987	1.6001	1.6063	1.6063	1.6074	1.6039	1.6001	1.5974	1.5946	
util living area	0.8379	0.7938	0.7405	0.6560	0.5546	0.4380	0.3430	0.3744	0.5225	0.6917	0.7979	0.8477 (86)	
Living	17.8320	18.2075	18.7341	19.4050	19.9884	20.4264	20.6332	20.5975	20.2605	19.4957	18.5594	17.7645	
Non living	16.4297	16.8787	17.5085	18.3060	18.9815	19.4736	19.6848	19.6553	19.3034	18.4312	17.3163	16.3527	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.4066	18.2075	18.7341	19.4050	19.9884	20.4264	20.6332	20.5975	20.2605	19.4957	18.5594	18.2268 (87)	
Th 2	20.0136	20.0158	20.0180	20.0283	20.0302	20.0392	20.0392	20.0409	20.0358	20.0302	20.0263	20.0223 (88)	
util rest of house	0.8260	0.7793	0.7219	0.6308	0.5199	0.3899	0.2810	0.3118	0.4753	0.6633	0.7812	0.8365 (89)	
MIT 2	18.5450	16.8787	17.5085	18.3060	18.9815	19.4736	19.6848	19.6553	19.3034	18.4312	17.3163	16.9995 (90)	
Living area fraction									FLA = Living area / (4) =				0.3649 (91)
MIT	18.8594	17.3636	17.9557	18.7070	19.3490	19.8213	20.0309	19.9991	19.6527	18.8197	17.7699	17.4474 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.8594	17.3636	17.9557	18.7070	19.3490	19.8213	20.0309	19.9991	19.6527	18.8197	17.7699	17.4474 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8102	0.7309	0.6756	0.5919	0.4931	0.3783	0.2804	0.3089	0.4548	0.6220	0.7333	0.7998 (94)
Useful gains	654.2165	702.3361	727.0681	713.5128	633.9241	482.5759	342.5418	351.4152	477.9509	569.2550	593.4399	613.1087 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1687.7909	1441.2026	1321.3919	1118.0694	870.1158	587.8576	386.2805	404.4404	627.6641	935.0366	1219.1819	1520.7228 (97)
Space heating kWh	768.9793	496.5183	442.1769	291.2807	175.7267	0.0000	0.0000	0.0000	0.0000	272.1415	450.5343	675.2649 (98a)
Space heating requirement - total per year (kWh/year)												3572.6226
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	768.9793	496.5183	442.1769	291.2807	175.7267	0.0000	0.0000	0.0000	0.0000	272.1415	450.5343	675.2649 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3572.6226
Space heating per m2										(98c) / (4) =		33.4202 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												299.3479 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	768.9793	496.5183	442.1769	291.2807	175.7267	0.0000	0.0000	0.0000	0.0000	272.1415	450.5343	675.2649 (98)
Space heating efficiency (main heating system 1)	299.3479	299.3479	299.3479	299.3479	299.3479	0.0000	0.0000	0.0000	0.0000	299.3479	299.3479	299.3479 (210)
Space heating fuel (main heating system)	256.8848	165.8666	147.7134	97.3051	58.7032	0.0000	0.0000	0.0000	0.0000	90.9114	150.5052	225.5786 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211 (216)
Fuel for water heating, kWh/month	173.3167	153.1232	162.1623	141.2121	135.9908	121.5520	119.1816	124.4234	126.3648	142.1023	152.5819	171.2326 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1193.4684 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7211
Water heating fuel used												1723.2438 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	261.1023	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3177.8145	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1193.4684	0.1546	184.5340	(261)
Total CO2 associated with community systems			0.0000	(262)
Water heating (other fuel)	1723.2438	0.1411	243.1493	(264)
Space and water heating			427.6834	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	261.1023	0.1443	37.6851	(268)
Total CO2, kg/year			465.3685	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3500	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1193.4684	1.5724	1876.5841	(275)
Total CO2 associated with community systems			0.0000	(276)
Water heating (other fuel)	1723.2438	1.5217	2622.3390	(278)
Space and water heating			4498.9231	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	261.1023	1.5338	400.4875	(282)
Total Primary energy kWh/year			4899.4105	(286)
Dwelling Primary energy Rate (DPER)			45.8300	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

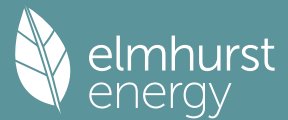
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)	
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3997	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3697 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4714	0.4621	0.4529	0.4067	0.3974	0.3512	0.3512	0.3420	0.3697	0.3974	0.4159	0.4344	(22b)
Effective ac	0.6111	0.6068	0.6025	0.5827	0.5790	0.5617	0.5617	0.5585	0.5683	0.5790	0.5865	0.5943	(25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.9900	1.0000	1.9900			(26)
TER Opening Type			20.2200	1.1450	23.1527			(27)
Heatloss Floor 1			53.4500	0.1300	6.9485			(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124			(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795			(30)
Total net area of external elements Aum(A, m2)			210.2900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831			(33)
Main dwelling								
Party Wall 1			53.1900	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

34.4812 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	14.0400	0.0500	0.7020	
E2 Other lintels (including other steel lintels)	13.1500	0.0500	0.6575	
E3 Sill	33.7000	0.0500	1.6850	
E4 Jamb	20.6800	0.1600	3.3088	
E5 Ground floor (normal)	20.6800	0.0000	0.0000	
E6 Intermediate floor within a dwelling	10.0000	0.0900	0.9000	
E16 Corner (normal)	10.0000	0.0600	0.6000	
E18 Party wall between dwellings	10.0400	0.0600	0.6024	
E10 Eaves (insulation at ceiling level)	10.6400	0.0600	0.6384	
E12 Gable (insulation at ceiling level)	10.6400	0.0800	0.8512	
P1 Party wall - Ground floor	10.6400	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.1200	1.2768	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.2221 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	63.8052 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	53.8937	53.5133	53.1404	51.3888	51.0611	49.5355	49.5355	49.2530	50.1231	51.0611	51.7240	52.4171	(38)
Heat transfer coeff	117.6989	117.3185	116.9455	115.1940	114.8663	113.3407	113.3407	113.0582	113.9283	114.8663	115.5292	116.2223	(39)
Average = Sum(39)m / 12 =												115.1924	
HLP	1.1010	1.0975	1.0940	1.0776	1.0745	1.0602	1.0602	1.0576	1.0657	1.0745	1.0807	1.0872	(40)
HLP (average)												1.0776	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

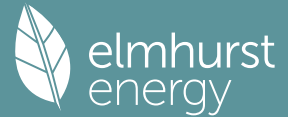
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7949 (42)
Hot water usage for mixer showers	71.0808	70.0126	68.4560	65.4777	63.2799	60.8288	59.4356	60.9804	62.6738	65.3055	68.3477	70.8084	(42a)
Hot water usage for baths	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865	(42b)
Hot water usage for other uses	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524	(42c)
Average daily hot water use (litres/day)													133.3092 (43)
Daily hot water use	145.0234	141.9266	138.1554	132.4208	127.7640	122.7575	120.8336	124.5886	128.5487	133.8047	139.6275	144.6473	(44)
Energy conte	229.6817	202.1016	212.3396	181.2775	171.9949	150.9447	146.1378	154.2667	158.5135	181.5717	198.9250	226.4828	(45)
Energy content (annual)										Total = Sum(45)m =		2214.2373	
Distribution loss (46)m = 0.15 x (45)m	34.4522	30.3152	31.8509	27.1916	25.7992	22.6417	21.9207	23.1400	23.7770	27.2358	29.8388	33.9724	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	280.6077	248.0993	263.2657	230.5608	222.9210	200.2280	197.0638	205.1927	207.7968	232.4977	248.2083	277.4088	(62)
WWHRS	-32.4952	-28.7390	-30.0938	-24.9189	-23.2235	-19.8725	-18.6273	-19.8083	-20.5609	-24.2390	-27.4598	-31.8934	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2511.9193	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	117.1100	103.9970	111.3438	99.7014	97.9292	89.6157	89.3317	92.0345	92.1324	101.1134	105.5692	116.0464	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.5506	151.1810	136.5506	141.1022	136.5506	141.1022	136.5506	136.5506	141.1022	136.5506	141.1022	136.5506	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)

Full SAP Calculation Printout



Water heating gains (Table 5)	157.4059	154.7574	149.6556	138.4742	131.6252	124.4663	120.0694	123.7023	127.9616	135.9052	146.6239	155.9763 (72)
Total internal gains	628.9043	643.6570	616.9423	595.4476	565.2826	542.0395	521.3091	522.1711	537.9646	559.2215	593.2562	615.6928 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	9.7600		36.7938		0.6300		0.7000		0.7700		109.7480 (77)	
Southwest	3.1600		36.7938		0.6300		0.7000		0.7700		35.5332 (79)	
Northwest	7.3000		11.2829		0.6300		0.7000		0.7700		25.1720 (81)	
Solar gains	170.4531	298.7059	430.9110	571.1446	673.7068	683.7804	653.0176	574.2167	479.1151	336.1216	205.6862	144.8871 (83)
Total gains	799.3574	942.3629	1047.8533	1166.5922	1238.9894	1225.8199	1174.3268	1096.3879	1017.0798	895.3431	798.9425	760.5799 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.6993	8.7275	8.7554	8.8885	8.9138	9.0338	9.0338	9.0564	8.9872	8.9138	8.8627	8.8098
alpha	1.5800	1.5818	1.5837	1.5926	1.5943	1.6023	1.6023	1.6038	1.5991	1.5943	1.5908	1.5873
util living area	0.8412	0.8000	0.7495	0.6678	0.5684	0.4518	0.3552	0.3863	0.5347	0.6997	0.8021	0.8503 (86)
MIT	16.9600	17.4454	18.1422	19.0479	19.8419	20.4487	20.7380	20.6893	20.2244	19.1923	17.9426	16.8814 (87)
Th 2	20.0000	20.0029	20.0058	20.0192	20.0217	20.0334	20.0334	20.0356	20.0289	20.0217	20.0166	20.0113 (88)
util rest of house	0.8294	0.7856	0.7311	0.6427	0.5335	0.4028	0.2914	0.3222	0.4871	0.6714	0.7855	0.8391 (89)
MIT 2	15.4592	16.0394	16.8729	17.9487	18.8695	19.5515	19.8479	19.8071	19.3208	18.1420	16.6536	15.3683 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	16.0069	16.5525	17.3361	18.3498	19.2244	19.8789	20.1727	20.1290	19.6506	18.5252	17.1240	15.9204 (92)
Temperature adjustment	0.0000											
adjusted MIT	16.0069	16.5525	17.3361	18.3498	19.2244	19.8789	20.1727	20.1290	19.6506	18.5252	17.1240	15.9204 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7646	0.7206	0.6699	0.5929	0.5019	0.3944	0.3011	0.3288	0.4667	0.6196	0.7219	0.7751 (94)
Useful gains	611.1951	679.0718	701.9252	691.6560	621.8389	483.4981	353.5371	360.4904	474.6299	554.7810	576.7552	589.5115 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1377.8859	1367.0562	1267.2331	1088.5585	864.2987	598.3109	404.9340	421.5958	632.3653	910.3428	1158.0603	1362.1757 (97)
Space heating kWh	570.4180	462.3255	420.5891	285.7698	180.3901	0.0000	0.0000	0.0000	0.0000	264.5380	418.5397	574.8621 (98a)
Space heating requirement - total per year (kWh/year)												3177.4321
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	570.4180	462.3255	420.5891	285.7698	180.3901	0.0000	0.0000	0.0000	0.0000	264.5380	418.5397	574.8621 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3177.4321
Space heating per m ²												(98c) / (4) = 29.7234 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	570.4180	462.3255	420.5891	285.7698	180.3901	0.0000	0.0000	0.0000	0.0000	264.5380	418.5397	574.8621 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	618.0043	500.8943	455.6761	309.6098	195.4389	0.0000	0.0000	0.0000	0.0000	286.6067	453.4557	622.8192 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating													
Water heating requirement	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154 (64)	
Efficiency of water heater	85.8646	85.6901	85.3661	84.7979	83.8325	79.8000	79.8000	79.8000	79.8000	84.5973	85.4714	85.9006 (216)	
(217)m	288.9579	255.9926	273.1433	242.5084	238.2102	226.0094	223.6047	232.3114	234.6315	246.1765	258.2718	285.8133 (217)	
Fuel for water heating, kWh/month	288.9579	255.9926	273.1433	242.5084	238.2102	226.0094	223.6047	232.3114	234.6315	246.1765	258.2718	285.8133 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
(221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Pumps and Fa	28.3725	22.7615	20.4942	15.0149	11.5980	9.4756	10.5800	13.7523	17.8629	23.4371	26.4722	29.1611 (232)	
Lighting	-48.5532	-67.7194	-96.3011	-107.0602	-114.3908	-106.3424	-104.9605	-99.5560	-89.9274	-76.7913	-53.0907	-42.0577 (233a)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m													
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													

Full SAP Calculation Printout



(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-29.7082	-62.2200	-123.1855	-184.3508	-243.1547	-244.1470	-241.3361	-204.6697	-150.4150	-88.8330	-39.6106	-23.5190	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3442.5050	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												3005.6308	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												228.9824	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2641.9002	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4121.2181	(238)

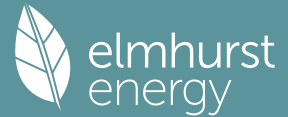
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3442.5050	0.2100	722.9261 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3005.6308	0.2100	631.1825 (264)
Space and water heating			1354.1085 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	228.9824	0.1443	33.0492 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	0.1348	-135.7414
PV Unit electricity exported	-1635.1495	0.1260	-206.0235
Total			-341.7649 (269)
Total CO2, kg/year			1057.3222 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.8900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3442.5050	1.1300	3890.0307 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3005.6308	1.1300	3396.3628 (278)
Space and water heating			7286.3935 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	228.9824	1.5338	351.2208 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	1.4983	-1508.4416
PV Unit electricity exported	-1635.1495	0.4625	-756.2547
Total			-2264.6963 (283)
Total Primary energy kWh/year			5503.0188 (286)
Target Primary Energy Rate (TPER)			51.4800 (287)

Full SAP Calculation Printout



Plot Reference	P4				Issued on Date	09/07/2026	
Assessment Reference	Design Stage- Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	4 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	80 C	DER	4.35	TER	9.89		
Environmental	96 A	% DER < TER				56.02	
CO ₂ Emissions (t/year)	0.43	DFEE	35.32	TFEE	36.03		
Compliance Check	See BREL	% DFEE < TFEE				1.96	
% DPER < TPER	10.97	DPER	45.83	TPER	51.48		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

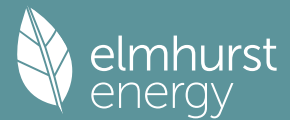
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3234 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4124	0.4043	0.3962	0.3558	0.3477	0.3073	0.3073	0.2992	0.3234	0.3477	0.3639	0.3801 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5850	0.5817	0.5785	0.5633	0.5604	0.5472	0.5472	0.5448	0.5523	0.5604	0.5662	0.5722 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600			9.0000	1761.8400 (32c)
Internal Floor 1			53.4500			18.0000	962.1000 (32d)
Internal Ceiling 1			53.4500			9.0000	481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)													14.0400		0.0470		0.6599	
E3 Sill													13.1500		0.0350		0.4603	
E4 Jamb													33.7000		0.0470		1.5839	
E5 Ground floor (normal)													20.6800		0.0150		0.3102	
E6 Intermediate floor within a dwelling													20.6800		0.0100		0.2068	
E16 Corner (normal)													10.0000		0.0430		0.4300	
E18 Party wall between dwellings													10.0000		0.0690		0.6900	
E10 Eaves (insulation at ceiling level)													10.0400		0.0370		0.3715	
E12 Gable (insulation at ceiling level)													10.6400		0.2500		2.6600	
P1 Party wall - Ground floor													10.6400		0.1310		1.3938	
P2 Party wall - Intermediate floor within a dwelling													10.6400		0.0400		0.4256	
P4 Party wall - Roof (insulation at ceiling level)													10.6400		0.2400		2.5536	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)																	11.7455	(36)
Point Thermal bridges																	0.0000	
Total fabric heat loss															(33) + (36) + (36a) =		64.3286	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)																		
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Heat transfer coeff	51.5957	51.3045	51.0190	49.6783	49.4275	48.2597	48.2597	48.0435	48.7095	49.4275	49.9349	50.4654	(38)					
Average = Sum(39)m / 12 =	115.9243	115.6331	115.3477	114.0069	113.7561	112.5883	112.5883	112.3721	113.0381	113.7561	114.2635	114.7941	(39)					
												114.0057						
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
HLP (average)	1.0844	1.0817	1.0790	1.0665	1.0641	1.0532	1.0532	1.0512	1.0574	1.0641	1.0689	1.0738	(40)					
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31						
												31						

4. Water heating energy requirements (kWh/year)																		

Assumed occupancy																		2.7949 (42)
Hot water usage for mixer showers																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)					
Hot water usage for baths																		
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865	(42b)					
Hot water usage for other uses																		
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524	(42c)					
Average daily hot water use (litres/day)												67.7751	(43)					
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
	73.9427	71.9140	69.6994	66.9431	64.4841	61.9287	61.3979	63.6081	65.8749	68.4992	71.2798	73.8389	(44)					
Energy conte	117.1071	102.4046	107.1254	91.6418	86.8080	76.1486	74.2555	78.7601	81.2303	92.9527	101.5511	115.6139	(45)					
Energy content (annual)										Total = Sum(45)m =		1125.5991						
Distribution loss (46)m = 0.15 x (45)m																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)					
Water storage loss (or HIU loss):																		
Total storage loss																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)					
If cylinder contains dedicated solar storage																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)					
Primary loss																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)					
Combi loss																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)					
Total heat required for water heating calculated for each month																		
	99.5410	87.0439	91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718	(62)					
WWHRS																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)					
PV diverter																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)					
Solar input																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)					
FGHRS																		
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)					
Output from w/h																		
	99.5410	87.0439	91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718	(64)					
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		956.7593	(64)					
Electric shower(s)												957	(64)					
	56.9238	50.7196	55.3839	52.8522	53.8439	51.3619	53.0739	53.8439	52.8522	55.3839	54.3425	56.9238	(64a)					
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		647.5055	(64a)					
Heat gains from water heating, kWh/month																		
	39.1162	34.4409	36.6101	32.6869	31.9077	29.0220	29.0478	30.1975	30.4745	33.5984	35.1652	38.7989	(65)					

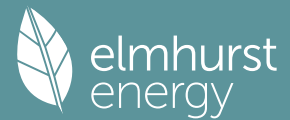
5. Internal gains (see Table 5 and 5a)																		

Metabolic gains (Table 5), Watts																		
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	(66)					
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	139.5973	154.5541	139.5973	144.2505	139.5973	144.2505	139.5973	139.5973	144.2505	139.5973	144.2505	139.5973	(67)					
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427	(68)					
Pumps, fans	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	(69)					
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)					
Water heating gains (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)					
Total internal gains	52.5756	51.2513	49.2071	45.3985	42.8867	40.3084	39.0427	40.5880	42.3257	45.1592	48.8406	52.1491	(72)					
	524.1206	540.5241	516.5405	502.5202	476.5908	461.0299	443.3291	442.1036	455.4770	468.5222	495.6212	511.9123	(73)					

6. Solar gains																		

[Jan]				Area		Solar flux		g		FF		Access					Gains	
				m2		Table 6a		W/m2		Specific data		Specific data		factor			Table 6d	W
										or Table 6b		or Table 6c						
Southeast				9.7600		36.7938		0.6800		0.7000		0.7700					118.4582	(77)
Southwest				3.1600		36.7938		0.6800		0.7000		0.7700					38.3533	(79)
Northwest				7.3000		11.2829		0.6800		0.7000		0.7700					27.1697	(81)
Solar gains	183.9812	322.4127	465.1103	616.4736	727.1756	738.0487	704.8444	619.7895	517.1401	362.7979	222.0105	156.3861	(83)					
Total gains	708.1018	862.9368	981.6508	1118.9937	1203.7664	1199.0785	1148.1735	1061.8931	972.6171	831.3201	717.6317	668.2984	(84)					

Full SAP Calculation Printout



----- Mean internal temperature (heating season) -----													
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.8325	8.8547	8.8766	8.9810	9.0008	9.0942	9.0942	9.1117	9.0580	9.0008	8.9609	8.9195	
alpha	1.5888	1.5903	1.5918	1.5987	1.6001	1.6063	1.6063	1.6074	1.6039	1.6001	1.5974	1.5946	
util living area	0.8614	0.8171	0.7638	0.6779	0.5752	0.4569	0.3599	0.3941	0.5469	0.7185	0.8235	0.8712 (86)	
MIT	16.8099	17.3382	18.0730	19.0132	19.8287	20.4423	20.7346	20.6816	20.2014	19.1226	17.8143	16.7142 (87)	
Th 2	20.0136	20.0158	20.0180	20.0283	20.0302	20.0392	20.0392	20.0409	20.0358	20.0302	20.0263	20.0223 (88)	
util rest of house	0.8509	0.8037	0.7461	0.6533	0.5406	0.4080	0.2958	0.3295	0.4995	0.6912	0.8083	0.8613 (89)	
MIT 2	16.1612	16.6776	17.3954	18.3078	19.0788	19.6413	19.8856	19.8494	19.4396	18.4337	17.1612	16.0728 (90)	
Living area fraction									fLA = Living area / (4) =				0.3649 (91)
MIT	16.3979	16.9187	17.6427	18.5652	19.3524	19.9336	20.1954	20.1531	19.7176	18.6851	17.3995	16.3069 (92)	
Temperature adjustment												0.0000	
adjusted MIT	16.3979	16.9187	17.6427	18.5652	19.3524	19.9336	20.1954	20.1531	19.7176	18.6851	17.3995	16.3069 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7985	0.7494	0.6940	0.6105	0.5139	0.4022	0.3068	0.3375	0.4823	0.6461	0.7552	0.8101 (94)
Useful gains	565.4078	646.6996	681.2310	683.0959	618.5716	482.2980	352.2156	358.4163	469.0934	537.1449	541.9471	541.3654 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1402.4417	1389.7594	1285.2816	1101.9011	870.5105	600.5030	404.7992	421.7409	635.0036	919.7316	1176.8625	1389.7954 (97)
Space heating kWh	622.7533	499.3362	449.4136	301.5397	187.4426	0.0000	0.0000	0.0000	0.0000	284.6445	457.1391	631.2319 (98a)
Space heating requirement - total per year (kWh/year)												3433.5009
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	622.7533	499.3362	449.4136	301.5397	187.4426	0.0000	0.0000	0.0000	0.0000	284.6445	457.1391	631.2319 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3433.5009
Space heating per m2												(98c) / (4) = 32.1188 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	1058.3304	833.1537	854.0279	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6871	0.7409	0.7131	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	727.1494	617.2666	609.0268	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1341.3816	1284.7046	1186.6567	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	442.2472	496.5739	429.7566	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	110.5618	124.1435	107.4392	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												342.1444 (107)
Energy for space heating												32.1188 (99)
Energy for space cooling												3.2006 (108)
Total												35.3194 (109)
Fabric Energy Efficiency (DFEE)												35.3 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

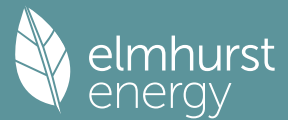
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)

Full SAP Calculation Printout



Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
40.0000 / (5) = 0.1497 (8)
Yes
Blower Door
5.0000 (17)
0.3997 (18)
1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3697 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4714	0.4621	0.4529	0.4067	0.3974	0.3512	0.3512	0.3420	0.3697	0.3974	0.4159	0.4344 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.6111	0.6068	0.6025	0.5827	0.5790	0.5617	0.5617	0.5585	0.5683	0.5790	0.5865	0.5943 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			1.9900	1.0000	1.9900		(26)
TER Opening Type			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485		(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124		(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795		(30)
Total net area of external elements Aum(A, m2)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)					52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							34.4812 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	14.0400	0.0500	0.7020
E3 Sill	13.1500	0.0500	0.6575
E4 Jamb	33.7000	0.0500	1.6850
E5 Ground floor (normal)	20.6800	0.1600	3.3088
E6 Intermediate floor within a dwelling	20.6800	0.0000	0.0000
E16 Corner (normal)	10.0000	0.0900	0.9000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E10 Eaves (insulation at ceiling level)	10.0400	0.0600	0.6024
E12 Gable (insulation at ceiling level)	10.6400	0.0600	0.6384
P1 Party wall - Ground floor	10.6400	0.0800	0.8512
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.1200	1.2768
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.2221 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 63.8052 (37)

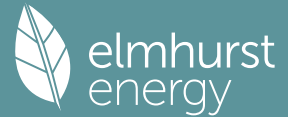
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	53.8937	53.5133	53.1404	51.3888	51.0611	49.5355	49.5355	49.2530	50.1231	51.0611	51.7240	52.4171 (38)
Heat transfer coeff	117.6989	117.3185	116.9455	115.1940	114.8663	113.3407	113.3407	113.0582	113.9283	114.8663	115.5292	116.2223 (39)
Average = Sum(39)m / 12 =												115.1924
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1010	1.0975	1.0940	1.0776	1.0745	1.0602	1.0602	1.0576	1.0657	1.0745	1.0807	1.0872 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												0.0000 (42a)
0.0000 0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Hot water usage for baths												30.5865 (42b)
30.6903 30.2345			29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	
Hot water usage for other uses												43.2524 (42c)
43.2524 41.6796			40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	
Average daily hot water use (litres/day)												67.7751 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	73.9427	71.9140	69.6994	66.9431	64.4841	61.9287	61.3979	63.6081	65.8749	68.4992	71.2798	73.8389 (44)
Energy conte	117.1071	102.4046	107.1254	91.6418	86.8080	76.1486	74.2555	78.7601	81.2303	92.9527	101.5511	115.6139 (45)
Energy content (annual)										Total = Sum(45)m =		1125.5991
Distribution loss (46)m = 0.15 x (45)m												
0.0000 0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000 0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
99.5410 87.0439			91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	99.5410	87.0439	91.0566	77.8955	73.7868	64.7263	63.1172	66.9461	69.0458	79.0098	86.3185	98.2718 (64)
Total per year (kWh/year) = Sum(64)m =												956.7593 (64)
12Total per year (kWh/year)												957 (64)

Full SAP Calculation Printout



Electric shower(s)	56.9238	50.7196	55.3839	52.8522	53.8439	51.3619	53.0739	53.8439	52.8522	55.3839	54.3425	56.9238 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												647.5055 (64a)
Heat gains from water heating, kWh/month	39.1162	34.4409	36.6101	32.6869	31.9077	29.0220	29.0478	30.1975	30.4745	33.5984	35.1652	38.7989 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.5506	151.1810	136.5506	141.1022	136.5506	141.1022	136.5506	136.5506	141.1022	136.5506	141.1022	136.5506	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)
Water heating gains (Table 5)	52.5756	51.2513	49.2071	45.3985	42.8867	40.3084	39.0427	40.5880	42.3257	45.1592	48.8406	52.1491	(72)
Total internal gains	521.0739	537.1510	513.4938	499.3719	473.5440	457.8816	440.2824	439.0569	452.3287	465.4755	492.4729	508.8656	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
Southeast					9.7600	36.7938	0.6300	0.7000	0.7700	109.7480 (77)				
Southwest					3.1600	36.7938	0.6300	0.7000	0.7700	35.5332 (79)				
Northwest					7.3000	11.2829	0.6300	0.7000	0.7700	25.1720 (81)				
Solar gains	170.4531	298.7059	430.9110	571.1446	673.7068	683.7804	653.0176	574.2167	479.1151	336.1216	205.6862	144.8871	(83)	
Total gains	691.5271	835.8568	944.4048	1070.5165	1147.2509	1141.6620	1093.3000	1013.2736	931.4438	801.5971	698.1592	653.7527	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.6993	8.7275	8.7554	8.8885	8.9138	9.0338	9.0338	9.0564	8.9872	8.9138	8.8627	8.8098	
alpha	1.5800	1.5818	1.5837	1.5926	1.5943	1.6023	1.6023	1.6038	1.5991	1.5943	1.5908	1.5873	
util living area	0.8666	0.8252	0.7751	0.6925	0.5925	0.4737	0.3751	0.4092	0.5624	0.7299	0.8301	0.8755	(86)
MIT	16.7313	17.2446	17.9745	18.9283	19.7637	20.4068	20.7153	20.6606	20.1604	19.0606	17.7486	16.6470	(87)
Th 2	20.0000	20.0029	20.0058	20.0192	20.0217	20.0334	20.0334	20.0356	20.0289	20.0217	20.0166	20.0113	(88)
util rest of house	0.8562	0.8120	0.7578	0.6682	0.5577	0.4238	0.3089	0.3429	0.5146	0.7030	0.8152	0.8658	(89)
MIT 2	16.0766	16.5795	17.2941	18.2235	19.0161	19.6093	19.8683	19.8310	19.4011	18.3712	17.0922	16.0007	(90)
Living area fraction	16.3155	16.8222	17.5424	18.4807	19.2889	19.9003	20.1774	20.1338	19.6782	18.6228	17.3317	16.2366	(91)
MIT	16.3155	16.8222	17.5424	18.4807	19.2889	19.9003	20.1774	20.1338	19.6782	18.6228	17.3317	16.2366	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.3155	16.8222	17.5424	18.4807	19.2889	19.9003	20.1774	20.1338	19.6782	18.6228	17.3317	16.2366	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	556.0141	633.2597	665.5856	667.5858	606.5619	475.4324	349.1455	354.7714	461.5493	526.3937	532.0304	532.7466	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1414.2157	1398.6943	1291.3579	1103.6371	871.7087	600.7432	405.4628	422.1314	635.5121	921.5483	1182.0616	1398.9187	(97)
Space heating kWh	638.5020	514.3720	465.5746	313.9569	197.2693	0.0000	0.0000	0.0000	0.0000	293.9950	468.0224	644.4321	(98a)
Space heating requirement - total per year (kWh/year)												3536.1242	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	638.5020	514.3720	465.5746	313.9569	197.2693	0.0000	0.0000	0.0000	0.0000	293.9950	468.0224	644.4321	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3536.1242	
Space heating per m ²												33.0788	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1065.4026	838.7212	859.2422	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6704	0.7256	0.6979	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	714.2415	608.5664	599.6861	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1277.6845	1223.8398	1133.0154	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	405.6790	457.7634	396.7970	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	101.4197	114.4409	99.1993	0.0000	0.0000	0.0000	0.0000	(107)

Full SAP Calculation Printout



Space cooling requirement	315.0598 (107)
Energy for space heating	33.0788 (99)
Energy for space cooling	2.9472 (108)
Total	36.0260 (109)
Fabric Energy Efficiency (TFEE)	36.0 (109)

Full SAP Calculation Printout



Plot Reference	P4			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	4, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	80 C	DER	4.35	TER	9.89
Environmental	96 A	% DER < TER			56.02
CO ₂ Emissions (t/year)	0.43	DFEE	35.32	TFEE	36.03
Compliance Check	See BREL	% DFEE < TFEE			1.96
% DPER < TPER	10.97	DPER	45.83	TPER	51.48
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

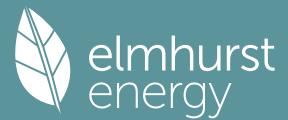
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3234 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4124	0.4043	0.3962	0.3558	0.3477	0.3073	0.3073	0.2992	0.3234	0.3477	0.3639	0.3801 (22b)
Effective ac	0.5850	0.5817	0.5785	0.5633	0.5604	0.5472	0.5472	0.5448	0.5523	0.5604	0.5662	0.5722 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600		9.0000		1761.8400 (32c)
Internal Floor 1			53.4500		18.0000		962.1000 (32d)
Internal Ceiling 1			53.4500		9.0000		481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				14.0400	0.0470		0.6599
E3 Sill				13.1500	0.0350		0.4603

Full SAP Calculation Printout



E4 Jamb						33.7000		0.0470		1.5839		
E5 Ground floor (normal)						20.6800		0.0150		0.3102		
E6 Intermediate floor within a dwelling						20.6800		0.0100		0.2068		
E16 Corner (normal)						10.0000		0.0430		0.4300		
E18 Party wall between dwellings						10.0000		0.0690		0.6900		
E10 Eaves (insulation at ceiling level)						10.0400		0.0370		0.3715		
E12 Gable (insulation at ceiling level)						10.6400		0.2500		2.6600		
P1 Party wall - Ground floor						10.6400		0.1310		1.3938		
P2 Party wall - Intermediate floor within a dwelling						10.6400		0.0400		0.4256		
P4 Party wall - Roof (insulation at ceiling level)						10.6400		0.2400		2.5536		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											11.7455	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	64.3286 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	51.5957	51.3045	51.0190	49.6783	49.4275	48.2597	48.2597	48.0435	48.7095	49.4275	49.9349	50.4654 (38)
Average = Sum(39)m / 12 =	115.9243	115.6331	115.3477	114.0069	113.7561	112.5883	112.5883	112.3721	113.0381	113.7561	114.2635	114.7941 (39)
												114.0057
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0844	1.0817	1.0790	1.0665	1.0641	1.0532	1.0532	1.0512	1.0574	1.0641	1.0689	1.0738 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.0665
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy conte	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2350.3171
	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2821.3131 (64)
Electric shower(s)												2821 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	113.0500	100.2474	106.9778	94.9699	92.7308	84.2674	83.5803	86.4338	86.8874	96.0577	101.1593	111.9154 (65)

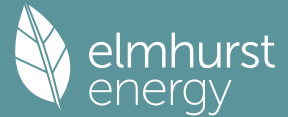
5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	139.5973	154.5541	139.5973	144.2505	139.5973	144.2505	139.5973	139.5973	144.2505	139.5973	144.2505	139.5973 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427 (68)
Pumps, fans	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Total internal gains	151.9489	149.1777	143.7874	131.9026	124.6382	117.0381	112.3392	116.1745	120.6770	129.1098	140.4990	150.4240 (72)
	623.4939	638.4505	611.1208	589.0243	558.3423	537.7596	516.6255	517.6900	533.8282	552.4729	587.2796	610.1872 (73)

6. Solar gains												

[Jan]												
		Area		Solar flux		g		FF		Access		Gains
		m2		Table 6a		W/m2		Specific data		factor		W
				or Table 6b				or Table 6c		Table 6d		
Southeast		9.7600		36.7938		0.6800		0.7000		0.7700		118.4582 (77)
Southwest		3.1600		36.7938		0.6800		0.7000		0.7700		38.3533 (79)
Northwest		7.3000		11.2829		0.6800		0.7000		0.7700		27.1697 (81)

Full SAP Calculation Printout



Solar gains	183.9812	322.4127	465.1103	616.4736	727.1756	738.0487	704.8444	619.7895	517.1401	362.7979	222.0105	156.3861 (83)
Total gains	807.4751	960.8631	1076.2311	1205.4978	1285.5179	1275.8082	1221.4700	1137.4795	1050.9684	915.2708	809.2901	766.5733 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.8325	8.8547	8.8766	8.9810	9.0008	9.0942	9.0942	9.1117	9.0580	9.0008	8.9609	8.9195
alpha	1.5888	1.5903	1.5918	1.5987	1.6001	1.6063	1.6063	1.6074	1.6039	1.6001	1.5974	1.5946
util living area	0.8379	0.7938	0.7405	0.6560	0.5546	0.4380	0.3430	0.3744	0.5225	0.6917	0.7979	0.8477 (86)
Living	17.8320	18.2075	18.7341	19.4050	19.9884	20.4264	20.6332	20.5975	20.2605	19.4957	18.5594	17.7645
Non living	16.4297	16.8787	17.5085	18.3060	18.9815	19.4736	19.6848	19.6553	19.3034	18.4312	17.3163	16.3527
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.4066	18.2075	18.7341	19.4050	19.9884	20.4264	20.6332	20.5975	20.2605	19.4957	18.5594	18.2268 (87)
Th 2	20.0136	20.0158	20.0180	20.0283	20.0302	20.0392	20.0392	20.0409	20.0358	20.0302	20.0263	20.0223 (88)
util rest of house	0.8260	0.7793	0.7219	0.6308	0.5199	0.3899	0.2810	0.3118	0.4753	0.6633	0.7812	0.8365 (89)
MIT 2	18.5450	16.8787	17.5085	18.3060	18.9815	19.4736	19.6848	19.6553	19.3034	18.4312	17.3163	16.9995 (90)
Living area fraction	18.8594	17.3636	17.9557	18.7070	19.3490	19.8213	20.0309	19.9991	19.6527	18.8197	17.7699	17.4474 (92)
MIT	18.8594	17.3636	17.9557	18.7070	19.3490	19.8213	20.0309	19.9991	19.6527	18.8197	17.7699	17.4474 (93)
Temperature adjustment												0.0000
adjusted MIT	18.8594	17.3636	17.9557	18.7070	19.3490	19.8213	20.0309	19.9991	19.6527	18.8197	17.7699	17.4474 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8102	0.7309	0.6756	0.5919	0.4931	0.3783	0.2804	0.3089	0.4548	0.6220	0.7333	0.7998 (94)
Useful gains	654.2165	702.3361	727.0681	713.5128	633.9241	482.5759	342.5418	351.4152	477.9509	569.2550	593.4399	613.1087 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1687.7909	1441.2026	1321.3919	1118.0694	870.1158	587.8576	386.2805	404.4404	627.6641	935.0366	1219.1819	1520.7228 (97)
Space heating kWh	768.9793	496.5183	442.1769	291.2807	175.7267	0.0000	0.0000	0.0000	0.0000	272.1415	450.5343	675.2649 (98a)
Space heating requirement - total per year (kWh/year)												3572.6226
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	768.9793	496.5183	442.1769	291.2807	175.7267	0.0000	0.0000	0.0000	0.0000	272.1415	450.5343	675.2649 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3572.6226
Space heating per m2										(98c) / (4) =		33.4202 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												299.3479 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	768.9793	496.5183	442.1769	291.2807	175.7267	0.0000	0.0000	0.0000	0.0000	272.1415	450.5343	675.2649 (98)
Space heating efficiency (main heating system 1)	299.3479	299.3479	299.3479	299.3479	299.3479	0.0000	0.0000	0.0000	0.0000	299.3479	299.3479	299.3479 (210)
Space heating fuel (main heating system)	256.8848	165.8666	147.7134	97.3051	58.7032	0.0000	0.0000	0.0000	0.0000	90.9114	150.5052	225.5786 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211 (216)
Fuel for water heating, kWh/month	173.3167	153.1232	162.1623	141.2121	135.9908	121.5520	119.1816	124.4234	126.3648	142.1023	152.5819	171.2326 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1193.4684 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7211
Water heating fuel used												1723.2438 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	261.1023	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3177.8145	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1193.4684	0.1546	184.5340	(261)
Total CO2 associated with community systems			0.0000	(262)
Water heating (other fuel)	1723.2438	0.1411	243.1493	(264)
Space and water heating			427.6834	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	261.1023	0.1443	37.6851	(268)
Total CO2, kg/year			465.3685	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3500	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1193.4684	1.5724	1876.5841	(275)
Total CO2 associated with community systems			0.0000	(276)
Water heating (other fuel)	1723.2438	1.5217	2622.3390	(278)
Space and water heating			4498.9231	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	261.1023	1.5338	400.4875	(282)
Total Primary energy kWh/year			4899.4105	(286)
Dwelling Primary energy Rate (DPER)			45.8300	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

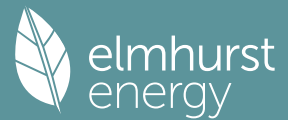
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)	
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1497 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3997	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3697	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4714	0.4621	0.4529	0.4067	0.3974	0.3512	0.3512	0.3420	0.3697	0.3974	0.4159	0.4344	(22b)
Effective ac	0.6111	0.6068	0.6025	0.5827	0.5790	0.5617	0.5617	0.5585	0.5683	0.5790	0.5865	0.5943	(25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.9900	1.0000	1.9900			(26)
TER Opening Type			20.2200	1.1450	23.1527			(27)
Heatloss Floor 1			53.4500	0.1300	6.9485			(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124			(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795			(30)
Total net area of external elements Aum(A, m2)			210.2900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831			(33)
Main dwelling								
Party Wall 1			53.1900	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

34.4812 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	14.0400	0.0500	0.7020	
E2 Other lintels (including other steel lintels)	13.1500	0.0500	0.6575	
E3 Sill	33.7000	0.0500	1.6850	
E4 Jamb	20.6800	0.1600	3.3088	
E5 Ground floor (normal)	20.6800	0.0000	0.0000	
E6 Intermediate floor within a dwelling	10.0000	0.0900	0.9000	
E16 Corner (normal)	10.0000	0.0600	0.6000	
E18 Party wall between dwellings	10.0400	0.0600	0.6024	
E10 Eaves (insulation at ceiling level)	10.6400	0.0600	0.6384	
E12 Gable (insulation at ceiling level)	10.6400	0.0800	0.8512	
P1 Party wall - Ground floor	10.6400	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.1200	1.2768	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.2221 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	63.8052 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	53.8937	53.5133	53.1404	51.3888	51.0611	49.5355	49.5355	49.2530	50.1231	51.0611	51.7240	52.4171	(38)
Heat transfer coeff	117.6989	117.3185	116.9455	115.1940	114.8663	113.3407	113.3407	113.0582	113.9283	114.8663	115.5292	116.2223	(39)
Average = Sum(39)m / 12 =												115.1924	
HLP	1.1010	1.0975	1.0940	1.0776	1.0745	1.0602	1.0602	1.0576	1.0657	1.0745	1.0807	1.0872	(40)
HLP (average)												1.0776	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

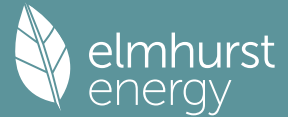
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7949 (42)
Hot water usage for mixer showers	71.0808	70.0126	68.4560	65.4777	63.2799	60.8288	59.4356	60.9804	62.6738	65.3055	68.3477	70.8084	(42a)
Hot water usage for baths	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865	(42b)
Hot water usage for other uses	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524	(42c)
Average daily hot water use (litres/day)													133.3092 (43)
Daily hot water use	145.0234	141.9266	138.1554	132.4208	127.7640	122.7575	120.8336	124.5886	128.5487	133.8047	139.6275	144.6473	(44)
Energy conte	229.6817	202.1016	212.3396	181.2775	171.9949	150.9447	146.1378	154.2667	158.5135	181.5717	198.9250	226.4828	(45)
Energy content (annual)										Total = Sum(45)m =		2214.2373	
Distribution loss (46)m = 0.15 x (45)m	34.4522	30.3152	31.8509	27.1916	25.7992	22.6417	21.9207	23.1400	23.7770	27.2358	29.8388	33.9724	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	280.6077	248.0993	263.2657	230.5608	222.9210	200.2280	197.0638	205.1927	207.7968	232.4977	248.2083	277.4088	(62)
WWHRS	-32.4952	-28.7390	-30.0938	-24.9189	-23.2235	-19.8725	-18.6273	-19.8083	-20.5609	-24.2390	-27.4598	-31.8934	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2511.9193	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	117.1100	103.9970	111.3438	99.7014	97.9292	89.6157	89.3317	92.0345	92.1324	101.1134	105.5692	116.0464	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	139.7441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.5506	151.1810	136.5506	141.1022	136.5506	141.1022	136.5506	136.5506	141.1022	136.5506	141.1022	136.5506	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.0246	269.7955	262.8129	247.9480	229.1836	211.5477	199.7659	196.9950	203.9776	218.8425	237.6069	255.2427	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	36.9744	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)

Full SAP Calculation Printout



Water heating gains (Table 5)	157.4059	154.7574	149.6556	138.4742	131.6252	124.4663	120.0694	123.7023	127.9616	135.9052	146.6239	155.9763 (72)
Total internal gains	628.9043	643.6570	616.9423	595.4476	565.2826	542.0395	521.3091	522.1711	537.9646	559.2215	593.2562	615.6928 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific FF data or Table 6c		Access factor Table 6d		Gains W	
Southeast	9.7600		36.7938		0.6300		0.7000		0.7700		109.7480 (77)	
Southwest	3.1600		36.7938		0.6300		0.7000		0.7700		35.5332 (79)	
Northwest	7.3000		11.2829		0.6300		0.7000		0.7700		25.1720 (81)	
Solar gains	170.4531	298.7059	430.9110	571.1446	673.7068	683.7804	653.0176	574.2167	479.1151	336.1216	205.6862	144.8871 (83)
Total gains	799.3574	942.3629	1047.8533	1166.5922	1238.9894	1225.8199	1174.3268	1096.3879	1017.0798	895.3431	798.9425	760.5799 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.6993	8.7275	8.7554	8.8885	8.9138	9.0338	9.0338	9.0564	8.9872	8.9138	8.8627	8.8098
alpha	1.5800	1.5818	1.5837	1.5926	1.5943	1.6023	1.6023	1.6038	1.5991	1.5943	1.5908	1.5873
util living area	0.8412	0.8000	0.7495	0.6678	0.5684	0.4518	0.3552	0.3863	0.5347	0.6997	0.8021	0.8503 (86)
MIT	16.9600	17.4454	18.1422	19.0479	19.8419	20.4487	20.7380	20.6893	20.2244	19.1923	17.9426	16.8814 (87)
Th 2	20.0000	20.0029	20.0058	20.0192	20.0217	20.0334	20.0334	20.0356	20.0289	20.0217	20.0166	20.0113 (88)
util rest of house	0.8294	0.7856	0.7311	0.6427	0.5335	0.4028	0.2914	0.3222	0.4871	0.6714	0.7855	0.8391 (89)
MIT 2	15.4592	16.0394	16.8729	17.9487	18.8695	19.5515	19.8479	19.8071	19.3208	18.1420	16.6536	15.3683 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	16.0069	16.5525	17.3361	18.3498	19.2244	19.8789	20.1727	20.1290	19.6506	18.5252	17.1240	15.9204 (92)
Temperature adjustment	0.0000											
adjusted MIT	16.0069	16.5525	17.3361	18.3498	19.2244	19.8789	20.1727	20.1290	19.6506	18.5252	17.1240	15.9204 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7646	0.7206	0.6699	0.5929	0.5019	0.3944	0.3011	0.3288	0.4667	0.6196	0.7219	0.7751 (94)
Useful gains	611.1951	679.0718	701.9252	691.6560	621.8389	483.4981	353.5371	360.4904	474.6299	554.7810	576.7552	589.5115 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1377.8859	1367.0562	1267.2331	1088.5585	864.2987	598.3109	404.9340	421.5958	632.3653	910.3428	1158.0603	1362.1757 (97)
Space heating kWh	570.4180	462.3255	420.5891	285.7698	180.3901	0.0000	0.0000	0.0000	0.0000	264.5380	418.5397	574.8621 (98a)
Space heating requirement - total per year (kWh/year)												3177.4321
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	570.4180	462.3255	420.5891	285.7698	180.3901	0.0000	0.0000	0.0000	0.0000	264.5380	418.5397	574.8621 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3177.4321
Space heating per m ²												(98c) / (4) = 29.7234 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	570.4180	462.3255	420.5891	285.7698	180.3901	0.0000	0.0000	0.0000	0.0000	264.5380	418.5397	574.8621 (98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)	
Space heating fuel (main heating system)	618.0043	500.8943	455.6761	309.6098	195.4389	0.0000	0.0000	0.0000	0.0000	286.6067	453.4557	622.8192 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating													
Water heating requirement	248.1126	219.3604	233.1719	205.6419	199.6975	180.3555	178.4365	185.3845	187.2359	208.2588	220.7485	245.5154 (64)	
Efficiency of water heater (217)m	85.8646	85.6901	85.3661	84.7979	83.8325	79.8000	79.8000	79.8000	79.8000	84.5973	85.4714	85.9006 (217)	
Fuel for water heating, kWh/month	288.9579	255.9926	273.1433	242.5084	238.2102	226.0094	223.6047	232.3114	234.6315	246.1765	258.2718	285.8133 (219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Lighting	28.3725	22.7615	20.4942	15.0149	11.5980	9.4756	10.5800	13.7523	17.8629	23.4371	26.4722	29.1611 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-48.5532	-67.7194	-96.3011	-107.0602	-114.3908	-106.3424	-104.9605	-99.5560	-89.9274	-76.7913	-53.0907	-42.0577 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													

Full SAP Calculation Printout



(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-29.7082	-62.2200	-123.1855	-184.3508	-243.1547	-244.1470	-241.3361	-204.6697	-150.4150	-88.8330	-39.6106	-23.5190	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3442.5050	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												3005.6308	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												228.9824	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2641.9002	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4121.2181	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3442.5050	0.2100	722.9261 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3005.6308	0.2100	631.1825 (264)
Space and water heating			1354.1085 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	228.9824	0.1443	33.0492 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	0.1348	-135.7414
PV Unit electricity exported	-1635.1495	0.1260	-206.0235
Total			-341.7649 (269)
Total CO2, kg/year			1057.3222 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.8900 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3442.5050	1.1300	3890.0307 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3005.6308	1.1300	3396.3628 (278)
Space and water heating			7286.3935 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	228.9824	1.5338	351.2208 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1006.7507	1.4983	-1508.4416
PV Unit electricity exported	-1635.1495	0.4625	-756.2547
Total			-2264.6963 (283)
Total Primary energy kWh/year			5503.0188 (286)
Target Primary Energy Rate (TPER)			51.4800 (287)

Full SAP Calculation Printout



Plot Reference	P4			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	4, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	80 C	DER	4.35	TER	9.89
Environmental	96 A	% DER < TER			56.02
CO ₂ Emissions (t/year)	0.43	DFEE	35.32	TFEE	36.03
Compliance Check	See BREL	% DFEE < TFEE			1.96
% DPER < TPER	10.97	DPER	45.83	TPER	51.48
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	267.2500 (5)

2. Ventilation rate

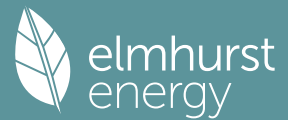
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3234 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4124	0.4043	0.3962	0.3558	0.3477	0.3073	0.3073	0.2992	0.3234	0.3477	0.3639	0.3801 (22b)
Effective ac	0.5850	0.5817	0.5785	0.5633	0.5604	0.5472	0.5472	0.5448	0.5523	0.5604	0.5662	0.5722 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000 (28a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1			195.7600		9.0000		1761.8400 (32c)
Internal Floor 1			53.4500		18.0000		962.1000 (32d)
Internal Ceiling 1			53.4500		9.0000		481.0500 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.4812 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				14.0400	0.0470		0.6599
E3 Sill				13.1500	0.0350		0.4603

Full SAP Calculation Printout



E4 Jamb						33.7000		0.0470		1.5839		
E5 Ground floor (normal)						20.6800		0.0150		0.3102		
E6 Intermediate floor within a dwelling						20.6800		0.0100		0.2068		
E16 Corner (normal)						10.0000		0.0430		0.4300		
E18 Party wall between dwellings						10.0000		0.0690		0.6900		
E10 Eaves (insulation at ceiling level)						10.0400		0.0370		0.3715		
E12 Gable (insulation at ceiling level)						10.6400		0.2500		2.6600		
P1 Party wall - Ground floor						10.6400		0.1310		1.3938		
P2 Party wall - Intermediate floor within a dwelling						10.6400		0.0400		0.4256		
P4 Party wall - Roof (insulation at ceiling level)						10.6400		0.2400		2.5536		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											11.7455	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	64.3286 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	51.5957	51.3045	51.0190	49.6783	49.4275	48.2597	48.2597	48.0435	48.7095	49.4275	49.9349	50.4654 (38)
Average = Sum(39)m / 12 =	115.9243	115.6331	115.3477	114.0069	113.7561	112.5883	112.5883	112.3721	113.0381	113.7561	114.2635	114.7941 (39)
												114.0057
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0844	1.0817	1.0790	1.0665	1.0641	1.0532	1.0532	1.0512	1.0574	1.0641	1.0689	1.0738 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.0665
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy conte	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												2350.3171
	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
												Total per year (kWh/year) = Sum(64)m =
												2821.3131 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	113.0500	100.2474	106.9778	94.9699	92.7308	84.2674	83.5803	86.4338	86.8874	96.0577	101.1593	111.9154 (65)

5. Internal gains (see Table 5 and 5a)												

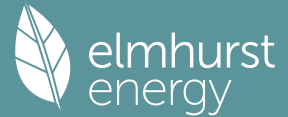
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929 (66)
	36.9617	32.8291	26.6984	20.2124	15.1090	12.7557	13.7829	17.9156	24.0463	30.5323	35.6357	37.9890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441	402.6798	392.2581	370.0716	342.0651	315.7429	298.1581	294.0224	304.4441	326.6306	354.6372	380.9593 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Water heating gains (Table 5)	151.9489	149.1777	143.7874	131.9026	124.6382	117.0381	112.3392	116.1745	120.6770	129.1098	140.4990	150.4240 (72)
Total internal gains	697.9165	695.1483	673.2057	632.6484	592.2740	555.9984	534.7420	538.5743	559.6291	596.7346	641.2336	679.8341 (73)

6. Solar gains												

[Jan]												
			Area	Solar flux	g	FF		Access		Gains		
			m2	Table 6a	Specific data	Specific data		factor		W		
				W/m2	or Table 6b	or Table 6c		Table 6d				
Southeast			9.7600	36.7938	0.6800	0.7000		0.7700		118.4582 (77)		
Southwest			3.1600	36.7938	0.6800	0.7000		0.7700		38.3533 (79)		
Northwest			7.3000	11.2829	0.6800	0.7000		0.7700		27.1697 (81)		

Solar gains	183.9812	322.4127	465.1103	616.4736	727.1756	738.0487	704.8444	619.7895	517.1401	362.7979	222.0105	156.3861 (83)

Full SAP Calculation Printout



Total gains 881.8977 1017.5610 1138.3160 1249.1219 1319.4497 1294.0471 1239.5864 1158.3638 1076.7693 959.5325 863.2441 836.2202 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.8325	8.8547	8.8766	8.9810	9.0008	9.0942	9.0942	9.1117	9.0580	9.0008	8.9609	8.9195
alpha	1.5888	1.5903	1.5918	1.5987	1.6001	1.6063	1.6063	1.6074	1.6039	1.6001	1.5974	1.5946
util living area	0.8204	0.7806	0.7257	0.6454	0.5464	0.4337	0.3391	0.3693	0.5148	0.6781	0.7831	0.8313 (86)
Living	17.9434	18.2825	18.8034	19.4418	20.0076	20.4323	20.6365	20.6021	20.2732	19.5380	18.6320	17.8726
Non living	16.5615	16.9666	17.5884	18.3471	19.0017	19.4791	19.6873	19.6589	19.3158	18.4781	17.4009	16.4811
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.4626	18.2825	18.8034	19.4418	20.0076	20.4323	20.6365	20.6021	20.2732	19.5380	18.6320	18.3195 (87)
Th 2	20.0136	20.0158	20.0180	20.0283	20.0302	20.0392	20.0392	20.0409	20.0358	20.0302	20.0263	20.0223 (88)
util rest of house	0.8077	0.7655	0.7066	0.6200	0.5117	0.3859	0.2776	0.3073	0.4678	0.6493	0.7657	0.8192 (89)
MIT 2	18.5991	16.9666	17.5884	18.3471	19.0017	19.4791	19.6873	19.6589	19.3158	18.4781	17.4009	17.1053 (90)
Living area fraction									fLA = Living area / (4) =			0.3649 (91)
MIT	18.9142	17.4468	18.0318	18.7466	19.3688	19.8269	20.0336	20.0031	19.6652	18.8649	17.8502	17.5484 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9142	17.4468	18.0318	18.7466	19.3688	19.8269	20.0336	20.0031	19.6652	18.8649	17.8502	17.5484 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7916	0.7173	0.6611	0.5820	0.4858	0.3745	0.2772	0.3047	0.4480	0.6091	0.7180	0.7817 (94)
Useful gains	698.1402	729.9453	752.5507	727.0430	640.9995	484.6790	343.5898	352.9238	482.4443	584.4632	619.7948	653.6843 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1694.1384	1450.8263	1330.1660	1122.5813	872.3707	588.4923	386.5887	404.8886	629.0782	940.1839	1228.3549	1532.3123 (97)
Space heating kWh	741.0227	484.4321	429.7458	284.7876	172.1402	0.0000	0.0000	0.0000	0.0000	264.6562	438.1633	653.6992 (98a)
Space heating requirement - total per year (kWh/year)												3468.6471
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	741.0227	484.4321	429.7458	284.7876	172.1402	0.0000	0.0000	0.0000	0.0000	264.6562	438.1633	653.6992 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3468.6471
Space heating per m2										(98c) / (4) =		32.4476 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												299.3479 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	741.0227	484.4321	429.7458	284.7876	172.1402	0.0000	0.0000	0.0000	0.0000	264.6562	438.1633	653.6992 (98)
Space heating efficiency (main heating system 1)	299.3479	299.3479	299.3479	299.3479	299.3479	0.0000	0.0000	0.0000	0.0000	299.3479	299.3479	299.3479 (210)
Space heating fuel (main heating system)	247.5457	161.8291	143.5607	95.1360	57.5051	0.0000	0.0000	0.0000	0.0000	88.4109	146.3726	218.3744 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211 (216)
Fuel for water heating, kWh/month	173.3167	153.1232	162.1623	141.2121	135.9908	121.5520	119.1816	124.4234	126.3648	142.1023	152.5819	171.2326 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1158.7344 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7211
Water heating fuel used												1723.2438 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	261.1023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3143.0805 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1158.7344	16.4900	191.0753 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.2438	16.4900	284.1629 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	261.1023	16.4900	43.0558 (250)
Additional standing charges			0.0000 (251)
Total energy cost			518.2940 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2283 (257)
SAP value		80.0885
SAP rating (Section 12)		80 (258)
SAP band		C

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1158.7344	0.1546	179.1237 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1723.2438	0.1411	243.1493 (264)
Space and water heating			422.2730 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Total CO2, kg/year			459.9581 (272)
CO2 emissions per m2			4.3000 (273)
EI value			95.9424
EI rating			96 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

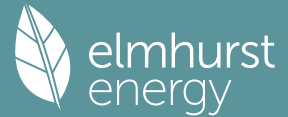
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	267.2500 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	1 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3234 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000	(22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750	(22a)
Adj infilt rate													
Effective ac	0.4528	0.4124	0.3881	0.3558	0.3720	0.3396	0.3477	0.3315	0.3558	0.3881	0.3881	0.4124	(22b)
	0.6025	0.5850	0.5753	0.5633	0.5692	0.5577	0.5604	0.5550	0.5633	0.5753	0.5753	0.5850	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Solid Door			1.9900	1.0000	1.9900			(26)
Windows			20.2200	1.1450	23.1527			(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	0.0000	(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	0.0000	(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	481.0500	(30)
Total net area of external elements Aum(A, m2)			210.2900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.5831			(33)
Main dwelling								
Party Wall 1			53.1900	0.0000	0.0000	0.0000	0.0000	(32)
Internal Wall 1			195.7600			9.0000	1761.8400	(32c)
Internal Floor 1			53.4500			18.0000	962.1000	(32d)
Internal Ceiling 1			53.4500			9.0000	481.0500	(32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K (28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
List of Thermal Bridges (34.4812) (35)

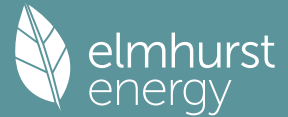
	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	14.0400	0.0470	0.6599	
E3 Sill	13.1500	0.0350	0.4603	
E4 Jamb	33.7000	0.0470	1.5839	
E5 Ground floor (normal)	20.6800	0.0150	0.3102	
E6 Intermediate floor within a dwelling	20.6800	0.0100	0.2068	
E16 Corner (normal)	10.0000	0.0430	0.4300	
E18 Party wall between dwellings	10.0000	0.0690	0.6900	
E10 Eaves (insulation at ceiling level)	10.0400	0.0370	0.3715	
E12 Gable (insulation at ceiling level)	10.6400	0.2500	2.6600	
P1 Party wall - Ground floor	10.6400	0.1310	1.3938	
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0400	0.4256	
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.2400	2.5536	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.7455 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 64.3286 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	53.1382	51.5957	50.7394	49.6783	50.1973	49.1824	49.4275	48.9431	49.6783	50.7394	50.7394	51.5957	(38)
Heat transfer coeff	117.4669	115.9243	115.0680	114.0069	114.5259	113.5110	113.7561	113.2717	114.0069	115.0680	115.0680	115.9243	(39)
Average = Sum(39)m / 12 =												114.7998	
HLP	1.0988	1.0844	1.0764	1.0665	1.0713	1.0618	1.0641	1.0596	1.0665	1.0764	1.0764	1.0844	(40)
HLP (average)												1.0739	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7949 (42)
Hot water usage for mixer showers												
	79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595 (42a)
Hot water usage for baths												
	30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865 (42b)
Hot water usage for other uses												
	43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524 (42c)
Average daily hot water use (litres/day)												141.5009 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984 (44)
Energy content (annual)	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											2350.3171
	36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Total per year (kWh/year) = Sum(64)m =											2821.3131 (64)	
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	
Heat gains from water heating, kWh/month												
	113.0500	100.2474	106.9778	94.9699	92.7308	84.2674	83.5803	86.4338	86.8874	96.0577	101.1593	111.9154 (65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.9617	32.8291	26.6984	20.2124	15.1090	12.7557	13.7829	17.9156	24.0463	30.5323	35.6357	37.9890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441	402.6798	392.2581	370.0716	342.0651	315.7429	298.1581	294.0224	304.4441	326.6306	354.6372	380.9593 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Water heating gains (Table 5)	151.9489	149.1777	143.7874	131.9026	124.6382	117.0381	112.3392	116.1745	120.6770	129.1098	140.4990	150.4240 (72)
Total internal gains	697.9165	695.1483	673.2057	632.6484	592.2740	555.9984	534.7420	538.5743	559.6291	596.7346	641.2336	679.8341 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
Southeast				9.7600	47.5950		0.6800	0.7000	0.7700		153.2326 (77)	
Southwest				3.1600	47.5950		0.6800	0.7000	0.7700		49.6122 (79)	
Northwest				7.3000	15.4678		0.6800	0.7000	0.7700		37.2471 (81)	
Solar gains	240.0919	356.0257	514.5975	710.8706	819.0111	896.4141	845.3532	744.2320	614.7082	428.1029	279.2454	196.3915 (83)
Total gains	938.0084	1051.1740	1187.8032	1343.5189	1411.2852	1452.4125	1380.0952	1282.8063	1174.3373	1024.8375	920.4790	876.2256 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.7165	8.8325	8.8982	8.9810	8.9403	9.0203	9.0008	9.0393	8.9810	8.8982	8.8982	8.8325
alpha	1.5811	1.5888	1.5932	1.5987	1.5960	1.6014	1.6001	1.6026	1.5987	1.5932	1.5932	1.5888
util living area	0.7897	0.7576	0.6960	0.6050	0.4949	0.3684	0.2840	0.2815	0.4364	0.6107	0.7358	0.8004 (86)
Living	18.3371	18.5556	19.0577	19.6492	20.1870	20.5483	20.6935	20.7053	20.4606	19.8955	19.0857	18.3303
Non living	17.0303	17.2932	17.8908	18.5855	19.1956	19.5881	19.7274	19.7432	19.5059	18.8838	17.9390	17.0304
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.6611	18.5556	19.0577	19.6492	20.1870	20.5483	20.6935	20.7053	20.4606	19.8955	19.0857	18.7120 (87)
Th 2	20.0018	20.0136	20.0201	20.0283	20.0243	20.0321	20.0302	20.0340	20.0283	20.0201	20.0201	20.0136 (88)
util rest of house	0.7740	0.7404	0.6746	0.5772	0.4567	0.3186	0.2222	0.2149	0.3826	0.5740	0.7134	0.7851 (89)
MIT 2	18.7838	17.2932	17.8908	18.5855	19.1956	19.5881	19.7274	19.7432	19.5059	18.8838	17.9390	17.5561 (90)
Living area fraction	19.1039	17.7539	18.3166	18.9737	19.5574	19.9385	20.0800	20.0943	19.8543	19.2530	18.3575	0.3649 (91)
MIT	19.1039	17.7539	18.3166	18.9737	19.5574	19.9385	20.0800	20.0943	19.8543	19.2530	18.3575	17.9779 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1039	17.7539	18.3166	18.9737	19.5574	19.9385	20.0800	20.0943	19.8543	19.2530	18.3575	17.9779 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.7583	0.6930	0.6315	0.5437	0.4369	0.3135	0.2255	0.2193	0.3722	0.5416	0.6679	0.7472 (94)
Useful gains	711.2592	728.5031	750.0543	730.4559	616.6320	455.3375	311.2171	281.3279	437.0701	555.0356	614.7500	654.6844 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	1574.5193	1374.1496	1256.1558	1068.6640	796.7974	526.5210	338.9897	305.1874	530.6176	811.5742	1099.7596	1400.1228 (97)
Space heating kWh	642.2655	433.8744	376.5395	243.5099	134.0430	0.0000	0.0000	0.0000	0.0000	190.8647	349.2069	554.6061 (98a)
Space heating requirement - total per year (kWh/year)												2924.9100
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	642.2655	433.8744	376.5395	243.5099	134.0430	0.0000	0.0000	0.0000	0.0000	190.8647	349.2069	554.6061 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2924.9100
Space heating per m2										(98c) / (4) =		27.3612 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												298.9462 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	642.2655	433.8744	376.5395	243.5099	134.0430	0.0000	0.0000	0.0000	0.0000	190.8647	349.2069	554.6061 (98)
Space heating efficiency (main heating system 1)	298.9462	298.9462	298.9462	298.9462	298.9462	0.0000	0.0000	0.0000	0.0000	298.9462	298.9462	298.9462 (210)
Space heating fuel (main heating system)	214.8432	145.1346	125.9556	81.4561	44.8385	0.0000	0.0000	0.0000	0.0000	63.8458	116.8126	185.5204 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)												

Full SAP Calculation Printout



Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	283.7559	250.6949	265.4938	231.1940	222.6456	199.0062	195.1254	203.7074	206.8859	232.6514	249.8088	280.3438 (64)
Efficiency of water heater (217)m	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303 (216)
Fuel for water heating, kWh/month	173.3069	153.1145	162.1531	141.2041	135.9832	121.5451	119.1749	124.4164	126.3577	142.0943	152.5733	171.2229 (217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												978.4068 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7303
Water heating fuel used												1723.1464 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												261.1023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
FV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2962.6556 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	978.4068	27.6700	270.7252 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.1464	27.6700	476.7946 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	261.1023	27.6700	72.2470 (250)
Additional standing charges			0.0000 (251)
Total energy cost			819.7668 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	978.4068	0.1550	151.6406 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1723.1464	0.1411	243.1356 (264)
Space and water heating			394.7762 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Total CO2, kg/year			432.4613 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	978.4068	1.5738	1539.7721 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1723.1464	1.5217	2622.1908 (278)
Space and water heating			4161.9629 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	261.1023	1.5338	400.4875 (282)
Total Primary energy kWh/year			4562.4504 (286)

SAP 10 EPC IMPROVEMENTS

Design Stage- Triple Glazed

Current energy efficiency rating: C 80
Current environmental impact rating: A 96

Full SAP Calculation Printout



N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:
N Solar water heating
U Solar photovoltaic panels

SAP change
+ 2.2
+ 5.7

Cost change
-£ 124
-£ 275

CO2 change
-56 kg (13.0%)
-134 kg (35.6%)

Recommended measures
Solar water heating
Solar photovoltaic panels

Typical annual savings
£124
£275
£398

Energy efficiency
B 82
B 88

Environmental impact
A 96
A 97

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 596 TEST (30 Jun 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current	Potential	Saving
Electricity	£820	£696	£124
Space heating	£271	£293	-£22
Water heating	£477	£331	£146
Lighting	£72	£72	£0
Generated (PV)	-£0	-£275	£275
Total cost of fuels	£820	£421	£399
Total cost of uses	£820	£421	£399
Delivered energy	28 kWh/m²	14 kWh/m²	13 kWh/m²
Carbon dioxide emissions	0.4 tonnes	0.2 tonnes	0.2 tonnes
CO2 emissions per m²	4 kg/m²	2 kg/m²	2 kg/m²
Primary energy	43 kWh/m²	23 kWh/m²	20 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 267.2500 (5)

2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.1497 (8)

Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
Blower Door
4.0000 (17)
0.3497 (18)
1 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

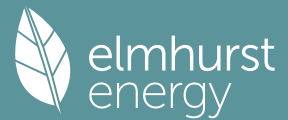
(20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.3234 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4124	0.4043	0.3962	0.3558	0.3477	0.3073	0.3073	0.2992	0.3234	0.3477	0.3639	0.3801 (22b)
Effective ac	0.5850	0.5817	0.5785	0.5633	0.5604	0.5472	0.5472	0.5448	0.5523	0.5604	0.5662	0.5722 (25)

3. Heat losses and heat loss parameter

Element	Gross m²	Openings m²	NetArea m²	U-value W/m²K	A x U W/K	K-value kJ/m²K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)

Full SAP Calculation Printout



Heatloss Floor 1				53.4500	0.1300	6.9485	0.0000	0.0000 (28a)
External Wall 1	103.3900	22.2100		81.1800	0.1800	14.6124	0.0000	0.0000 (29a)
External Roof 1	53.4500			53.4500	0.1100	5.8795	9.0000	481.0500 (30)
Total net area of external elements Aum(A, m2)				210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		52.5831		(33)
Main dwelling								
Party Wall 1				53.1900	0.0000	0.0000	0.0000	0.0000 (32)
Internal Wall 1				195.7600			9.0000	1761.8400 (32c)
Internal Floor 1				53.4500			18.0000	962.1000 (32d)
Internal Ceiling 1				53.4500			9.0000	481.0500 (32e)

Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =	3686.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K										34.4812 (35)
List of Thermal Bridges										
K1 Element						Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)						14.0400	0.0470	0.6599		
E3 Sill						13.1500	0.0350	0.4603		
E4 Jamb						33.7000	0.0470	1.5839		
E5 Ground floor (normal)						20.6800	0.0150	0.3102		
E6 Intermediate floor within a dwelling						20.6800	0.0100	0.2068		
E16 Corner (normal)						10.0000	0.0430	0.4300		
E18 Party wall between dwellings						10.0000	0.0690	0.6900		
E10 Eaves (insulation at ceiling level)						10.0400	0.0370	0.3715		
E12 Gable (insulation at ceiling level)						10.6400	0.2500	2.6600		
P1 Party wall - Ground floor						10.6400	0.1310	1.3938		
P2 Party wall - Intermediate floor within a dwelling						10.6400	0.0400	0.4256		
P4 Party wall - Roof (insulation at ceiling level)						10.6400	0.2400	2.5536		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)										11.7455 (36)
Point Thermal bridges									(36a) =	0.0000
Total fabric heat loss									(33) + (36) + (36a) =	64.3286 (37)

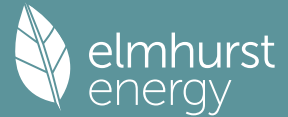
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat transfer coeff	51.5957	51.3045	51.0190	49.6783	49.4275	48.2597	48.2597	48.0435	48.7095	49.4275	49.9349	50.4654	(38)	
Average = Sum(39)m / 12 =	115.9243	115.6331	115.3477	114.0069	113.7561	112.5883	112.5883	112.3721	113.0381	113.7561	114.2635	114.7941	(39)	
	115.9243	115.6331	115.3477	114.0069	113.7561	112.5883	112.5883	112.3721	113.0381	113.7561	114.2635	114.7941	(39)	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.0844	1.0817	1.0790	1.0665	1.0641	1.0532	1.0532	1.0512	1.0574	1.0641	1.0689	1.0738	(40)	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)

Assumed occupancy														2.7949 (42)
Hot water usage for mixer showers														
Hot water usage for baths														
Hot water usage for other uses														
Average daily hot water use (litres/day)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984	(44)	
Energy content (annual)	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414	(45)	
Distribution loss (46)m = 0.15 x (45)m														
Water storage loss (or HIU loss):														
Store volume														200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):														1.0000 (48)
Temperature factor from Table 2b														0.5400 (49)
Enter (49) or (54) in (55)														0.5400 (55)
Total storage loss														
If cylinder contains dedicated solar storage														
Primary loss														
Combi loss														
Total heat required for water heating calculated for each month														
WWHRS														
PV diverter														
Aperture area of solar collector														
Zero-loss collector efficiency														
Collector linear heat loss coefficient														
Collector 2nd order heat loss coefficient														
Collector loop efficiency														
Incidence angle modifier														
Overshading factor														
Overall heat loss coefficient of system														
Heat loss coefficient of collector loop														
Dedicated solar storage volume														
Effective solar volume														
Reference volume														
Storage tank correction coefficient														
Heat delivered to hot water														
Heat delivered to space heating														
Solar input														
Solar input														
FGHRS														
Output from w/h														
Electric shower(s)														
Heat gains from water heating, kWh/month														

5. Internal gains (see Table 5 and 5a)

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.9617	32.8291	26.6984	20.2124	15.1090	12.7557	13.7829	17.9156	24.0463	30.5323	35.6357	37.9890	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441	402.6798	392.2581	370.0716	342.0651	315.7429	298.1581	294.0224	304.4441	326.6306	354.6372	380.9593	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	(71)
Water heating gains (Table 5)	151.9489	149.1777	142.2866	124.3986	110.8808	103.0306	98.3317	103.1676	114.6738	127.6090	140.4990	150.4240	(72)
Total internal gains	697.9165	695.1483	671.7049	625.1444	578.5167	541.9910	520.7345	525.5674	553.6259	595.2338	641.2336	679.8341	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
Southeast				9.7600	36.7938	0.6800	0.7000	0.7700	118.4582 (77)				
Southwest				3.1600	36.7938	0.6800	0.7000	0.7700	38.3533 (79)				
Northwest				7.3000	11.2829	0.6800	0.7000	0.7700	27.1697 (81)				
Solar gains	183.9812	322.4127	465.1103	616.4736	727.1756	738.0487	704.8444	619.7895	517.1401	362.7979	222.0105	156.3861	(83)
Total gains	881.8977	1017.5610	1136.8152	1241.6179	1305.6923	1280.0397	1225.5789	1145.3569	1070.7661	958.0317	863.2441	836.2202	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.8325	8.8547	8.8766	8.9810	9.0008	9.0942	9.0942	9.1117	9.0580	9.0008	8.9609	8.9195	
alpha	1.5888	1.5903	1.5918	1.5987	1.6001	1.6063	1.6063	1.6074	1.6039	1.6001	1.5974	1.5946	
util living area	0.8204	0.7806	0.7261	0.6472	0.5497	0.4370	0.3421	0.3725	0.5166	0.6786	0.7831	0.8313	(86)
Living	17.9434	18.2825	18.8018	19.4356	19.9999	20.4278	20.6340	20.5993	20.2703	19.5366	18.6320	17.8726	
Non living	16.5615	16.9666	17.5865	18.3402	18.9936	19.4749	19.6854	19.6566	19.3130	18.4766	17.4009	16.4811	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.4626	18.2825	18.8018	19.4356	19.9999	20.4278	20.6340	20.5993	20.2703	19.5366	18.6320	18.3195	(87)
Th 2	20.0136	20.0158	20.0180	20.0283	20.0302	20.0392	20.0392	20.0409	20.0358	20.0302	20.0263	20.0223	(88)
util rest of house	0.8077	0.7655	0.7070	0.6218	0.5150	0.3890	0.2802	0.3101	0.4696	0.6497	0.7657	0.8192	(89)
MIT 2	18.5991	16.9666	17.5865	18.3402	18.9936	19.4749	19.6854	19.6566	19.3130	18.4766	17.4009	17.1053	(90)
Living area fraction									flA =	Living area /	(4) =	0.3649	(91)
MIT	18.9142	17.4468	18.0300	18.7399	19.3608	19.8226	20.0315	20.0006	19.6623	18.8634	17.8502	17.5484	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9142	17.4468	18.0300	18.7399	19.3608	19.8226	20.0315	20.0006	19.6623	18.8634	17.8502	17.5484	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	698.1402	729.9453	751.9484	724.7504	638.1590	483.0681	342.7820	351.9900	481.4121	583.9586	619.7948	653.6843	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1694.1384	1450.8263	1329.9591	1121.8182	871.4666	588.0063	386.3512	404.6113	628.7539	940.0136	1228.3549	1532.3123	(97)
Space heating kWh	741.0227	484.4321	430.0400	285.8889	173.5809	0.0000	0.0000	0.0000	0.0000	264.9049	438.1633	653.6992	(98a)
Space heating requirement - total per year (kWh/year)												3471.7318	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	741.0227	484.4321	430.0400	285.8889	173.5809	0.0000	0.0000	0.0000	0.0000	264.9049	438.1633	653.6992	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3471.7318	
Space heating per m2										(98c) / (4) =		32.4764	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													299.3479 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	741.0227	484.4321	430.0400	285.8889	173.5809	0.0000	0.0000	0.0000	0.0000	264.9049	438.1633	653.6992	(98)
Space heating efficiency (main heating system 1)	299.3479	299.3479	299.3479	299.3479	299.3479	0.0000	0.0000	0.0000	0.0000	299.3479	299.3479	299.3479	(210)
Space heating fuel (main heating system)	247.5457	161.8291	143.6589	95.5039	57.9863	0.0000	0.0000	0.0000	0.0000	88.4940	146.3726	218.3744	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

Water heating

Full SAP Calculation Printout



Water heating requirement	283.7559	234.4960	205.4502	143.6789	104.2507	89.2193	85.7653	107.3771	143.4422	202.5472	249.8088	280.3438 (64)
Efficiency of water heater												163.7211 (216)
(217)m	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211	163.7211 (217)
Fuel for water heating, kWh/month	173.3167	143.2290	125.4879	87.7583	63.6758	54.4947	52.3850	65.5854	87.6138	123.7148	152.5819	171.2326 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945 (231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.8751	-57.8699	-87.3344	-101.2459	-109.1555	-96.5731	-95.1118	-89.6918	-79.3294	-67.2153	-43.4538	-33.0276 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1159.7649 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.7211
Water heating fuel used												1301.0759 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
pump for solar water heating												80.0000 (230g)
Total electricity for the above, kWh/year												80.0000 (231)
Electricity for lighting (calculated in Appendix L)												261.1023 (232)

Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-898.8836 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1903.0595 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1159.7649	16.4900	191.2452 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1301.0759	16.4900	214.5474 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	261.1023	16.4900	43.0558 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-898.8836	16.4900	-148.2259
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-148.2259 (252)
Total energy cost			313.8145 (255)

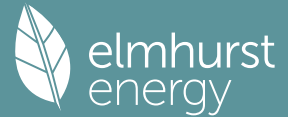
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.7437 (257)
SAP value		87.9441
SAP rating (Section 12)		88 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1159.7649	0.1546	179.2661 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1301.0759	0.1456	189.4861 (264)
Space and water heating			368.7522 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-898.8836	0.1344	-120.8008
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-120.8008 (269)
Total CO2, kg/year			296.7335 (272)
CO2 emissions per m2			2.7800 (273)
EI value			97.3823
EI rating			97 (274)
EI band			A

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.4500 (1b)	x 2.4000 (2b)	= 128.2800 (1b) - (3b)
First floor	53.4500 (1c)	x 2.6000 (2c)	= 138.9700 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	106.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	267.2500 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1497 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3497 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3234 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000 (22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750 (22a)
Adj infilt rate	0.4528	0.4124	0.3881	0.3558	0.3720	0.3396	0.3477	0.3315	0.3558	0.3881	0.3881	0.4124 (22b)
Effective ac	0.6025	0.5850	0.5753	0.5633	0.5692	0.5577	0.5604	0.5550	0.5633	0.5753	0.5753	0.5850 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.9900	1.0000	1.9900		(26)
Windows			20.2200	1.1450	23.1527		(27)
Heatloss Floor 1			53.4500	0.1300	6.9485	0.0000	(28a)
External Wall 1	103.3900	22.2100	81.1800	0.1800	14.6124	0.0000	(29a)
External Roof 1	53.4500		53.4500	0.1100	5.8795	9.0000	(30)
Total net area of external elements Aum(A, m ²)			210.2900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.5831		(33)
Main dwelling							
Party Wall 1			53.1900	0.0000	0.0000	0.0000	(32)
Internal Wall 1			195.7600		9.0000	1761.8400	(32c)
Internal Floor 1			53.4500			18.0000	(32d)
Internal Ceiling 1			53.4500			9.0000	(32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 3686.0400 (34)
34.4812 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	14.0400	0.0470	0.6599
E3 Sill	13.1500	0.0350	0.4603
E4 Jamb	33.7000	0.0470	1.5839
E5 Ground floor (normal)	20.6800	0.0150	0.3102
E6 Intermediate floor within a dwelling	20.6800	0.0100	0.2068
E16 Corner (normal)	10.0000	0.0430	0.4300
E18 Party wall between dwellings	10.0000	0.0690	0.6900
E10 Eaves (insulation at ceiling level)	10.0400	0.0370	0.3715
E12 Gable (insulation at ceiling level)	10.6400	0.2500	2.6600
P1 Party wall - Ground floor	10.6400	0.1310	1.3938
P2 Party wall - Intermediate floor within a dwelling	10.6400	0.0400	0.4256
P4 Party wall - Roof (insulation at ceiling level)	10.6400	0.2400	2.5536

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
(36a) = 0.0000
Total fabric heat loss
(33) + (36) + (36a) = 64.3286 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	53.1382	51.5957	50.7394	49.6783	50.1973	49.1824	49.4275	48.9431	49.6783	50.7394	50.7394	51.5957 (38)
Average = Sum(39)m / 12 =	117.4669	115.9243	115.0680	114.0069	114.5259	113.5110	113.7561	113.2717	114.0069	115.0680	115.0680	115.9243 (39)
												114.7998

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0988	1.0844	1.0764	1.0665	1.0713	1.0618	1.0641	1.0596	1.0665	1.0764	1.0764	1.0844 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

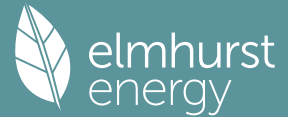
assumed occupancy													2.7949 (42)
Hot water usage for mixer showers													
79.9659	78.7641	77.0130	73.6625	71.1898	68.4324	66.8651	68.6030	70.5081	73.4687	76.8912	79.6595	(42a)	
Hot water usage for baths													
30.6903	30.2345	29.5926	28.4092	27.5230	26.5404	26.0096	26.6470	27.3410	28.3924	29.6002	30.5865	(42b)	
Hot water usage for other uses													
43.2524	41.6796	40.1067	38.5339	36.9611	35.3883	35.3883	36.9611	38.5339	40.1067	41.6796	43.2524	(42c)	
Average daily hot water use (litres/day)												141.5009 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
153.9085	150.6782	146.7124	140.6056	135.6740	130.3611	128.2630	132.2111	136.3830	141.9679	148.1710	153.4984	(44)	
Energy content (annual)	243.7535	214.5637	225.4914	192.4820	182.6432	160.2942	155.1230	163.7050	168.1739	192.6490	211.0968	240.3414 (45)	
Total = Sum(45)m =												2350.3171	
Distribution loss (46)m = 0.15 x (45)m													
36.5630	32.1846	33.8237	28.8723	27.3965	24.0441	23.2685	24.5557	25.2261	28.8974	31.6645	36.0512 (46)		
Water storage loss (or HIU loss):													
Store volume												200.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.5400 (55)	
Total storage loss													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)	
If cylinder contains dedicated solar storage													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)	
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
283.7559	250.6949	264.0981	224.4404	209.8513	186.3995	182.0985	191.6109	201.4830	231.2557	249.8088	280.3438 (62)		
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Aperture area of solar collector												3.0000 (H1)	
Zero-loss collector efficiency												0.8000 (H2)	
Collector linear heat loss coefficient												1.8000 (H3)	
Collector 2nd order heat loss coefficient												0.0000 (H4)	
Collector loop efficiency												0.9000 (H5)	
Incidence angle modifier												1.0000 (H6)	
Overshading factor												0.8000 (H8)	
Overall heat loss coefficient of system												6.5000 (H10)	
Heat loss coefficient of collector loop												3.9667 (H11)	
Dedicated solar storage volume												75.0000 (H12)	
Effective solar volume												75.0000 (H14)	
Reference volume													

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929	167.6929 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	36.9617	32.8291	26.6984	20.2124	15.1090	12.7557	13.7829	17.9156	24.0463	30.5323	35.6357	37.9890 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	398.5441	402.6798	392.2581	370.0716	342.0651	315.7429	298.1581	294.0224	304.4441	326.6306	354.6372	380.9593 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642	54.5642 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952	-111.7952 (71)
Water heating gains (Table 5)	151.9489	149.1777	142.2866	124.3986	110.8808	103.0306	98.3317	103.1676	114.6738	127.6090	140.4990	150.4240 (72)
Total internal gains	697.9165	695.1483	671.7049	625.1444	578.5167	541.9910	520.7345	525.5674	553.6259	595.2338	641.2336	679.8341 (73)

[Jan]				Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				9.7600	47.5950	0.6800	0.7000	0.7700	153.2326 (77)			
Southwest				3.1600	47.5950	0.6800	0.7000	0.7700	49.6122 (79)			
Northwest				7.3000	15.4678	0.6800	0.7000	0.7700	37.2471 (81)			
Solar gains	240.0919	356.0257	514.5975	710.8706	819.0111	896.4141	845.3532	744.2320	614.7082	428.1029	279.2454	196.3915 (83)
Total gains	938.0084	1051.1740	1186.3024	1336.0149	1397.5279	1438.4051	1366.0877	1269.7994	1168.3341	1023.3367	920.4790	876.2256 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.7165	8.8325	8.8982	8.9810	8.9403	9.0203	9.0008	9.0393	8.9810	8.8982	8.8982	8.8325
alpha	1.5811	1.5888	1.5932	1.5987	1.5960	1.6014	1.6001	1.6026	1.5987	1.5932	1.5932	1.5888
util living area												

Full SAP Calculation Printout



	0.7897	0.7576	0.6963	0.6067	0.4979	0.3711	0.2864	0.2839	0.4379	0.6111	0.7358	0.8004 (86)
Living	18.3371	18.5556	19.0563	19.6438	20.1809	20.5453	20.6919	20.7039	20.4586	19.8944	19.0857	18.3303
Non living	17.0303	17.2932	17.8891	18.5797	19.1894	19.5855	19.7263	19.7422	19.5041	18.8827	17.9390	17.0304
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.6611	18.5556	19.0563	19.6438	20.1809	20.5453	20.6919	20.7039	20.4586	19.8944	19.0857	18.7120 (87)
Th 2	20.0018	20.0136	20.0201	20.0283	20.0243	20.0321	20.0302	20.0340	20.0283	20.0201	20.0201	20.0136 (88)
util rest of house												
	0.7740	0.7404	0.6749	0.5790	0.4597	0.3211	0.2242	0.2169	0.3840	0.5745	0.7134	0.7851 (89)
MIT 2	18.7838	17.2932	17.8891	18.5797	19.1894	19.5855	19.7263	19.7422	19.5041	18.8827	17.9390	17.5561 (90)
Living area fraction									FLA = Living area /	(4) =		0.3649 (91)
MIT	19.1039	17.7539	18.3150	18.9680	19.5513	19.9357	20.0787	20.0932	19.8524	19.2519	18.3575	17.9779 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1039	17.7539	18.3150	18.9680	19.5513	19.9357	20.0787	20.0932	19.8524	19.2519	18.3575	17.9779 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7583	0.6930	0.6318	0.5453	0.4396	0.3158	0.2274	0.2212	0.3735	0.5420	0.6679	0.7472	(94)
Useful gains	711.2592	728.5031	749.5084	728.4786	614.3836	454.2640	310.7166	280.8925	436.3883	554.6432	614.7500	654.6844	(95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000	(96)
Heat loss rate W	1574.5193	1374.1496	1255.9701	1068.0176	796.0983	526.2056	338.8437	305.0594	530.4102	811.4448	1099.7596	1400.1228	(97)
Space heating kWh	642.2655	433.8744	376.8075	244.4680	135.1957	0.0000	0.0000	0.0000	0.0000	191.0604	349.2069	554.6061	(98a)
Space heating requirement - total per year (kWh/year)												2927.4847	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	642.2655	433.8744	376.8075	244.4680	135.1957	0.0000	0.0000	0.0000	0.0000	191.0604	349.2069	554.6061	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2927.4847	
Space heating per m2											(98c) / (4) =	27.3853	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													298.9462 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	642.2655	433.8744	376.8075	244.4680	135.1957	0.0000	0.0000	0.0000	0.0000	191.0604	349.2069	554.6061	(98)
Space heating efficiency (main heating system 1)	298.9462	298.9462	298.9462	298.9462	298.9462	0.0000	0.0000	0.0000	0.0000	298.9462	298.9462	298.9462	(210)
Space heating fuel (main heating system)	214.8432	145.1346	126.0452	81.7766	45.2241	0.0000	0.0000	0.0000	0.0000	63.9113	116.8126	185.5204	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	276.9868	226.4980	192.9790	125.9353	88.2459	66.1402	64.5100	85.4056	124.2803	186.2069	238.9120	280.3438	(64)
Efficiency of water heater	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	163.7303	(216)
Fuel for water heating, kWh/month	169.1726	138.3360	117.8639	76.9163	53.8971	40.3958	39.4001	52.1624	75.9055	113.7278	145.9180	171.2229	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	32.3524	25.9543	23.3690	17.1211	13.2248	10.8048	12.0641	15.6814	20.3686	26.7247	30.1855	33.2516	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-49.2946	-63.1143	-93.9778	-109.7107	-114.4697	-104.6036	-102.5387	-97.8707	-87.9683	-75.6127	-52.7594	-40.6548	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													979.2680 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													163.7303
Water heating fuel used													1194.9184 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
pump for solar water heating													80.0000 (230g)
Total electricity for the above, kWh/year													80.0000 (231)
Electricity for lighting (calculated in Appendix L)													261.1023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-992.5753 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)

Full SAP Calculation Printout



Energy used	0.0000 (237)
Total delivered energy for all uses	1522.7135 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	979.2680	27.6700	270.9635 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1194.9184	27.6700	330.6339 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	27.6700	22.1360 (249)
Energy for lighting	261.1023	27.6700	72.2470 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-992.5753	27.6700	-274.6456
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-274.6456 (252)
Total energy cost			421.3348 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	979.2680	0.1550	151.7600 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1194.9184	0.1469	175.5890 (264)
Space and water heating			327.3490 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	261.1023	0.1443	37.6851 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-992.5753	0.1348	-133.8151
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-133.8151 (269)
Total CO2, kg/year			242.3160 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	979.2680	1.5737	1541.0749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1194.9184	1.5436	1844.5067 (278)
Space and water heating			3385.5816 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	261.1023	1.5338	400.4875 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-992.5753	1.4983	-1487.1437
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1487.1437 (283)
Total Primary energy kWh/year			2419.9494 (286)

Full SAP Calculation Printout



Plot Reference	P5			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	5, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	82 B	DER	3.72	TER	8.77
Environmental	96 A	% DER < TER			57.58
CO ₂ Emissions (t/year)	0.48	DFEE	37.45	TFEE	39.21
Compliance Check	See BREL	% DFEE < TFEE			4.47
% DPER < TPER	14.92	DPER	38.97	TPER	45.81
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 354.4000 (5)

2. Ventilation rate

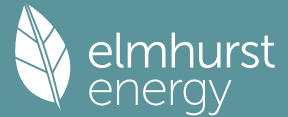
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1411 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3411 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2899 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3696	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			36.3100	1.1450	41.5763		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411	0.0000	0.0000 (28a)
External Wall 1	177.5500	38.3300	139.2200	0.1800	25.0596	0.0000	0.0000 (29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292	9.0000	591.4800 (30)
Flat	10.8300		10.8300	0.1600	1.7328	9.0000	97.4700 (30)
Total net area of external elements Aum(A, m ²)			330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	87.5590		(33)
Main dwelling							
Internal Wall 1			263.4600			9.0000	2371.1400 (32c)
Internal Floor 1			65.7200			18.0000	1182.9600 (32d)
Internal Ceiling 1			65.7200			9.0000	591.4800 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4834.5300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.0005 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.2900	0.0470	1.0476	
E3 Sill				21.3900	0.0350	0.7487	

Full SAP Calculation Printout



E4 Jamb									54.5600	0.0470	2.5643	
E5 Ground floor (normal)									38.0700	0.0150	0.5710	
E6 Intermediate floor within a dwelling									33.1500	0.0100	0.3315	
E16 Corner (normal)									22.4000	0.0430	0.9632	
E17 Corner (inverted - internal area greater than external area)									2.4000	-0.0690	-0.1656	
E10 Eaves (insulation at ceiling level)									19.9700	0.0370	0.7389	
E12 Gable (insulation at ceiling level)									13.1800	0.0890	1.1730	
E14 Flat roof									9.3200	0.0800	0.7456	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.7183 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 96.2773 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	66.4662	66.1559	65.8518	64.4233	64.1561	62.9119	62.9119	62.6815	63.3912	64.1561	64.6967	65.2620 (38)
Average = Sum(39)m / 12 =	162.7435	162.4332	162.1291	160.7006	160.4334	159.1892	159.1892	158.9588	159.6684	160.4334	160.9740	161.5393 (39)
												160.6994
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1445	1.1424	1.1402	1.1302	1.1283	1.1196	1.1196	1.1179	1.1229	1.1283	1.1321	1.1361 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.9211 (42)
Hot water usage for mixer showers												
	82.3475	81.1100	79.3067	75.8563	73.3101	70.4706	68.8566	70.6462	72.6080	75.6568	79.1813	82.0320 (42a)
Hot water usage for baths												
	31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938 (42b)
Hot water usage for other uses												
	44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454 (42c)
Average daily hot water use (litres/day)												145.7163 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	158.4936	155.1669	151.0829	144.7941	139.7156	134.2445	132.0840	136.1497	140.4459	146.1972	152.5851	158.0712 (44)
Energy conte	251.0151	220.9556	232.2087	198.2159	188.0841	165.0692	159.7441	168.5818	173.1839	198.3882	217.3855	247.5013 (45)
Energy content (annual)										Total = Sum(45)m =		2420.3335
Distribution loss (46)m = 0.15 x (45)m												
	37.6523	33.1433	34.8313	29.7324	28.2126	24.7604	23.9616	25.2873	25.9776	29.7582	32.6078	37.1252 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037 (64)
12Total per year (kWh/year)												2891.3295 (64)
Electric shower(s)												2891 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	115.4644	102.3727	109.2113	96.8764	94.5399	85.8551	85.1168	88.0554	88.5532	97.9660	103.2503	114.2961 (65)

5. Internal gains (see Table 5 and 5a)												

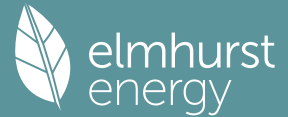
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.3055	174.1597	157.3055	162.5490	157.3055	162.5490	157.3055	157.3055	162.5490	157.3055	162.5490	157.3055 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	311.8885	315.1250	306.9693	289.6068	267.6897	247.0908	233.3295	230.0930	238.2487	255.6112	277.5283	298.1272 (68)
Pumps, fans	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457 (71)
Total internal gains	155.1941	152.3403	146.7894	134.5506	127.0697	119.2432	114.4044	118.3540	122.9906	131.6747	143.4032	153.6238 (72)
	691.2053	708.4421	677.8813	653.5235	618.8821	595.7002	571.8565	572.5697	590.6055	611.4086	650.2976	675.8737 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	14.3900											50.4746 (74)
East	2.8800											18.6586 (76)
South	9.7800											150.8273 (78)
West	9.2600											59.9927 (80)

Solar gains	279.9532	497.3344	731.9465	988.4516	1178.1380	1199.9282	1144.3128	998.7704	820.4604	563.8189	339.1176	237.0858 (83)

Full SAP Calculation Printout



Total gains 971.1585 1205.7765 1409.8279 1641.9751 1797.0201 1795.6284 1716.1692 1571.3401 1411.0659 1175.2276 989.4152 912.9594 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.2518	8.2676	8.2831	8.3567	8.3706	8.4360	8.4360	8.4483	8.4107	8.3706	8.3425	8.3133	21.0000 (85)
alpha	1.5501	1.5512	1.5522	1.5571	1.5580	1.5624	1.5624	1.5632	1.5607	1.5580	1.5562	1.5542	
util living area	0.8594	0.8117	0.7516	0.6594	0.5517	0.4352	0.3419	0.3778	0.5329	0.7107	0.8211	0.8699	(86)
Living	17.5821	18.0015	18.5917	19.3212	19.9459	20.4004	20.6164	20.5744	20.2057	19.3688	18.3480	17.5009	
Non living	16.1132	16.6137	17.3171	18.1787	18.8972	19.4029	19.6216	19.5872	19.2070	18.2570	17.0441	16.0192	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.2837	18.0015	18.5917	19.3212	19.9459	20.4004	20.6164	20.5744	20.2057	19.3688	18.3480	18.0020	(87)
Th 2	19.9646	19.9664	19.9681	19.9763	19.9778	19.9849	19.9849	19.9862	19.9822	19.9778	19.9747	19.9715	(88)
util rest of house	0.8484	0.7975	0.7329	0.6333	0.5155	0.3849	0.2768	0.3116	0.4835	0.6820	0.8052	0.8596	(89)
MIT 2	18.3843	16.6137	17.3171	18.1787	18.8972	19.4029	19.6216	19.5872	19.2070	18.2570	17.0441	16.7150	(90)
Living area fraction									fLA = Living area / (4) =			0.1874	(91)
MIT	18.5528	16.8737	17.5559	18.3927	19.0937	19.5898	19.8080	19.7722	19.3941	18.4653	17.2884	16.9562	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5528	16.8737	17.5559	18.3927	19.0937	19.5898	19.8080	19.7722	19.3941	18.4653	17.2884	16.9562	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8309	0.7431	0.6791	0.5864	0.4806	0.3637	0.2646	0.2965	0.4513	0.6306	0.7509	0.8204	(94)
Useful gains	806.9104	896.0201	957.3681	962.8403	863.6470	652.9869	454.1641	465.8364	636.8450	741.0706	742.9044	748.9844	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2319.5515	1944.9308	1792.4788	1525.4839	1186.1912	794.3257	510.6824	536.0379	845.3005	1261.8497	1640.0679	2060.6198	(97)
Space heating kWh	1125.4050	704.8680	621.3223	405.1034	239.9729	0.0000	0.0000	0.0000	0.0000	387.4597	645.9577	975.8567	(98a)
Space heating requirement - total per year (kWh/year)												5105.9457	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1125.4050	704.8680	621.3223	405.1034	239.9729	0.0000	0.0000	0.0000	0.0000	387.4597	645.9577	975.8567	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5105.9457	
Space heating per m2										(98c) / (4) =		35.9093	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)

Efficiency of main space heating system 1 (in %)

Efficiency of main space heating system 2 (in %)

Efficiency of secondary/supplementary heating system, %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1125.4050	704.8680	621.3223	405.1034	239.9729	0.0000	0.0000	0.0000	0.0000	387.4597	645.9577	975.8567	(98)
Space heating efficiency (main heating system 1)	320.1796	320.1796	320.1796	320.1796	320.1796	0.0000	0.0000	0.0000	0.0000	320.1796	320.1796	320.1796	(210)
Space heating fuel (main heating system)	351.4918	220.1477	194.0543	126.5238	74.9495	0.0000	0.0000	0.0000	0.0000	121.0132	201.7485	304.7842	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037	(64)
Efficiency of water heater (217)m	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	(216)
Fuel for water heating, kWh/month	170.0816	150.2513	159.0905	138.4697	133.3024	119.0975	116.7394	121.9045	123.8400	139.3245	149.6731	168.0281	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	37.3038	29.9265	26.9455	19.7414	15.2489	12.4584	13.9105	18.0814	23.4860	30.8149	34.8053	38.3406	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1594.7130	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.1046	
Water heating fuel used												1689.8025	(219)
Space cooling fuel												0.0000	(221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	301.0634 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3585.5789 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1594.7130	0.1548	246.7950 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1689.8025	0.1411	238.4503 (264)
Space and water heating			485.2453 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	301.0634	0.1443	43.4528 (268)
Total CO2, kg/year			528.6981 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1594.7130	1.5729	2508.2955 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1689.8025	1.5218	2571.5232 (278)
Space and water heating			5079.8187 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	301.0634	1.5338	461.7811 (282)
Total Primary energy kWh/year			5541.5998 (286)
Dwelling Primary energy Rate (DPER)			38.9700 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

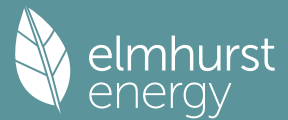
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	354.4000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1129 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3629 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3084 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3933	0.3855	0.3778	0.3393	0.3316	0.2930	0.2930	0.2853	0.3084	0.3316	0.3470	0.3624 (22b)
Effective ac	0.5773	0.5743	0.5714	0.5576	0.5550	0.5429	0.5429	0.5407	0.5476	0.5550	0.5602	0.5657 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.0200	1.0000	2.0200		(26)
TER Opening Type			33.5200	1.1450	38.3817		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411		(28a)
External Wall 1	177.5500	35.5400	142.0100	0.1800	25.5618		(29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292		(30)
Flat	10.8300		10.8300	0.1100	1.1913		(30)
Total net area of external elements Aum(A, m2)			330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)					84.3251		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

34.0005 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	22.2900	0.0500	1.1145
E2 Other lintels (including other steel lintels)	21.3900	0.0500	1.0695
E3 Sill	54.5600	0.0500	2.7280
E4 Jamb	38.0700	0.1600	6.0912
E5 Ground floor (normal)	33.1500	0.0000	0.0000
E6 Intermediate floor within a dwelling	22.4000	0.0900	2.0160
E16 Corner (normal)	2.4000	-0.0900	-0.2160
E17 Corner (inverted - internal area greater than external area)	19.9700	0.0600	1.1982
E10 Eaves (insulation at ceiling level)	13.1800	0.0600	0.7908
E12 Gable (insulation at ceiling level)	9.3200	0.0800	0.7456
E14 Flat roof			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			15.5378 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss			99.8629 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	67.5194	67.1682	66.8240	65.2072	64.9048	63.4966	63.4966	63.2359	64.0390	64.9048	65.5167	66.1564 (38)
Heat transfer coeff	167.3823	167.0311	166.6869	165.0701	164.7676	163.3595	163.3595	163.0987	163.9019	164.7676	165.3796	166.0193 (39)
Average = Sum(39)m / 12 =												165.0687

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1772	1.1747	1.1723	1.1609	1.1588	1.1489	1.1489	1.1470	1.1527	1.1588	1.1631	1.1676 (40)
HLP (average)												1.1609
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

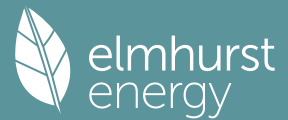
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9211 (42)
Hot water usage for mixer showers													
73.1978	72.0978	70.4948	67.4279	65.1645	62.6405	61.2058	62.7966	64.5405	67.2505	70.3833	72.9173	72.9173	(42a)
Hot water usage for baths													
31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938	31.4938	(42b)
Hot water usage for other uses													
44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454	44.5454	(42c)
Average daily hot water use (litres/day)													137.2805 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
149.3438	146.1547	142.2710	136.3657	131.5700	126.4144	124.4332	128.3002	132.3784	137.7909	143.7872	148.9566	148.9566	(44)
Energy content (annual)													
236.5241	208.1223	218.6652	186.6778	177.1186	155.4413	150.4912	158.8624	163.2358	186.9809	204.8512	233.2300	233.2300	(45)
Distribution loss (46)m = 0.15 x (45)m													
35.4786	31.2183	32.7998	28.0017	26.5678	23.3162	22.5737	23.8294	24.4854	28.0471	30.7277	34.9845	34.9845	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	(56)
If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
287.4502	254.1201	269.5913	235.9611	228.0446	204.7246	201.4173	209.7885	212.5191	237.9070	254.1345	284.1561	284.1561	(62)
WWHRS	-33.4630	-29.5949	-30.9901	-25.6610	-23.9152	-20.4644	-19.1821	-20.3982	-21.1732	-24.9609	-28.2777	-32.8433	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
253.9873	224.5251	238.6012	210.3000	204.1295	184.2602	182.2352	189.3902	191.3458	212.9461	225.8569	251.3128	251.3128	(64)
12Total per year (kWh/year)													
Electric shower(s)													2568.8904 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
119.3851	105.9989	113.4470	101.4970	99.6328	91.1109	90.7792	93.5626	93.7025	102.9120	107.5397	118.2898	118.2898	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	157.3120	174.1668	157.3120	162.5557	157.3120	162.5557	157.3120	157.3120	162.5557	157.3120	162.5557	157.3120 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	311.8885	315.1250	306.9693	289.6068	267.6897	247.0908	233.3295	230.0930	238.2487	255.6112	277.5283	298.1272 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457 (71)
Water heating gains (Table 5)												
	160.4639	157.7364	152.4826	140.9681	133.9150	126.5429	122.0150	125.7562	130.1424	138.3226	149.3607	158.9917 (72)
Total internal gains												
	699.4815	716.8453	686.5809	662.9476	628.7338	603.0065	579.4736	579.9783	597.7639	621.0629	659.2617	684.2480 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
North	13.2900				10.6334	0.6300		0.7000		0.7700	43.1885 (74)	
East	2.6600				19.6403	0.6300		0.7000		0.7700	15.9662 (76)	
South	9.0300				46.7521	0.6300		0.7000		0.7700	129.0210 (78)	
West	8.5400				19.6403	0.6300		0.7000		0.7700	51.2598 (80)	
Solar gains	239.4355	425.3470	625.9862	845.3489	1007.5743	1026.2124	978.6473	854.1733	701.6820	482.2037	290.0354	202.7735 (83)
Total gains	938.9170	1142.1923	1312.5671	1508.2966	1636.3081	1629.2189	1558.1209	1434.1516	1299.4459	1103.2666	949.2971	887.0215 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.0231	8.0400	8.0566	8.1355	8.1504	8.2207	8.2207	8.2338	8.1935	8.1504	8.1203	8.0890
alpha	1.5349	1.5360	1.5371	1.5424	1.5434	1.5480	1.5480	1.5489	1.5462	1.5434	1.5414	1.5393
util living area	0.8672	0.8257	0.7730	0.6889	0.5868	0.4708	0.3742	0.4100	0.5647	0.7320	0.8321	0.8763 (86)
MIT	16.5645	17.0843	17.8501	18.8311	19.7032	20.3648	20.6902	20.6293	20.0962	18.9467	17.5900	16.4670 (87)
Th 2	19.9383	19.9403	19.9422	19.9514	19.9531	19.9611	19.9611	19.9626	19.9580	19.9531	19.9496	19.9460 (88)
util rest of house	0.8564	0.8120	0.7548	0.6631	0.5500	0.4178	0.3036	0.3391	0.5140	0.7038	0.8166	0.8662 (89)
MIT 2	14.9751	15.5958	16.5098	17.6703	18.6782	19.4166	19.7487	19.6977	19.1443	17.8334	16.2187	14.8607 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	15.2729	15.8747	16.7609	17.8877	18.8702	19.5943	19.9251	19.8723	19.3226	18.0420	16.4756	15.1616 (92)
Temperature adjustment	0.0000											
adjusted MIT	15.2729	15.8747	16.7609	17.8877	18.8702	19.5943	19.9251	19.8723	19.3226	18.0420	16.4756	15.1616 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7865	0.7392	0.6835	0.6017	0.5065	0.3973	0.3009	0.3324	0.4786	0.6385	0.7446	0.7978 (94)
Useful gains	738.4644	844.2664	897.0767	907.4698	828.7210	647.3117	468.8845	476.6712	621.9449	704.4596	706.8081	707.6878 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1836.6687	1833.1123	1710.3601	1483.6084	1181.4178	815.8646	543.1873	566.3239	855.9995	1226.2023	1550.5369	1819.8410 (97)
Space heating kWh	817.0640	664.5044	605.0829	414.8198	262.4064	0.0000	0.0000	0.0000	0.0000	388.1765	607.4847	827.4420 (98a)
Space heating requirement - total per year (kWh/year)	4586.9807											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	817.0640	664.5044	605.0829	414.8198	262.4064	0.0000	0.0000	0.0000	0.0000	388.1765	607.4847	827.4420 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4586.9807											
Space heating per m2	(98c) / (4) = 32.2595 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	817.0640	664.5044	605.0829	414.8198	262.4064	0.0000	0.0000	0.0000	0.0000	388.1765	607.4847	827.4420 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	885.2265	719.9398	655.5611	449.4255	284.2973	0.0000	0.0000	0.0000	0.0000	420.5596	658.1633	896.4702 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	253.9873	224.5251	238.6012	210.3000	204.1295	184.2602	182.2352	189.3902	191.3458	212.9461	225.8569	251.3128 (64)
Efficiency of water heater	86.4869	86.3407	86.0552	85.5539	84.6241	79.8000	79.8000	79.8000	79.8000	85.3885	86.1662	79.8000 (216)
Fuel for water heating, kWh/month	293.6713	260.0454	277.2653	245.8099	241.2192	230.9025	228.3649	237.3311	239.7818	249.3850	262.1178	290.4458 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	32.6863	26.2222	23.6102	17.2978	13.3613	10.9163	12.1887	15.8433	20.5788	27.0006	30.4971	33.5948 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-65.7392	-89.8670	-125.2711	-136.3985	-143.3475	-132.3621	-130.5656	-124.9469	-114.6765	-100.4478	-71.1966	-57.1572 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-46.2279	-96.0350	-188.7446	-280.5182	-368.1867	-369.0771	-364.8749	-310.3036	-229.1773	-136.5080	-61.4296	-36.6623 (233b)

Full SAP Calculation Printout



Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													4969.6432	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													3056.3399	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													263.7973	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-3779.7213	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													4596.0591	(238)

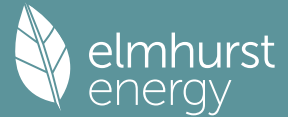
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4969.6432	0.2100	1043.6251 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3056.3399	0.2100	641.8314 (264)
Space and water heating			1685.4565 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	263.7973	0.1443	38.0741 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1291.9760	0.1353	-174.7766
PV Unit electricity exported	-2487.7454	0.1262	-313.9536
Total			-488.7302 (269)
Total CO2, kg/year			1246.7297 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.7700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4969.6432	1.1300	5615.6969 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3056.3399	1.1300	3453.6641 (278)
Space and water heating			9069.3610 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	263.7973	1.5338	404.6211 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1291.9760	1.5000	-1937.9702
PV Unit electricity exported	-2487.7454	0.4633	-1152.4581
Total			-3090.4283 (283)
Total Primary energy kWh/year			6513.6546 (286)
Target Primary Energy Rate (TPER)			45.8100 (287)

Full SAP Calculation Printout



Plot Reference	P5				Issued on Date	09/07/2026	
Assessment Reference	Design Stage- Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	5 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	82 B	DER	3.72	TER	8.77		
Environmental	96 A	% DER < TER				57.58	
CO ₂ Emissions (t/year)	0.48	DFEE	37.45	TFEE	39.21		
Compliance Check	See BREL	% DFEE < TFEE				4.47	
% DPER < TPER	14.92	DPER	38.97	TPER	45.81		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 354.4000 (5)

2. Ventilation rate

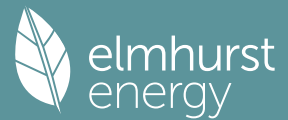
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 40.0000 / (5) = 0.1129 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3129 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2659 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3391	0.3324	0.3258	0.2925	0.2859	0.2526	0.2526	0.2460	0.2659	0.2859	0.2992	0.3125 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5575	0.5553	0.5531	0.5428	0.5409	0.5319	0.5319	0.5303	0.5354	0.5409	0.5448	0.5488 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			36.3100	1.1450	41.5763		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411	0.0000	0.0000 (28a)
External Wall 1	177.5500	38.3300	139.2200	0.1800	25.0596	0.0000	0.0000 (29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292	9.0000	591.4800 (30)
Flat	10.8300		10.8300	0.1600	1.7328	9.0000	97.4700 (30)
Total net area of external elements Aum(A, m ²)			330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	87.5590	(33)
Main dwelling							
Internal Wall 1			263.4600			9.0000	2371.1400 (32c)
Internal Floor 1			65.7200			18.0000	1182.9600 (32d)
Internal Ceiling 1			65.7200			9.0000	591.4800 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 4834.5300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.0005 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)									22.2900	0.0470	1.0476	
E3 Sill									21.3900	0.0350	0.7487	
E4 Jamb									54.5600	0.0470	2.5643	
E5 Ground floor (normal)									38.0700	0.0150	0.5710	
E6 Intermediate floor within a dwelling									33.1500	0.0100	0.3315	
E16 Corner (normal)									22.4000	0.0430	0.9632	
E17 Corner (inverted - internal area greater than external area)									2.4000	-0.0690	-0.1656	
E10 Eaves (insulation at ceiling level)									19.9700	0.0370	0.7389	
E12 Gable (insulation at ceiling level)									13.1800	0.0890	1.1730	
E14 Flat roof									9.3200	0.0800	0.7456	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.7183 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 96.2773 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	65.1989	64.9378	64.6819	63.4800	63.2552	62.2083	62.2083	62.0145	62.6116	63.2552	63.7101	64.1857 (38)
Average = Sum(39)m / 12 =	161.4762	161.2151	160.9592	159.7573	159.5325	158.4856	158.4856	158.2918	158.8889	159.5325	159.9874	160.4630 (39)
												159.7562
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1356	1.1338	1.1320	1.1235	1.1220	1.1146	1.1146	1.1132	1.1174	1.1220	1.1252	1.1285 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.1235

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.9211 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938 (42b)
Hot water usage for other uses												
	44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454 (42c)
Average daily hot water use (litres/day)												69.7946 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	76.1461	74.0569	71.7762	68.9378	66.4055	63.7739	63.2274	65.5035	67.8379	70.5404	73.4039	76.0392 (44)
Energy content (annual)	120.5968	105.4561	110.3173	94.3724	89.3946	78.4175	76.4681	81.1070	83.6509	95.7226	104.5773	119.0591 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1159.1396
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	102.5072	89.6377	93.7697	80.2165	75.9854	66.6549	64.9979	68.9410	71.1033	81.3642	88.8907	101.2002 (62)
WWHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	102.5072	89.6377	93.7697	80.2165	75.9854	66.6549	64.9979	68.9410	71.1033	81.3642	88.8907	101.2002 (64)
12Total per year (kWh/year)												985.2687 (64)
Electric shower(s)												985 (64)
	58.6192	52.2302	57.0334	54.4263	55.4476	52.8916	54.6546	55.4476	54.4263	57.0334	55.9609	58.6192 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												666.7902 (64a)
Heat gains from water heating, kWh/month												
	40.2816	35.4670	37.7008	33.6607	32.8582	29.8866	29.9131	31.0971	31.3824	34.5994	36.2129	39.9549 (65)

5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.3055	174.1597	157.3055	162.5490	157.3055	162.5490	157.3055	157.3055	162.5490	157.3055	162.5490	157.3055 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	311.8885	315.1250	306.9693	289.6068	267.6897	247.0908	233.3295	230.0930	238.2487	255.6112	277.5283	298.1272 (68)
Pumps, fans	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457 (71)
Total internal gains	54.1420	52.7782	50.6731	46.7510	44.1643	41.5092	40.2058	41.7972	43.5866	46.5046	50.2957	53.7028 (72)
	590.1532	608.8800	581.7650	565.7239	535.9767	517.9662	497.6579	496.0129	511.2015	526.2384	557.1901	575.9526 (73)

6. Solar gains												

[Jan]												
				Area		Solar flux	g	FF		Access		Gains
				m2		Table 6a	W/m2	Specific data		factor		W
								or Table 6b		Table 6d		
North				14.3900		10.6334	0.6800	0.7000		0.7700		50.4746 (74)
East				2.8800		19.6403	0.6800	0.7000		0.7700		18.6586 (76)
South				9.7800		46.7521	0.6800	0.7000		0.7700		150.8273 (78)
West				9.2600		19.6403	0.6800	0.7000		0.7700		59.9927 (80)

Solar gains	279.9532	497.3344	731.9465	988.4516	1178.1380	1199.9282	1144.3128	998.7704	820.4604	563.8189	339.1176	237.0858 (83)
Total gains	870.1064	1106.2145	1313.7115	1554.1755	1714.1147	1717.8944	1641.9707	1494.7833	1331.6619	1090.0574	896.3078	813.0384 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.3166	8.3300	8.3433	8.4060	8.4179	8.4735	8.4735	8.4839	8.4520	8.4179	8.3939	8.3691
alpha	1.5544	1.5553	1.5562	1.5604	1.5612	1.5649	1.5649	1.5656	1.5635	1.5612	1.5596	1.5579
util living area	0.8764	0.8283	0.7678	0.6742	0.5651	0.4474	0.3527	0.3909	0.5498	0.7299	0.8396	0.8868 (86)
MIT	16.5479	17.1296	17.9420	18.9454	19.8034	20.4262	20.7241	20.6638	20.1513	18.9937	17.5892	16.4323 (87)
Th 2	19.9718	19.9733	19.9748	19.9816	19.9829	19.9889	19.9889	19.9900	19.9866	19.9829	19.9803	19.9776 (88)
util rest of house	0.8664	0.8150	0.7499	0.6486	0.5290	0.3967	0.2865	0.3236	0.5004	0.7022	0.8250	0.8776 (89)
MIT 2	15.8820	16.4507	17.2431	18.2122	19.0198	19.5859	19.8332	19.7924	19.3598	18.2834	16.9173	15.7721 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	16.0067	16.5779	17.3740	18.3496	19.1666	19.7433	20.0001	19.9557	19.5081	18.4165	17.0432	15.8958 (92)
Temperature adjustment	0.0000											
adjusted MIT	16.0067	16.5779	17.3740	18.3496	19.1666	19.7433	20.0001	19.9557	19.5081	18.4165	17.0432	15.8958 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8126	0.7572	0.6929	0.6006	0.4968	0.3834	0.2873	0.3211	0.4742	0.6499	0.7682	0.8255 (94)
Useful gains	707.0557	837.6800	910.3053	933.3666	851.5963	658.6116	471.7009	480.0303	631.5330	708.4712	688.5323	671.1608 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1890.3591	1882.6485	1750.2771	1509.6413	1191.1603	815.1373	538.8722	562.8317	859.2839	1246.9870	1590.7822	1876.7438 (97)
Space heating kWh	880.3777	702.2188	624.9391	414.9178	252.6356	0.0000	0.0000	0.0000	0.0000	400.6558	649.6200	896.9538 (98a)
Space heating requirement - total per year (kWh/year)	4822.3185											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	880.3777	702.2188	624.9391	414.9178	252.6356	0.0000	0.0000	0.0000	0.0000	400.6558	649.6200	896.9538 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4822.3185											
Space heating per m2	(98c) / (4) = 33.9146 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1489.7650	1172.7937	1203.0176	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6880	0.7404	0.7085	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1025.0214	868.3763	852.3008	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1940.4494	1854.7101	1685.8158	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	659.1082	733.8323	620.1351	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	164.7770	183.4581	155.0338	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	503.2689 (107)											
Energy for space heating	33.9146 (99)											
Energy for space cooling	3.5394 (108)											
Total	37.4540 (109)											
Fabric Energy Efficiency (DFEE)	37.5 (109)											

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

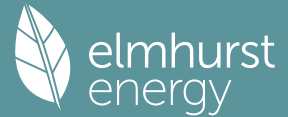
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	354.4000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)

Full SAP Calculation Printout



Number of flueless gas fires

0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
40.0000 / (5) = 0.1129 (8)
Yes
Blower Door
5.0000 (17)
0.3629 (18)
2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3084 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3933	0.3855	0.3778	0.3393	0.3316	0.2930	0.2930	0.2853	0.3084	0.3316	0.3470	0.3624 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5773	0.5743	0.5714	0.5576	0.5550	0.5429	0.5429	0.5407	0.5476	0.5550	0.5602	0.5657 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.0200	1.0000	2.0200		(26)
TER Opening Type			33.5200	1.1450	38.3817		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411		(28a)
External Wall 1	177.5500	35.5400	142.0100	0.1800	25.5618		(29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292		(30)
Flat	10.8300		10.8300	0.1100	1.1913		(30)
Total net area of external elements Aum(A, m2)			330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 84.3251		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

34.0005 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	22.2900	0.0500	1.1145
E3 Sill	21.3900	0.0500	1.0695
E4 Jamb	54.5600	0.0500	2.7280
E5 Ground floor (normal)	38.0700	0.1600	6.0912
E6 Intermediate floor within a dwelling	33.1500	0.0000	0.0000
E16 Corner (normal)	22.4000	0.0900	2.0160
E17 Corner (inverted - internal area greater than external area)	2.4000	-0.0900	-0.2160
E10 Eaves (insulation at ceiling level)	19.9700	0.0600	1.1982
E12 Gable (insulation at ceiling level)	13.1800	0.0600	0.7908
E14 Flat roof	9.3200	0.0800	0.7456

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5378 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 99.8629 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	67.5194	67.1682	66.8240	65.2072	64.9048	63.4966	63.4966	63.2359	64.0390	64.9048	65.5167	66.1564 (38)
Heat transfer coeff	167.3823	167.0311	166.6869	165.0701	164.7676	163.3595	163.3595	163.0987	163.9019	164.7676	165.3796	166.0193 (39)
Average = Sum(39)m / 12 =												165.0687

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1772	1.1747	1.1723	1.1609	1.1588	1.1489	1.1489	1.1470	1.1527	1.1588	1.1631	1.1676 (40)
HLP (average)												1.1609
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9211 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 31.6007 31.1313 30.4705 29.2519 28.3394 27.3277 26.7812 27.4374 28.1520 29.2346 30.4783 31.4938 (42b)

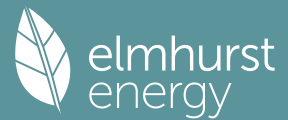
Hot water usage for other uses 44.5454 42.9256 41.3057 39.6859 38.0661 36.4462 36.4462 38.0661 39.6859 41.3057 42.9256 44.5454 (42c)

Average daily hot water use (litres/day) 69.7946 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	76.1461	74.0569	71.7762	68.9378	66.4055	63.7739	63.2274	65.5035	67.8379	70.5404	73.4039	76.0392 (44)
Energy conte	120.5968	105.4561	110.3173	94.3724	89.3946	78.4175	76.4681	81.1070	83.6509	95.7226	104.5773	119.0591 (45)
Energy content (annual)										Total = Sum(45)m =		1159.1396
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	102.5072	89.6377	93.7697	80.2165	75.9854	66.6549	64.9979	68.9410	71.1033	81.3642	88.8907	101.2002 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h	102.5072	89.6377	93.7697	80.2165	75.9854	66.6549	64.9979	68.9410	71.1033	81.3642	88.8907	101.2002 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		985.2687 (64)
Electric shower(s)	58.6192	52.2302	57.0334	54.4263	55.4476	52.8916	54.6546	55.4476	54.4263	57.0334	55.9609	58.6192 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												666.7902 (64a)

Heat gains from water heating, kWh/month

Full SAP Calculation Printout



40.2816 35.4670 37.7008 33.6607 32.8582 29.8866 29.9131 31.0971 31.3824 34.5994 36.2129 39.9549 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	157.3120	174.1668	157.3120	162.5557	157.3120	162.5557	157.3120	157.3120	162.5557	157.3120	162.5557	157.3120	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	311.8885	315.1250	306.9693	289.6068	267.6897	247.0908	233.3295	230.0930	238.2487	255.6112	277.5283	298.1272	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	(71)
Water heating gains (Table 5)	54.1420	52.7782	50.6731	46.7510	44.1643	41.5092	40.2058	41.7972	43.5866	46.5046	50.2957	53.7028	(72)
Total internal gains	590.1596	608.8871	581.7714	565.7306	535.9831	517.9728	497.6643	496.0193	511.2082	526.2449	557.1968	575.9590	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	13.2900	10.6334	0.6300	0.7000	0.7700	43.1885 (74)
East	2.6600	19.6403	0.6300	0.7000	0.7700	15.9662 (76)
South	9.0300	46.7521	0.6300	0.7000	0.7700	129.0210 (78)
West	8.5400	19.6403	0.6300	0.7000	0.7700	51.2598 (80)

Solar gains	239.4355	425.3470	625.9862	845.3489	1007.5743	1026.2124	978.6473	854.1733	701.6820	482.2037	290.0354	202.7735	(83)
Total gains	829.5951	1034.2341	1207.7576	1411.0795	1543.5574	1544.1852	1476.3117	1350.1927	1212.8902	1008.4486	847.2322	778.7325	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil _m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	0.0231	0.0400	0.0566	0.1355	0.1504	0.2207	0.2207	0.2338	0.1935	0.1504	0.1203	0.0890	
alpha	1.5349	1.5360	1.5371	1.5424	1.5434	1.5480	1.5480	1.5489	1.5462	1.5434	1.5414	1.5393	
util living area	0.8858	0.8444	0.7920	0.7072	0.6046	0.4872	0.3893	0.4277	0.5859	0.7548	0.8528	0.8947	(86)
MIT	16.3868	16.9277	17.7196	18.7381	19.6422	20.3313	20.6713	20.6052	20.0435	18.8414	17.4377	16.2855	(87)
Th 2	19.9383	19.9403	19.9422	19.9514	19.9531	19.9611	19.9611	19.9626	19.9580	19.9531	19.9496	19.9460	(88)
util rest of house	0.8762	0.8318	0.7747	0.6821	0.5680	0.4336	0.3170	0.3552	0.5353	0.7278	0.8387	0.8859	(89)
MIT 2	15.7051	16.2356	17.0111	18.0011	18.8582	19.4908	19.7761	19.7307	19.2506	18.1238	16.7530	15.6102	(90)
Living area fraction	15.8328	16.3653	17.1438	18.1392	19.0051	19.6482	19.9438	19.8946	19.3992	18.2583	16.8812	15.7368	(91)
MIT	15.8328	16.3653	17.1438	18.1392	19.0051	19.6482	19.9438	19.8946	19.3992	18.2583	16.8812	15.7368	(92)
Temperature adjustment	15.8328	16.3653	17.1438	18.1392	19.0051	19.6482	19.9438	19.8946	19.3992	18.2583	16.8812	15.7368	(93)
adjusted MIT	15.8328	16.3653	17.1438	18.1392	19.0051	19.6482	19.9438	19.8946	19.3992	18.2583	16.8812	15.7368	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.8232	0.7741	0.7163	0.6301	0.5303	0.4159	0.3157	0.3500	0.5043	0.6730	0.7821	0.8347	(94)
Ext temp.	682.9450	800.6080	865.1017	889.0592	818.4944	642.2714	466.0331	472.5474	611.6339	678.7118	662.6496	649.9895	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	1930.3941	1915.0572	1774.1880	1525.1191	1203.6458	824.6770	546.2393	569.9608	868.5425	1261.8332	1617.6189	1915.3239	(97)
Space heating requirement - total per year (kWh/year)	928.1022	748.9098	676.3602	457.9632	286.5527	0.0000	0.0000	0.0000	0.0000	433.8423	687.5779	941.4088	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating contribution - total per year (kWh/year)	928.1022	748.9098	676.3602	457.9632	286.5527	0.0000	0.0000	0.0000	0.0000	433.8423	687.5779	941.4088	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	928.1022	748.9098	676.3602	457.9632	286.5527	0.0000	0.0000	0.0000	0.0000	433.8423	687.5779	941.4088	(98c)
Space heating per m ²										(98c) / (4) =		36.2945	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1535.5793	1208.8603	1239.5504	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.6446	0.7001	0.6676	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	989.7698	846.3095	827.4804	0.0000	0.0000	0.0000	0.0000	(102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1737.4055	1661.0757	1516.8070	0.0000	0.0000	0.0000	0.0000	(103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	538.2977	606.1861	512.8590	0.0000	0.0000	0.0000	0.0000	(104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	134.5744	151.5465	128.2147	0.0000	0.0000	0.0000	0.0000	(106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	134.5744	151.5465	128.2147	0.0000	0.0000	0.0000	0.0000	(107)
Energy for space heating												414.3357	(107)
Energy for space cooling												36.2945	(99)
												2.9140	(108)

Total
Fabric Energy Efficiency (TFEE)

39.2085 (109)
39.2 (109)

Full SAP Calculation Printout



Plot Reference	P5			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	5, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	82 B	DER	3.72	TER	8.77
Environmental	96 A	% DER < TER			57.58
CO ₂ Emissions (t/year)	0.48	DFEE	37.45	TFEE	39.21
Compliance Check	See BREL	% DFEE < TFEE			4.47
% DPER < TPER	14.92	DPER	38.97	TPER	45.81
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 354.4000 (5)

2. Ventilation rate

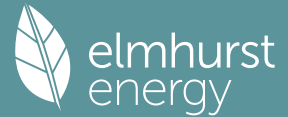
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 50.0000 / (5) = 0.1411 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3411 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2899 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3696	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			36.3100	1.1450	41.5763		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411	0.0000	0.0000 (28a)
External Wall 1	177.5500	38.3300	139.2200	0.1800	25.0596	0.0000	0.0000 (29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292	9.0000	591.4800 (30)
Flat	10.8300		10.8300	0.1600	1.7328	9.0000	97.4700 (30)
Total net area of external elements Aum(A, m ²)			330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	87.5590		(33)
Main dwelling							
Internal Wall 1			263.4600			9.0000	2371.1400 (32c)
Internal Floor 1			65.7200			18.0000	1182.9600 (32d)
Internal Ceiling 1			65.7200			9.0000	591.4800 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4834.5300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.0005 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.2900	0.0470	1.0476	
E3 Sill				21.3900	0.0350	0.7487	

Full SAP Calculation Printout



E4 Jamb									54.5600	0.0470	2.5643	
E5 Ground floor (normal)									38.0700	0.0150	0.5710	
E6 Intermediate floor within a dwelling									33.1500	0.0100	0.3315	
E16 Corner (normal)									22.4000	0.0430	0.9632	
E17 Corner (inverted - internal area greater than external area)									2.4000	-0.0690	-0.1656	
E10 Eaves (insulation at ceiling level)									19.9700	0.0370	0.7389	
E12 Gable (insulation at ceiling level)									13.1800	0.0890	1.1730	
E14 Flat roof									9.3200	0.0800	0.7456	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.7183 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 96.2773 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	66.4662	66.1559	65.8518	64.4233	64.1561	62.9119	62.9119	62.6815	63.3912	64.1561	64.6967	65.2620 (38)
Average = Sum(39)m / 12 =	162.7435	162.4332	162.1291	160.7006	160.4334	159.1892	159.1892	158.9588	159.6684	160.4334	160.9740	161.5393 (39)
												160.6994
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1445	1.1424	1.1402	1.1302	1.1283	1.1196	1.1196	1.1179	1.1229	1.1283	1.1321	1.1361 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.9211 (42)
Hot water usage for mixer showers												
	82.3475	81.1100	79.3067	75.8563	73.3101	70.4706	68.8566	70.6462	72.6080	75.6568	79.1813	82.0320 (42a)
Hot water usage for baths												
	31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938 (42b)
Hot water usage for other uses												
	44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454 (42c)
Average daily hot water use (litres/day)												145.7163 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	158.4936	155.1669	151.0829	144.7941	139.7156	134.2445	132.0840	136.1497	140.4459	146.1972	152.5851	158.0712 (44)
Energy conte	251.0151	220.9556	232.2087	198.2159	188.0841	165.0692	159.7441	168.5818	173.1839	198.3882	217.3855	247.5013 (45)
Energy content (annual)										Total = Sum(45)m =		2420.3335
Distribution loss (46)m = 0.15 x (45)m												
	37.6523	33.1433	34.8313	29.7324	28.2126	24.7604	23.9616	25.2873	25.9776	29.7582	32.6078	37.1252 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage												
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037 (64)
12Total per year (kWh/year)												2891.3295 (64)
Electric shower(s)												2891 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	115.4644	102.3727	109.2113	96.8764	94.5399	85.8551	85.1168	88.0554	88.5532	97.9660	103.2503	114.2961 (65)

5. Internal gains (see Table 5 and 5a)												

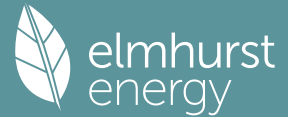
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.3055	174.1597	157.3055	162.5490	157.3055	162.5490	157.3055	157.3055	162.5490	157.3055	162.5490	157.3055 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	311.8885	315.1250	306.9693	289.6068	267.6897	247.0908	233.3295	230.0930	238.2487	255.6112	277.5283	298.1272 (68)
Pumps, fans	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457 (71)
Total internal gains	155.1941	152.3403	146.7894	134.5506	127.0697	119.2432	114.4044	118.3540	122.9906	131.6747	143.4032	153.6238 (72)
	691.2053	708.4421	677.8813	653.5235	618.8821	595.7002	571.8565	572.5697	590.6055	611.4086	650.2976	675.8737 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	14.3900											50.4746 (74)
East	2.8800											18.6586 (76)
South	9.7800											150.8273 (78)
West	9.2600											59.9927 (80)

Solar gains	279.9532	497.3344	731.9465	988.4516	1178.1380	1199.9282	1144.3128	998.7704	820.4604	563.8189	339.1176	237.0858 (83)

Full SAP Calculation Printout



Total gains 971.1585 1205.7765 1409.8279 1641.9751 1797.0201 1795.6284 1716.1692 1571.3401 1411.0659 1175.2276 989.4152 912.9594 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.2518	8.2676	8.2831	8.3567	8.3706	8.4360	8.4360	8.4483	8.4107	8.3706	8.3425	8.3133	21.0000 (85)
alpha	1.5501	1.5512	1.5522	1.5571	1.5580	1.5624	1.5624	1.5632	1.5607	1.5580	1.5562	1.5542	
util living area	0.8594	0.8117	0.7516	0.6594	0.5517	0.4352	0.3419	0.3778	0.5329	0.7107	0.8211	0.8699	(86)
Living	17.5821	18.0015	18.5917	19.3212	19.9459	20.4004	20.6164	20.5744	20.2057	19.3688	18.3480	17.5009	
Non living	16.1132	16.6137	17.3171	18.1787	18.8972	19.4029	19.6216	19.5872	19.2070	18.2570	17.0441	16.0192	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	19.2837	18.0015	18.5917	19.3212	19.9459	20.4004	20.6164	20.5744	20.2057	19.3688	18.3480	18.0020	(87)
Th 2	19.9646	19.9664	19.9681	19.9763	19.9778	19.9849	19.9849	19.9862	19.9822	19.9778	19.9747	19.9715	(88)
util rest of house	0.8484	0.7975	0.7329	0.6333	0.5155	0.3849	0.2768	0.3116	0.4835	0.6820	0.8052	0.8596	(89)
MIT 2	18.3843	16.6137	17.3171	18.1787	18.8972	19.4029	19.6216	19.5872	19.2070	18.2570	17.0441	16.7150	(90)
Living area fraction									fLA = Living area / (4) =			0.1874	(91)
MIT	18.5528	16.8737	17.5559	18.3927	19.0937	19.5898	19.8080	19.7722	19.3941	18.4653	17.2884	16.9562	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.5528	16.8737	17.5559	18.3927	19.0937	19.5898	19.8080	19.7722	19.3941	18.4653	17.2884	16.9562	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8309	0.7431	0.6791	0.5864	0.4806	0.3637	0.2646	0.2965	0.4513	0.6306	0.7509	0.8204	(94)
Useful gains	806.9104	896.0201	957.3681	962.8403	863.6470	652.9869	454.1641	465.8364	636.8450	741.0706	742.9044	748.9844	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2319.5515	1944.9308	1792.4788	1525.4839	1186.1912	794.3257	510.6824	536.0379	845.3005	1261.8497	1640.0679	2060.6198	(97)
Space heating kWh	1125.4050	704.8680	621.3223	405.1034	239.9729	0.0000	0.0000	0.0000	0.0000	387.4597	645.9577	975.8567	(98a)
Space heating requirement - total per year (kWh/year)												5105.9457	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1125.4050	704.8680	621.3223	405.1034	239.9729	0.0000	0.0000	0.0000	0.0000	387.4597	645.9577	975.8567	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5105.9457	
Space heating per m2										(98c) / (4) =		35.9093	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)	0.0000	(201)
Efficiency of main space heating system 1 (in %)	1.0000	(202)
Efficiency of main space heating system 2 (in %)	320.1796	(206)
Efficiency of secondary/supplementary heating system, %	0.0000	(207)
	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1125.4050	704.8680	621.3223	405.1034	239.9729	0.0000	0.0000	0.0000	0.0000	387.4597	645.9577	975.8567	(98)
Space heating efficiency (main heating system 1)	320.1796	320.1796	320.1796	320.1796	320.1796	0.0000	0.0000	0.0000	0.0000	320.1796	320.1796	320.1796	(210)
Space heating fuel (main heating system)	351.4918	220.1477	194.0543	126.5238	74.9495	0.0000	0.0000	0.0000	0.0000	121.0132	201.7485	304.7842	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037	(64)
Efficiency of water heater (217)m	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	(216)
Fuel for water heating, kWh/month	170.0816	150.2513	159.0905	138.4697	133.3024	119.0975	116.7394	121.9045	123.8400	139.3245	149.6731	168.0281	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	37.3038	29.9265	26.9455	19.7414	15.2489	12.4584	13.9105	18.0814	23.4860	30.8149	34.8053	38.3406	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1594.7130	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.1046	
Water heating fuel used												1689.8025	(219)
Space cooling fuel												0.0000	(221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	301.0634 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3585.5789 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1594.7130	0.1548	246.7950 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1689.8025	0.1411	238.4503 (264)
Space and water heating			485.2453 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	301.0634	0.1443	43.4528 (268)
Total CO2, kg/year			528.6981 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7200 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1594.7130	1.5729	2508.2955 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1689.8025	1.5218	2571.5232 (278)
Space and water heating			5079.8187 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	301.0634	1.5338	461.7811 (282)
Total Primary energy kWh/year			5541.5998 (286)
Dwelling Primary energy Rate (DPER)			38.9700 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

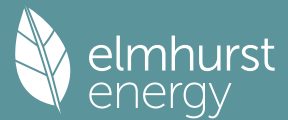
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	354.4000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1129 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3629 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3084 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)
Adj infilt rate	0.3933 0.3855 0.3778 0.3393 0.3316 0.2930 0.2930 0.2853 0.3084 0.3316 0.3470 0.3624 (22b)
Effective ac	0.5773 0.5743 0.5714 0.5576 0.5550 0.5429 0.5429 0.5407 0.5476 0.5550 0.5602 0.5657 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.0200	1.0000	2.0200		(26)
TER Opening Type			33.5200	1.1450	38.3817		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411		(28a)
External Wall 1	177.5500	35.5400	142.0100	0.1800	25.5618		(29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292		(30)
Flat	10.8300		10.8300	0.1100	1.1913		(30)
Total net area of external elements Aum(A, m2)			330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)					84.3251		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

34.0005 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	22.2900	0.0500	1.1145
E2 Other lintels (including other steel lintels)	21.3900	0.0500	1.0695
E3 Sill	54.5600	0.0500	2.7280
E4 Jamb	38.0700	0.1600	6.0912
E5 Ground floor (normal)	33.1500	0.0000	0.0000
E6 Intermediate floor within a dwelling	22.4000	0.0900	2.0160
E16 Corner (normal)	2.4000	-0.0900	-0.2160
E17 Corner (inverted - internal area greater than external area)	19.9700	0.0600	1.1982
E10 Eaves (insulation at ceiling level)	13.1800	0.0600	0.7908
E12 Gable (insulation at ceiling level)	9.3200	0.0800	0.7456
E14 Flat roof			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5378 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 99.8629 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	67.5194	67.1682	66.8240	65.2072	64.9048	63.4966	63.4966	63.2359	64.0390	64.9048	65.5167	66.1564
Heat transfer coeff	167.3823	167.0311	166.6869	165.0701	164.7676	163.3595	163.3595	163.0987	163.9019	164.7676	165.3796	166.0193
Average = Sum(39)m / 12 =												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1772	1.1747	1.1723	1.1609	1.1588	1.1489	1.1489	1.1470	1.1527	1.1588	1.1631	1.1676
HLP (average)												
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

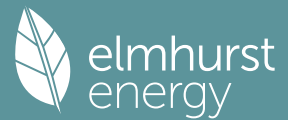
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9211 (42)
Hot water usage for mixer showers	73.1978	72.0978	70.4948	67.4279	65.1645	62.6405	61.2058	62.7966	64.5405	67.2505	70.3833	72.9173	(42a)
Hot water usage for baths	31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938	(42b)
Hot water usage for other uses	44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454	(42c)
Average daily hot water use (litres/day)													137.2805 (43)
Daily hot water use	149.3438	146.1547	142.2710	136.3657	131.5700	126.4144	124.4332	128.3002	132.3784	137.7909	143.7872	148.9566	(44)
Energy conte	236.5241	208.1223	218.6652	186.6778	177.1186	155.4413	150.4912	158.8624	163.2358	186.9809	204.8512	233.2300	(45)
Energy content (annual)													Total = Sum(45)m = 2280.2008
Distribution loss (46)m = 0.15 x (45)m	35.4786	31.2183	32.7998	28.0017	26.5678	23.3162	22.5737	23.8294	24.4854	28.0471	30.7277	34.9845	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	287.4502	254.1201	269.5913	235.9611	228.0446	204.7246	201.4173	209.7885	212.5191	237.9070	254.1345	284.1561	(62)
WWHRS	-33.4630	-29.5949	-30.9901	-25.6610	-23.9152	-20.4644	-19.1821	-20.3982	-21.1732	-24.9609	-28.2777	-32.8433	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	253.9873	224.5251	238.6012	210.3000	204.1295	184.2602	182.2352	189.3902	191.3458	212.9461	225.8569	251.3128	(64)
Total per year (kWh/year)													2568.8904 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	119.3851	105.9989	113.4470	101.4970	99.6328	91.1109	90.7792	93.5626	93.7025	102.9120	107.5397	118.2898	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	146.0571	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	157.3120	174.1668	157.3120	162.5557	157.3120	162.5557	157.3120	157.3120	162.5557	157.3120	162.5557	157.3120	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	311.8885	315.1250	306.9693	289.6068	267.6897	247.0908	233.3295	230.0930	238.2487	255.6112	277.5283	298.1272	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	37.6057	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	(71)
Water heating gains (Table 5)	160.4639	157.7364	152.4826	140.9681	133.9150	126.5429	122.0150	125.7562	130.1424	138.3226	149.3607	158.9917	(72)
Total internal gains	699.4815	716.8453	686.5809	662.9476	628.7338	603.0065	579.4736	579.9783	597.7639	621.0629	659.2617	684.2480	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W			
North	13.2900				10.6334	0.6300	0.7000	0.7700	43.1885 (74)			
East	2.6600				19.6403	0.6300	0.7000	0.7700	15.9662 (76)			
South	9.0300				46.7521	0.6300	0.7000	0.7700	129.0210 (78)			
West	8.5400				19.6403	0.6300	0.7000	0.7700	51.2598 (80)			
Solar gains	239.4355	425.3470	625.9862	845.3489	1007.5743	1026.2124	978.6473	854.1733	701.6820	482.2037	290.0354	202.7735 (83)
Total gains	938.9170	1142.1923	1312.5671	1508.2966	1636.3081	1629.2189	1558.1209	1434.1516	1299.4459	1103.2666	949.2971	887.0215 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.0231	8.0400	8.0566	8.1355	8.1504	8.2207	8.2207	8.2338	8.1935	8.1504	8.1203	8.0890
alpha	1.5349	1.5360	1.5371	1.5424	1.5434	1.5480	1.5480	1.5489	1.5462	1.5434	1.5414	1.5393
util living area	0.8672	0.8257	0.7730	0.6889	0.5868	0.4708	0.3742	0.4100	0.5647	0.7320	0.8321	0.8763 (86)
MIT	16.5645	17.0843	17.8501	18.8311	19.7032	20.3648	20.6902	20.6293	20.0962	18.9467	17.5900	16.4670 (87)
Th 2	19.9383	19.9403	19.9422	19.9514	19.9531	19.9611	19.9611	19.9626	19.9580	19.9531	19.9496	19.9460 (88)
util rest of house	0.8564	0.8120	0.7548	0.6631	0.5500	0.4178	0.3036	0.3391	0.5140	0.7038	0.8166	0.8662 (89)
MIT 2	14.9751	15.5958	16.5098	17.6703	18.6782	19.4166	19.7487	19.6977	19.1443	17.8334	16.2187	14.8607 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	15.2729	15.8747	16.7609	17.8877	18.8702	19.5943	19.9251	19.8723	19.3226	18.0420	16.4756	15.1616 (92)
Temperature adjustment	0.0000											
adjusted MIT	15.2729	15.8747	16.7609	17.8877	18.8702	19.5943	19.9251	19.8723	19.3226	18.0420	16.4756	15.1616 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7865	0.7392	0.6835	0.6017	0.5065	0.3973	0.3009	0.3324	0.4786	0.6385	0.7446	0.7978 (94)
Useful gains	738.4644	844.2664	897.0767	907.4698	828.7210	647.3117	468.8845	476.6712	621.9449	704.4596	706.8081	707.6878 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1836.6687	1833.1123	1710.3601	1483.6084	1181.4178	815.8646	543.1873	566.3239	855.9995	1226.2023	1550.5369	1819.8410 (97)
Space heating kWh	817.0640	664.5044	605.0829	414.8198	262.4064	0.0000	0.0000	0.0000	0.0000	388.1765	607.4847	827.4420 (98a)
Space heating requirement - total per year (kWh/year)	4586.9807											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	817.0640	664.5044	605.0829	414.8198	262.4064	0.0000	0.0000	0.0000	0.0000	388.1765	607.4847	827.4420 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4586.9807											
Space heating per m2	(98c) / (4) = 32.2595 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	817.0640	664.5044	605.0829	414.8198	262.4064	0.0000	0.0000	0.0000	0.0000	388.1765	607.4847	827.4420 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	885.2265	719.9398	655.5611	449.4255	284.2973	0.0000	0.0000	0.0000	0.0000	420.5596	658.1633	896.4702 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	253.9873	224.5251	238.6012	210.3000	204.1295	184.2602	182.2352	189.3902	191.3458	212.9461	225.8569	251.3128 (64)
Efficiency of water heater	86.4869	86.3407	86.0552	85.5539	84.6241	79.8000	79.8000	79.8000	79.8000	85.3885	86.1662	79.8000 (216)
Fuel for water heating, kWh/month	293.6713	260.0454	277.2653	245.8099	241.2192	230.9025	228.3649	237.3311	239.7818	249.3850	262.1178	290.4458 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	32.6863	26.2222	23.6102	17.2978	13.3613	10.9163	12.1887	15.8433	20.5788	27.0006	30.4971	33.5948 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-65.7392	-89.8670	-125.2711	-136.3985	-143.3475	-132.3621	-130.5656	-124.9469	-114.6765	-100.4478	-71.1966	-57.1572 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-46.2279	-96.0350	-188.7446	-280.5182	-368.1867	-369.0771	-364.8749	-310.3036	-229.1773	-136.5080	-61.4296	-36.6623 (233b)

Full SAP Calculation Printout



Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													4969.6432	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													3056.3399	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													263.7973	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-3779.7213	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													4596.0591	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4969.6432	0.2100	1043.6251 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3056.3399	0.2100	641.8314 (264)
Space and water heating			1685.4565 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	263.7973	0.1443	38.0741 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1291.9760	0.1353	-174.7766
PV Unit electricity exported	-2487.7454	0.1262	-313.9536
Total			-488.7302 (269)
Total CO2, kg/year			1246.7297 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.7700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4969.6432	1.1300	5615.6969 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3056.3399	1.1300	3453.6641 (278)
Space and water heating			9069.3610 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	263.7973	1.5338	404.6211 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1291.9760	1.5000	-1937.9702
PV Unit electricity exported	-2487.7454	0.4633	-1152.4581
Total			-3090.4283 (283)
Total Primary energy kWh/year			6513.6546 (286)
Target Primary Energy Rate (TPER)			45.8100 (287)

Full SAP Calculation Printout



Plot Reference	P5			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	5, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	82 B	DER	3.72	TER	8.77
Environmental	96 A	% DER < TER			57.58
CO ₂ Emissions (t/year)	0.48	DFEE	37.45	TFEE	39.21
Compliance Check	See BREL	% DFEE < TFEE			4.47
% DPER < TPER	14.92	DPER	38.97	TPER	45.81
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 354.4000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1411 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3411 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2899 (21)

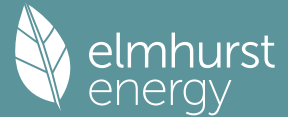
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3696	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			36.3100	1.1450	41.5763		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411	0.0000	0.0000 (28a)
External Wall 1	177.5500	38.3300	139.2200	0.1800	25.0596	0.0000	0.0000 (29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292	9.0000	591.4800 (30)
Flat	10.8300		10.8300	0.1600	1.7328	9.0000	97.4700 (30)
Total net area of external elements Aum(A, m ²)			330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	87.5590		(33)
Main dwelling							
Internal Wall 1			263.4600			9.0000	2371.1400 (32c)
Internal Floor 1			65.7200			18.0000	1182.9600 (32d)
Internal Ceiling 1			65.7200			9.0000	591.4800 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4834.5300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							34.0005 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				22.2900	0.0470	1.0476	
E3 Sill				21.3900	0.0350	0.7487	

SAP 10 Online 3.1.67 Page 2 of 15

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.2518	8.2676	8.2831	8.3567	8.3706	8.4360	8.4360	8.4483	8.4107	8.3706	8.3425	8.3133
alpha	1.5501	1.5512	1.5522	1.5571	1.5580	1.5624	1.5624	1.5632	1.5607	1.5580	1.5562	1.5542
util living area	0.8446	0.8004	0.7391	0.6506	0.5450	0.4317	0.3388	0.3736	0.5265	0.6991	0.8085	0.8560 (86)
Living	17.6821	18.0687	18.6525	19.3528	19.9620	20.4054	20.6191	20.5784	20.2169	19.4068	18.4136	17.5978
Non living	16.2316	16.6926	17.3870	18.2138	18.9139	19.4074	19.6237	19.5903	19.2179	18.2991	17.1206	16.1343
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.3339	18.0687	18.6525	19.3528	19.9620	20.4054	20.6191	20.5784	20.2169	19.4068	18.4136	18.0850 (87)
Th 2	19.9646	19.9664	19.9681	19.9763	19.9778	19.9849	19.9849	19.9862	19.9822	19.9778	19.9747	19.9715 (88)
util rest of house	0.8327	0.7856	0.7198	0.6242	0.5088	0.3816	0.2741	0.3079	0.4771	0.6699	0.7918	0.8449 (89)
MIT 2	18.4329	16.6926	17.3870	18.2138	18.9139	19.4074	19.6237	19.5903	19.2179	18.2991	17.1206	16.8098 (90)
Living area fraction	18.6017	16.9504	17.6241	18.4272	19.1103	19.5944	19.8102	19.7754	19.4051	18.5066	17.3629	17.0488 (91)
MIT	18.6017	16.9504	17.6241	18.4272	19.1103	19.5944	19.8102	19.7754	19.4051	18.5066	17.3629	17.0488 (92)
Temperature adjustment	18.6017	16.9504	17.6241	18.4272	19.1103	19.5944	19.8102	19.7754	19.4051	18.5066	17.3629	0.0000
adjusted MIT	18.6017	16.9504	17.6241	18.4272	19.1103	19.5944	19.8102	19.7754	19.4051	18.5066	17.3629	17.0488 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8146	0.7310	0.6666	0.5782	0.4747	0.3607	0.2621	0.2931	0.4457	0.6194	0.7372	0.8043 (94)
Useful gains	861.1875	929.6913	987.6234	978.5198	871.5691	655.2859	455.2633	467.4787	642.0836	759.4286	775.3081	798.9901 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2327.5093	1957.3850	1803.5447	1531.0286	1188.8558	795.0569	511.0234	536.5539	847.0532	1268.4840	1652.0549	2075.5794 (97)
Space heating kWh	1090.9434	690.6101	607.0455	397.8063	236.0613	0.0000	0.0000	0.0000	0.0000	378.7372	631.2577	949.7824 (98a)
Space heating requirement - total per year (kWh/year)												4982.2440
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1090.9434	690.6101	607.0455	397.8063	236.0613	0.0000	0.0000	0.0000	0.0000	378.7372	631.2577	949.7824 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4982.2440
Space heating per m2										(98c) / (4) =		35.0393 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												320.1796 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1090.9434	690.6101	607.0455	397.8063	236.0613	0.0000	0.0000	0.0000	0.0000	378.7372	631.2577	949.7824 (98)
Space heating efficiency (main heating system 1)	320.1796	320.1796	320.1796	320.1796	320.1796	0.0000	0.0000	0.0000	0.0000	320.1796	320.1796	320.1796 (210)
Space heating fuel (main heating system)	340.7286	215.6946	189.5953	124.2447	73.7278	0.0000	0.0000	0.0000	0.0000	118.2890	197.1574	296.6405 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037 (64)
Efficiency of water heater (217)m	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046 (216)
Fuel for water heating, kWh/month	170.0816	150.2513	159.0905	138.4697	133.3024	119.0975	116.7394	121.9045	123.8400	139.3245	149.6731	168.0281 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	37.3038	29.9265	26.9455	19.7414	15.2489	12.4584	13.9105	18.0814	23.4860	30.8149	34.8053	38.3406 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1556.0779 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												171.1046
Water heating fuel used												1689.8025 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:
 Total electricity for the above, kWh/year 0.0000 (231)
 Electricity for lighting (calculated in Appendix L) 301.0634 (232)

Energy saving/generation technologies (Appendices M ,N and Q)
 PV generation 0.0000 (233)
 Wind generation 0.0000 (234)
 Hydro-electric generation (Appendix N) 0.0000 (235a)
 Electricity generated - Micro CHP (Appendix N) 0.0000 (235)
 Appendix Q - special features
 Energy saved or generated -0.0000 (236)
 Energy used 0.0000 (237)
 Total delivered energy for all uses 3546.9438 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1556.0779	16.4900	256.5972 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1689.8025	16.4900	278.6484 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	301.0634	16.4900	49.6454 (250)
Additional standing charges			0.0000 (251)
Total energy cost			584.8910 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.3600 (256)
 Energy cost factor (ECF) 1.1249 (257)

$$[(255) \times (256)] / [(4) + 45.0] =$$

 SAP value 81.7662
 SAP rating (Section 12) 82 (258)
 SAP band B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1556.0779	0.1547	240.7675 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1689.8025	0.1411	238.4503 (264)
Space and water heating			479.2178 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	301.0634	0.1443	43.4528 (268)
Total CO2, kg/year			522.6706 (272)
CO2 emissions per m2			3.6800 (273)
EI value			96.2585
EI rating			96 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
 CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

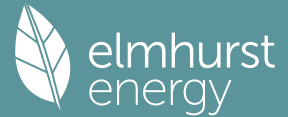
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 354.4000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1411 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3411 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.2899 (21)

Wind speed	Jan 5.6000	Feb 5.1000	Mar 4.8000	Apr 4.4000	May 4.6000	Jun 4.2000	Jul 4.3000	Aug 4.1000	Sep 4.4000	Oct 4.8000	Nov 4.8000	Dec 5.1000 (22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750 (22a)
Adj infilt rate	0.4059	0.3696	0.3479	0.3189	0.3334	0.3044	0.3117	0.2972	0.3189	0.3479	0.3479	0.3696 (22b)
Effective ac	0.5824	0.5683	0.5605	0.5509	0.5556	0.5463	0.5486	0.5442	0.5509	0.5605	0.5605	0.5683 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Solid Door			2.0200	1.0000	2.0200			(26)
Windows			36.3100	1.1450	41.5763			(27)
Heatloss Floor 1			76.4700	0.1300	9.9411	0.0000	0.0000	(28a)
External Wall 1	177.5500	38.3300	139.2200	0.1800	25.0596	0.0000	0.0000	(29a)
External Roof 1	65.7200		65.7200	0.1100	7.2292	9.0000	591.4800	(30)
Flat	10.8300		10.8300	0.1600	1.7328	9.0000	97.4700	(30)
Total net area of external elements Aum(A, m2)			330.5700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	87.5590			(33)
Main dwelling								
Internal Wall 1			263.4600			9.0000	2371.1400	(32c)
Internal Floor 1			65.7200			18.0000	1182.9600	(32d)
Internal Ceiling 1			65.7200			9.0000	591.4800	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 4834.5300 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 34.0005 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	22.2900	0.0470	1.0476
E2 Other lintels (including other steel lintels)	21.3900	0.0350	0.7487
E3 Sill	54.5600	0.0470	2.5643
E4 Jamb	38.0700	0.0150	0.5710
E5 Ground floor (normal)	33.1500	0.0100	0.3315
E6 Intermediate floor within a dwelling	22.4000	0.0430	0.9632
E16 Corner (normal)	2.4000	-0.0690	-0.1656
E17 Corner (inverted - internal area greater than external area)	19.9700	0.0370	0.7389
E10 Eaves (insulation at ceiling level)	13.1800	0.0890	1.1730
E12 Gable (insulation at ceiling level)	9.3200	0.0800	0.7456
E14 Flat roof			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.7183 (36)

Point Thermal Bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 96.2773 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

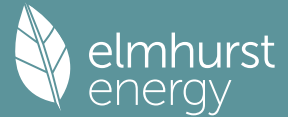
(38)m	Jan 68.1097	Feb 66.4662	Mar 65.5538	Apr 64.4233	May 64.9763	Jun 63.8950	Jul 64.1561	Aug 63.6400	Sep 64.4233	Oct 65.5538	Nov 65.5538	Dec 66.4662 (38)
Heat transfer coeff	164.3870	162.7435	161.8311	160.7006	161.2536	160.1723	160.4334	159.9173	160.7006	161.8311	161.8311	162.7435 (39)
Average = Sum(39)m / 12 =												161.5454

HLP	Jan 1.1561	Feb 1.1445	Mar 1.1381	Apr 1.1302	May 1.1341	Jun 1.1265	Jul 1.1283	Aug 1.1247	Sep 1.1302	Oct 1.1381	Nov 1.1381	Dec 1.1445 (40)
HLP (average)												1.1361
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9211 (42)
Hot water usage for mixer showers												
82.3475	81.1100	79.3067	75.8563	73.3101	70.4706	68.8566	70.6462	72.6080	75.6568	79.1813	82.0320 (42a)	
Hot water usage for baths												
31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938 (42b)	
Hot water usage for other uses												
44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454 (42c)	
Average daily hot water use (litres/day)												145.7163 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
158.4936	155.1669	151.0829	144.7941	139.7156	134.2445	132.0840	136.1497	140.4459	146.1972	152.5851	158.0712 (44)	
Energy content	251.0151	220.9556	232.2087	198.2159	188.0841	165.0692	159.7441	168.5818	173.1839	198.3882	217.3855	247.5013 (45)
Energy content (annual)										Total = Sum(45)m =		2420.3335
Distribution loss (46)m = 0.15 x (45)m												
37.6523	33.1433	34.8313	29.7324	28.2126	24.7604	23.9616	25.2873	25.9776	29.7582	32.6078	37.1252 (46)	
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)	
If cylinder contains dedicated solar storage												
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h												
291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037 (64)	
	Total per year (kWh/year) = Sum(64)m =										2891.3295 (64)	
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =										0.0000 (64a)	
Heat gains from water heating, kWh/month												
115.4644	102.3727	109.2113	96.8764	94.5399	85.8551	85.1168	88.0554	88.5532	97.9660	103.2503	114.2961 (65)	

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.6186	37.8535	30.7845	23.3059	17.4214	14.7079	15.8924	20.6575	27.7265	35.2052	41.0896	43.8031	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	465.5053	470.3358	458.1631	432.2489	399.5369	368.7923	348.2529	343.4224	355.5951	381.5093	414.2213	444.9660	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	(71)
Water heating gains (Table 5)	155.1941	152.3403	146.7894	134.5506	127.0697	119.2432	114.4044	118.3540	122.9906	131.6747	143.4032	153.6238	(72)
Total internal gains	777.1889	774.4004	749.6079	703.9762	657.8989	616.6142	592.4205	596.3048	620.1830	662.2600	712.5849	756.2637	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

North					14.3900	14.2444	0.6800	0.7000			0.7700	67.6153 (74)	
East					2.8800	26.6336	0.6800	0.7000			0.7700	25.3025 (76)	
South					9.7800	59.7356	0.6800	0.7000			0.7700	192.7137 (78)	
West					9.2600	26.6336	0.6800	0.7000			0.7700	81.3545 (80)	

Solar gains	366.9861	551.8794	813.6666	1143.8696	1329.9770	1459.9220	1375.1378	1202.9299	979.5211	668.6075	428.5335	299.0337	(83)
Total gains	1144.1749	1326.2798	1563.2745	1847.8458	1987.8759	2076.5361	1967.5583	1799.2346	1599.7041	1330.8675	1141.1184	1055.2974	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	8.1693	8.2518	8.2983	8.3567	8.3280	8.3843	8.3706	8.3976	8.3567	8.2983	8.2983	8.2518		
alpha	1.5446	1.5501	1.5532	1.5571	1.5552	1.5590	1.5580	1.5598	1.5571	1.5532	1.5532	1.5501		
util living area	0.8134	0.7767	0.7076	0.6063	0.4900	0.3617	0.2796	0.2811	0.4426	0.6288	0.7609	0.8259	(86)	
Living	18.1152	18.3645	18.9273	19.5812	20.1568	20.5333	20.6832	20.6929	20.4261	19.8019	18.9078	18.0924		
Non living	16.7484	17.0459	17.7124	18.4748	19.1239	19.5275	19.6701	19.6839	19.4302	18.7488	17.7073	16.7283		
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0		
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0		
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10		
MIT	19.5518	18.3645	18.9273	19.5812	20.1568	20.5333	20.6832	20.6929	20.4261	19.8019	18.9078	18.5089	(87)	
Th 2	19.9553	19.9646	19.9698	19.9763	19.9731	19.9793	19.9778	19.9807	19.9763	19.9698	19.9698	19.9646	(88)	
util rest of house														
MIT 2	0.7984	0.7598	0.6858	0.5774	0.4503	0.3101	0.2154	0.2112	0.3859	0.5910	0.7388	0.8115	(89)	
Living area fraction	18.6392	17.0459	17.7124	18.4748	19.1239	19.5275	19.6701	19.6839	19.4302	18.7488	17.7073	17.2980	(90)	
MIT	18.8102	17.2930	17.9401	18.6821	19.3174	19.7159	19.8599	19.8729	19.6168	18.9461	17.9322	17.5249	(92)	
Temperature adjustment												0.0000		
adjusted MIT	18.8102	17.2930	17.9401	18.6821	19.3174	19.7159	19.8599	19.8729	19.6168	18.9461	17.9322	17.5249	(93)	

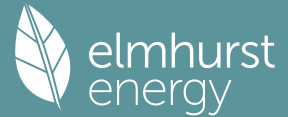
8. Space heating requirement

Utilisation	0.7796	0.7052	0.6346	0.5361	0.4225	0.2959	0.2076	0.2033	0.3641	0.5473	0.6845	0.7689	(94)	
Useful gains	891.9838	935.2604	992.0883	990.5550	839.8792	614.3941	408.4336	365.8114	582.4353	728.3869	781.0612	811.4667	(95)	
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000	(96)	
Heat loss rate W	2155.1405	1854.1330	1705.7098	1459.5022	1083.2055	707.3107	442.7854	395.4627	709.7849	1091.7254	1477.8806	1891.8723	(97)	
Space heating kWh	939.7886	617.4824	530.9344	337.6419	181.0347	0.0000	0.0000	0.0000	0.0000	270.3238	501.7099	803.8217	(98a)	
Space heating requirement - total per year (kWh/year)												4182.7376		
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)												0.0000		
Space heating kWh	939.7886	617.4824	530.9344	337.6419	181.0347	0.0000	0.0000	0.0000	0.0000	270.3238	501.7099	803.8217	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												4182.7376		
Space heating per m2										(98c) / (4) =		29.4165	(99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													319.8367	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	939.7886	617.4824	530.9344	337.6419	181.0347	0.0000	0.0000	0.0000	0.0000	270.3238	501.7099	803.8217	(98)	
Space heating efficiency (main heating system 1)	319.8367	319.8367	319.8367	319.8367	319.8367	0.0000	0.0000	0.0000	0.0000	319.8367	319.8367	319.8367	(210)	
Space heating fuel (main heating system)	293.8339	193.0618	166.0017	105.5670	56.6022	0.0000	0.0000	0.0000	0.0000	84.5193	156.8644	251.3225	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)														

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	291.0175	257.0868	272.2111	236.9279	228.0865	203.7812	199.7465	208.5842	211.8959	238.3906	256.0975	287.5037	(64)
Efficiency of water heater												171.0177	(216)
(217)m	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	(217)
Fuel for water heating, kWh/month	170.1681	150.3276											
Lighting	37.3038	29.9265	26.9455	19.7414	15.2489	12.4584	13.9105	18.0814	23.4860	30.8149	34.8053	38.3406	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	37.3038	29.9265	26.9455	19.7414	15.2489	12.4584	13.9105	18.0814	23.4860	30.8149	34.8053	38.3406	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1307.7728	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.0177	
Water heating fuel used												1690.6613	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												301.0634	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3299.4975	(238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1307.7728	27.6700	361.8607	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1690.6613	27.6700	467.8060	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	301.0634	27.6700	83.3042	(250)
Additional standing charges			0.0000	(251)
Total energy cost			912.9710	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1307.7728	0.1551	202.8974	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1690.6613	0.1411	238.5715	(264)
Space and water heating			441.4689	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	301.0634	0.1443	43.4528	(268)
Total CO2, kg/year			484.9216	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1307.7728	1.5743	2058.8780	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1690.6613	1.5218	2572.8301	(278)
Space and water heating			4631.7081	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	301.0634	1.5338	461.7811	(282)
Total Primary energy kWh/year			5093.4893	(286)

SAP 10 EPC IMPROVEMENTS

Design Stage- Triple Glazed

Current energy efficiency rating: B 82
Current environmental impact rating: A 96

Full SAP Calculation Printout



N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:
N Solar water heating
U Solar photovoltaic panels

SAP change
+ 1.7
+ 4.8

Cost change
-£ 118
-£ 287

CO2 change
-54 kg (11.1%)
-140 kg (32.4%)

Recommended measures
Solar water heating
Solar photovoltaic panels

Typical annual savings
£118
£287
£406

Energy efficiency
B 83
B 88

Environmental impact
A 97
A 97

Potential energy efficiency rating: B 88
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 596 TEST (30 Jun 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current £913	Potential £795	Saving £118
Electricity			
Space heating	£362	£384	-£22
Water heating	£468	£327	£141
Lighting	£83	£83	£0
Generated (PV)	-£0	-£287	£287
Total cost of fuels	£913	£508	£405
Total cost of uses	£913	£507	£406
Delivered energy	23 kWh/m²	13 kWh/m²	10 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.3 tonnes	0.2 tonnes
CO2 emissions per m²	3 kg/m²	2 kg/m²	1 kg/m²
Primary energy	36 kWh/m²	20 kWh/m²	15 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	354.4000 (5)

2. Ventilation rate

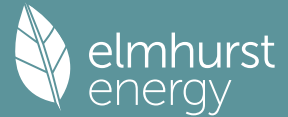
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	5 * 10 = 50.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) = 0.1411 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3411 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2899 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3696	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			36.3100	1.1450	41.5763		(27)
Heatloss Floor 1			76.4700	0.1300	9.9411	0.0000	(28a)
External Wall 1	177.5500	38.3300	139.2200	0.1800	25.0596	0.0000	(29a)

Full SAP Calculation Printout



External Roof 1	65.7200	65.7200	0.1100	7.2292	9.0000	591.4800 (30)
Flat	10.8300	10.8300	0.1600	1.7328	9.0000	97.4700 (30)
Total net area of external elements Aum(A, m2)		330.5700				(31)
Fabric heat loss, W/K = Sum (A x U)		(26)...(30) + (32) =	87.5590			(33)
Main dwelling						
Internal Wall 1		263.4600			9.0000	2371.1400 (32c)
Internal Floor 1		65.7200			18.0000	1182.9600 (32d)
Internal Ceiling 1		65.7200			9.0000	591.4800 (32e)

Heat capacity Cm = Sum(A x k)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
 (28)...(30) + (32) + (32a)...(32e) = 4834.5300 (34)
 34.0005 (35)

List of Thermal Bridges						
K1 Element		Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)		22.2900	0.0470	1.0476		
E3 Sill		21.3900	0.0350	0.7487		
E4 Jamb		54.5600	0.0470	2.5643		
E5 Ground floor (normal)		38.0700	0.0150	0.5710		
E6 Intermediate floor within a dwelling		33.1500	0.0100	0.3315		
E16 Corner (normal)		22.4000	0.0430	0.9632		
E17 Corner (inverted - internal area greater than external area)		2.4000	-0.0690	-0.1656		
E10 Eaves (insulation at ceiling level)		19.9700	0.0370	0.7389		
E12 Gable (insulation at ceiling level)		13.1800	0.0890	1.1730		
E14 Flat roof		9.3200	0.0800	0.7456		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						8.7183 (36)
Point Thermal bridges					(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =	96.2773 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	66.4662	66.1559	65.8518	64.4233	64.1561	62.9119	62.9119	62.6815	63.3912	64.1561	64.6967	65.2620	(39)
Average = Sum(39)m / 12 =	162.7435	162.4332	162.1291	160.7006	160.4334	159.1892	159.1892	158.9588	159.6684	160.4334	160.9740	161.5393	(39)
												160.6994	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.1445	1.1424	1.1402	1.1302	1.1283	1.1196	1.1196	1.1179	1.1229	1.1283	1.1321	1.1361	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

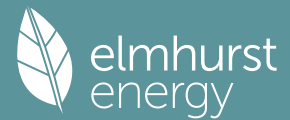
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9211 (42)
Hot water usage for mixer showers													
82.3475	81.1100	79.3067	75.8563	73.3101	70.4706	68.8566	70.6462	72.6080	75.6568	79.1813	82.0320	(42a)	
Hot water usage for baths													
31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938	(42b)	
Hot water usage for other uses													
44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454	(42c)	
Average daily hot water use (litres/day)												145.7163 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	158.4936	155.1669	151.0829	144.7941	139.7156	134.2445	132.0840	136.1497	140.4459	146.1972	152.5851	158.0712	(44)
Energy content (annual)	251.0151	220.9556	232.2087	198.2159	188.0841	165.0692	159.7441	168.5818	173.1839	198.3882	217.3855	247.5013	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2420.3335	
37.6523	33.1433	34.8313	29.7324	28.2126	24.7604	23.9616	25.2873	25.9776	29.7582	32.6078	37.1252	(46)	
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.5400	(55)
Total storage loss													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	(56)
If cylinder contains dedicated solar storage													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
291.0175	257.0868	270.8154	230.1743	215.2922	191.1745	186.7196	196.4878	206.4930	236.9949	256.0975	287.5037	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Aperture area of solar collector												3.0000	(H1)
Zero-loss collector efficiency												0.8000	(H2)
Collector linear heat loss coefficient												1.8000	(H3)
Collector 2nd order heat loss coefficient												0.0000	(H4)
Collector loop efficiency												0.9000	(H5)
Incidence angle modifier												1.0000	(H6)
Overshading factor												0.8000	(H8)
Overall heat loss coefficient of system												6.5000	(H10)
Heat loss coefficient of collector loop												3.9667	(H11)
Dedicated solar storage volume												75.0000	(H12)
Effective solar volume												75.0000	(H14)
Reference volume												225.0000	(H15)
Storage tank correction coefficient												1.3161	(H16)
Heat delivered to hot water												629.1727	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												629.1727	
Solar input	-0.0000	-16.1938	-58.8194	-81.1483	-106.3242	-97.8855	-97.0546	-84.7481	-58.2652	-28.7336	-0.0000	-0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
291.0175	240.8930	211.9959	149.0260	108.9680	93.2891	89.6650	111.7397	148.2278	208.2613	256.0975	287.5037	(64)	
Electric shower(s)										Total per year (kWh/year) = Sum(64)m =	2196.6844	(64)	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)	
Heat gains from water heating, kWh/month													
115.4644	102.3727	108.0947	91.4735	84.3044	75.7697	74.6953	78.3782	84.2309	96.8494	103.2503	114.2961	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	42.6186	37.8535	30.7845	23.3059	17.4214	14.7079	15.8924	20.6575	27.7265	35.2052	41.0896	43.8031 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	465.5053	470.3358	458.1631	432.2489	399.5369	368.7923	348.2529	343.4224	355.5951	381.5093	414.2213	444.9660 (68)
Pumps, fans	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457 (71)
Total internal gains	155.1941	152.3403	145.2886	127.0466	113.3124	105.2358	100.3969	105.3471	116.9874	130.1739	143.4032	153.6238 (72)
	777.1889	774.4004	748.1071	696.4722	644.1415	602.6067	578.4130	583.2979	614.1798	660.7592	712.5849	756.2637 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W	
North				14.3900	10.6334	0.6800	0.7000		0.7700		50.4746 (74)	
East				2.8800	19.6403	0.6800	0.7000		0.7700		18.6586 (76)	
South				9.7800	46.7521	0.6800	0.7000		0.7700		150.8273 (78)	
West				9.2600	19.6403	0.6800	0.7000		0.7700		59.9927 (80)	
Solar gains	279.9532	497.3344	731.9465	988.4516	1178.1380	1199.9282	1144.3128	998.7704	820.4604	563.8189	339.1176	237.0858 (83)
Total gains	1057.1421	1271.7349	1480.0536	1684.9238	1822.2796	1802.5349	1722.7258	1582.0683	1434.6402	1224.5782	1051.7025	993.3495 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	8.2518	8.2676	8.2831	8.3567	8.3706	8.4360	8.4360	8.4483	8.4107	8.3706	8.3425	8.3133
alpha	1.5501	1.5512	1.5522	1.5571	1.5580	1.5624	1.5624	1.5632	1.5607	1.5580	1.5562	1.5542
util living area	0.8446	0.8004	0.7394	0.6519	0.5474	0.4340	0.3409	0.3759	0.5278	0.6995	0.8085	0.8560 (86)
Living	17.6821	18.0687	18.6513	19.3482	19.9564	20.4021	20.6173	20.5762	20.2147	19.4057	18.4136	17.5978
Non living	16.2316	16.6926	17.3856	18.2087	18.9081	19.4044	19.6223	19.5886	19.2157	18.2979	17.1206	16.1343
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.3339	18.0687	18.6513	19.3482	19.9564	20.4021	20.6173	20.5762	20.2147	19.4057	18.4136	18.0850 (87)
Th 2	19.9646	19.9664	19.9681	19.9763	19.9778	19.9849	19.9849	19.9862	19.9822	19.9778	19.9747	19.9715 (88)
util rest of house	0.8327	0.7856	0.7201	0.6255	0.5112	0.3838	0.2759	0.3099	0.4784	0.6702	0.7918	0.8449 (89)
MIT 2	18.4329	16.6926	17.3856	18.2087	18.9081	19.4044	19.6223	19.5886	19.2157	18.2979	17.1206	16.8098 (90)
Living area fraction	18.6017	16.9504	17.6227	18.4222	19.1045	19.5913	19.8087	19.7737	19.4029	18.5054	17.3629	17.0488 (92)
MIT	18.6017	16.9504	17.6227	18.4222	19.1045	19.5913	19.8087	19.7737	19.4029	18.5054	17.3629	17.0488 (93)
Temperature adjustment												0.0000
adjusted MIT	18.6017	16.9504	17.6227	18.4222	19.1045	19.5913	19.8087	19.7737	19.4029	18.5054	17.3629	17.0488 (93)

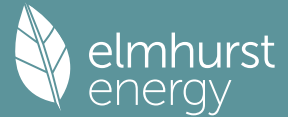
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8146	0.7310	0.6669	0.5794	0.4768	0.3627	0.2638	0.2949	0.4468	0.6197	0.7372	0.8043 (94)
Ext temp.	861.1875	929.6913	987.0022	976.2173	868.8001	653.7507	454.5172	466.5841	641.0320	758.8966	775.3081	798.9901 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	2327.5093	1957.3850	1803.3180	1530.2157	1187.9255	794.5688	510.7920	536.2729	846.7018	1268.2921	1652.0549	2075.5794 (97)
Space heating requirement - total per year (kWh/year)	1090.9434	690.6101	607.3389	398.8789	237.4293	0.0000	0.0000	0.0000	0.0000	378.9903	631.2577	949.7824 (98a)
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	1090.9434	690.6101	607.3389	398.8789	237.4293	0.0000	0.0000	0.0000	0.0000	378.9903	631.2577	949.7824 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1090.9434	690.6101	607.3389	398.8789	237.4293	0.0000	0.0000	0.0000	0.0000	378.9903	631.2577	949.7824 (98c)
Space heating per m2												35.0603 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	320.1796 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	1090.9434	690.6101	607.3389	398.8789	237.4293	0.0000	0.0000	0.0000	0.0000	378.9903	631.2577	949.7824 (98)
Space heating fuel (main heating system)	320.1796	320.1796	320.1796	320.1796	320.1796	0.0000	0.0000	0.0000	0.0000	320.1796	320.1796	320.1796 (210)
Space heating efficiency (main heating system 2)	340.7286	215.6946	189.6869	124.5797	74.1550	0.0000	0.0000	0.0000	0.0000	118.3680	197.1574	296.6405 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating requirement	291.0175	240.8930	211.9959	149.0260	108.9680	93.2891	89.6650	111.7397	148.2278	208.2613	256.0975	287.5037 (64)
Efficiency of water heater												171.1046 (216)

Full SAP Calculation Printout



(217)m	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	171.1046	(217)
Fuel for water heating, kWh/month	170.0816	140.7870	123.8985	87.0965	63.6850	54.5217	52.4036	65.3049	86.6299	121.7158	149.6731	168.0281	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	37.3038	29.9265	26.9455	19.7414	15.2489	12.4584	13.9105	18.0814	23.4860	30.8149	34.8053	38.3406	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.7107	-59.4624	-90.5016	-105.9009	-115.0216	-101.7037	-100.1729	-93.8407	-82.2179	-69.3191	-44.4417	-33.6563	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1557.0108	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.1046	
Water heating fuel used												1283.8256	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												301.0634	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-935.9496	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2285.9503	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1557.0108	16.4900	256.7511	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1283.8256	16.4900	211.7028	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	301.0634	16.4900	49.6454	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-935.9496	16.4900	-154.3381	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-154.3381	(252)
Total energy cost			376.9532	(255)

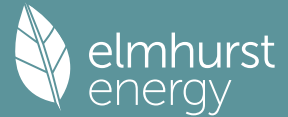
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.7249	(257)
SAP value		88.2486	
SAP rating (Section 12)		88	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1557.0108	0.1547	240.8966	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1283.8256	0.1455	186.8519	(264)
Space and water heating			427.7484	(265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970	(267)
Energy for lighting	301.0634	0.1443	43.4528	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-935.9496	0.1342	-125.6487	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-125.6487	(269)
Total CO2, kg/year			356.6495	(272)
CO2 emissions per m2			2.5100	(273)
EI value			97.4469	
EI rating			97	(274)
EI band			A	

Full SAP Calculation Printout



CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	76.4700 (1b)	x 2.4000 (2b)	= 183.5280 (1b) - (3b)
First floor	65.7200 (1c)	x 2.6000 (2c)	= 170.8720 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	142.1900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 354.4000 (5)

2. Ventilation rate

												m3 per hour	
Number of open chimneys												0 * 80 =	0.0000 (6a)
Number of open flues												0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire												0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler												0 * 20 =	0.0000 (6d)
Number of flues attached to other heater												0 * 35 =	0.0000 (6e)
Number of blocked chimneys												0 * 20 =	0.0000 (6f)
Number of intermittent extract fans												5 * 10 =	50.0000 (7a)
Number of passive vents												0 * 10 =	0.0000 (7b)
Number of flueless gas fires												0 * 40 =	0.0000 (7c)
												Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =												50.0000 / (5) =	0.1411 (8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												4.0000 (17)	
Infiltration rate												0.3411 (18)	
Number of sides sheltered												2 (19)	
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.2899 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000	(22)
Adj infilt rate	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750	(22a)
	0.4059	0.3696	0.3479	0.3189	0.3334	0.3044	0.3117	0.2972	0.3189	0.3479	0.3479	0.3696	(22b)
Effective ac	0.5824	0.5683	0.5605	0.5509	0.5556	0.5463	0.5486	0.5442	0.5509	0.5605	0.5605	0.5683	(25)

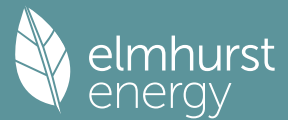
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
Main dwelling													
Solid Door			2.0200	1.0000	2.0200		(26)						
Windows			36.3100	1.1450	41.5763		(27)						
Heatloss Floor 1			76.4700	0.1300	9.9411	0.0000	0.0000 (28a)						
External Wall 1	177.5500	38.3300	139.2200	0.1800	25.0596	0.0000	0.0000 (29a)						
External Roof 1	65.7200		65.7200	0.1100	7.2292	9.0000	591.4800 (30)						
Flat	10.8300		10.8300	0.1600	1.7328	9.0000	97.4700 (30)						
Total net area of external elements Aum(A, m2)			330.5700				(31)						
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	87.5590		(33)						
Main dwelling													
Internal Wall 1			263.4600			9.0000	2371.1400 (32c)						
Internal Floor 1			65.7200			18.0000	1182.9600 (32d)						
Internal Ceiling 1			65.7200			9.0000	591.4800 (32e)						
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4834.5300 (34)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							34.0005 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				22.2900	0.0470	1.0476							
E3 Sill				21.3900	0.0350	0.7487							
E4 Jamb				54.5600	0.0470	2.5643							
E5 Ground floor (normal)				38.0700	0.0150	0.5710							
E6 Intermediate floor within a dwelling				33.1500	0.0100	0.3315							
E16 Corner (normal)				22.4000	0.0430	0.9632							
E17 Corner (inverted - internal area greater than external area)				2.4000	-0.0690	-0.1656							
E10 Eaves (insulation at ceiling level)				19.9700	0.0370	0.7389							
E12 Gable (insulation at ceiling level)				13.1800	0.0890	1.1730							
E14 Flat roof				9.3200	0.0800	0.7456							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.7183 (36)						
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	96.2773 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 68.1097	Feb 66.4662	Mar 65.5538	Apr 64.4233	May 64.9763	Jun 63.8950	Jul 64.1561	Aug 63.6400	Sep 64.4233	Oct 65.5538	Nov 65.5538	Dec 66.4662	(38)
Heat transfer coeff	164.3870	162.7435	161.8311	160.7006	161.2536	160.1723	160.4334	159.9173	160.7006	161.8311	161.8311	162.7435	(39)
Average = Sum(39)m / 12 =												161.5454	
HLP	Jan 1.1561	Feb 1.1445	Mar 1.1381	Apr 1.1302	May 1.1341	Jun 1.1265	Jul 1.1283	Aug 1.1247	Sep 1.1302	Oct 1.1381	Nov 1.1381	Dec 1.1445	(40)
HLP (average)												1.1361	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.9211 (42)
Hot water usage for mixer showers	

Full SAP Calculation Printout



Hot water usage for baths	82.3475	81.1100	79.3067	75.8563	73.3101	70.4706	68.8566	70.6462	72.6080	75.6568	79.1813	82.0320 (42a)
Hot water usage for other uses	31.6007	31.1313	30.4705	29.2519	28.3394	27.3277	26.7812	27.4374	28.1520	29.2346	30.4783	31.4938 (42b)
Average daily hot water use (litres/day)	44.5454	42.9256	41.3057	39.6859	38.0661	36.4462	36.4462	38.0661	39.6859	41.3057	42.9256	44.5454 (42c)
												145.7163 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	158.4936	155.1669	151.0829	144.7941	139.7156	134.2445	132.0840	136.1497	140.4459	146.1972	152.5851	158.0712 (44)
Distribution loss (46)m = 0.15 x (45)m	251.0151	220.9556	232.2087	198.2159	188.0841	165.0692	159.7441	168.5818	173.1839	198.3882	217.3855	247.5013 (45)
Water storage loss (or HIU loss):	37.6523	33.1433	34.8313	29.7324	28.2126	24.7604	23.9616	25.2873	25.9776	29.7582	32.6078	37.1252 (46)
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	291.0175	257.0868	270.8154	230.1743	215.2922	191.1745	186.7196	196.4878	206.4930	236.9949	256.0975	287.5037 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												804.5742 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												804.5742
Solar input	-6.7368	-24.2192	-71.3643	-99.0657	-122.5524	-121.3348	-118.6654	-107.0102	-77.5964	-45.1607	-10.8684	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	284.2807	232.8676	199.4511	131.1087	92.7398	69.8397	68.0542	89.4775	128.8966	191.8342	245.2291	287.5037 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	115.4644	102.3727	108.0947	91.4735	84.3044	75.7697	74.6953	78.3782	84.2309	96.8494	103.2503	114.2961 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685	175.2685 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	42.6186	37.8535	30.7845	23.3059	17.4214	14.7079	15.8924	20.6575	27.7265	35.2052	41.0896	43.8031 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	465.5053	470.3358	458.1631	432.2489	399.5369	368.7923	348.2529	343.4224	355.5951	381.5093	414.2213	444.9660 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480	55.4480 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457	-116.8457 (71)
Water heating gains (Table 5)	155.1941	152.3403	145.2886	127.0466	113.3124	105.2358	100.3969	105.3471	116.9874	130.1739	143.4032	153.6238 (72)
Total internal gains	777.1889	774.4004	748.1071	696.4722	644.1415	602.6067	578.4130	583.2979	614.1798	660.7592	712.5849	756.2637 (73)

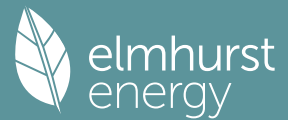
6. Solar gains

[Jan]												Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W							
															North		14.3900	14.2444	0.6800	0.7000	0.7700	67.6153	(74)						
															East		2.8800	26.6336	0.6800	0.7000	0.7700	25.3025	(76)						
															South		9.7800	59.7356	0.6800	0.7000	0.7700	192.7137	(78)						
															West		9.2600	26.6336	0.6800	0.7000	0.7700	81.3545	(80)						
															Solar gains		366.9861	551.8794	813.6666	1143.8696	1329.9770	1459.9220	1375.1378	1202.9299	979.5211	668.6075	428.5335	299.0337	(83)
															Total gains		1144.1749	1326.2798	1561.7737	1840.3418	1974.1186	2062.5287	1953.5509	1786.2277	1593.7009	1329.3667	1141.1184	1055.2974	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	8.1693	8.2518	8.2983	8.3567	8.3280	8.3843	8.3706	8.3976	8.3567	8.2983	8.2983	8.2518
alpha	1.5446	1.5501	1.5532	1.5571	1.5552	1.5590	1.5580	1.5598	1.5571	1.5532	1.5532	1.5501
util living area	0.8134	0.7767	0.7079	0.6075	0.4922	0.3636	0.2812	0.2828	0.4437	0.6291	0.7609	0.8259 (86)
Living	18.1152	18.3645	18.9262	19.5773	20.1525	20.5312	20.6820	20.6918	20.4246	19.8010	18.9078	18.0924
Non living	16.7484	17.0459	17.7112	18.4705	19.1195	19.5257	19.6694	19.6832	19.4289	18.7479	17.7073	16.7283

Full SAP Calculation Printout



24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.5518	18.3645	18.9262	19.5773	20.1525	20.5312	20.6820	20.6918	20.4246	19.8010	18.9078	18.5089 (87)
Th 2	19.9553	19.9646	19.9698	19.9763	19.9731	19.9793	19.9778	19.9807	19.9763	19.9698	19.9698	19.9646 (88)
util rest of house												
MIT 2	0.7984	0.7598	0.6861	0.5787	0.4524	0.3118	0.2168	0.2125	0.3870	0.5913	0.7388	0.8115 (89)
Living area fraction	18.6392	17.0459	17.7112	18.4705	19.1195	19.5257	19.6694	19.6832	19.4289	18.7479	17.7073	17.2980 (90)
MIT	18.8102	17.2930	17.9388	18.6779	19.3130	19.7140	19.8591	19.8722	19.6155	18.9452	17.9322	17.5249 (91)
Temperature adjustment												0.0000
adjusted MIT	18.8102	17.2930	17.9388	18.6779	19.3130	19.7140	19.8591	19.8722	19.6155	18.9452	17.9322	17.5249 (93)

8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.7796	0.7052	0.6349	0.5372	0.4244	0.2974	0.2088	0.2046	0.3650	0.5476	0.6845	0.7689 (94)
Useful gains	891.9838	935.2604	991.5281	988.5958	837.7313	613.4130	407.9974	365.4246	581.7618	727.9768	781.0612	811.4667 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	2155.1405	1854.1330	1705.5073	1458.8244	1082.5032	707.0082	442.6515	395.3426	709.5683	1091.5812	1477.8806	1891.8723 (97)
Space heating kWh	939.7886	617.4824	531.2005	338.5646	182.1103	0.0000	0.0000	0.0000	0.0000	270.5217	501.7099	803.8217 (98a)
Space heating requirement - total per year (kWh/year)												4185.1998
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	939.7886	617.4824	531.2005	338.5646	182.1103	0.0000	0.0000	0.0000	0.0000	270.5217	501.7099	803.8217 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4185.1998
Space heating per m2										(98c) / (4) =		29.4339 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP												

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												319.8367 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	939.7886	617.4824	531.2005	338.5646	182.1103	0.0000	0.0000	0.0000	0.0000	270.5217	501.7099	803.8217 (98)
Space heating efficiency (main heating system 1)	319.8367	319.8367	319.8367	319.8367	319.8367	0.0000	0.0000	0.0000	0.0000	319.8367	319.8367	319.8367 (210)
Space heating fuel (main heating system)	293.8339	193.0618	166.0849	105.8554	56.9385	0.0000	0.0000	0.0000	0.0000	84.5812	156.8644	251.3225 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	284.2807	232.8676	199.4511	131.1087	92.7398	69.8397	68.0542	89.4775	128.8966	191.8342	245.2291	287.5037 (64)
Efficiency of water heater	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177	171.0177 (216)
Fuel for water heating, kWh/month	166.2288	136.1658	116.6260	76.6638	54.2282	40.8377	39.7937	52.3206	75.3703	112.1722	143.3940	168.1135 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945 (231)
Lighting	37.3038	29.9265	26.9455	19.7414	15.2489	12.4584	13.9105	18.0814	23.4860	30.8149	34.8053	38.3406 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-50.4962	-64.9551	-97.6165	-115.2546	-121.1296	-111.2435	-108.9847	-103.2357	-91.7101	-78.1721	-54.1003	-41.5109 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1308.5426 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												171.0177
Water heating fuel used												1181.9147 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
pump for solar water heating												80.0000 (230g)
Total electricity for the above, kWh/year												80.0000 (231)
Electricity for lighting (calculated in Appendix L)												301.0634 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1038.4093 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												1833.1115 (238)

Full SAP Calculation Printout



10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1308.5426	27.6700	362.0737 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1181.9147	27.6700	327.0358 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	27.6700	22.1360 (249)
Energy for lighting	301.0634	27.6700	83.3042 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1038.4093	27.6700	-287.3278
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-287.3278 (252)
Total energy cost			507.2219 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1308.5426	0.1551	203.0041 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1181.9147	0.1468	173.5298 (264)
Space and water heating			376.5339 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	301.0634	0.1443	43.4528 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1038.4093	0.1346	-139.7939
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-139.7939 (269)
Total CO2, kg/year			291.2898 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1308.5426	1.5743	2060.0430 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1181.9147	1.5432	1823.8790 (278)
Space and water heating			3883.9220 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	301.0634	1.5338	461.7811 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1038.4093	1.4975	-1555.0631
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1555.0631 (283)
Total Primary energy kWh/year			2911.6640 (286)

Full SAP Calculation Printout



Plot Reference	P6			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	6 , Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	79 C	DER	4.67	TER	9.28
Environmental	96 A	% DER < TER			49.68
CO ₂ Emissions (t/year)	0.42	DFEE	44.96	TFEE	46.81
Compliance Check	See BREL	% DFEE < TFEE			3.96
% DPER < TPER	2.11	DPER	49.05	TPER	50.11
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6000	2.6500	258.6400
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1160 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	4.0000		(17)
Infiltration rate	0.3160		(18)
Number of sides sheltered	1		(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2923	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

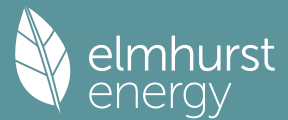
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.1002		(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2756.4300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		28.2421	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0470	0.7722
E3 Sill	15.5300	0.0350	0.5435
E4 Jamb	39.3200	0.0470	1.8480
E5 Ground floor (normal)	47.9400	0.0150	0.7191

Full SAP Calculation Printout



E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
Average = Sum(39)m / 12 =												131.1577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
HLP (average)												1.3438	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers													
Hot water usage for baths	78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805	(42a)
Hot water usage for other uses	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Average daily hot water use (litres/day)	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
												138.8731	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy content (annual)	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU loss):	35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817	(46)
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage													
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(64)
												2777.6646	(64)
12Total per year (kWh/year)												2778	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month	111.5448	98.9225	105.5854	93.7813	91.6030	83.2776	82.6225	85.4230	85.8489	94.8681	99.8557	110.4313	(65)

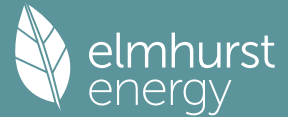
5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Water heating gains (Table 5)	149.9257	147.2061	141.9159	130.2518	123.1223	115.6634	111.0517	114.8158	119.2346	127.5109	138.6885	148.4292	(72)
Total internal gains	593.3577	606.8964	581.3671	559.8961	530.7874	510.9027	490.9115	492.0566	507.3186	525.4017	558.5586	580.7250	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	5.7200	11.2829	0.6800	0.7000	0.7700	21.2892	(75)
Southeast	7.6900	36.7938	0.6800	0.7000	0.7700	93.3344	(77)
Southwest	4.1300	36.7938	0.6800	0.7000	0.7700	50.1263	(79)
Northwest	6.8800	11.2829	0.6800	0.7000	0.7700	25.6065	(81)
Southeast	1.6200	38.2331	0.6800	0.7000	1.0000	26.5340	(82)

Full SAP Calculation Printout



Solar gains	216.8904	389.6188	584.4334	806.5249	975.9147	1000.0558	951.2294	820.5566	660.9138	444.6714	263.5130	183.1709 (83)
Total gains	810.2480	996.5152	1165.8004	1366.4210	1506.7021	1510.9585	1442.1410	1312.6132	1168.2325	970.0731	822.0716	763.8960 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8267	0.7782	0.7169	0.6244	0.5192	0.4089	0.3226	0.3574	0.5052	0.6768	0.7868	0.8375 (86)
Living	17.3212	17.7420	18.3596	19.1332	19.8096	20.3106	20.5565	20.5077	20.0943	19.1956	18.1243	17.2372
Non living	15.7504	16.2444	16.9688	17.8673	18.6311	19.1775	19.4207	19.3825	18.9673	17.9666	16.7138	15.6555
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.1648	17.7420	18.3596	19.1332	19.8096	20.3106	20.5565	20.5077	20.0943	19.1956	18.1243	17.7805 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.8128	0.7610	0.6949	0.5947	0.4790	0.3538	0.2512	0.2847	0.4502	0.6436	0.7673	0.8244 (89)
MIT 2	18.1263	16.2444	16.9688	17.8673	18.6311	19.1775	19.4207	19.3825	18.9673	17.9666	16.7138	16.3822 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	18.4608	16.7268	17.4168	18.2751	19.0108	19.5425	19.7866	19.7449	19.3304	18.3625	17.1682	16.8326 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.4608	16.7268	17.4168	18.2751	19.0108	19.5425	19.7866	19.7449	19.3304	18.3625	17.1682	16.8326 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7949	0.7054	0.6418	0.5506	0.4490	0.3400	0.2494	0.2799	0.4251	0.5951	0.7119	0.7825 (94)
Useful gains	644.0928	702.9550	748.1729	752.3661	676.5044	513.7034	359.5986	367.3648	496.5850	577.3120	585.2737	597.7490 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1878.7686	1566.3909	1443.4013	1229.6280	957.4193	642.7064	414.3782	434.3962	682.0031	1016.5807	1322.5700	1664.7378 (97)
Space heating kWh	918.5988	580.2289	517.2500	343.6286	209.0006	0.0000	0.0000	0.0000	0.0000	326.8159	530.8533	793.8396 (98a)
Space heating requirement - total per year (kWh/year)	4220.2157											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	918.5988	580.2289	517.2500	343.6286	209.0006	0.0000	0.0000	0.0000	0.0000	326.8159	530.8533	793.8396 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4220.2157											
Space heating per m2	(98c) / (4) = 43.2399 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	334.0749 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	918.5988	580.2289	517.2500	343.6286	209.0006	0.0000	0.0000	0.0000	0.0000	326.8159	530.8533	793.8396 (98)
Space heating efficiency (main heating system 1)	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)	274.9679	173.6823	154.8306	102.8597	62.5610	0.0000	0.0000	0.0000	0.0000	97.8271	158.9025	237.6233 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	1263.2544 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	173.7000											

Full SAP Calculation Printout



Water heating fuel used	1599.1161 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3102.2760 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1263.2544	0.1546	195.2964 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1599.1161	0.1411	225.6229 (264)
Space and water heating			420.9193 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	239.9055	0.1443	34.6258 (268)
Total CO2, kg/year			455.5450 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1263.2544	1.5723	1986.2023 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1599.1161	1.5217	2433.4031 (278)
Space and water heating			4419.6054 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	239.9055	1.5338	367.9751 (282)
Total Primary energy kWh/year			4787.5804 (286)
Dwelling Primary energy Rate (DPER)			49.0500 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

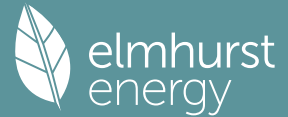
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		4 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	258.6400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1160 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3660 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3385 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4316	0.4232	0.4147	0.3724	0.3639	0.3216	0.3216	0.3132	0.3385	0.3639	0.3809	0.3978 (22b)
Effective ac	0.5932	0.5895	0.5860	0.5693	0.5662	0.5517	0.5517	0.5490	0.5573	0.5662	0.5725	0.5791 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0200	1.0000	2.0200			(26)
TER Opening Type			20.9900	1.1450	24.0344			(27)
TER Roof Window			1.3900	1.1450	2.0902			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880			(28a)
External Wall 1	127.0400	23.0100	104.0300	0.1800	18.7254			(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776			(30)
Rafter	38.6900	1.3900	37.3000	0.1100	4.1030			(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					70.9386			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

28.2421 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	16.4300	0.0500	0.8215
E2 Other lintels (including other steel lintels)	15.5300	0.0500	0.7765
E3 Sill	39.3200	0.0500	1.9660
E4 Jamb	47.9400	0.1600	7.6704
E5 Ground floor (normal)	13.2500	0.0900	1.1925
E16 Corner (normal)	1.8000	0.0800	0.1440
R1 Head of roof window	1.8000	0.0600	0.1080
R2 Sill of roof window	3.6000	0.0800	0.2880
R3 Jamb of roof window	2.6500	-0.0900	-0.2385
E17 Corner (inverted - internal area greater than external area)	25.2100	0.0600	1.5126
E10 Eaves (insulation at ceiling level)	5.1800	0.0600	0.3108
E12 Gable (insulation at ceiling level)	12.5200	0.0400	0.5008
E11 Eaves (insulation at rafter level)	6.1800	0.0800	0.4944
E13 Gable (insulation at rafter level)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5470 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 86.4856 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	50.6267	50.3179	50.0153	48.5938	48.3279	47.0898	47.0898	46.8605	47.5667	48.3279	48.8659	49.4283	(38)
Heat transfer coeff	137.1122	136.8035	136.5009	135.0794	134.8134	133.5754	133.5754	133.3461	134.0523	134.8134	135.3514	135.9139	(39)
Average = Sum(39)m / 12 =												135.0781	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4048	1.4017	1.3986	1.3840	1.3813	1.3686	1.3686	1.3663	1.3735	1.3813	1.3868	1.3926	(40)
HLP (average)												1.3840	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

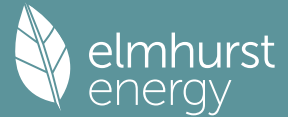
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers	69.7610	68.7126	67.1850	64.2620	62.1050	59.6994	58.3321	59.8482	61.5102	64.0930	67.0787	69.4937	(42a)
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)												130.8334	(43)
Daily hot water use	142.3301	139.2908	135.5896	129.9616	125.3913	120.4778	118.5896	122.2748	126.1613	131.3196	137.0344	141.9609	(44)
Energy conte	225.4160	198.3483	208.3962	177.9110	168.8008	148.1415	143.4238	151.4017	155.5696	178.1995	195.2306	222.2765	(45)
Energy content (annual)										Total = Sum(45)m =		2173.1155	
Distribution loss (46)m = 0.15 x (45)m	33.8124	29.7522	31.2594	26.6866	25.3201	22.2212	21.5136	22.7103	23.3354	26.7299	29.2846	33.3415	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	276.3421	244.3460	259.3223	227.1943	219.7268	197.4248	194.3499	202.3278	204.8529	229.1256	244.5139	273.2026	(62)
WWHRS	-31.8918	-28.2054	-29.5351	-24.4562	-22.7923	-19.5035	-18.2815	-19.4405	-20.1791	-23.7889	-26.9500	-31.3012	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2476.4034	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	115.6917	102.7490	110.0326	98.5820	96.8671	88.6837	88.4293	91.0819	91.1535	99.9922	104.3408	114.6478	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

Full SAP Calculation Printout



Water heating gains (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Total internal gains	155.4996	152.9003	147.8933	136.9195	130.1977	123.1718	118.8565	122.4219	126.6021	134.3981	144.9178	(72)
	601.9315	615.5906	590.3444	569.5638	540.8628	518.4111	498.7164	499.6628	514.6861	535.2890	567.7878	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W		
Northeast				4.9100	11.2829	0.6300	0.7000		0.7700		16.9307	(75)	
Southeast				6.6100	36.7938	0.6300	0.7000		0.7700		74.3273	(77)	
Southwest				3.5500	36.7938	0.6300	0.7000		0.7700		39.9186	(79)	
Northwest				5.9200	11.2829	0.6300	0.7000		0.7700		20.4134	(81)	
Southeast				1.3900	38.2331	0.6300	0.7000		1.0000		21.0928	(82)	
Solar gains	172.6829	310.2017	465.3008	642.1162	776.9758	796.1965	757.3229	653.2871	526.1894	354.0309	209.8020	145.8368	(83)
Total gains	774.6144	925.7923	1055.6452	1211.6799	1317.8386	1314.6075	1256.0393	1152.9498	1040.8755	889.3198	777.5899	735.2291	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	5.5843	5.5969	5.6093	5.6683	5.6795	5.7322	5.7322	5.7420	5.7118	5.6795	5.6569	5.6335	
alpha	1.3723	1.3731	1.3740	1.3779	1.3786	1.3821	1.3821	1.3828	1.3808	1.3786	1.3771	1.3756	
util living area	0.8381	0.7978	0.7462	0.6637	0.5651	0.4546	0.3637	0.3983	0.5455	0.7048	0.8020	0.8470	(86)
MIT	16.2120	16.7193	17.5091	18.5457	19.4928	20.2324	20.6093	20.5391	19.9375	18.7045	17.2885	16.1170	(87)
Th 2	19.7596	19.7620	19.7644	19.7756	19.7777	19.7875	19.7875	19.7893	19.7837	19.7777	19.7735	19.7690	(88)
util rest of house	0.8245	0.7813	0.7249	0.6344	0.5239	0.3956	0.2846	0.3189	0.4887	0.6721	0.7830	0.8341	(89)
MIT 2	14.5370	15.1338	16.0635	17.2731	18.3511	19.1639	19.5411	19.4846	18.8730	17.4888	15.8271	14.4287	(90)
Living area fraction	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(91)
MIT	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(92)
Temperature adjustment	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(93)
adjusted MIT	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7498	0.7055	0.6522	0.5733	0.4828	0.3806	0.2915	0.3214	0.4582	0.6080	0.7084	0.7603	(94)
Useful gains	580.8275	653.1177	688.4888	694.7088	636.2730	500.3758	366.1489	370.5291	476.9589	540.6724	550.8441	559.0186	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1477.5980	1469.8939	1368.9938	1186.4047	946.2390	655.6055	438.8226	456.6158	685.7959	981.4981	1244.9411	1464.1406	(97)
Space heating kWh	667.1973	548.8737	506.2957	354.0210	230.6147	0.0000	0.0000	0.0000	0.0000	327.9743	499.7498	673.4107	(98a)
Space heating requirement - total per year (kWh/year)												3808.1372	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	667.1973	548.8737	506.2957	354.0210	230.6147	0.0000	0.0000	0.0000	0.0000	327.9743	499.7498	673.4107	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3808.1372	
Space heating per m2										(98c) / (4) =		39.0178	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	667.1973	548.8737	506.2957	354.0210	230.6147	0.0000	0.0000	0.0000	0.0000	327.9743	499.7498	673.4107	(98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating fuel (main heating system)	722.8573	594.6627	548.5327	383.5547	249.8534	0.0000	0.0000	0.0000	0.0000	355.3351	541.4407	729.5891	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)	
Efficiency of water heater (217)m	86.1934	86.0578	85.7799	85.2970	84.4148	79.8000	79.8000	79.8000	79.8000	85.1045	85.8629	86.2298	(216)	
Fuel for water heating, kWh/month	283.6068	251.1575	267.8801	237.6849	233.2940	222.9590	220.6371	229.1820	231.4207	241.2760	253.3853	280.5310	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	26.4506	21.2197	19.1060	13.9978	10.8123	8.8338	9.8634	12.8208	16.6529	21.8496	24.6790	27.1858	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-73.3099	-95.3983	-126.6994	-131.2873	-132.8224	-120.9442	-119.3395	-116.6757	-111.1153	-103.2927	-77.6580	-64.3493	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-69.5958	-141.8717	-274.0843	-400.8308	-520.0576	-519.0514	-513.0000	-438.8421	-327.7513	-199.1381	-91.6152	-55.3942 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												4125.8258 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2953.0145 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												213.4717 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4824.1245 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2554.1874 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4125.8258	0.2100	866.4234 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2953.0145	0.2100	620.1330 (264)
Space and water heating			1486.5565 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	213.4717	0.1443	30.8106 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1272.8919	0.1363	-173.5517
PV Unit electricity exported	-3551.2326	0.1267	-449.9328
Total			-623.4845 (269)
Total CO2, kg/year			905.8118 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4125.8258	1.1300	4662.1831 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2953.0145	1.1300	3336.9064 (278)
Space and water heating			7999.0895 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	213.4717	1.5338	327.4300 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1272.8919	1.5040	-1914.4308
PV Unit electricity exported	-3551.2326	0.4651	-1651.6870
Total			-3566.1177 (283)
Total Primary energy kWh/year			4890.5026 (286)
Target Primary Energy Rate (TPER)			50.1100 (287)

Full SAP Calculation Printout



Plot Reference	P6			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	6 , Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	79 C	DER	4.67	TER	9.28
Environmental	96 A	% DER < TER			49.68
CO ₂ Emissions (t/year)	0.42	DFEE	44.96	TFEE	46.81
Compliance Check	See BREL	% DFEE < TFEE			3.96
% DPER < TPER	2.11	DPER	49.05	TPER	50.11
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6000	2.6500	258.6400
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1160 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		4.0000 (17)
Infiltration rate		0.3160 (18)
Number of sides sheltered		1 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2923 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum (A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	75.1002	(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		2756.4300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							28.2421 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				16.4300	0.0470	0.7722	
E3 Sill				15.5300	0.0350	0.5435	

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 48.6026	Feb 48.3724	Mar 48.1468	Apr 47.0872	May 46.8890	Jun 45.9661	Jul 45.9661	Aug 45.7952	Sep 46.3216	Oct 46.8890	Nov 47.2900	Dec 47.7093 (38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808 (39)
Average = Sum(39)m / 12 =												131.1577
HLP	Jan 1.3594	Feb 1.3570	Mar 1.3547	Apr 1.3438	May 1.3418	Jun 1.3324	Jul 1.3324	Aug 1.3306	Sep 1.3360	Oct 1.3418	Nov 1.3459	Dec 1.3502 (40)
HLP (average)												1.3438
Days in mont.	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42)
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209 (42b)
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463 (42c)
Average daily hot water use (litres/day)												66.5161 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	72.5690	70.5782	68.4047	65.6996	63.2863	60.7784	60.2574	62.4265	64.6512	67.2267	69.9557	72.4672 (44)
Energy content (annual)	114.9316	100.5024	105.1355	89.9395	85.1956	74.7341	72.8762	77.2971	79.7213	91.2259	99.6646	113.4661 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1104.6899
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =										938.9864	939 (64)
Electric shower(s)	55.8669	49.7779	54.3556	51.8709	52.8442	50.4082	52.0885	52.8442	51.8709	54.3556	53.3335	55.8669 (64a)
	Total Energy used by instantaneous electric shower(s) = Sum(64a)m =										635.4833	635.4833 (64a)
Heat gains from water heating, kWh/month	38.3897	33.8012	35.9302	32.0799	31.3151	28.4831	28.5083	29.6367	29.9085	32.9744	34.5121	38.0783 (65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Water heating gains (Table 5)	51.5991	50.2995	48.2932	44.5554	42.0902	39.5598	38.3176	39.8342	41.5396	44.3204	47.9335	51.1805	(72)
Total internal gains	495.0310	509.9898	487.7444	474.1997	449.7553	434.7991	418.1775	417.0751	429.6236	442.2113	467.8035	483.4764	(73)

6. Solar gains													
[Jan]		Area		Solar flux		g		FF		Access		Gains	
		m2		Table 6a		Specific data		Specific data		factor		W	
				W/m2		or Table 6b		or Table 6c		Table 6d			
Northeast		5.7200		11.2829		0.6800		0.7000		0.7700		21.2892 (75)	
Southeast		7.6900		36.7938		0.6800		0.7000		0.7700		93.3344 (77)	
Southwest		4.1300		36.7938		0.6800		0.7000		0.7700		50.1263 (79)	
Northwest		6.8800		11.2829		0.6800		0.7000		0.7700		25.6065 (81)	
Southeast		1.6200		38.2331		0.6800		0.7000		1.0000		26.5340 (82)	
Solar gains	216.8904	389.6188	584.4334	806.5249	975.9147	1000.0558	951.2294	820.5566	660.9138	444.6714	263.5130	183.1709	(83)

Full SAP Calculation Printout



Total gains 711.9214 899.6086 1072.1778 1280.7245 1425.6700 1434.8549 1369.4069 1237.6316 1090.5374 886.8826 731.3166 666.6473 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8490	0.7995	0.7374	0.6426	0.5354	0.4234	0.3355	0.3730	0.5254	0.7003	0.8104	0.8598 (86)
MIT	16.1640	16.7524	17.6089	18.6843	19.6204	20.3138	20.6557	20.5850	20.0049	18.7516	17.2671	16.0471 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.8364	0.7835	0.7162	0.6133	0.4951	0.3673	0.2622	0.2983	0.4701	0.6682	0.7924	0.8480 (89)
MIT 2	15.4117	15.9845	16.8171	17.8517	18.7279	19.3542	19.6350	19.5889	19.1053	17.9470	16.5074	15.3018 (90)
Living area fraction	fLA = Living area / (4) =											0.3221 (91)
MIT	15.6540	16.2319	17.0722	18.1199	19.0154	19.6633	19.9638	19.9098	19.3951	18.2062	16.7521	15.5419 (92)
Temperature adjustment	0.0000											
adjusted MIT	15.6540	16.2319	17.0722	18.1199	19.0154	19.6633	19.9638	19.9098	19.3951	18.2062	16.7521	15.5419 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7756	0.7204	0.6560	0.5647	0.4651	0.3595	0.2720	0.3046	0.4482	0.6150	0.7305	0.7885	(94)
Useful gains	552.1876	648.0728	703.3674	723.2288	663.1103	515.8961	372.4295	376.9740	488.7401	545.4460	534.2198	525.6472	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
Space heating kWh	1506.3815	1500.8409	1397.8353	1209.2764	958.0292	658.4200	437.4226	455.8037	690.4442	996.1074	1267.9193	1494.6408	(97)
Space heating requirement - total per year (kWh/year)	709.9203	573.0602	516.6841	349.9542	219.4197	0.0000	0.0000	0.0000	0.0000	335.2921	528.2637	720.9313	(98a)
Solar heating kWh													
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating kWh													
Space heating requirement after solar contribution - total per year (kWh/year)	709.9203	573.0602	516.6841	349.9542	219.4197	0.0000	0.0000	0.0000	0.0000	335.2921	528.2637	720.9313	(98c)
Space heating per m2													
											(98c) / (4) =	40.5074	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan 4.3000	Feb 4.9000	Mar 6.5000	Apr 8.9000	May 11.7000	Jun 14.6000	Jul 16.6000	Aug 16.4000	Sep 14.1000	Oct 10.6000	Nov 7.1000	Dec 4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	1222.3528	962.2778	986.9864	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6590	0.7099	0.6767	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	805.5176	683.0926	667.9012	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1603.6393	1530.6460	1381.9597	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	574.6476	630.5798	531.2595	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	143.6619	157.6449	132.8149	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												434.1217 (107)
Energy for space heating												40.5074 (99)
Energy for space cooling												4.4480 (108)
Total												44.9554 (109)
Fabric Energy Efficiency (DFEE)												45.0 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

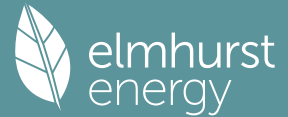
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 258.6400 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)

Full SAP Calculation Printout



Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
30.0000 / (5) = 0.1160 (8)
Yes
Blower Door
5.0000 (17)
0.3660 (18)
1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3385 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infiltr rate	0.4316	0.4232	0.4147	0.3724	0.3639	0.3216	0.3216	0.3132	0.3385	0.3639	0.3809	0.3978	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5932	0.5895	0.5860	0.5693	0.5662	0.5517	0.5517	0.5490	0.5573	0.5662	0.5725	0.5791	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0200	1.0000	2.0200			(26)
TER Opening Type			20.9900	1.1450	24.0344			(27)
TER Roof Window			1.3900	1.1450	2.0902			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880			(28a)
External Wall 1	127.0400	23.0100	104.0300	0.1800	18.7254			(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776			(30)
Rafter	38.6900	1.3900	37.3000	0.1100	4.1030			(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	70.9386		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							28.2421	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0500	0.8215
E3 Sill	15.5300	0.0500	0.7765
E4 Jamb	39.3200	0.0500	1.9660
E5 Ground floor (normal)	47.9400	0.1600	7.6704
E16 Corner (normal)	13.2500	0.0900	1.1925
R1 Head of roof window	1.8000	0.0800	0.1440
R2 Sill of roof window	1.8000	0.0600	0.1080
R3 Jamb of roof window	3.6000	0.0800	0.2880
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0900	-0.2385
E10 Eaves (insulation at ceiling level)	25.2100	0.0600	1.5126
E12 Gable (insulation at ceiling level)	5.1800	0.0600	0.3108
E11 Eaves (insulation at rafter level)	12.5200	0.0400	0.5008
E13 Gable (insulation at rafter level)	6.1800	0.0800	0.4944

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 86.4856 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	50.6267	50.3179	50.0153	48.5938	48.3279	47.0898	47.0898	46.8605	47.5667	48.3279	48.8659	49.4283	(39)
Average = Sum(39)m / 12 =	137.1122	136.8035	136.5009	135.0794	134.8134	133.5754	133.5754	133.3461	134.0523	134.8134	135.3514	135.9139	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.4048	1.4017	1.3986	1.3840	1.3813	1.3686	1.3686	1.3663	1.3735	1.3813	1.3868	1.3926	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7162	(42)	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)	
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)	
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)	
Average daily hot water use (litres/day)												66.5161	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	72.5690	70.5782	68.4047	65.6996	63.2863	60.7784	60.2574	62.4265	64.6512	67.2267	69.9557	72.4672	(44)	
Energy content (annual)	114.9316	100.5024	105.1355	89.9395	85.1956	74.7341	72.8762	77.2971	79.7213	91.2259	99.6646	113.4661	(45)	
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m =	1104.6899	
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)	
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462	(64)	
												Total per year (kWh/year) = Sum(64)m =	938.9864	(64)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Water heating gains (Table 5)	51.5991	50.2995	48.2932	44.5554	42.0902	39.5598	38.3176	39.8342	41.5396	44.3204	47.9335	51.1805	(72)
Total internal gains	495.0310	509.9898	487.7444	474.1997	449.7553	434.7991	418.1775	417.0751	429.6236	442.2113	467.8035	483.4764	(73)

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
Northeast						4.9100	11.2829	0.6300	0.7000			0.7700			16.9307 (75)
Southeast						6.6100	36.7938	0.6300	0.7000			0.7700			74.3273 (77)
Southwest						3.5500	36.7938	0.6300	0.7000			0.7700			39.9186 (79)
Northwest						5.9200	11.2829	0.6300	0.7000			0.7700			20.4134 (81)
Southeast						1.3900	38.2331	0.6300	0.7000			1.0000			21.0928 (82)
Solar gains	172.6829	310.2017	465.3008	642.1162	776.9758	796.1965	757.3229	653.2871	526.1894	354.0309	209.8020	145.8368			(83)
Total gains	667.7139	820.1914	953.0452	1116.3158	1226.7311	1230.9955	1175.5004	1070.3622	955.8129	796.2421	677.6056	629.3131			(84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.5843	5.5969	5.6093	5.6683	5.6795	5.7322	5.7322	5.7420	5.7118	5.6795	5.6569	5.6335
alpha	1.3723	1.3731	1.3740	1.3779	1.3786	1.3821	1.3821	1.3828	1.3808	1.3786	1.3771	1.3756
util living area	0.8620	0.8212	0.7694	0.6855	0.5859	0.4736	0.3813	0.4188	0.5704	0.7322	0.8280	0.8709 (86)
MIT	15.9971	16.5290	17.3495	18.4307	19.4158	20.1887	20.5837	20.5067	19.8702	18.5749	17.1039	15.8975 (87)
Th 2	19.7596	19.7620	19.7644	19.7756	19.7777	19.7875	19.7875	19.7893	19.7837	19.7777	19.7735	19.7690 (88)
util rest of house	0.8500	0.8060	0.7492	0.6570	0.5449	0.4138	0.2999	0.3373	0.5137	0.7011	0.8108	0.8596 (89)
MIT 2	15.2296	15.7498	16.5519	17.6010	18.5324	19.2397	19.5689	19.5176	18.9776	17.7672	16.3329	15.1376 (90)
Living area fraction									fLA = Living area / (4) =			0.3221 (91)
MIT	15.4768	16.0008	16.8088	17.8683	18.8170	19.5454	19.8958	19.8362	19.2651	18.0274	16.5813	15.3824 (92)
Temperature adjustment												0.0000
adjusted MIT	15.4768	16.0008	16.8088	17.8683	18.8170	19.5454	19.8958	19.8362	19.2651	18.0274	16.5813	15.3824 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7903	0.7431	0.6869	0.6030	0.5078	0.4005	0.3078	0.3408	0.4857	0.6446	0.7492	0.8013 (94)
Useful gains	527.7118	609.4485	654.6777	673.1482	622.9041	493.0682	361.8273	364.7569	464.2388	513.2974	507.6354	504.2793 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1532.4803	1518.6250	1407.1640	1211.4275	959.4671	660.5808	440.2399	458.2044	692.3992	1001.3077	1283.3062	1519.8371 (97)
Space heating kWh	747.5478	610.9666	559.8498	387.5611	250.4029	0.0000	0.0000	0.0000	0.0000	363.0796	558.4830	755.5750 (98a)
Space heating requirement - total per year (kWh/year)												4233.4657
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	747.5478	610.9666	559.8498	387.5611	250.4029	0.0000	0.0000	0.0000	0.0000	363.0796	558.4830	755.5750 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4233.4657
Space heating per m2										(98c) / (4) =		43.3757 (99)

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	1255.6085	988.4578	1013.4304	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6053	0.6594	0.6264	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	760.0786	651.7957	634.8035	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1370.0229	1308.4490	1190.3161	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	439.1599	488.5500	413.3014	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												
Intermittency factor (Table 10b)									fc = cooled area / (4) =			1.0000 (105)

Full SAP Calculation Printout



Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	109.7900	122.1375	103.3254	0.0000	0.0000	0.0000	0.0000	(107)
Energy for space heating													335.2528 (107)
Energy for space cooling													43.3757 (99)
Total													3.4350 (108)
Fabric Energy Efficiency (TFEE)													46.8106 (109)
													46.8 (109)

Full SAP Calculation Printout



Plot Reference	P6			Issued on Date	09/07/2026	
Assessment Reference	Design Stage- Triple Glazed		Plot Type Ref	Design Stage		
Plot Address	6 , Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2	
SAP Rating	79 C	DER	4.67	TER	9.28	
Environmental	96 A	% DER < TER			49.68	
CO ₂ Emissions (t/year)	0.42	DFEE	44.96	TFEE	46.81	
Compliance Check	See BREL	% DFEE < TFEE			3.96	
% DPER < TPER	2.11	DPER	49.05	TPER	50.11	
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6000	2.6500	258.6400
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1160 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	4.0000		(17)
Infiltration rate	0.3160		(18)
Number of sides sheltered	1		(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2923	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

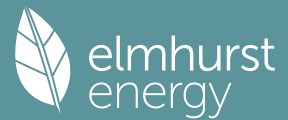
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.1002		(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2756.4300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		28.2421	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0470	0.7722
E3 Sill	15.5300	0.0350	0.5435
E4 Jamb	39.3200	0.0470	1.8480
E5 Ground floor (normal)	47.9400	0.0150	0.7191

Full SAP Calculation Printout



E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
Average = Sum(39)m / 12 =												131.1577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
HLP (average)												1.3438	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													138.8731 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy conte	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Energy content (annual)										Total = Sum(45)m =			2306.6686
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5400 (55)
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS													
PV diverter													
Solar input													
FGHRS													
Output from w/h													
12Total per year (kWh/year)													
Electric shower(s)													
Heat gains from water heating, kWh/month													

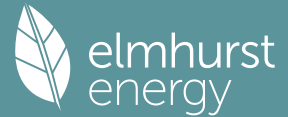
5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
Pumps, fans													
Losses e.g. evaporation (negative values) (Table 5)													
Water heating gains (Table 5)													
Total internal gains													

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	5.7200	11.2829	0.6800	0.7000	0.7700	21.2892 (75)
Southeast		7.6900	0.6800	0.7000	0.7700	93.3344 (77)
Southwest	4.1300	36.7938	0.6800	0.7000	0.7700	50.1263 (79)
Northwest	6.8800	11.2829	0.6800	0.7000	0.7700	25.6065 (81)
Southeast	1.6200	38.2331	0.6800	0.7000	1.0000	26.5340 (82)

Full SAP Calculation Printout



Solar gains	216.8904	389.6188	584.4334	806.5249	975.9147	1000.0558	951.2294	820.5566	660.9138	444.6714	263.5130	183.1709 (83)
Total gains	810.2480	996.5152	1165.8004	1366.4210	1506.7021	1510.9585	1442.1410	1312.6132	1168.2325	970.0731	822.0716	763.8960 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8267	0.7782	0.7169	0.6244	0.5192	0.4089	0.3226	0.3574	0.5052	0.6768	0.7868	0.8375 (86)
Living	17.3212	17.7420	18.3596	19.1332	19.8096	20.3106	20.5565	20.5077	20.0943	19.1956	18.1243	17.2372
Non living	15.7504	16.2444	16.9688	17.8673	18.6311	19.1775	19.4207	19.3825	18.9673	17.9666	16.7138	15.6555
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.1648	17.7420	18.3596	19.1332	19.8096	20.3106	20.5565	20.5077	20.0943	19.1956	18.1243	17.7805 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.8128	0.7610	0.6949	0.5947	0.4790	0.3538	0.2512	0.2847	0.4502	0.6436	0.7673	0.8244 (89)
MIT 2	18.1263	16.2444	16.9688	17.8673	18.6311	19.1775	19.4207	19.3825	18.9673	17.9666	16.7138	16.3822 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	18.4608	16.7268	17.4168	18.2751	19.0108	19.5425	19.7866	19.7449	19.3304	18.3625	17.1682	16.8326 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.4608	16.7268	17.4168	18.2751	19.0108	19.5425	19.7866	19.7449	19.3304	18.3625	17.1682	16.8326 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7949	0.7054	0.6418	0.5506	0.4490	0.3400	0.2494	0.2799	0.4251	0.5951	0.7119	0.7825 (94)
Useful gains	644.0928	702.9550	748.1729	752.3661	676.5044	513.7034	359.5986	367.3648	496.5850	577.3120	585.2737	597.7490 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1878.7686	1566.3909	1443.4013	1229.6280	957.4193	642.7064	414.3782	434.3962	682.0031	1016.5807	1322.5700	1664.7378 (97)
Space heating kWh	918.5988	580.2289	517.2500	343.6286	209.0006	0.0000	0.0000	0.0000	0.0000	326.8159	530.8533	793.8396 (98a)
Space heating requirement - total per year (kWh/year)	4220.2157											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	918.5988	580.2289	517.2500	343.6286	209.0006	0.0000	0.0000	0.0000	0.0000	326.8159	530.8533	793.8396 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4220.2157											
Space heating per m2	(98c) / (4) = 43.2399 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	334.0749 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	918.5988	580.2289	517.2500	343.6286	209.0006	0.0000	0.0000	0.0000	0.0000	326.8159	530.8533	793.8396 (98)
Space heating efficiency (main heating system 1)	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)	274.9679	173.6823	154.8306	102.8597	62.5610	0.0000	0.0000	0.0000	0.0000	97.8271	158.9025	237.6233 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	1263.2544 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	173.7000											

Full SAP Calculation Printout



Water heating fuel used	1599.1161 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3102.2760 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1263.2544	0.1546	195.2964 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1599.1161	0.1411	225.6229 (264)
Space and water heating			420.9193 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	239.9055	0.1443	34.6258 (268)
Total CO2, kg/year			455.5450 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1263.2544	1.5723	1986.2023 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1599.1161	1.5217	2433.4031 (278)
Space and water heating			4419.6054 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	239.9055	1.5338	367.9751 (282)
Total Primary energy kWh/year			4787.5804 (286)
Dwelling Primary energy Rate (DPER)			49.0500 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

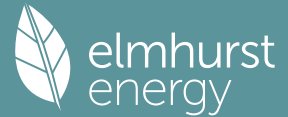
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		4 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 258.6400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1160 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3660 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3385 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4316	0.4232	0.4147	0.3724	0.3639	0.3216	0.3216	0.3132	0.3385	0.3639	0.3809	0.3978 (22b)
Effective ac	0.5932	0.5895	0.5860	0.5693	0.5662	0.5517	0.5517	0.5490	0.5573	0.5662	0.5725	0.5791 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0200	1.0000	2.0200			(26)
TER Opening Type			20.9900	1.1450	24.0344			(27)
TER Roof Window			1.3900	1.1450	2.0902			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880			(28a)
External Wall 1	127.0400	23.0100	104.0300	0.1800	18.7254			(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776			(30)
Rafter	38.6900	1.3900	37.3000	0.1100	4.1030			(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					70.9386			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

28.2421 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	16.4300	0.0500	0.8215
E2 Other lintels (including other steel lintels)	15.5300	0.0500	0.7765
E3 Sill	39.3200	0.0500	1.9660
E4 Jamb	47.9400	0.1600	7.6704
E5 Ground floor (normal)	13.2500	0.0900	1.1925
E16 Corner (normal)	1.8000	0.0800	0.1440
R1 Head of roof window	1.8000	0.0600	0.1080
R2 Sill of roof window	3.6000	0.0800	0.2880
R3 Jamb of roof window	2.6500	-0.0900	-0.2385
E17 Corner (inverted - internal area greater than external area)	25.2100	0.0600	1.5126
E10 Eaves (insulation at ceiling level)	5.1800	0.0600	0.3108
E12 Gable (insulation at ceiling level)	12.5200	0.0400	0.5008
E11 Eaves (insulation at rafter level)	6.1800	0.0800	0.4944
E13 Gable (insulation at rafter level)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5470 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 86.4856 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	50.6267	50.3179	50.0153	48.5938	48.3279	47.0898	47.0898	46.8605	47.5667	48.3279	48.8659	49.4283	(38)
Heat transfer coeff	137.1122	136.8035	136.5009	135.0794	134.8134	133.5754	133.5754	133.3461	134.0523	134.8134	135.3514	135.9139	(39)
Average = Sum(39)m / 12 =												135.0781	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4048	1.4017	1.3986	1.3840	1.3813	1.3686	1.3686	1.3663	1.3735	1.3813	1.3868	1.3926	(40)
HLP (average)												1.3840	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

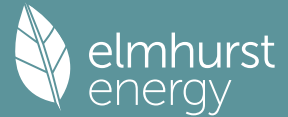
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers	69.7610	68.7126	67.1850	64.2620	62.1050	59.6994	58.3321	59.8482	61.5102	64.0930	67.0787	69.4937	(42a)
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)												130.8334	(43)
Daily hot water use	142.3301	139.2908	135.5896	129.9616	125.3913	120.4778	118.5896	122.2748	126.1613	131.3196	137.0344	141.9609	(44)
Energy conte	225.4160	198.3483	208.3962	177.9110	168.8008	148.1415	143.4238	151.4017	155.5696	178.1995	195.2306	222.2765	(45)
Energy content (annual)										Total = Sum(45)m =		2173.1155	
Distribution loss (46)m = 0.15 x (45)m	33.8124	29.7522	31.2594	26.6866	25.3201	22.2212	21.5136	22.7103	23.3354	26.7299	29.2846	33.3415	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	276.3421	244.3460	259.3223	227.1943	219.7268	197.4248	194.3499	202.3278	204.8529	229.1256	244.5139	273.2026	(62)
WWHRS	-31.8918	-28.2054	-29.5351	-24.4562	-22.7923	-19.5035	-18.2815	-19.4405	-20.1791	-23.7889	-26.9500	-31.3012	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2476.4034	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	115.6917	102.7490	110.0326	98.5820	96.8671	88.6837	88.4293	91.0819	91.1535	99.9922	104.3408	114.6478	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

Full SAP Calculation Printout



Water heating gains (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Total internal gains	155.4996	152.9003	147.8933	136.9195	130.1977	123.1718	118.8565	122.4219	126.6021	134.3981	144.9178	(72)
	601.9315	615.5906	590.3444	569.5638	540.8628	518.4111	498.7164	499.6628	514.6861	535.2890	567.7878	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W		
Northeast				4.9100	11.2829	0.6300	0.7000		0.7700		16.9307	(75)	
Southeast				6.6100	36.7938	0.6300	0.7000		0.7700		74.3273	(77)	
Southwest				3.5500	36.7938	0.6300	0.7000		0.7700		39.9186	(79)	
Northwest				5.9200	11.2829	0.6300	0.7000		0.7700		20.4134	(81)	
Southeast				1.3900	38.2331	0.6300	0.7000		1.0000		21.0928	(82)	
Solar gains	172.6829	310.2017	465.3008	642.1162	776.9758	796.1965	757.3229	653.2871	526.1894	354.0309	209.8020	145.8368	(83)
Total gains	774.6144	925.7923	1055.6452	1211.6799	1317.8386	1314.6075	1256.0393	1152.9498	1040.8755	889.3198	777.5899	735.2291	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	5.5843	5.5969	5.6093	5.6683	5.6795	5.7322	5.7322	5.7420	5.7118	5.6795	5.6569	5.6335		
alpha	1.3723	1.3731	1.3740	1.3779	1.3786	1.3821	1.3821	1.3828	1.3808	1.3786	1.3771	1.3756		
util living area	0.8381	0.7978	0.7462	0.6637	0.5651	0.4546	0.3637	0.3983	0.5455	0.7048	0.8020	0.8470	(86)	
MIT	16.2120	16.7193	17.5091	18.5457	19.4928	20.2324	20.6093	20.5391	19.9375	18.7045	17.2885	16.1170	(87)	
Th 2	19.7596	19.7620	19.7644	19.7756	19.7777	19.7875	19.7875	19.7893	19.7837	19.7777	19.7735	19.7690	(88)	
util rest of house	0.8245	0.7813	0.7249	0.6344	0.5239	0.3956	0.2846	0.3189	0.4887	0.6721	0.7830	0.8341	(89)	
MIT 2	14.5370	15.1338	16.0635	17.2731	18.3511	19.1639	19.5411	19.4846	18.8730	17.4888	15.8271	14.4287	(90)	
Living area fraction	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(91)	
MIT	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(92)	
Temperature adjustment	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(93)	
adjusted MIT	15.0766	15.6446	16.5292	17.6830	18.7189	19.5081	19.8852	19.8243	19.2159	17.8804	16.2978	14.9726	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	580.8275	653.1177	688.4888	694.7088	636.2730	500.3758	366.1489	370.5291	476.9589	540.6724	550.8441	559.0186	(94)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Heat loss rate W	1477.5980	1469.8939	1368.9938	1186.4047	946.2390	655.6055	438.8226	456.6158	685.7959	981.4981	1244.9411	1464.1406	(97)	
Space heating kWh	667.1973	548.8737	506.2957	354.0210	230.6147	0.0000	0.0000	0.0000	0.0000	327.9743	499.7498	673.4107	(98a)	
Space heating requirement - total per year (kWh/year)												3808.1372		
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)												0.0000		
Space heating kWh	667.1973	548.8737	506.2957	354.0210	230.6147	0.0000	0.0000	0.0000	0.0000	327.9743	499.7498	673.4107	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												3808.1372		
Space heating per m2										(98c) / (4) =		39.0178	(99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
667.1973	548.8737	506.2957	354.0210	230.6147	0.0000	0.0000	0.0000	0.0000	0.0000	327.9743	499.7498	673.4107	(98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating fuel (main heating system)	722.8573	594.6627	548.5327	383.5547	249.8534	0.0000	0.0000	0.0000	0.0000	355.3351	541.4407	729.5891	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)	
Efficiency of water heater (217)m	86.1934	86.0578	85.7799	85.2970	84.4148	79.8000	79.8000	79.8000	79.8000	85.1045	85.8629	86.2298	(216)	
Fuel for water heating, kWh/month	283.6068	251.1575	267.8801	237.6849	233.2940	222.9590	220.6371	229.1820	231.4207	241.2760	253.3853	280.5310	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	26.4506	21.2197	19.1060	13.9978	10.8123	8.8338	9.8634	12.8208	16.6529	21.8496	24.6790	27.1858	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-73.3099	-95.3983	-126.6994	-131.2873	-132.8224	-120.9442	-119.3395	-116.6757	-111.1153	-103.2927	-77.6580	-64.3493	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-69.5958	-141.8717	-274.0843	-400.8308	-520.0576	-519.0514	-513.0000	-438.8421	-327.7513	-199.1381	-91.6152	-55.3942 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												4125.8258 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2953.0145 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												213.4717 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4824.1245 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2554.1874 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4125.8258	0.2100	866.4234 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2953.0145	0.2100	620.1330 (264)
Space and water heating			1486.5565 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	213.4717	0.1443	30.8106 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1272.8919	0.1363	-173.5517
PV Unit electricity exported	-3551.2326	0.1267	-449.9328
Total			-623.4845 (269)
Total CO2, kg/year			905.8118 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4125.8258	1.1300	4662.1831 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2953.0145	1.1300	3336.9064 (278)
Space and water heating			7999.0895 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	213.4717	1.5338	327.4300 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1272.8919	1.5040	-1914.4308
PV Unit electricity exported	-3551.2326	0.4651	-1651.6870
Total			-3566.1177 (283)
Total Primary energy kWh/year			4890.5026 (286)
Target Primary Energy Rate (TPER)			50.1100 (287)

Full SAP Calculation Printout



Plot Reference	P6			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	6 , Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	79 C	DER	4.67	TER	9.28
Environmental	96 A	% DER < TER			49.68
CO ₂ Emissions (t/year)	0.42	DFEE	44.96	TFEE	46.81
Compliance Check	See BREL	% DFEE < TFEE			3.96
% DPER < TPER	2.11	DPER	49.05	TPER	50.11
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6000	2.6500	258.6400
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1160 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	4.0000		(17)
Infiltration rate	0.3160		(18)
Number of sides sheltered	1		(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2923	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.1002		(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2756.4300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		28.2421	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0470	0.7722
E3 Sill	15.5300	0.0350	0.5435
E4 Jamb	39.3200	0.0470	1.8480
E5 Ground floor (normal)	47.9400	0.0150	0.7191

Full SAP Calculation Printout



E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
Average = Sum(39)m / 12 =												131.1577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
HLP (average)												1.3438	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers	78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805	(42a)
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)												138.8731	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy conte	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Energy content (annual)										Total = Sum(45)m =		2306.6686	
Distribution loss (46)m = 0.15 x (45)m	35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.5400	(55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	111.5448	98.9225	105.5854	93.7813	91.6030	83.2776	82.6225	85.4230	85.8489	94.8681	99.8557	110.4313	(65)

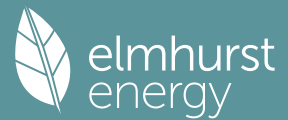
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Water heating gains (Table 5)	149.9257	147.2061	141.9159	130.2518	123.1223	115.6634	111.0517	114.8158	119.2346	127.5109	138.6885	148.4292	(72)
Total internal gains	668.9226	666.3147	645.5411	606.9471	568.6571	534.1565	513.8677	517.5200	537.4223	572.6284	614.9666	651.7489	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	5.7200	11.2829	0.6800	0.7000	0.7700	21.2892 (75)
Southeast	7.6900	36.7938	0.6800	0.7000	0.7700	93.3344 (77)
Southwest	4.1300	36.7938	0.6800	0.7000	0.7700	50.1263 (79)
Northwest	6.8800	11.2829	0.6800	0.7000	0.7700	25.6065 (81)
Southeast	1.6200	38.2331	0.6800	0.7000	1.0000	26.5340 (82)

Full SAP Calculation Printout



Solar gains	216.8904	389.6188	584.4334	806.5249	975.9147	1000.0558	951.2294	820.5566	660.9138	444.6714	263.5130	183.1709 (83)
Total gains	885.8129	1055.9335	1229.9745	1413.4720	1544.5718	1534.2123	1465.0971	1338.0766	1198.3361	1017.2998	878.4796	834.9198 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8100	0.7655	0.7034	0.6148	0.5119	0.4047	0.3187	0.3524	0.4977	0.6640	0.7725	0.8216 (86)
Living	17.4285	17.8160	18.4259	19.1691	19.8286	20.3175	20.5605	20.5132	20.1086	19.2387	18.1966	17.3418
Non living	15.8750	16.3293	17.0433	17.9062	18.6504	19.1834	19.4234	19.3865	18.9806	18.0130	16.7963	15.7773
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.2183	17.8160	18.4259	19.1691	19.8286	20.3175	20.5605	20.5132	20.1086	19.2387	18.1966	17.8700 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.7951	0.7477	0.6808	0.5849	0.4717	0.3498	0.2480	0.2803	0.4429	0.6303	0.7522	0.8075 (89)
MIT 2	18.1777	16.3293	17.0433	17.9062	18.6504	19.1834	19.4234	19.3865	18.9806	18.0130	16.7963	16.4826 (90)
Living area fraction	18.5129	16.8082	17.4887	18.3130	19.0299	19.5487	19.7897	19.7494	19.3440	18.4079	17.2474	16.9295 (92)
MIT	18.5129	16.8082	17.4887	18.3130	19.0299	19.5487	19.7897	19.7494	19.3440	18.4079	17.2474	16.9295 (93)
Temperature adjustment												0.0000
adjusted MIT	18.5129	16.8082	17.4887	18.3130	19.0299	19.5487	19.7897	19.7494	19.3440	18.4079	17.2474	16.9295 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7769	0.6922	0.6286	0.5419	0.4426	0.3364	0.2463	0.2759	0.4186	0.5830	0.6970	0.7647 (94)
Useful gains	688.2228	730.9699	773.1742	765.8903	683.6857	516.1700	360.8507	369.1445	501.6809	593.1250	612.2849	638.4888 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1885.6785	1577.1708	1452.9038	1234.5984	959.9304	643.5230	414.7824	434.9784	683.7789	1022.5213	1332.9728	1677.5071 (97)
Space heating kWh	890.9070	568.6471	505.7188	337.4698	205.5260	0.0000	0.0000	0.0000	0.0000	319.4708	518.8953	773.0296 (98a)
Space heating requirement - total per year (kWh/year)												4119.6645
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	890.9070	568.6471	505.7188	337.4698	205.5260	0.0000	0.0000	0.0000	0.0000	319.4708	518.8953	773.0296 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4119.6645
Space heating per m2										(98c) / (4) =		42.2097 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												334.0749 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	890.9070	568.6471	505.7188	337.4698	205.5260	0.0000	0.0000	0.0000	0.0000	319.4708	518.8953	773.0296 (98)
Space heating efficiency (main heating system 1)	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)	266.6788	170.2155	151.3789	101.0162	61.5210	0.0000	0.0000	0.0000	0.0000	95.6285	155.3231	231.3941 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1233.1560 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.7000
Water heating fuel used												1599.1161 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	239.9055	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3072.1776	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1233.1560	16.4900	203.3474	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1599.1161	16.4900	263.6942	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	239.9055	16.4900	39.5604	(250)
Additional standing charges			0.0000	(251)
Total energy cost			506.6021	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2789	(257)
SAP value		79.2684	
SAP rating (Section 12)		79	(258)
SAP band		C	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1233.1560	0.1546	190.6067	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1599.1161	0.1411	225.6229	(264)
Space and water heating			416.2296	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	239.9055	0.1443	34.6258	(268)
Total CO2, kg/year			450.8553	(272)
CO2 emissions per m2			4.6200	(273)
EI value			95.7634	
EI rating			96	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

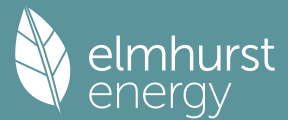
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	97.6000	2.6500	258.6400	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000			(5)
Dwelling volume				

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	$= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =$	
Pressure test	30.0000 / (5) =	0.1160 (8)
Pressure Test Method		Yes
Measured/design AP50		Blower Door
Infiltration rate		4.0000 (17)
Number of sides sheltered		0.3160 (18)
		1 (19)

Full SAP Calculation Printout



Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.9250 \quad (20)$$
$$(21) = (18) \times (20) = 0.2923 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000	(22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750	(22a)
Adj infilt rate													
Effective ac	0.4092	0.3727	0.3508	0.3215	0.3361	0.3069	0.3142	0.2996	0.3215	0.3508	0.3508	0.3727	(22b)
	0.5837	0.5694	0.5615	0.5517	0.5565	0.5471	0.5494	0.5449	0.5517	0.5615	0.5615	0.5694	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Solid Door			2.0200	1.0000	2.0200			(26)
Windows			24.4200	1.1450	27.9618			(27)
Velux			1.6200	1.1450	1.8550			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000	(28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000	(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400	(30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300	(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	75.1002		(33)
Main dwelling								
Internal Wall 1			203.0400			9.0000	1827.3600	(32c)

Heat capacity Cm = Sum(A x k)

$$(28)...(30) + (32) + (32a)...(32e) = 2756.4300 \quad (34)$$

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

$$28.2421 \quad (35)$$

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0470	0.7722
E3 Sill	15.5300	0.0350	0.5435
E4 Jamb	39.3200	0.0470	1.8480
E5 Ground floor (normal)	47.9400	0.0150	0.7191
E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

$$8.9712 \quad (36)$$

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	49.8217	48.6026	47.9258	47.0872	47.4974	46.6953	46.8890	46.5062	47.0872	47.9258	47.9258	48.6026	(38)
Heat transfer coeff	133.8932	132.6740	131.9972	131.1587	131.5688	130.7667	130.9604	130.5776	131.1587	131.9972	131.9972	132.6740	(39)
Average = Sum(39)m / 12 =												131.7853	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3719	1.3594	1.3524	1.3438	1.3480	1.3398	1.3418	1.3379	1.3438	1.3524	1.3524	1.3594	(40)
HLP (average)												1.3503	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162	(42)
Hot water usage for mixer showers														
78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805		(42a)	
Hot water usage for baths														
30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209		(42b)	
Hot water usage for other uses														
42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463		(42c)	
Average daily hot water use (litres/day)													138.8731	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477		(44)
Energy conte	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817		(46)

Water storage loss (or HIU loss):

Store volume

$$200.0000 \quad (47)$$

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b

$$1.0000 \quad (48)$$

Enter (49) or (54) in (55)

$$0.5400 \quad (49)$$

Total storage loss

$$0.5400 \quad (55)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400		(56)
If cylinder contains dedicated solar storage													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400		(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month													
279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h													
279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802		(64)
Total per year (kWh/year) = Sum(64)m =												2777.6646	(64)

Electric shower(s)

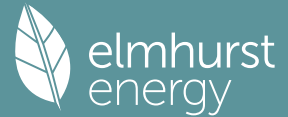
$$0.0000 \quad (64a)$$

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =

$$0.0000 \quad (64a)$$

Heat gains from water heating, kWh/month													
111.5448	98.9225	105.5854	93.7813	91.6030	83.2776	82.6225	85.4230	85.8489	94.8681	99.8557	110.4313		(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)	149.9257	147.2061	141.9159	130.2518	123.1223	115.6634	111.0517	114.8158	119.2346	127.5109	138.6885	148.4292 (72)
Total internal gains	668.9226	666.3147	645.5411	606.9471	568.6571	534.1565	513.8677	517.5200	537.4223	572.6284	614.9666	651.7489 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Northeast	5.7200		15.4678		0.6800		0.7000		0.7700		29.1854 (75)	
Southeast	7.6900		47.5950		0.6800		0.7000		0.7700		120.7335 (77)	
Southwest	4.1300		47.5950		0.6800		0.7000		0.7700		64.8413 (79)	
Northwest	6.8800		15.4678		0.6800		0.7000		0.7700		35.1041 (81)	
Southeast	1.6200		51.0923		0.6800		0.7000		1.0000		35.4585 (82)	
Solar gains	285.3227	434.2335	652.9739	937.8250	1106.0317	1220.8915	1147.2783	992.7210	793.0648	529.7967	334.2543	231.7895 (83)
Total gains	954.2453	1100.5481	1298.5150	1544.7721	1674.6888	1755.0480	1661.1460	1510.2410	1330.4871	1102.4251	949.2208	883.5384 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7186	5.7711	5.8007	5.8378	5.8196	5.8553	5.8466	5.8638	5.8378	5.8007	5.8007	5.7711
alpha	1.3812	1.3847	1.3867	1.3892	1.3880	1.3904	1.3898	1.3909	1.3892	1.3867	1.3867	1.3847
util living area	0.7781	0.7414	0.6720	0.5719	0.4596	0.3394	0.2635	0.2662	0.4190	0.5961	0.7248	0.7903 (86)
Living	17.8832	18.1279	18.7154	19.4108	20.0407	20.4602	20.6351	20.6461	20.3391	19.6607	18.7157	17.8630
Non living	16.4090	16.6964	17.3806	18.1770	18.8741	19.3136	19.4757	19.4914	19.2092	18.4847	17.4026	16.3938
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.4453	18.1279	18.7154	19.4108	20.0407	20.4602	20.6351	20.6461	20.3391	19.6607	18.7157	18.3160 (87)
Th 2	19.7850	19.7946	19.8000	19.8067	19.8034	19.8098	19.8082	19.8113	19.8067	19.8000	19.8000	19.7946 (88)
util rest of house	0.7598	0.7213	0.6469	0.5395	0.4159	0.2831	0.1934	0.1894	0.3565	0.5535	0.6987	0.7726 (89)
MIT 2	18.3921	16.6964	17.3806	18.1770	18.8741	19.3136	19.4757	19.4914	19.2092	18.4847	17.4026	16.9898 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.7314	17.1575	17.8106	18.5744	19.2499	19.6829	19.8492	19.8634	19.5731	18.8635	17.8256	17.4170 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7314	17.1575	17.8106	18.5744	19.2499	19.6829	19.8492	19.8634	19.5731	18.8635	17.8256	17.4170 (93)

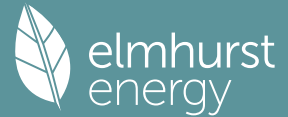
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.7418	0.6667	0.5974	0.5017	0.3938	0.2767	0.1959	0.1930	0.3431	0.5148	0.6457	0.7291 (94)
Useful gains	707.8240	733.7077	775.7296	775.0253	659.5411	485.6822	325.4601	291.4579	456.5054	567.5761	612.8816	644.1878 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	1744.8144	1493.5842	1374.1649	1177.0763	874.9197	573.1430	360.0332	321.6629	573.5757	879.5674	1191.3512	1528.0043 (97)
Space heating kWh	771.5209	510.6370	445.2359	289.4768	160.2417	0.0000	0.0000	0.0000	0.0000	232.1215	416.4981	657.5594 (98a)
Space heating requirement - total per year (kWh/year)	3483.2912											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	771.5209	510.6370	445.2359	289.4768	160.2417	0.0000	0.0000	0.0000	0.0000	232.1215	416.4981	657.5594 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3483.2912											
Space heating per m ²	(98c) / (4) = 35.6895 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	333.7876 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	771.5209	510.6370	445.2359	289.4768	160.2417	0.0000	0.0000	0.0000	0.0000	232.1215	416.4981	657.5594 (98)
Space heating efficiency (main heating system 1)	333.7876	333.7876	333.7876	333.7876	333.7876	0.0000	0.0000	0.0000	0.0000	333.7876	333.7876	333.7876 (210)
Space heating fuel (main heating system)	231.1413	152.9826	133.3890	86.7248	48.0071	0.0000	0.0000	0.0000	0.0000	69.5417	124.7794	196.9994 (211)
Space heating efficiency (main heating system 2)												

Full SAP Calculation Printout



Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	(216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1043.5653	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												173.7000	
Water heating fuel used												1599.1161	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												239.9055	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2882.5869	(238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1043.5653	27.6700	288.7545	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1599.1161	27.6700	442.4754	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	239.9055	27.6700	66.3819	(250)
Additional standing charges			0.0000	(251)
Total energy cost			797.6118	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1043.5653	0.1550	161.7106	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1599.1161	0.1411	225.6229	(264)
Space and water heating			387.3335	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	239.9055	0.1443	34.6258	(268)
Total CO2, kg/year			421.9593	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1043.5653	1.5736	1642.2031	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1599.1161	1.5217	2433.4031	(278)
Space and water heating			4075.6062	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	239.9055	1.5338	367.9751	(282)
Total Primary energy kWh/year			4443.5813	(286)

SAP 10 EPC IMPROVEMENTS

Design Stage- Triple Glazed

Current energy efficiency rating:

C 79

Full SAP Calculation Printout



Current environmental impact rating:

A 96

N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:
N Solar water heating
U Solar photovoltaic panels

SAP change
+ 2.1
+ 6.0

Cost change
-£ 115
-£ 270

CO2 change
-52 kg (12.4%)
-132 kg (35.6%)

Recommended measures

Solar water heating
Solar photovoltaic panels

Typical annual savings

£115
£270
£385

0.54 kg/m²
1.35 kg/m²
1.88 kg/m²

Energy efficiency
B 81
B 87

Environmental impact
A 96
A 97

Potential energy efficiency rating:
Potential environmental impact rating:

B 87
A 97

Fuel prices for cost data on this page from database revision number 596 TEST (30 Jun 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current	Potential	Saving
Electricity	£798	£683	£115
Space heating	£289	£311	-£22
Water heating	£442	£305	£137
Lighting	£66	£66	£0
Generated (PV)	-£0	-£270	£270
Total cost of fuels	£798	£413	£385
Total cost of uses	£797	£412	£385
Delivered energy	30 kWh/m ²	15 kWh/m ²	14 kWh/m ²
Carbon dioxide emissions	0.4 tonnes	0.2 tonnes	0.2 tonnes
CO2 emissions per m ²	4 kg/m ²	2 kg/m ²	2 kg/m ²
Primary energy	46 kWh/m ²	24 kWh/m ²	21 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	97.6000 (1b)	2.6500 (2b)	258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		258.6400 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 258.6400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1160 (8)

Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
Yes
Blower Door
4.0000 (17)
0.3160 (18)
1 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

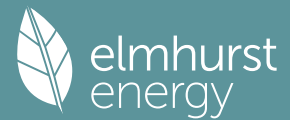
(20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.2923 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)

Full SAP Calculation Printout



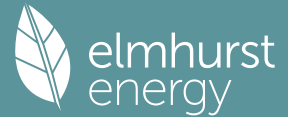
Windows						24.4200	1.1450	27.9618					(27)
Velux						1.6200	1.1450	1.8550					(27a)
Heatloss Floor 1						97.6000	0.1300	12.6880	0.0000		0.0000		(28a)
External Wall 1		127.0400		26.4400		100.6000	0.1800	18.1080	0.0000		0.0000		(29a)
External Roof 1		66.1600				66.1600	0.1100	7.2776	9.0000		595.4400		(30)
Rafter		38.6900		1.6200		37.0700	0.1400	5.1898	9.0000		333.6300		(30)
Total net area of external elements Aum(A, m2)						329.4900							(31)
Fabric heat loss, W/K = Sum (A x U)						(26)...	(30) + (32) =	75.1002					(33)
Main dwelling													
Internal Wall 1						203.0400			9.0000		1827.3600		(32c)
Heat capacity Cm = Sum(A x k)									(28)...	(30) + (32) + (32a)...	(32e) =	2756.4300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												28.2421	(35)
List of Thermal Bridges													
K1 Element								Length	Psi-value		Total		
E2 Other lintels (including other steel lintels)								16.4300	0.0470		0.7722		
E3 Sill								15.5300	0.0350		0.5435		
E4 Jamb								39.3200	0.0470		1.8480		
E5 Ground floor (normal)								47.9400	0.0150		0.7191		
E16 Corner (normal)								13.2500	0.0430		0.5697		
R1 Head of roof window								1.8000	0.0410		0.0738		
R2 Sill of roof window								1.8000	0.0460		0.0828		
R3 Jamb of roof window								3.6000	0.0430		0.1548		
E17 Corner (inverted - internal area greater than external area)								2.6500	-0.0690		-0.1829		
E10 Eaves (insulation at ceiling level)								25.2100	0.0370		0.9328		
E12 Gable (insulation at ceiling level)								5.1800	0.2500		1.2950		
E11 Eaves (insulation at rafter level)								12.5200	0.1500		1.8780		
E13 Gable (insulation at rafter level)								6.1800	0.0460		0.2843		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.9712	(36)
Point Thermal bridges												(36a) =	0.0000
Total fabric heat loss												(33) + (36) + (36a) =	84.0714 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Average = Sum(39)m / 12 =	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
												131.1577	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers													
	78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805	(42a)
Hot water usage for baths													
	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses													
	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)													138.8731 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy conte	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Energy content (annual)										Total = Sum(45)m =		2306.6686	
Distribution loss (46)m = 0.15 x (45)m													
	35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5400 (55)
Total storage loss													
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage													
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	279.2290	246.7102	259.9105	220.8658	206.4595	183.4227	179.2177	188.5707	198.3597	227.6779	245.8883	275.8802	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Aperture area of solar collector													3.0000 (H1)
Zero-loss collector efficiency													0.8000 (H2)
Collector linear heat loss coefficient													1.8000 (H3)
Collector 2nd order heat loss coefficient													0.0000 (H4)
Collector loop efficiency													0.9000 (H5)
Incidence angle modifier													1.0000 (H6)
Overshading factor													0.8000 (H8)
Overall heat loss coefficient of system													6.5000 (H10)
Heat loss coefficient of collector loop													3.9667 (H11)
Dedicated solar storage volume													75.0000 (H12)
Effective solar volume													75.0000 (H14)
Reference volume													225.0000 (H15)
Storage tank correction coefficient													1.3161 (H16)
Heat delivered to hot water													623.4638 (H24)
Heat delivered to space heating													0.0000 (H29)
Solar input													623.4638
Solar input	-0.0000	-16.2023	-58.5368	-80.5111	-105.1325	-96.7244	-95.8673	-83.9014	-57.8957	-28.6925	-0.0000	-0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	279.2290	230.5079	201.3737	140.3547	101.3270	86.6984	83.3504	104.6693	140.4640	198.9854	245.8883	275.8802	(64)
								Total per year (kWh/year) = Sum(64)m =				2088.7284	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000	(64a)
Heat gains from water heating, kWh/month													
	111.5448	98.9225	104.4689	88.3784	81.3676	73.1923	72.2009	75.7458	81.5266	93.7515	99.8557	110.4313	(65)

5. Internal gains (see Table 5 and 5a)													

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)	149.9257	147.2061	140.4151	122.7478	109.3650	101.6559	97.0442	101.8089	113.2314	126.0101	138.6885	148.4292 (72)
Total internal gains	668.9226	666.3147	644.0403	599.4431	554.8998	520.1490	499.8603	504.5131	531.4191	571.1276	614.9666	651.7489 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast					5.7200	11.2829		0.6800	0.7000	0.7700	21.2892 (75)	
Southeast					7.6900	36.7938		0.6800	0.7000	0.7700	93.3344 (77)	
Southwest					4.1300	36.7938		0.6800	0.7000	0.7700	50.1263 (79)	
Northwest					6.8800	11.2829		0.6800	0.7000	0.7700	25.6065 (81)	
Southeast					1.6200	38.2331		0.6800	0.7000	1.0000	26.5340 (82)	
Solar gains	216.8904	389.6188	584.4334	806.5249	975.9147	1000.0558	951.2294	820.5566	660.9138	444.6714	263.5130	183.1709 (83)
Total gains	885.8129	1055.9335	1228.4737	1405.9680	1530.8145	1520.2048	1451.0897	1325.0696	1192.3329	1015.7990	878.4796	834.9198 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8100	0.7655	0.7037	0.6163	0.5145	0.4072	0.3210	0.3550	0.4992	0.6644	0.7725	0.8216 (86)
Living	17.4285	17.8160	18.4244	19.1635	19.8218	20.3133	20.5581	20.5104	20.1058	19.2374	18.1966	17.3418
Non living	15.8750	16.3293	17.0416	17.9001	18.6435	19.1799	19.4218	19.3845	18.9780	18.0116	16.7963	15.7773
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.2183	17.8160	18.4244	19.1635	19.8218	20.3133	20.5581	20.5104	20.1058	19.2374	18.1966	17.8700 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.7951	0.7477	0.6812	0.5865	0.4743	0.3522	0.2499	0.2825	0.4443	0.6307	0.7522	0.8075 (89)
MIT 2	18.1777	16.3293	17.0416	17.9001	18.6435	19.1799	19.4218	19.3845	18.9780	18.0116	16.7963	16.4826 (90)
Living area fraction	18.5129	16.8082	17.4870	18.3071	19.0230	19.5450	19.7878	19.7472	19.3413	18.4065	17.2474	16.9295 (92)
MIT	18.5129	16.8082	17.4870	18.3071	19.0230	19.5450	19.7878	19.7472	19.3413	18.4065	17.2474	16.9295 (93)
Temperature adjustment												0.0000
adjusted MIT	18.5129	16.8082	17.4870	18.3071	19.0230	19.5450	19.7878	19.7472	19.3413	18.4065	17.2474	16.9295 (93)

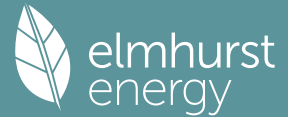
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7769	0.6922	0.6289	0.5432	0.4449	0.3386	0.2482	0.2779	0.4199	0.5834	0.6970	0.7647 (94)
Useful gains	688.2228	730.9699	772.6013	763.7627	681.1014	514.6909	360.0907	368.2424	500.6776	592.6324	612.2849	638.4888 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1885.6785	1577.1708	1452.6864	1233.8179	959.0279	643.0335	414.5372	434.6835	683.4299	1022.3367	1332.9728	1677.5071 (97)
Space heating kWh	890.9070	568.6471	505.9834	338.4397	206.7773	0.0000	0.0000	0.0000	0.0000	319.7000	518.8953	773.0296 (98a)
Space heating requirement - total per year (kWh/year)												4122.3793
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	890.9070	568.6471	505.9834	338.4397	206.7773	0.0000	0.0000	0.0000	0.0000	319.7000	518.8953	773.0296 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4122.3793
Space heating per m ²												(98c) / (4) = 42.2375 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												334.0749 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	890.9070	568.6471	505.9834	338.4397	206.7773	0.0000	0.0000	0.0000	0.0000	319.7000	518.8953	773.0296 (98)
Space heating efficiency (main heating system 1)	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)	266.6788	170.2155	151.4581	101.3066	61.8955	0.0000	0.0000	0.0000	0.0000	95.6971	155.3231	231.3941 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)												

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	279.2290	230.5079	201.3737	140.3547	101.3270	86.6984	83.3504	104.6693	140.4640	198.9854	245.8883	275.8802	(64)
Efficiency of water heater												173.7000	(216)
(217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	(217)
Fuel for water heating, kWh/month	160.7536	132.7046	115.9319	80.8029	58.3345	49.9127	47.9853	60.2587	80.8659	114.5569	141.5592	158.8257	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.7930	-57.5278	-86.6100	-100.0647	-107.3922	-94.0291	-92.6094	-87.5024	-77.6589	-66.6492	-43.2359	-32.9280	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1233.9687	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												173.7000	
Water heating fuel used												1202.4919	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												239.9055	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-885.0007	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1871.3653	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1233.9687	16.4900	203.4814	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1202.4919	16.4900	198.2909	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	239.9055	16.4900	39.5604	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-885.0007	16.4900	-145.9366	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-145.9366	(252)
Total energy cost			308.5881	(255)

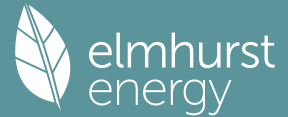
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.7790	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	87.3717	
SAP rating (Section 12)		87	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1233.9687	0.1546	190.7191	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1202.4919	0.1457	175.2024	(264)
Space and water heating			365.9215	(265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970	(267)
Energy for lighting	239.9055	0.1443	34.6258	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-885.0007	0.1345	-119.0620	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-119.0620	(269)
Total CO2, kg/year			292.5822	(272)
CO2 emissions per m2			3.0000	(273)
EI value			97.2506	
EI rating			97	(274)
EI band			A	

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 258.6400 (5)

2. Ventilation rate

		m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		30.0000 / (5) = 0.1160 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	4.0000 (17)		
Infiltration rate	0.3160 (18)		
Number of sides sheltered	1 (19)		
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.2923 (21)

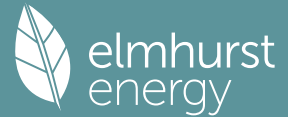
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000 (22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750 (22a)
Adj infilt rate	0.4092	0.3727	0.3508	0.3215	0.3361	0.3069	0.3142	0.2996	0.3215	0.3508	0.3508	0.3727 (22b)
Effective ac	0.5837	0.5694	0.5615	0.5517	0.5565	0.5471	0.5494	0.5449	0.5517	0.5615	0.5615	0.5694 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.1002		(33c)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	2756.4300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							28.2421 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				16.4300	0.0470	0.7722	
E3 Sill				15.5300	0.0350	0.5435	
E4 Jamb				39.3200	0.0470	1.8480	
E5 Ground floor (normal)				47.9400	0.0150	0.7191	
E16 Corner (normal)				13.2500	0.0430	0.5697	
R1 Head of roof window				1.8000	0.0410	0.0738	
R2 Sill of roof window				1.8000	0.0460	0.0828	
R3 Jamb of roof window				3.6000	0.0430	0.1548	
E17 Corner (inverted - internal area greater than external area)				2.6500	-0.0690	-0.1829	
E10 Eaves (insulation at ceiling level)				25.2100	0.0370	0.9328	
E12 Gable (insulation at ceiling level)				5.1800	0.2500	1.2950	
E11 Eaves (insulation at rafter level)				12.5200	0.1500	1.8780	
E13 Gable (insulation at rafter level)				6.1800	0.0460	0.2843	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.9712 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	84.0714 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	49.8217	48.6026	47.9258	47.0872	47.4974	46.6953	46.8890	46.5062	47.0872	47.9258	47.9258	48.6026 (38)
Average = Sum(39)m / 12 =	133.8932	132.6740	131.9972	131.1587	131.5688	130.7667	130.9604	130.5776	131.1587	131.9972	131.9972	132.6740 (39)
												131.7853
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3719	1.3594	1.3524	1.3438	1.3480	1.3398	1.3418	1.3379	1.3438	1.3524	1.3524	1.3594 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7162 (42)
Hot water usage for mixer showers												78.1805 (42a)
Hot water usage for baths												30.0209 (42b)
Hot water usage for other uses												42.4463 (42c)
Average daily hot water use (litres/day)												138.8731 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477 (44)
Energy content (annual)	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778 (45)
Distribution loss (46)m = 0.15 x (45)m	35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	279.2290	246.7102	259.9105	220.8658	206.4595	183.4227	179.2177	188.5707	198.3597	227.6779	245.8883	275.8802 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												796.0520 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												796.0520
Solar input	-6.7900	-24.1826	-70.9603	-98.1423	-120.9931	-119.5648	-116.8936	-105.6852	-76.9483	-44.9765	-10.9153	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	272.4389	222.5276	188.9502	122.7235	85.4664	63.8579	62.3241	82.8855	121.4114	182.7013	234.9731	275.8802 (64)
	Total per year (kWh/year) = Sum(64)m =											1916.1403 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	111.5448	98.9225	104.4689	88.3784	81.3676	73.1923	72.2009	75.7458	81.5266	93.7515	99.8557	110.4313 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)	149.9257	147.2061	140.4151	122.7478	109.3650	101.6559	97.0442	101.8089	113.2314	126.0101	138.6885	148.4292 (72)
Total internal gains	668.9226	666.3147	644.0403	599.4431	554.8998	520.1490	499.8603	504.5131	531.4191	571.1276	614.9666	651.7489 (73)

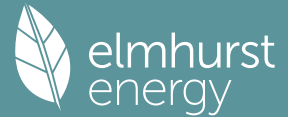
6. Solar gains

[Jan]															
				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W		
Northeast				5.7200	15.4678		0.6800		0.7000		0.7700		29.1854 (75)		
Southeast				7.6900	47.5950		0.6800		0.7000		0.7700		120.7335 (77)		
Southwest				4.1300	47.5950		0.6800		0.7000		0.7700		64.8413 (79)		
Northwest				6.8800	15.4678		0.6800		0.7000		0.7700		35.1041 (81)		
Southeast				1.6200	51.0923		0.6800		0.7000		1.0000		35.4585 (82)		
Solar gains	285.3227	434.2335	652.9739	937.8250	1106.0317	1220.8915	1147.2783	992.7210	793.0648	529.7967	334.2543	231.7895	(83)		
Total gains	954.2453	1100.5481	1297.0142	1537.2681	1660.9315	1741.0405	1647.1385	1497.2341	1324.4839	1100.9243	949.2208	883.5384	(84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7186	5.7711	5.8007	5.8378	5.8196	5.8553	5.8466	5.8638	5.8378	5.8007	5.8007	5.7711
alpha	1.3812	1.3847	1.3867	1.3892	1.3880	1.3904	1.3898	1.3909	1.3892	1.3867	1.3867	1.3847
util living area	0.7781	0.7414	0.6724	0.5734	0.4620	0.3414	0.2653	0.2681	0.4202	0.5965	0.7248	0.7903 (86)
Living	17.8832	18.1279	18.7140	19.4060	20.0354	20.4574	20.6335	20.6447	20.3372	19.6597	18.7157	17.8630
Non living	16.4090	16.6964	17.3791	18.1719	18.8689	19.3114	19.4748	19.4906	19.2076	18.4836	17.4026	16.3938
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.4453	18.1279	18.7140	19.4060	20.0354	20.4574	20.6335	20.6447	20.3372	19.6597	18.7157	18.3160 (87)
Th 2	19.7850	19.7946	19.8000	19.8067	19.8034	19.8098	19.8082	19.8113	19.8067	19.8000	19.8000	19.7946 (88)
util rest of house	0.7598	0.7213	0.6472	0.5410	0.4182	0.2850	0.1948	0.1908	0.3577	0.5539	0.6987	0.7726 (89)
MIT 2	18.3921	16.6964	17.3791	18.1719	18.8689	19.3114	19.4748	19.4906	19.2076	18.4836	17.4026	16.9898 (90)
Living area fraction									fLA = Living area / (4) =			0.3221 (91)
MIT	18.7314	17.1575	17.8091	18.5695	19.2447	19.6806	19.8480	19.8624	19.5715	18.8625	17.8256	17.4170 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7314	17.1575	17.8091	18.5695	19.2447	19.6806	19.8480	19.8624	19.5715	18.8625	17.8256	17.4170 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7418	0.6667	0.5977	0.5030	0.3959	0.2784	0.1973	0.1944	0.3442	0.5152	0.6457	0.7291 (94)
Useful gains	707.8240	733.7077	775.2122	773.2063	657.5138	484.7088	324.9978	291.0412	455.8439	567.1925	612.8816	644.1878 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	1744.8144	1493.5842	1373.9706	1176.4221	874.2306	572.8309	359.8858	321.5282	573.3540	879.4273	1191.3512	1528.0043 (97)
Space heating kWh	771.5209	510.6370	445.4762	290.3154	161.2373	0.0000	0.0000	0.0000	0.0000	232.3027	416.4981	657.5594 (98a)
Space heating requirement - total per year (kWh/year)												3485.5471
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	771.5209	510.6370	445.4762	290.3154	161.2373	0.0000	0.0000	0.0000	0.0000	232.3027	416.4981	657.5594 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3485.5471
Space heating per m2										(98c) / (4) =		35.7126 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												333.7876 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	771.5209	510.6370	445.4762	290.3154	161.2373	0.0000	0.0000	0.0000	0.0000	232.3027	416.4981	657.5594 (98)
Space heating efficiency (main heating system 1)	333.7876	333.7876	333.7876	333.7876	333.7876	0.0000	0.0000	0.0000	0.0000	333.7876	333.7876	333.7876 (210)
Space heating fuel (main heating system)	231.1413	152.9826	133.4610	86.9761	48.3054	0.0000	0.0000	0.0000	0.0000	69.5960	124.7794	196.9994 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	272.4389	222.5276	188.9502	122.7235	85.4664	63.8579	62.3241	82.8855	121.4114	182.7013	234.9731	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	156.8445	128.1103	108.7796	70.6526	49.2035	36.7633	35.8803	47.7176	69.8972	105.1821	135.2752	158.8257 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-49.1376	-62.6912	-93.1005	-108.2258	-112.3056	-101.5221	-99.5439	-95.2060	-85.9071	-74.7936	-52.4189	-40.4926 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1044.2411 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.7000
Water heating fuel used												1103.1320 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
pump for solar water heating												80.0000 (230g)
Total electricity for the above, kWh/year												80.0000 (231)
Electricity for lighting (calculated in Appendix L)												239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-975.3449 (233)
Wind generation												0.0000 (234)

Full SAP Calculation Printout



Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1491.9337 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1044.2411	27.6700	288.9415 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1103.1320	27.6700	305.2366 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	27.6700	22.1360 (249)
Energy for lighting	239.9055	27.6700	66.3819 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-975.3449	27.6700	-269.8779
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-269.8779 (252)
Total energy cost			412.8181 (255)

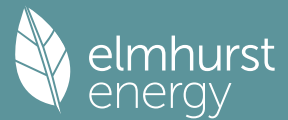
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1044.2411	0.1549	161.8043 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1103.1320	0.1470	162.1908 (264)
Space and water heating			323.9951 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	239.9055	0.1443	34.6258 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-975.3449	0.1350	-131.6483
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-131.6483 (269)
Total CO2, kg/year			238.0696 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1044.2411	1.5736	1643.2256 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1103.1320	1.5439	1703.1574 (278)
Space and water heating			3346.3831 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	239.9055	1.5338	367.9751 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-975.3449	1.4989	-1461.9151
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1461.9151 (283)
Total Primary energy kWh/year			2373.4671 (286)

Full SAP Calculation Printout



Plot Reference	P7				Issued on Date	09/07/2026	
Assessment Reference	Design Stage- Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	7 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	79 C	DER	4.65	TER	9.24		
Environmental	96 A	% DER < TER				49.68	
CO ₂ Emissions (t/year)	0.42	DFEE	44.78	TFEE	46.65		
Compliance Check	See BREL	% DFEE < TFEE				4.02	
% DPER < TPER	1.96	DPER	48.92	TPER	49.90		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	97.6000	2.6500	258.6400
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

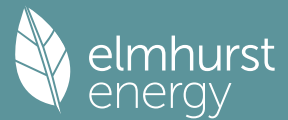
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1160 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3160 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2923 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 75.1002		(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 2756.4300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							28.2421 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				16.4300	0.0470		0.7722
E3 Sill				15.5300	0.0350		0.5435
E4 Jamb				39.3200	0.0470		1.8480
E5 Ground floor (normal)				47.9400	0.0150		0.7191

Full SAP Calculation Printout



E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
Average = Sum(39)m / 12 =												131.1577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													138.8731 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy content (annual)	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5400 (55)
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS													
PV diverter													
Solar input													
FGHRS													
Output from w/h													
12Total per year (kWh/year)													
Electric shower(s)													
Heat gains from water heating, kWh/month													

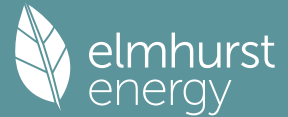
5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
Pumps, fans													
Losses e.g. evaporation (negative values) (Table 5)													
Water heating gains (Table 5)													
Total internal gains													

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	4.1300	11.2829	0.6800	0.7000	0.7700	15.3714 (75)
Southeast	7.6900	36.7938	0.6800	0.7000	0.7700	93.3344 (77)
Southwest	5.7200	36.7938	0.6800	0.7000	0.7700	69.4243 (79)
Northwest	6.8800	11.2829	0.6800	0.7000	0.7700	25.6065 (81)
Southeast	1.6200	38.2331	0.6800	0.7000	1.0000	26.5340 (82)

Full SAP Calculation Printout



Solar gains	230.2706	410.4446	607.7070	826.6107	990.4246	1010.9471	963.1920	837.2162	683.1686	466.2806	279.1815	194.8532 (83)
Total gains	823.6283	1017.3410	1189.0741	1386.5068	1521.2120	1521.8498	1454.1036	1329.2729	1190.4872	991.6823	837.7401	775.5783 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8238	0.7737	0.7120	0.6203	0.5163	0.4069	0.3205	0.3542	0.4996	0.6709	0.7828	0.8349 (86)
Living	17.3405	17.7682	18.3840	19.1487	19.8169	20.3138	20.5586	20.5113	20.1049	19.2156	18.1447	17.2547
Non living	15.7730	16.2746	16.9962	17.8841	18.6386	19.1803	19.4221	19.3851	18.9772	17.9881	16.7371	15.6759
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.1744	17.7682	18.3840	19.1487	19.8169	20.3138	20.5586	20.5113	20.1049	19.2156	18.1447	17.7955 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.8096	0.7563	0.6898	0.5905	0.4762	0.3519	0.2495	0.2818	0.4448	0.6375	0.7631	0.8216 (89)
MIT 2	18.1355	16.2746	16.9962	17.8841	18.6386	19.1803	19.4221	19.3851	18.9772	17.9881	16.7371	16.3990 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	18.4702	16.7557	17.4432	18.2915	19.0182	19.5454	19.7882	19.7479	19.3405	18.3835	17.1905	16.8489 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.4702	16.7557	17.4432	18.2915	19.0182	19.5454	19.7882	19.7479	19.3405	18.3835	17.1905	16.8489 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7917	0.7007	0.6369	0.5468	0.4465	0.3383	0.2478	0.2772	0.4203	0.5895	0.7077	0.7795 (94)
Useful gains	652.0680	712.8944	757.3600	758.1934	679.2811	514.8656	360.2553	368.5355	500.3678	584.6284	592.8923	604.5843 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1880.0168	1570.2175	1446.8974	1231.7722	958.3914	643.0914	414.5903	434.7794	683.3220	1019.3328	1325.5056	1666.8787 (97)
Space heating kWh	913.5939	576.1211	513.0158	340.9768	207.6580	0.0000	0.0000	0.0000	0.0000	323.4201	527.4816	790.3470 (98a)
Space heating requirement - total per year (kWh/year)	4192.6144											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	913.5939	576.1211	513.0158	340.9768	207.6580	0.0000	0.0000	0.0000	0.0000	323.4201	527.4816	790.3470 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4192.6144											
Space heating per m2	(98c) / (4) = 42.9571 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												334.0749 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	913.5939	576.1211	513.0158	340.9768	207.6580	0.0000	0.0000	0.0000	0.0000	323.4201	527.4816	790.3470 (98)
Space heating efficiency (main heating system 1)	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)	273.4698	172.4527	153.5631	102.0660	62.1591	0.0000	0.0000	0.0000	0.0000	96.8106	157.8932	236.5778 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	1254.9924 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	173.7000											

Full SAP Calculation Printout



Water heating fuel used	1599.1161 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3094.0140 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1254.9924	0.1546	194.0339 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1599.1161	0.1411	225.6229 (264)
Space and water heating			419.6568 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	239.9055	0.1443	34.6258 (268)
Total CO2, kg/year			454.2826 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1254.9924	1.5723	1973.2660 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1599.1161	1.5217	2433.4031 (278)
Space and water heating			4406.6691 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	239.9055	1.5338	367.9751 (282)
Total Primary energy kWh/year			4774.6442 (286)
Dwelling Primary energy Rate (DPER)			48.9200 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

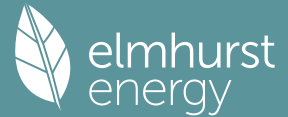
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		4 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	258.6400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1160 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3660 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3385 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4316	0.4232	0.4147	0.3724	0.3639	0.3216	0.3216	0.3132	0.3385	0.3639	0.3809	0.3978 (22b)
Effective ac	0.5932	0.5895	0.5860	0.5693	0.5662	0.5517	0.5517	0.5490	0.5573	0.5662	0.5725	0.5791 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0200	1.0000	2.0200			(26)
TER Opening Type			20.9900	1.1450	24.0344			(27)
TER Roof Window			1.3900	1.1450	2.0902			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880			(28a)
External Wall 1	127.0400	23.0100	104.0300	0.1800	18.7254			(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776			(30)
Rafter	38.6900	1.3900	37.3000	0.1100	4.1030			(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					70.9386			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

28.2421 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	16.4300	0.0500	0.8215
E2 Other lintels (including other steel lintels)	15.5300	0.0500	0.7765
E3 Sill	39.3200	0.0500	1.9660
E4 Jamb	47.9400	0.1600	7.6704
E5 Ground floor (normal)	13.2500	0.0900	1.1925
E16 Corner (normal)	1.8000	0.0800	0.1440
R1 Head of roof window	1.8000	0.0600	0.1080
R2 Sill of roof window	3.6000	0.0800	0.2880
R3 Jamb of roof window	2.6500	-0.0900	-0.2385
E17 Corner (inverted - internal area greater than external area)	25.2100	0.0600	1.5126
E10 Eaves (insulation at ceiling level)	5.1800	0.0600	0.3108
E12 Gable (insulation at ceiling level)	12.5200	0.0400	0.5008
E11 Eaves (insulation at rafter level)	6.1800	0.0800	0.4944
E13 Gable (insulation at rafter level)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5470 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 86.4856 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	50.6267	50.3179	50.0153	48.5938	48.3279	47.0898	47.0898	46.8605	47.5667	48.3279	48.8659	49.4283	(38)
Average = Sum(39)m / 12 =	137.1122	136.8035	136.5009	135.0794	134.8134	133.5754	133.5754	133.3461	134.0523	134.8134	135.3514	135.9139	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4048	1.4017	1.3986	1.3840	1.3813	1.3686	1.3686	1.3663	1.3735	1.3813	1.3868	1.3926	(40)
HLP (average)												1.3840	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

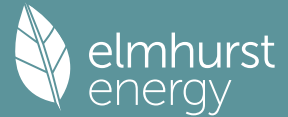
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers	69.7610	68.7126	67.1850	64.2620	62.1050	59.6994	58.3321	59.8482	61.5102	64.0930	67.0787	69.4937	(42a)
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)												130.8334	(43)
Daily hot water use	142.3301	139.2908	135.5896	129.9616	125.3913	120.4778	118.5896	122.2748	126.1613	131.3196	137.0344	141.9609	(44)
Energy conte	225.4160	198.3483	208.3962	177.9110	168.8008	148.1415	143.4238	151.4017	155.5696	178.1995	195.2306	222.2765	(45)
Energy content (annual)										Total = Sum(45)m =		2173.1155	
Distribution loss (46)m = 0.15 x (45)m	33.8124	29.7522	31.2594	26.6866	25.3201	22.2212	21.5136	22.7103	23.3354	26.7299	29.2846	33.3415	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	276.3421	244.3460	259.3223	227.1943	219.7268	197.4248	194.3499	202.3278	204.8529	229.1256	244.5139	273.2026	(62)
WWHRS	-31.8918	-28.2054	-29.5351	-24.4562	-22.7923	-19.5035	-18.2815	-19.4405	-20.1791	-23.7889	-26.9500	-31.3012	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2476.4034	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month	115.6917	102.7490	110.0326	98.5820	96.8671	88.6837	88.4293	91.0819	91.1535	99.9922	104.3408	114.6478	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

Full SAP Calculation Printout



Water heating gains (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Total internal gains	155.4996	152.9003	147.8933	136.9195	130.1977	123.1718	118.8565	122.4219	126.6021	134.3981	144.9178	(72)
	601.9315	615.5906	590.3444	569.5638	540.8628	518.4111	498.7164	499.6628	514.6861	535.2890	567.7878	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
Northeast					3.5500	11.2829	0.6300	0.7000			0.7700	12.2412 (75)	
Southeast					6.6100	36.7938	0.6300	0.7000			0.7700	74.3273 (77)	
Southwest					4.9100	36.7938	0.6300	0.7000			0.7700	55.2113 (79)	
Northwest					5.9200	11.2829	0.6300	0.7000			0.7700	20.4134 (81)	
Southeast					1.3900	38.2331	0.6300	0.7000			1.0000	21.0928 (82)	
Solar gains	183.2861	326.7051	483.7441	658.0332	788.4742	804.8273	766.8027	666.4891	543.8252	371.1551	222.2185	155.0944 (83)	
Total gains	785.2176	942.2957	1074.0885	1227.5970	1329.3370	1323.2384	1265.5191	1166.1518	1058.5113	906.4441	790.0064	744.4868 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	5.5843	5.5969	5.6093	5.6683	5.6795	5.7322	5.7322	5.7420	5.7118	5.6795	5.6569	5.6335		
alpha	1.3723	1.3731	1.3740	1.3779	1.3786	1.3821	1.3821	1.3828	1.3808	1.3786	1.3771	1.3756		
util living area	0.8358	0.7942	0.7421	0.6601	0.5626	0.4528	0.3617	0.3951	0.5406	0.6999	0.7988	0.8449	(86)	
MIT	16.2325	16.7479	17.5366	18.5641	19.5020	20.2367	20.6122	20.5439	19.9506	18.7271	17.3105	16.1355	(87)	
Th 2	19.7596	19.7620	19.7644	19.7756	19.7777	19.7875	19.7875	19.7893	19.7837	19.7777	19.7735	19.7690	(88)	
util rest of house	0.8220	0.7775	0.7206	0.6307	0.5213	0.3938	0.2829	0.3161	0.4838	0.6670	0.7797	0.8319	(89)	
MIT 2	14.5609	15.1668	16.0947	17.2931	18.3606	19.1677	19.5431	19.4882	18.8854	17.5134	15.8523	14.4503	(90)	
Living area fraction	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(91)	
MIT	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(92)	
Temperature adjustment	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(93)	
adjusted MIT	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.7472	0.7017	0.6483	0.5702	0.4807	0.3791	0.2899	0.3189	0.4541	0.6035	0.7050	0.7579	(94)	
Ext temp.	586.6874	661.2286	696.2958	699.9711	638.9842	501.6226	366.9234	371.8551	480.6774	546.9957	556.9931	564.2720	(95)	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Space heating kWh	1480.7321	1474.2154	1373.0870	1189.0430	947.5049	656.1330	439.1230	457.1441	687.4861	984.7288	1248.2105	1466.9448	(97)	
Space heating requirement - total per year (kWh/year)	665.1693	546.3271	503.5327	352.1317	229.5394	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98a)	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Space heating contribution - total per year (kWh/year)	665.1693	546.3271	503.5327	352.1317	229.5394	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98c)	
Space heating per m2										(98c) / (4) =		38.8488	(99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating efficiency (main heating system 1)	665.1693	546.3271	503.5327	352.1317	229.5394	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98)	
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating efficiency (main heating system 2)	720.6601	591.9037	545.5392	381.5078	248.6884	0.0000	0.0000	0.0000	0.0000	352.8423	539.1945	727.6149	(211)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)	
Efficiency of water heater (217)m	86.1877	86.0489	85.7689	85.2855	84.4042	79.8000	79.8000	79.8000	79.8000	85.0891	85.8546	86.2248	(216)	
Fuel for water heating, kWh/month	283.6253	251.1834	267.9145	237.7168	233.3230	222.9590	220.6371	229.1820	231.4207	241.3195	253.4096	280.5472	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	26.4506	21.2197	19.1060	13.9978	10.8123	8.8338	9.8634	12.8208	16.6529	21.8496	24.6790	27.1858	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-73.3099	-95.3983	-126.6994	-131.2873	-132.8224	-120.9442	-119.3395	-116.6757	-111.1153	-103.2927	-77.6580	-64.3493	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-69.5958	-141.8717	-274.0843	-400.8308	-520.0576	-519.0514	-513.0000	-438.8421	-327.7513	-199.1381	-91.6152	-55.3942	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												4107.9509	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2953.2383	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												213.4717	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-4824.1245	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2536.5364	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4107.9509	0.2100	862.6697	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2953.2383	0.2100	620.1800	(264)
Space and water heating			1482.8497	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	213.4717	0.1443	30.8106	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1272.8919	0.1363	-173.5517	
PV Unit electricity exported	-3551.2326	0.1267	-449.9328	
Total			-623.4845	(269)
Total CO2, kg/year			902.1050	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2400	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4107.9509	1.1300	4641.9846	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2953.2383	1.1300	3337.1592	(278)
Space and water heating			7979.1438	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	213.4717	1.5338	327.4300	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1272.8919	1.5040	-1914.4308	
PV Unit electricity exported	-3551.2326	0.4651	-1651.6870	
Total			-3566.1177	(283)
Total Primary energy kWh/year			4870.5569	(286)
Target Primary Energy Rate (TPER)			49.9000	(287)

Full SAP Calculation Printout



Plot Reference	P7			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	7, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	79 C	DER	4.65	TER	9.24
Environmental	96 A	% DER < TER			49.68
CO ₂ Emissions (t/year)	0.42	DFEE	44.78	TFEE	46.65
Compliance Check	See BREL	% DFEE < TFEE			4.02
% DPER < TPER	1.96	DPER	48.92	TPER	49.90
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6000	2.6500	258.6400
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1160 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		4.0000 (17)
Infiltration rate		0.3160 (18)
Number of sides sheltered		1 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2923 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	75.1002	(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							2756.4300 (34)
List of Thermal Bridges							28.2421 (35)
K1 Element					Length	Psi-value	Total
E2 Other lintels (including other steel lintels)					16.4300	0.0470	0.7722
E3 Sill					15.5300	0.0350	0.5435

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 48.6026	Feb 48.3724	Mar 48.1468	Apr 47.0872	May 46.8890	Jun 45.9661	Jul 45.9661	Aug 45.7952	Sep 46.3216	Oct 46.8890	Nov 47.2900	Dec 47.7093 (38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808 (39)
Average = Sum(39)m / 12 =												131.1577
HLP	Jan 1.3594	Feb 1.3570	Mar 1.3547	Apr 1.3438	May 1.3418	Jun 1.3324	Jul 1.3324	Aug 1.3306	Sep 1.3360	Oct 1.3418	Nov 1.3459	Dec 1.3502 (40)
HLP (average)	1.3438											
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7162 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209 (42b)
Hot water usage for other uses												
	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463 (42c)
Average daily hot water use (litres/day)												66.5161 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	72.5690	70.5782	68.4047	65.6996	63.2863	60.7784	60.2574	62.4265	64.6512	67.2267	69.9557	72.4672 (44)
Energy content (annual)												
	114.9316	100.5024	105.1355	89.9395	85.1956	74.7341	72.8762	77.2971	79.7213	91.2259	99.6646	113.4661 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1104.6899
Water storage loss (or HIU loss):												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462 (62)
WWHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 938.9864 (64)
Electric shower(s)												939 (64)
	55.8669	49.7779	54.3556	51.8709	52.8442	50.4082	52.0885	52.8442	51.8709	54.3556	53.3335	55.8669 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												635.4833 (64a)
Heat gains from water heating, kWh/month												
	38.3897	33.8012	35.9302	32.0799	31.3151	28.4831	28.5083	29.6367	29.9085	32.9744	34.5121	38.0783 (65)

5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Water heating gains (Table 5)	51.5991	50.2995	48.2932	44.5554	42.0902	39.5598	38.3176	39.8342	41.5396	44.3204	47.9335	51.1805	(72)
Total internal gains	495.0310	509.9898	487.7444	474.1997	449.7553	434.7991	418.1775	417.0751	429.6236	442.2113	467.8035	483.4764	(73)

6. Solar gains												
[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W
Northeast				4.1300	11.2829		0.6800		0.7000		0.7700	15.3714 (75)
Southeast				7.6900	36.7938		0.6800		0.7000		0.7700	93.3344 (77)
Southwest				5.7200	36.7938		0.6800		0.7000		0.7700	69.4243 (79)
Northwest				6.8800	11.2829		0.6800		0.7000		0.7700	25.6065 (81)
Southeast				1.6200	38.2331		0.6800		0.7000		1.0000	26.5340 (82)
Solar gains	230.2706	410.4446	607.7070	826.6107	990.4246	1010.9471	963.1920	837.2162	683.1686	466.2806	279.1815	194.8532 (83)

Full SAP Calculation Printout



Total gains 725.3016 920.4344 1095.4514 1300.8103 1440.1798 1445.7462 1381.3695 1254.2913 1112.7922 908.4918 746.9850 678.3296 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8460	0.7949	0.7323	0.6383	0.5324	0.4212	0.3333	0.3694	0.5195	0.6941	0.8063	0.8571 (86)
MIT	16.1914	16.7896	17.6435	18.7064	19.6310	20.3185	20.6587	20.5903	20.0203	18.7803	17.2962	16.0719 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.8332	0.7786	0.7109	0.6089	0.4922	0.3653	0.2603	0.2951	0.4642	0.6616	0.7880	0.8452 (89)
MIT 2	15.4381	16.0201	16.8495	17.8716	18.7367	19.3576	19.6368	19.5921	19.1173	17.9728	16.5350	15.3258 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	15.6808	16.2680	17.1053	18.1405	19.0248	19.6671	19.9660	19.9137	19.4082	18.2329	16.7802	15.5661 (92)
Temperature adjustment	0.0000											
adjusted MIT	15.6808	16.2680	17.1053	18.1405	19.0248	19.6671	19.9660	19.9137	19.4082	18.2329	16.7802	15.5661 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7721	0.7155	0.6510	0.5608	0.4626	0.3578	0.2702	0.3017	0.4431	0.6091	0.7260	0.7853 (94)
Useful gains	559.9904	658.5544	713.1162	729.4923	666.1727	517.2373	373.2362	378.4053	493.0618	553.3997	542.3241	532.6864 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1509.9368	1505.6155	1402.2115	1211.9673	959.2592	658.9149	437.7012	456.3101	692.1543	999.6110	1271.6077	1497.8386 (97)
Space heating kWh	706.7601	569.2250	512.6869	347.3820	218.0564	0.0000	0.0000	0.0000	0.0000	331.9812	525.0842	718.0733 (98a)
Space heating requirement - total per year (kWh/year)	3929.2491											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	706.7601	569.2250	512.6869	347.3820	218.0564	0.0000	0.0000	0.0000	0.0000	331.9812	525.0842	718.0733 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3929.2491											
Space heating per m2	(98c) / (4) = 40.2587 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan 4.3000	Feb 4.9000	Mar 6.5000	Apr 8.9000	May 11.7000	Jun 14.6000	Jul 16.6000	Aug 16.4000	Sep 14.1000	Oct 10.6000	Nov 7.1000	Dec 4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	1222.3528	962.2778	986.9864	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6611	0.7122	0.6804	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	808.1584	685.3086	671.5859	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1616.3694	1544.6283	1401.4320	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000										
			0.0000	0.0000	0.0000	581.9119	639.3338	543.0055	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	145.4780	159.8335	135.7514	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												441.0628 (107)
Energy for space heating												40.2587 (99)
Energy for space cooling												4.5191 (108)
Total												44.7778 (109)
Fabric Energy Efficiency (DFEE)												44.8 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

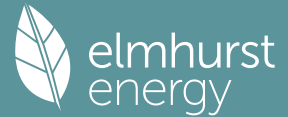
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 258.6400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)

Full SAP Calculation Printout



Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
30.0000 / (5) = 0.1160 (8)
Yes
Blower Door
5.0000 (17)
0.3660 (18)
1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3385 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infiltr rate	0.4316	0.4232	0.4147	0.3724	0.3639	0.3216	0.3216	0.3132	0.3385	0.3639	0.3809	0.3978	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5932	0.5895	0.5860	0.5693	0.5662	0.5517	0.5517	0.5490	0.5573	0.5662	0.5725	0.5791	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0200	1.0000	2.0200			(26)
TER Opening Type			20.9900	1.1450	24.0344			(27)
TER Roof Window			1.3900	1.1450	2.0902			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880			(28a)
External Wall 1	127.0400	23.0100	104.0300	0.1800	18.7254			(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776			(30)
Rafter	38.6900	1.3900	37.3000	0.1100	4.1030			(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 70.9386			(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							28.2421	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0500	0.8215
E3 Sill	15.5300	0.0500	0.7765
E4 Jamb	39.3200	0.0500	1.9660
E5 Ground floor (normal)	47.9400	0.1600	7.6704
E16 Corner (normal)	13.2500	0.0900	1.1925
R1 Head of roof window	1.8000	0.0800	0.1440
R2 Sill of roof window	1.8000	0.0600	0.1080
R3 Jamb of roof window	3.6000	0.0800	0.2880
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0900	-0.2385
E10 Eaves (insulation at ceiling level)	25.2100	0.0600	1.5126
E12 Gable (insulation at ceiling level)	5.1800	0.0600	0.3108
E11 Eaves (insulation at rafter level)	12.5200	0.0400	0.5008
E13 Gable (insulation at rafter level)	6.1800	0.0800	0.4944

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 86.4856 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

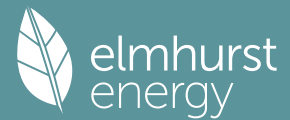
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	50.6267	50.3179	50.0153	48.5938	48.3279	47.0898	47.0898	46.8605	47.5667	48.3279	48.8659	49.4283	(39)
Average = Sum(39)m / 12 =	137.1122	136.8035	136.5009	135.0794	134.8134	133.5754	133.5754	133.3461	134.0523	134.8134	135.3514	135.9139	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.4048	1.4017	1.3986	1.3840	1.3813	1.3686	1.3686	1.3663	1.3735	1.3813	1.3868	1.3926	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)													66.5161 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	72.5690	70.5782	68.4047	65.6996	63.2863	60.7784	60.2574	62.4265	64.6512	67.2267	69.9557	72.4672	(44)
Energy content (annual)	114.9316	100.5024	105.1355	89.9395	85.1956	74.7341	72.8762	77.2971	79.7213	91.2259	99.6646	113.4661	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1104.6899
Water storage loss (or HIU loss):													(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	97.6919	85.4270	89.3651	76.4486	72.4162	63.5240	61.9447	65.7025	67.7631	77.5420	84.7150	96.4462	(64)
													Total per year (kWh/year) = Sum(64)m = 938.9864 (64)

Full SAP Calculation Printout



12Total per year (kWh/year)	939 (64)										
Electric shower(s)	55.8669	49.7779	54.3556	51.8709	52.8442	50.4082	52.0885	52.8442	51.8709	54.3556	53.3335
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 635.4833 (64a)										
Heat gains from water heating, kWh/month	38.3897	33.8012	35.9302	32.0799	31.3151	28.4831	28.5083	29.6367	29.9085	32.9744	34.5121
	38.0783 (65)										

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)	51.5991	50.2995	48.2932	44.5554	42.0902	39.5598	38.3176	39.8342	41.5396	44.3204	47.9335	51.1805 (72)
Total internal gains	495.0310	509.9898	487.7444	474.1997	449.7553	434.7991	418.1775	417.0751	429.6236	442.2113	467.8035	483.4764 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				3.5500	11.2829		0.6300		0.7000		0.7700		12.2412 (75)
Southeast				6.6100	36.7938		0.6300		0.7000		0.7700		74.3273 (77)
Southwest				4.9100	36.7938		0.6300		0.7000		0.7700		55.2113 (79)
Northwest				5.9200	11.2829		0.6300		0.7000		0.7700		20.4134 (81)
Southeast				1.3900	38.2331		0.6300		0.7000		1.0000		21.0928 (82)
Solar gains	183.2861	326.7051	483.7441	658.0332	788.4742	804.8273	766.8027	666.4891	543.8252	371.1551	222.2185	155.0944	(83)
Total gains	678.3170	836.6949	971.4885	1132.2328	1238.2294	1239.6264	1184.9802	1083.5642	973.4488	813.3664	690.0221	638.5708	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.5843	5.5969	5.6093	5.6683	5.6795	5.7322	5.7322	5.7420	5.7118	5.6795	5.6569	5.6335
alpha	1.3723	1.3731	1.3740	1.3779	1.3786	1.3821	1.3821	1.3828	1.3808	1.3786	1.3771	1.3756
util living area	0.8596	0.8175	0.7651	0.6818	0.5832	0.4716	0.3792	0.4154	0.5651	0.7271	0.8248	0.8688 (86)
MIT	16.0190	16.5595	17.3790	18.4505	19.4259	20.1934	20.5869	20.5121	19.8847	18.5996	17.1276	15.9172 (87)
Th 2	19.7596	19.7620	19.7644	19.7756	19.7777	19.7875	19.7875	19.7893	19.7837	19.7777	19.7735	19.7690 (88)
util rest of house	0.8474	0.8021	0.7448	0.6531	0.5421	0.4118	0.2980	0.3342	0.5083	0.6956	0.8073	0.8574 (89)
MIT 2	15.2508	15.7791	16.5797	17.6190	18.5410	19.2431	19.5708	19.5209	18.9890	17.7895	16.3555	15.1567 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	15.4983	16.0305	16.8372	17.8868	18.8260	19.5492	19.8981	19.8402	19.2776	18.0505	16.6042	15.4017 (92)
Temperature adjustment	0.0000											
adjusted MIT	15.4983	16.0305	16.8372	17.8868	18.8260	19.5492	19.8981	19.8402	19.2776	18.0505	16.6042	15.4017 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.7875	0.7390	0.6826	0.5995	0.5054	0.3988	0.3061	0.3380	0.4811	0.6396	0.7455	0.7987 (94)
Ext temp.	534.1459	618.3031	663.1627	678.8255	625.8217	494.4128	362.6718	366.2138	468.3050	520.2413	514.4040	510.0528 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1535.4224	1522.6886	1411.0309	1213.9336	960.6840	661.0970	440.5418	458.7383	694.0648	1004.4237	1286.4059	1522.4673 (97)
Space heating requirement - total per year (kWh/year)	744.9497	607.7471	556.4140	385.2778	249.1375	0.0000	0.0000	0.0000	0.0000	360.2317	555.8414	753.2364 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	744.9497	607.7471	556.4140	385.2778	249.1375	0.0000	0.0000	0.0000	0.0000	360.2317	555.8414	753.2364 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4212.8355
Space heating per m2												43.1643 (99)

8c. Space cooling requirement

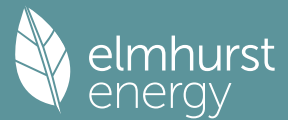
Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1255.6085	988.4578	1013.4304	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6074	0.6617	0.6300	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	762.7125	654.0620	638.4745	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1380.1109	1319.5293	1205.7470	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	444.5269	495.1077	422.0508	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												1.0000 (105)
Intermittency factor (Table 10b)												

Full SAP Calculation Printout



Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	111.1317	123.7769	105.5127	0.0000	0.0000	0.0000	0.0000	(107)
Energy for space heating													340.4213 (107)
Energy for space cooling													43.1643 (99)
Total													3.4879 (108)
Fabric Energy Efficiency (TFEE)													46.6522 (109)
													46.7 (109)

Full SAP Calculation Printout



Plot Reference	P7				Issued on Date	09/07/2026	
Assessment Reference	Design Stage- Triple Glazed			Plot Type Ref	Design Stage		
Plot Address	7 , Tawny Gardens, Angmering, West Sussex, BN16 4UN				SAP Version	10.2	
SAP Rating	79 C	DER	4.65	TER	9.24		
Environmental	96 A	% DER < TER				49.68	
CO ₂ Emissions (t/year)	0.42	DFEE	44.78	TFEE	46.65		
Compliance Check	See BREL	% DFEE < TFEE				4.02	
% DPER < TPER	1.96	DPER	48.92	TPER	49.90		
Assessor Details	Mrs. Faye Mitchell				Assessor ID	V981-0001	
Client	Wilmington Arundel Road, James Meachim						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	97.6000	2.6500	258.6400
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

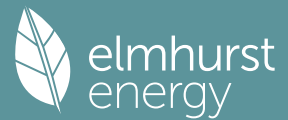
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1160 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3160 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2923 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	(28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	(30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	(30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.1002		(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	2756.4300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							28.2421 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				16.4300	0.0470	0.7722	
E3 Sill				15.5300	0.0350	0.5435	
E4 Jamb				39.3200	0.0470	1.8480	
E5 Ground floor (normal)				47.9400	0.0150	0.7191	

Full SAP Calculation Printout



E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
Average = Sum(39)m / 12 =												131.1577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
HLP (average)												1.3438	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers													
Hot water usage for baths	78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805	(42a)
Hot water usage for other uses	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Average daily hot water use (litres/day)	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
												138.8731	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy content (annual)	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU loss):	35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817	(46)
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage													
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(64)
Total per year (kWh/year)													2777.6646 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	111.5448	98.9225	105.5854	93.7813	91.6030	83.2776	82.6225	85.4230	85.8489	94.8681	99.8557	110.4313	(65)

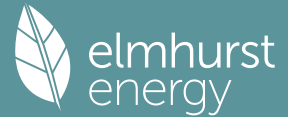
5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Water heating gains (Table 5)	149.9257	147.2061	141.9159	130.2518	123.1223	115.6634	111.0517	114.8158	119.2346	127.5109	138.6885	148.4292	(72)
Total internal gains	593.3577	606.8964	581.3671	559.8961	530.7874	510.9027	490.9115	492.0566	507.3186	525.4017	558.5586	580.7250	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	4.1300	11.2829	0.6800	0.7000	0.7700	15.3714 (75)
Southeast	7.6900	36.7938	0.6800	0.7000	0.7700	93.3344 (77)
Southwest	5.7200	36.7938	0.6800	0.7000	0.7700	69.4243 (79)
Northwest	6.8800	11.2829	0.6800	0.7000	0.7700	25.6065 (81)
Southeast	1.6200	38.2331	0.6800	0.7000	1.0000	26.5340 (82)

Full SAP Calculation Printout



Solar gains	230.2706	410.4446	607.7070	826.6107	990.4246	1010.9471	963.1920	837.2162	683.1686	466.2806	279.1815	194.8532 (83)
Total gains	823.6283	1017.3410	1189.0741	1386.5068	1521.2120	1521.8498	1454.1036	1329.2729	1190.4872	991.6823	837.7401	775.5783 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8238	0.7737	0.7120	0.6203	0.5163	0.4069	0.3205	0.3542	0.4996	0.6709	0.7828	0.8349 (86)
Living	17.3405	17.7682	18.3840	19.1487	19.8169	20.3138	20.5586	20.5113	20.1049	19.2156	18.1447	17.2547
Non living	15.7730	16.2746	16.9962	17.8841	18.6386	19.1803	19.4221	19.3851	18.9772	17.9881	16.7371	15.6759
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.1744	17.7682	18.3840	19.1487	19.8169	20.3138	20.5586	20.5113	20.1049	19.2156	18.1447	17.7955 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.8096	0.7563	0.6898	0.5905	0.4762	0.3519	0.2495	0.2818	0.4448	0.6375	0.7631	0.8216 (89)
MIT 2	18.1355	16.2746	16.9962	17.8841	18.6386	19.1803	19.4221	19.3851	18.9772	17.9881	16.7371	16.3990 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	18.4702	16.7557	17.4432	18.2915	19.0182	19.5454	19.7882	19.7479	19.3405	18.3835	17.1905	16.8489 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.4702	16.7557	17.4432	18.2915	19.0182	19.5454	19.7882	19.7479	19.3405	18.3835	17.1905	16.8489 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7917	0.7007	0.6369	0.5468	0.4465	0.3383	0.2478	0.2772	0.4203	0.5895	0.7077	0.7795 (94)
Useful gains	652.0680	712.8944	757.3600	758.1934	679.2811	514.8656	360.2553	368.5355	500.3678	584.6284	592.8923	604.5843 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1880.0168	1570.2175	1446.8974	1231.7722	958.3914	643.0914	414.5903	434.7794	683.3220	1019.3328	1325.5056	1666.8787 (97)
Space heating kWh	913.5939	576.1211	513.0158	340.9768	207.6580	0.0000	0.0000	0.0000	0.0000	323.4201	527.4816	790.3470 (98a)
Space heating requirement - total per year (kWh/year)	4192.6144											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	913.5939	576.1211	513.0158	340.9768	207.6580	0.0000	0.0000	0.0000	0.0000	323.4201	527.4816	790.3470 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4192.6144											
Space heating per m2	(98c) / (4) = 42.9571 (99)											

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												334.0749 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	913.5939	576.1211	513.0158	340.9768	207.6580	0.0000	0.0000	0.0000	0.0000	323.4201	527.4816	790.3470 (98)
Space heating efficiency (main heating system 1)	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)	273.4698	172.4527	153.5631	102.0660	62.1591	0.0000	0.0000	0.0000	0.0000	96.8106	157.8932	236.5778 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	1254.9924 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	173.7000											

Full SAP Calculation Printout



Water heating fuel used	1599.1161 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3094.0140 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1254.9924	0.1546	194.0339 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1599.1161	0.1411	225.6229 (264)
Space and water heating			419.6568 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	239.9055	0.1443	34.6258 (268)
Total CO2, kg/year			454.2826 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1254.9924	1.5723	1973.2660 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1599.1161	1.5217	2433.4031 (278)
Space and water heating			4406.6691 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	239.9055	1.5338	367.9751 (282)
Total Primary energy kWh/year			4774.6442 (286)
Dwelling Primary energy Rate (DPER)			48.9200 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

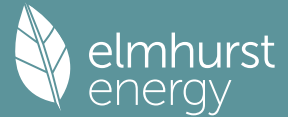
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		4 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	258.6400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1160 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3660 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3385 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4316	0.4232	0.4147	0.3724	0.3639	0.3216	0.3216	0.3132	0.3385	0.3639	0.3809	0.3978 (22b)
Effective ac	0.5932	0.5895	0.5860	0.5693	0.5662	0.5517	0.5517	0.5490	0.5573	0.5662	0.5725	0.5791 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0200	1.0000	2.0200			(26)
TER Opening Type			20.9900	1.1450	24.0344			(27)
TER Roof Window			1.3900	1.1450	2.0902			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880			(28a)
External Wall 1	127.0400	23.0100	104.0300	0.1800	18.7254			(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776			(30)
Rafter	38.6900	1.3900	37.3000	0.1100	4.1030			(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					70.9386			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

28.2421 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	16.4300	0.0500	0.8215
E2 Other lintels (including other steel lintels)	15.5300	0.0500	0.7765
E3 Sill	39.3200	0.0500	1.9660
E4 Jamb	47.9400	0.1600	7.6704
E5 Ground floor (normal)	13.2500	0.0900	1.1925
E16 Corner (normal)	1.8000	0.0800	0.1440
R1 Head of roof window	1.8000	0.0600	0.1080
R2 Sill of roof window	3.6000	0.0800	0.2880
R3 Jamb of roof window	2.6500	-0.0900	-0.2385
E17 Corner (inverted - internal area greater than external area)	25.2100	0.0600	1.5126
E10 Eaves (insulation at ceiling level)	5.1800	0.0600	0.3108
E12 Gable (insulation at ceiling level)	12.5200	0.0400	0.5008
E11 Eaves (insulation at rafter level)	6.1800	0.0800	0.4944
E13 Gable (insulation at rafter level)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5470 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 86.4856 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	50.6267	50.3179	50.0153	48.5938	48.3279	47.0898	47.0898	46.8605	47.5667	48.3279	48.8659	49.4283	(38)
Heat transfer coeff	137.1122	136.8035	136.5009	135.0794	134.8134	133.5754	133.5754	133.3461	134.0523	134.8134	135.3514	135.9139	(39)
Average = Sum(39)m / 12 =												135.0781	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4048	1.4017	1.3986	1.3840	1.3813	1.3686	1.3686	1.3663	1.3735	1.3813	1.3868	1.3926	(40)
HLP (average)												1.3840	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

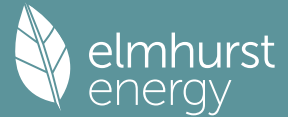
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers	69.7610	68.7126	67.1850	64.2620	62.1050	59.6994	58.3321	59.8482	61.5102	64.0930	67.0787	69.4937	(42a)
Hot water usage for baths	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)												130.8334	(43)
Daily hot water use	142.3301	139.2908	135.5896	129.9616	125.3913	120.4778	118.5896	122.2748	126.1613	131.3196	137.0344	141.9609	(44)
Energy conte	225.4160	198.3483	208.3962	177.9110	168.8008	148.1415	143.4238	151.4017	155.5696	178.1995	195.2306	222.2765	(45)
Energy content (annual)										Total = Sum(45)m =		2173.1155	
Distribution loss (46)m = 0.15 x (45)m	33.8124	29.7522	31.2594	26.6866	25.3201	22.2212	21.5136	22.7103	23.3354	26.7299	29.2846	33.3415	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	276.3421	244.3460	259.3223	227.1943	219.7268	197.4248	194.3499	202.3278	204.8529	229.1256	244.5139	273.2026	(62)
WWHRS	-31.8918	-28.2054	-29.5351	-24.4562	-22.7923	-19.5035	-18.2815	-19.4405	-20.1791	-23.7889	-26.9500	-31.3012	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2476.4034	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	115.6917	102.7490	110.0326	98.5820	96.8671	88.6837	88.4293	91.0819	91.1535	99.9922	104.3408	114.6478	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	135.8085	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.3010	140.9404	127.3010	131.5443	127.3010	131.5443	127.3010	127.3010	131.5443	127.3010	131.5443	127.3010	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.3884	255.0074	248.4076	234.3574	216.6216	199.9524	188.8163	186.1973	192.7971	206.8473	224.5832	241.2524	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	36.5808	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

Full SAP Calculation Printout



Water heating gains (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	(71)
Total internal gains	155.4996	152.9003	147.8933	136.9195	130.1977	123.1718	118.8565	122.4219	126.6021	134.3981	144.9178	(72)
	601.9315	615.5906	590.3444	569.5638	540.8628	518.4111	498.7164	499.6628	514.6861	535.2890	567.7878	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
Northeast					3.5500	11.2829	0.6300	0.7000			0.7700	12.2412 (75)	
Southeast					6.6100	36.7938	0.6300	0.7000			0.7700	74.3273 (77)	
Southwest					4.9100	36.7938	0.6300	0.7000			0.7700	55.2113 (79)	
Northwest					5.9200	11.2829	0.6300	0.7000			0.7700	20.4134 (81)	
Southeast					1.3900	38.2331	0.6300	0.7000			1.0000	21.0928 (82)	
Solar gains	183.2861	326.7051	483.7441	658.0332	788.4742	804.8273	766.8027	666.4891	543.8252	371.1551	222.2185	155.0944 (83)	
Total gains	785.2176	942.2957	1074.0885	1227.5970	1329.3370	1323.2384	1265.5191	1166.1518	1058.5113	906.4441	790.0064	744.4868 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	5.5843	5.5969	5.6093	5.6683	5.6795	5.7322	5.7322	5.7420	5.7118	5.6795	5.6569	5.6335		
alpha	1.3723	1.3731	1.3740	1.3779	1.3786	1.3821	1.3821	1.3828	1.3808	1.3786	1.3771	1.3756		
util living area	0.8358	0.7942	0.7421	0.6601	0.5626	0.4528	0.3617	0.3951	0.5406	0.6999	0.7988	0.8449	(86)	
MIT	16.2325	16.7479	17.5366	18.5641	19.5020	20.2367	20.6122	20.5439	19.9506	18.7271	17.3105	16.1355	(87)	
Th 2	19.7596	19.7620	19.7644	19.7756	19.7777	19.7875	19.7875	19.7893	19.7837	19.7777	19.7735	19.7690	(88)	
util rest of house	0.8220	0.7775	0.7206	0.6307	0.5213	0.3938	0.2829	0.3161	0.4838	0.6670	0.7797	0.8319	(89)	
MIT 2	14.5609	15.1668	16.0947	17.2931	18.3606	19.1677	19.5431	19.4882	18.8854	17.5134	15.8523	14.4503	(90)	
Living area fraction	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(91)	
MIT	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(92)	
Temperature adjustment	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(93)	
adjusted MIT	15.0994	15.6762	16.5592	17.7025	18.7283	19.5121	19.8875	19.8283	19.2285	17.9044	16.3220	14.9932	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.7472	0.7017	0.6483	0.5702	0.4807	0.3791	0.2899	0.3189	0.4541	0.6035	0.7050	0.7579	(94)	
Ext temp.	586.6874	661.2286	696.2958	699.9711	638.9842	501.6226	366.9234	371.8551	480.6774	546.9957	556.9931	564.2720	(95)	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)	
Space heating kWh	1480.7321	1474.2154	1373.0870	1189.0430	947.5049	656.1330	439.1230	457.1441	687.4861	984.7288	1248.2105	1466.9448	(97)	
Space heating requirement - total per year (kWh/year)	665.1693	546.3271	503.5327	352.1317	229.5394	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98a)	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Space heating contribution - total per year (kWh/year)	665.1693	546.3271	503.5327	352.1317	229.5394	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98c)	
Space heating per m2										(98c) / (4) =		38.8488	(99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating efficiency (main heating system 1)	665.1693	546.3271	503.5327	352.1317	229.5394	0.0000	0.0000	0.0000	0.0000	325.6734	497.6765	671.5886	(98)	
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating efficiency (main heating system 2)	720.6601	591.9037	545.5392	381.5078	248.6884	0.0000	0.0000	0.0000	0.0000	352.8423	539.1945	727.6149	(211)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	244.4503	216.1406	229.7873	202.7381	196.9345	177.9213	176.0684	182.8873	184.6737	205.3367	217.5639	241.9014	(64)	
Efficiency of water heater (217)m	86.1877	86.0489	85.7689	85.2855	84.4042	79.8000	79.8000	79.8000	79.8000	85.0891	85.8546	86.2248	(216)	
Fuel for water heating, kWh/month	283.6253	251.1834	267.9145	237.7168	233.3230	222.9590	220.6371	229.1820	231.4207	241.3195	253.4096	280.5472	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	26.4506	21.2197	19.1060	13.9978	10.8123	8.8338	9.8634	12.8208	16.6529	21.8496	24.6790	27.1858	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-73.3099	-95.3983	-126.6994	-131.2873	-132.8224	-120.9442	-119.3395	-116.6757	-111.1153	-103.2927	-77.6580	-64.3493	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-69.5958	-141.8717	-274.0843	-400.8308	-520.0576	-519.0514	-513.0000	-438.8421	-327.7513	-199.1381	-91.6152	-55.3942 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												4107.9509 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2953.2383 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												213.4717 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4824.1245 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2536.5364 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4107.9509	0.2100	862.6697 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2953.2383	0.2100	620.1800 (264)
Space and water heating			1482.8497 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	213.4717	0.1443	30.8106 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1272.8919	0.1363	-173.5517
PV Unit electricity exported	-3551.2326	0.1267	-449.9328
Total			-623.4845 (269)
Total CO2, kg/year			902.1050 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.2400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4107.9509	1.1300	4641.9846 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2953.2383	1.1300	3337.1592 (278)
Space and water heating			7979.1438 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	213.4717	1.5338	327.4300 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1272.8919	1.5040	-1914.4308
PV Unit electricity exported	-3551.2326	0.4651	-1651.6870
Total			-3566.1177 (283)
Total Primary energy kWh/year			4870.5569 (286)
Target Primary Energy Rate (TPER)			49.9000 (287)

Full SAP Calculation Printout



Plot Reference	P7			Issued on Date	09/07/2026
Assessment Reference	Design Stage- Triple Glazed	Plot Type Ref	Design Stage		
Plot Address	7, Tawny Gardens, Angmering, West Sussex, BN16 4UN			SAP Version	10.2
SAP Rating	79 C	DER	4.65	TER	9.24
Environmental	96 A	% DER < TER			49.68
CO ₂ Emissions (t/year)	0.42	DFEE	44.78	TFEE	46.65
Compliance Check	See BREL	% DFEE < TFEE			4.02
% DPER < TPER	1.96	DPER	48.92	TPER	49.90
Assessor Details	Mrs. Faye Mitchell			Assessor ID	V981-0001
Client	Wilmington Arundel Road, James Meachim				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	97.6000	2.6500	258.6400
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		
Dwelling volume			258.6400

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1160 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	4.0000		(17)
Infiltration rate	0.3160		(18)
Number of sides sheltered	1		(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2923	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.1002		(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2756.4300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		28.2421	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0470	0.7722
E3 Sill	15.5300	0.0350	0.5435
E4 Jamb	39.3200	0.0470	1.8480
E5 Ground floor (normal)	47.9400	0.0150	0.7191

Full SAP Calculation Printout



E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Heat transfer coeff	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
Average = Sum(39)m / 12 =												131.1577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
HLP (average)												1.3438	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

												2.7162 (42)
Assumed occupancy												
Hot water usage for mixer showers												
78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805	(42a)
Hot water usage for baths												
30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses												
42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)												138.8731 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy content (annual)												235.8778 (45)
Energy content (annual)												2306.6686
Distribution loss (46)m = 0.15 x (45)m												
35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817	(46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss												
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage												
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month												
279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												
279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802	(64)
Total per year (kWh/year) = Sum(64)m =												2777.6646 (64)
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
111.5448	98.9225	105.5854	93.7813	91.6030	83.2776	82.6225	85.4230	85.8489	94.8681	99.8557	110.4313	(65)

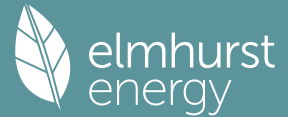
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)												
	149.9257	147.2061	141.9159	130.2518	123.1223	115.6634	111.0517	114.8158	119.2346	127.5109	138.6885	148.4292 (72)
Total internal gains												
	668.9226	666.3147	645.5411	606.9471	568.6571	534.1565	513.8677	517.5200	537.4223	572.6284	614.9666	651.7489 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	4.1300	11.2829	0.6800	0.7000	0.7700	15.3714	(75)
Southeast	7.6900	36.7938	0.6800	0.7000	0.7700	93.3344	(77)
Southwest	5.7200	36.7938	0.6800	0.7000	0.7700	69.4243	(79)
Northwest	6.8800	11.2829	0.6800	0.7000	0.7700	25.6065	(81)
Southeast	1.6200	38.2331	0.6800	0.7000	1.0000	26.5340	(82)

Full SAP Calculation Printout



Solar gains	230.2706	410.4446	607.7070	826.6107	990.4246	1010.9471	963.1920	837.2162	683.1686	466.2806	279.1815	194.8532 (83)
Total gains	899.1931	1076.7593	1253.2481	1433.5578	1559.0817	1545.1037	1477.0598	1354.7362	1220.5909	1038.9090	894.1481	846.6021 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area	0.8071	0.7611	0.6986	0.6108	0.5091	0.4027	0.3167	0.3492	0.4923	0.6583	0.7686	0.8190 (86)
Living	17.4469	17.8412	18.4492	19.1841	19.8358	20.3206	20.5625	20.5167	20.1188	19.2578	18.2162	17.3585
Non living	15.8965	16.3583	17.0695	17.9223	18.6576	19.1862	19.4248	19.3890	18.9902	18.0336	16.8185	15.7968
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.2275	17.8412	18.4492	19.1841	19.8358	20.3206	20.5625	20.5167	20.1188	19.2578	18.2162	17.8843 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house	0.7920	0.7431	0.6759	0.5808	0.4690	0.3480	0.2463	0.2776	0.4377	0.6244	0.7481	0.8048 (89)
MIT 2	18.1865	16.3583	17.0695	17.9223	18.6576	19.1862	19.4248	19.3890	18.9902	18.0336	16.8185	16.4987 (90)
Living area fraction	18.5218	16.8360	17.5139	18.3288	19.0371	19.5516	19.7913	19.7523	19.3537	18.4279	17.2688	16.9450 (92)
MIT	18.5218	16.8360	17.5139	18.3288	19.0371	19.5516	19.7913	19.7523	19.3537	18.4279	17.2688	16.9450 (93)
Temperature adjustment												0.0000
adjusted MIT	18.5218	16.8360	17.5139	18.3288	19.0371	19.5516	19.7913	19.7523	19.3537	18.4279	17.2688	16.9450 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7738	0.6878	0.6240	0.5382	0.4402	0.3348	0.2447	0.2733	0.4140	0.5777	0.6929	0.7619 (94)
Useful gains	695.8113	740.5433	781.9899	771.5316	686.3815	517.3064	361.4900	370.2793	505.3458	600.1471	619.5874	645.0071 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1886.8673	1580.8504	1456.2453	1236.6653	960.8704	643.8985	414.9884	435.3489	685.0517	1025.1501	1335.7823	1679.5518 (97)
Space heating kWh	886.1457	564.6863	501.6461	334.8963	204.2198	0.0000	0.0000	0.0000	0.0000	316.2023	515.6603	769.7012 (98a)
Space heating requirement - total per year (kWh/year)												4093.1580
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	886.1457	564.6863	501.6461	334.8963	204.2198	0.0000	0.0000	0.0000	0.0000	316.2023	515.6603	769.7012 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4093.1580
Space heating per m2										(98c) / (4) =		41.9381 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												334.0749 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	886.1457	564.6863	501.6461	334.8963	204.2198	0.0000	0.0000	0.0000	0.0000	316.2023	515.6603	769.7012 (98)
Space heating efficiency (main heating system 1)	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)	265.2536	169.0299	150.1598	100.2459	61.1299	0.0000	0.0000	0.0000	0.0000	94.6501	154.3547	230.3978 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1225.2217 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.7000
Water heating fuel used												1599.1161 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3064.2433 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1225.2217	16.4900	202.0391 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1599.1161	16.4900	263.6942 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	239.9055	16.4900	39.5604 (250)
Additional standing charges			0.0000 (251)
Total energy cost			505.2937 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.2756 (257)
SAP value	79.3219
SAP rating (Section 12)	79 (258)
SAP band	C

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1225.2217	0.1546	189.3947 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1599.1161	0.1411	225.6229 (264)
Space and water heating			415.0176 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	239.9055	0.1443	34.6258 (268)
Total CO2, kg/year			449.6434 (272)
CO2 emissions per m2			4.6100 (273)
EI value			95.7747
EI rating			96 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

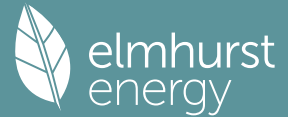
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 258.6400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1160 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3160 (18)
Number of sides sheltered	1 (19)

Full SAP Calculation Printout



Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.9250 \quad (20)$$
$$(21) = (18) \times (20) = 0.2923 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000	(22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750	(22a)
Adj infilt rate													
Effective ac	0.4092	0.3727	0.3508	0.3215	0.3361	0.3069	0.3142	0.2996	0.3215	0.3508	0.3508	0.3727	(22b)
	0.5837	0.5694	0.5615	0.5517	0.5565	0.5471	0.5494	0.5449	0.5517	0.5615	0.5615	0.5694	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Solid Door			2.0200	1.0000	2.0200			(26)
Windows			24.4200	1.1450	27.9618			(27)
Velux			1.6200	1.1450	1.8550			(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000	(28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000	(29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400	(30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300	(30)
Total net area of external elements Aum(A, m2)			329.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	75.1002		(33)
Main dwelling								
Internal Wall 1			203.0400			9.0000	1827.3600	(32c)

Heat capacity Cm = Sum(A x k)

$$(28)...(30) + (32) + (32a)...(32e) = 2756.4300 \quad (34)$$

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

$$28.2421 \quad (35)$$

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	16.4300	0.0470	0.7722
E3 Sill	15.5300	0.0350	0.5435
E4 Jamb	39.3200	0.0470	1.8480
E5 Ground floor (normal)	47.9400	0.0150	0.7191
E16 Corner (normal)	13.2500	0.0430	0.5697
R1 Head of roof window	1.8000	0.0410	0.0738
R2 Sill of roof window	1.8000	0.0460	0.0828
R3 Jamb of roof window	3.6000	0.0430	0.1548
E17 Corner (inverted - internal area greater than external area)	2.6500	-0.0690	-0.1829
E10 Eaves (insulation at ceiling level)	25.2100	0.0370	0.9328
E12 Gable (insulation at ceiling level)	5.1800	0.2500	1.2950
E11 Eaves (insulation at rafter level)	12.5200	0.1500	1.8780
E13 Gable (insulation at rafter level)	6.1800	0.0460	0.2843

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

$$8.9712 \quad (36)$$

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 84.0714 \quad (37)$$

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	49.8217	48.6026	47.9258	47.0872	47.4974	46.6953	46.8890	46.5062	47.0872	47.9258	47.9258	48.6026	(38)
Heat transfer coeff	133.8932	132.6740	131.9972	131.1587	131.5688	130.7667	130.9604	130.5776	131.1587	131.9972	131.9972	132.6740	(39)
Average = Sum(39)m / 12 =												131.7853	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3719	1.3594	1.3524	1.3438	1.3480	1.3398	1.3418	1.3379	1.3438	1.3524	1.3524	1.3594	(40)
HLP (average)												1.3503	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7162	(42)
Hot water usage for mixer showers													
78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805	(42a)	
Hot water usage for baths													
30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)	
Hot water usage for other uses													
42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)	
Average daily hot water use (litres/day)												138.8731	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477		(44)
Energy conte	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817		(46)

Water storage loss (or HIU loss):

Store volume

$$200.0000 \quad (47)$$

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b

$$1.0000 \quad (48)$$

Enter (49) or (54) in (55)

$$0.5400 \quad (49)$$

Total storage loss

$$0.5400 \quad (55)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400		(56)
If cylinder contains dedicated solar storage													
16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400		(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(61)
Total heat required for water heating calculated for each month													
279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802		(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(63d)
Output from w/h													
279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802		(64)
Total per year (kWh/year) = Sum(64)m =												2777.6646	(64)

Electric shower(s)

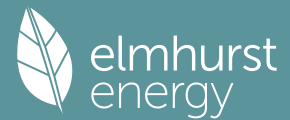
$$0.0000 \quad (64a)$$

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =

$$0.0000 \quad (64a)$$

Heat gains from water heating, kWh/month													
111.5448	98.9225	105.5854	93.7813	91.6030	83.2776	82.6225	85.4230	85.8489	94.8681	99.8557	110.4313		(65)

Full SAP Calculation Printout



5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)	149.9257	147.2061	141.9159	130.2518	123.1223	115.6634	111.0517	114.8158	119.2346	127.5109	138.6885	148.4292 (72)
Total internal gains	668.9226	666.3147	645.5411	606.9471	568.6571	534.1565	513.8677	517.5200	537.4223	572.6284	614.9666	651.7489 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
Northeast					4.1300	15.4678		0.6800	0.7000	0.7700		21.0727 (75)
Southeast					7.6900	47.5950		0.6800	0.7000	0.7700		120.7335 (77)
Southwest					5.7200	47.5950		0.6800	0.7000	0.7700		89.8044 (79)
Northwest					6.8800	15.4678		0.6800	0.7000	0.7700		35.1041 (81)
Southeast					1.6200	51.0923		0.6800	0.7000	1.0000		35.4585 (82)
Solar gains	302.1731	456.0719	676.6698	958.1591	1119.6383	1231.5100	1158.9989	1009.9294	816.9957	553.7603	353.1936	246.0013 (83)
Total gains	971.0957	1122.3866	1322.2109	1565.1062	1688.2954	1765.6665	1672.8667	1527.4494	1354.4180	1126.3888	968.1601	897.7502 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7186	5.7711	5.8007	5.8378	5.8196	5.8553	5.8466	5.8638	5.8378	5.8007	5.8007	5.7711
alpha	1.3812	1.3847	1.3867	1.3892	1.3880	1.3904	1.3898	1.3909	1.3892	1.3867	1.3867	1.3847
util living area	0.7743	0.7367	0.6672	0.5681	0.4573	0.3379	0.2620	0.2638	0.4140	0.5899	0.7199	0.7870 (86)
Living	17.9043	18.1525	18.7368	19.4237	20.0460	20.4623	20.6363	20.6481	20.3465	19.6772	18.7360	17.8815
Non living	16.4331	16.7244	17.4044	18.1906	18.8792	19.3152	19.4765	19.4925	19.2154	18.5015	17.4252	16.4151
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.4558	18.1525	18.7368	19.4237	20.0460	20.4623	20.6363	20.6481	20.3465	19.6772	18.7360	18.3319 (87)
Th 2	19.7850	19.7946	19.8000	19.8067	19.8034	19.8098	19.8082	19.8113	19.8067	19.8000	19.8000	19.7946 (88)
util rest of house	0.7558	0.7164	0.6418	0.5357	0.4137	0.2818	0.1922	0.1875	0.3519	0.5472	0.6936	0.7691 (89)
MIT 2	18.4021	16.7244	17.4044	18.1906	18.8792	19.3152	19.4765	19.4925	19.2154	18.5015	17.4252	17.0073 (90)
Living area fraction	18.7415	17.1844	17.8336	18.5878	19.2550	19.6847	19.8501	19.8647	19.5798	18.8803	17.8475	17.4340 (91)
MIT	18.7415	17.1844	17.8336	18.5878	19.2550	19.6847	19.8501	19.8647	19.5798	18.8803	17.8475	17.4340 (92)
Temperature adjustment	18.7415	17.1844	17.8336	18.5878	19.2550	19.6847	19.8501	19.8647	19.5798	18.8803	17.8475	0.0000
adjusted MIT	18.7415	17.1844	17.8336	18.5878	19.2550	19.6847	19.8501	19.8647	19.5798	18.8803	17.8475	17.4340 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7378	0.6620	0.5928	0.4983	0.3918	0.2755	0.1948	0.1912	0.3390	0.5093	0.6409	0.7256 (94)
Useful gains	716.4615	743.0169	783.8311	779.9075	661.5247	486.4116	325.8414	291.9991	459.1001	573.6299	620.4501	651.3705 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	1746.1708	1497.1492	1377.2041	1178.8298	875.5931	573.3767	360.1548	321.8375	574.4436	881.7751	1194.2412	1530.2626 (97)
Space heating kWh	766.1037	506.7769	441.4696	287.2241	159.2669	0.0000	0.0000	0.0000	0.0000	229.2600	413.1296	653.8957 (98a)
Space heating requirement - total per year (kWh/year)												3457.1265
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	766.1037	506.7769	441.4696	287.2241	159.2669	0.0000	0.0000	0.0000	0.0000	229.2600	413.1296	653.8957 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3457.1265
Space heating per m ²												(98c) / (4) = 35.4214 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												333.7876 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	766.1037	506.7769	441.4696	287.2241	159.2669	0.0000	0.0000	0.0000	0.0000	229.2600	413.1296	653.8957 (98)
Space heating efficiency (main heating system 1)	333.7876	333.7876	333.7876	333.7876	333.7876	0.0000	0.0000	0.0000	0.0000	333.7876	333.7876	333.7876 (210)
Space heating fuel (main heating system)	229.5183	151.8262	132.2606	86.0500	47.7150	0.0000	0.0000	0.0000	0.0000	68.6844	123.7702	195.9017 (211)
Space heating efficiency (main heating system 2)												

Full SAP Calculation Printout



Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	279.2290	246.7102	261.3062	227.6194	219.2538	196.0294	192.2446	200.6672	203.7626	229.0736	245.8883	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	160.7536	142.0324	150.4354	131.0417	126.2256	112.8552	110.6762	115.5251	117.3072	131.8789	141.5592	158.8257 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1035.7265 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.7000
Water heating fuel used												1599.1161 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2874.7481 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1035.7265	27.6700	286.5855	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1599.1161	27.6700	442.4754	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	239.9055	27.6700	66.3819	(250)
Additional standing charges			0.0000	(251)
Total energy cost			795.4428	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1035.7265	0.1550	160.5055	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1599.1161	0.1411	225.6229	(264)
Space and water heating			386.1283	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	239.9055	0.1443	34.6258	(268)
Total CO2, kg/year			420.7541	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1035.7265	1.5737	1629.9026	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1599.1161	1.5217	2433.4031	(278)
Space and water heating			4063.3057	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	239.9055	1.5338	367.9751	(282)
Total Primary energy kWh/year			4431.2808	(286)

SAP 10 EPC IMPROVEMENTS

Design Stage- Triple Glazed

Current energy efficiency rating:

C 79

Full SAP Calculation Printout



Current environmental impact rating:

A 96

N Solar water heating
U Solar photovoltaic panels
V2 Wind turbine

Recommended
Recommended
Not applicable

Recommended measures:
N Solar water heating
U Solar photovoltaic panels

SAP change
+ 2.1
+ 6.0

Cost change
-£ 115
-£ 270

CO2 change
-52 kg (12.4%)
-132 kg (35.7%)

Recommended measures

Solar water heating
Solar photovoltaic panels

Typical annual savings

£115
£270
£385

0.54 kg/m²
1.35 kg/m²
1.88 kg/m²

Energy efficiency
B 81
B 87

Environmental impact
A 96
A 97

Potential energy efficiency rating: B 87
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 596 TEST (30 Jun 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current	Potential	Saving
Electricity	£795	£681	£115
Space heating	£287	£309	-£22
Water heating	£442	£305	£137
Lighting	£66	£66	£0
Generated (PV)	-£0	-£270	£270
Total cost of fuels	£795	£411	£385
Total cost of uses	£795	£410	£385
Delivered energy	29 kWh/m²	15 kWh/m²	14 kWh/m²
Carbon dioxide emissions	0.4 tonnes	0.2 tonnes	0.2 tonnes
CO2 emissions per m²	4 kg/m²	2 kg/m²	2 kg/m²
Primary energy	45 kWh/m²	24 kWh/m²	21 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling	97.6000 (1b)	2.6500 (2b)	258.6400 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		258.6400 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 258.6400 (5)

2. Ventilation rate

	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1160 (8)

Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
Yes
Blower Door
4.0000 (17)
0.3160 (18)
1 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

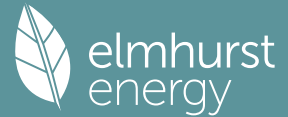
(20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.2923 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

3. Heat losses and heat loss parameter

Element	Gross m²	Openings m²	NetArea m²	U-value W/m²K	A x U W/K	K-value kJ/m²K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)

Full SAP Calculation Printout



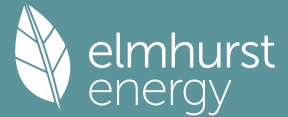
Windows						24.4200	1.1450	27.9618					(27)
Velux						1.6200	1.1450	1.8550					(27a)
Heatloss Floor 1						97.6000	0.1300	12.6880	0.0000		0.0000		(28a)
External Wall 1		127.0400		26.4400		100.6000	0.1800	18.1080	0.0000		0.0000		(29a)
External Roof 1		66.1600				66.1600	0.1100	7.2776	9.0000		595.4400		(30)
Rafter		38.6900		1.6200		37.0700	0.1400	5.1898	9.0000		333.6300		(30)
Total net area of external elements Aum(A, m2)						329.4900							(31)
Fabric heat loss, W/K = Sum (A x U)						(26)...	(30) + (32) =	75.1002					(33)
Main dwelling													
Internal Wall 1						203.0400			9.0000		1827.3600		(32c)
Heat capacity Cm = Sum(A x k)									(28)...	(30) + (32) + (32a)...	(32e) =	2756.4300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												28.2421	(35)
List of Thermal Bridges													
K1 Element								Length	Psi-value		Total		
E2 Other lintels (including other steel lintels)								16.4300	0.0470		0.7722		
E3 Sill								15.5300	0.0350		0.5435		
E4 Jamb								39.3200	0.0470		1.8480		
E5 Ground floor (normal)								47.9400	0.0150		0.7191		
E16 Corner (normal)								13.2500	0.0430		0.5697		
R1 Head of roof window								1.8000	0.0410		0.0738		
R2 Sill of roof window								1.8000	0.0460		0.0828		
R3 Jamb of roof window								3.6000	0.0430		0.1548		
E17 Corner (inverted - internal area greater than external area)								2.6500	-0.0690		-0.1829		
E10 Eaves (insulation at ceiling level)								25.2100	0.0370		0.9328		
E12 Gable (insulation at ceiling level)								5.1800	0.2500		1.2950		
E11 Eaves (insulation at rafter level)								12.5200	0.1500		1.8780		
E13 Gable (insulation at rafter level)								6.1800	0.0460		0.2843		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.9712	(36)
Point Thermal bridges												0.0000	(36a) =
Total fabric heat loss										(33) + (36) + (36a) =		84.0714	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	48.6026	48.3724	48.1468	47.0872	46.8890	45.9661	45.9661	45.7952	46.3216	46.8890	47.2900	47.7093	(38)
Average = Sum(39)m / 12 =	132.6740	132.4439	132.2183	131.1587	130.9604	130.0375	130.0375	129.8666	130.3930	130.9604	131.3615	131.7808	(39)
												131.1577	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.3594	1.3570	1.3547	1.3438	1.3418	1.3324	1.3324	1.3306	1.3360	1.3418	1.3459	1.3502	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.7162 (42)
Hot water usage for mixer showers													
	78.4811	77.3017	75.5831	72.2948	69.8681	67.1618	65.6236	67.3293	69.1990	72.1046	75.4636	78.1805	(42a)
Hot water usage for baths													
	30.1227	29.6754	29.0454	27.8838	27.0140	26.0496	25.5287	26.1542	26.8354	27.8674	29.0529	30.0209	(42b)
Hot water usage for other uses													
	42.4463	40.9028	39.3593	37.8158	36.2723	34.7288	34.7288	36.2723	37.8158	39.3593	40.9028	42.4463	(42c)
Average daily hot water use (litres/day)													138.8731 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477	(44)
Energy conte	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778	(45)
Energy content (annual)										Total = Sum(45)m =		2306.6686	
Distribution loss (46)m = 0.15 x (45)m													
	35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5400 (55)
Total storage loss													
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(56)
If cylinder contains dedicated solar storage													
	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	279.2290	246.7102	259.9105	220.8658	206.4595	183.4227	179.2177	188.5707	198.3597	227.6779	245.8883	275.8802	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Aperture area of solar collector													3.0000 (H1)
Zero-loss collector efficiency													0.8000 (H2)
Collector linear heat loss coefficient													1.8000 (H3)
Collector 2nd order heat loss coefficient													0.0000 (H4)
Collector loop efficiency													0.9000 (H5)
Incidence angle modifier													1.0000 (H6)
Overshading factor													0.8000 (H8)
Overall heat loss coefficient of system													6.5000 (H10)
Heat loss coefficient of collector loop													3.9667 (H11)
Dedicated solar storage volume													75.0000 (H12)
Effective solar volume													75.0000 (H14)
Reference volume													225.0000 (H15)
Storage tank correction coefficient													1.3161 (H16)
Heat delivered to hot water													623.4638 (H24)
Heat delivered to space heating													0.0000 (H29)
Solar input													623.4638
Solar input	-0.0000	-16.2023	-58.5368	-80.5111	-105.1325	-96.7244	-95.8673	-83.9014	-57.8957	-28.6925	-0.0000	-0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	279.2290	230.5079	201.3737	140.3547	101.3270	86.6984	83.3504	104.6693	140.4640	198.9854	245.8883	275.8802	(64)
								Total per year (kWh/year) = Sum(64)m =				2088.7284	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000	(64a)
Heat gains from water heating, kWh/month													
	111.5448	98.9225	104.4689	88.3784	81.3676	73.1923	72.2009	75.7458	81.5266	93.7515	99.8557	110.4313	(65)

5. Internal gains (see Table 5 and 5a)													

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)												
	149.9257	147.2061	140.4151	122.7478	109.3650	101.6559	97.0442	101.8089	113.2314	126.0101	138.6885	148.4292 (72)
Total internal gains												
	668.9226	666.3147	644.0403	599.4431	554.8998	520.1490	499.8603	504.5131	531.4191	571.1276	614.9666	651.7489 (73)

6. Solar gains

[Jan]				Area	Solar flux		g	FF		Access		Gains	
				m2	Table 6a		Specific data	Specific data		factor		W	
					W/m2		or Table 6b	or Table 6c		Table 6d			
Northeast				4.1300	11.2829		0.6800	0.7000		0.7700		15.3714 (75)	
Southeast				7.6900	36.7938		0.6800	0.7000		0.7700		93.3344 (77)	
Southwest				5.7200	36.7938		0.6800	0.7000		0.7700		69.4243 (79)	
Northwest				6.8800	11.2829		0.6800	0.7000		0.7700		25.6065 (81)	
Southeast				1.6200	38.2331		0.6800	0.7000		1.0000		26.5340 (82)	
Solar gains		230.2706	410.4446	607.7070	826.6107	990.4246	1010.9471	963.1920	837.2162	683.1686	466.2806	279.1815	194.8532 (83)
Total gains		899.1931	1076.7593	1251.7473	1426.0538	1545.3244	1531.0962	1463.0523	1341.7293	1214.5877	1037.4082	894.1481	846.6021 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7711	5.7811	5.7910	5.8378	5.8466	5.8881	5.8881	5.8959	5.8721	5.8466	5.8288	5.8102
alpha	1.3847	1.3854	1.3861	1.3892	1.3898	1.3925	1.3925	1.3931	1.3915	1.3898	1.3886	1.3873
util living area												
	0.8071	0.7611	0.6989	0.6123	0.5117	0.4052	0.3190	0.3517	0.4938	0.6587	0.7686	0.8190 (86)
Living	17.4469	17.8412	18.4477	19.1785	19.8290	20.3165	20.5602	20.5140	20.1161	19.2565	18.2162	17.3585
Non living	15.8965	16.3583	17.0678	17.9163	18.6507	19.1827	19.4232	19.3870	18.9876	18.0321	16.8185	15.7968
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.2275	17.8412	18.4477	19.1785	19.8290	20.3165	20.5602	20.5140	20.1161	19.2565	18.2162	17.8843 (87)
Th 2	19.7946	19.7964	19.7982	19.8067	19.8082	19.8156	19.8156	19.8169	19.8127	19.8082	19.8050	19.8017 (88)
util rest of house												
	0.7920	0.7431	0.6762	0.5824	0.4716	0.3504	0.2482	0.2797	0.4391	0.6248	0.7481	0.8048 (89)
MIT 2	18.1865	16.3583	17.0678	17.9163	18.6507	19.1827	19.4232	19.3870	18.9876	18.0321	16.8185	16.4987 (90)
Living area fraction									fLA = Living area / (4) =			0.3221 (91)
MIT	18.5218	16.8360	17.5123	18.3229	19.0303	19.5479	19.7894	19.7501	19.3511	18.4266	17.2688	16.9450 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5218	16.8360	17.5123	18.3229	19.0303	19.5479	19.7894	19.7501	19.3511	18.4266	17.2688	16.9450 (93)

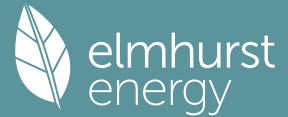
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7738	0.6878	0.6243	0.5396	0.4425	0.3369	0.2466	0.2753	0.4153	0.5780	0.6929	0.7619 (94)
Useful gains	695.8113	740.5433	781.4253	769.4331	683.8263	515.8427	360.7406	369.3953	504.3656	599.6636	619.5874	645.0071 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
	1886.8673	1580.8504	1456.0315	1235.8969	959.9794	643.4147	414.7468	435.0604	684.7116	1024.9693	1335.7823	1679.5518 (97)
Space heating kWh												
	886.1457	564.6863	501.9070	335.8540	205.4580	0.0000	0.0000	0.0000	0.0000	316.4274	515.6603	769.7012 (98a)
Space heating requirement - total per year (kWh/year)												
												4095.8399
Solar heating kWh												
	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												
												0.0000
Space heating kWh												
	886.1457	564.6863	501.9070	335.8540	205.4580	0.0000	0.0000	0.0000	0.0000	316.4274	515.6603	769.7012 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												
												4095.8399
Space heating per m ²												
										(98c) / (4) =		41.9656 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												334.0749 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement												
	886.1457	564.6863	501.9070	335.8540	205.4580	0.0000	0.0000	0.0000	0.0000	316.4274	515.6603	769.7012 (98)
Space heating efficiency (main heating system 1)												
	334.0749	334.0749	334.0749	334.0749	334.0749	0.0000	0.0000	0.0000	0.0000	334.0749	334.0749	334.0749 (210)
Space heating fuel (main heating system)												
	265.2536	169.0299	150.2379	100.5325	61.5006	0.0000	0.0000	0.0000	0.0000	94.7175	154.3547	230.3978 (211)
Space heating efficiency (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)												

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	279.2290	230.5079	201.3737	140.3547	101.3270	86.6984	83.3504	104.6693	140.4640	198.9854	245.8883	275.8802	(64)
Efficiency of water heater												173.7000	(216)
(217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	(217)
Fuel for water heating, kWh/month	160.7536	132.7046	115.9319	80.8029	58.3345	49.9127	47.9853	60.2587	80.8659	114.5569	141.5592	158.8257	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.7835	-57.5063	-86.5644	-100.0108	-107.3494	-94.0291	-92.6094	-87.5024	-77.6589	-66.6170	-43.2244	-32.9223	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1226.0245	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												173.7000	
Water heating fuel used												1202.4919	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												239.9055	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-884.7780	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1863.6440	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1226.0245	16.4900	202.1714	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1202.4919	16.4900	198.2909	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	239.9055	16.4900	39.5604	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-884.7780	16.4900	-145.8999	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-145.8999	(252)
Total energy cost			307.3149	(255)

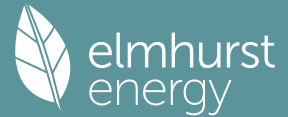
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.7758	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	87.4238	
SAP rating (Section 12)		87	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1226.0245	0.1546	189.5057	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1202.4919	0.1457	175.2024	(264)
Space and water heating			364.7081	(265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970	(267)
Energy for lighting	239.9055	0.1443	34.6258	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-884.7780	0.1345	-119.0297	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-119.0297	(269)
Total CO2, kg/year			291.4012	(272)
CO2 emissions per m2			2.9900	(273)
EI value			97.2617	
EI rating			97	(274)
EI band			A	

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	97.6000 (1b)	x 2.6500 (2b)	= 258.6400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 258.6400 (5)

2. Ventilation rate

			m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Air changes per hour			
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1160 (8)	
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	4.0000 (17)		
Infiltration rate	0.3160 (18)		
Number of sides sheltered	1 (19)		
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)		
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2923 (21)		

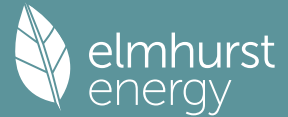
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.6000	5.1000	4.8000	4.4000	4.6000	4.2000	4.3000	4.1000	4.4000	4.8000	4.8000	5.1000 (22)
Wind factor	1.4000	1.2750	1.2000	1.1000	1.1500	1.0500	1.0750	1.0250	1.1000	1.2000	1.2000	1.2750 (22a)
Adj infilt rate												
	0.4092	0.3727	0.3508	0.3215	0.3361	0.3069	0.3142	0.2996	0.3215	0.3508	0.3508	0.3727 (22b)
Effective ac	0.5837	0.5694	0.5615	0.5517	0.5565	0.5471	0.5494	0.5449	0.5517	0.5615	0.5615	0.5694 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			2.0200	1.0000	2.0200		(26)
Windows			24.4200	1.1450	27.9618		(27)
Velux			1.6200	1.1450	1.8550		(27a)
Heatloss Floor 1			97.6000	0.1300	12.6880	0.0000	0.0000 (28a)
External Wall 1	127.0400	26.4400	100.6000	0.1800	18.1080	0.0000	0.0000 (29a)
External Roof 1	66.1600		66.1600	0.1100	7.2776	9.0000	595.4400 (30)
Rafter	38.6900	1.6200	37.0700	0.1400	5.1898	9.0000	333.6300 (30)
Total net area of external elements Aum(A, m ²)			329.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	75.1002		(33)
Main dwelling							
Internal Wall 1			203.0400			9.0000	1827.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	2756.4300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							28.2421 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				16.4300	0.0470	0.7722	
E3 Sill				15.5300	0.0350	0.5435	
E4 Jamb				39.3200	0.0470	1.8480	
E5 Ground floor (normal)				47.9400	0.0150	0.7191	
E16 Corner (normal)				13.2500	0.0430	0.5697	
R1 Head of roof window				1.8000	0.0410	0.0738	
R2 Sill of roof window				1.8000	0.0460	0.0828	
R3 Jamb of roof window				3.6000	0.0430	0.1548	
E17 Corner (inverted - internal area greater than external area)				2.6500	-0.0690	-0.1829	
E10 Eaves (insulation at ceiling level)				25.2100	0.0370	0.9328	
E12 Gable (insulation at ceiling level)				5.1800	0.2500	1.2950	
E11 Eaves (insulation at rafter level)				12.5200	0.1500	1.8780	
E13 Gable (insulation at rafter level)				6.1800	0.0460	0.2843	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.9712 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	84.0714 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	49.8217	48.6026	47.9258	47.0872	47.4974	46.6953	46.8890	46.5062	47.0872	47.9258	47.9258	48.6026 (38)
Heat transfer coeff	133.8932	132.6740	131.9972	131.1587	131.5688	130.7667	130.9604	130.5776	131.1587	131.9972	131.9972	132.6740 (39)
Average = Sum(39)m / 12 =												131.7853
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3719	1.3594	1.3524	1.3438	1.3480	1.3398	1.3418	1.3379	1.3438	1.3524	1.3524	1.3594 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7162 (42)
Hot water usage for mixer showers												78.1805 (42a)
Hot water usage for baths												30.0209 (42b)
Hot water usage for other uses												42.4463 (42c)
Average daily hot water use (litres/day)												138.8731 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	151.0502	147.8799	143.9878	137.9944	133.1544	127.9402	125.8811	129.7558	133.8501	139.3313	145.4192	150.6477 (44)
Energy content (annual)	239.2266	210.5790	221.3038	188.9074	179.2514	157.3174	152.2422	160.6648	165.0506	189.0712	207.1763	235.8778 (45)
Distribution loss (46)m = 0.15 x (45)m	35.8840	31.5869	33.1956	28.3361	26.8877	23.5976	22.8363	24.0997	24.7576	28.3607	31.0765	35.3817 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5400 (55)
Total storage loss	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (56)
If cylinder contains dedicated solar storage	16.7400	15.1200	16.7400	16.2000	16.7400	16.2000	16.7400	16.7400	16.2000	16.7400	16.2000	16.7400 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	279.2290	246.7102	259.9105	220.8658	206.4595	183.4227	179.2177	188.5707	198.3597	227.6779	245.8883	275.8802 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												796.0520 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												796.0520
Solar input	-6.7900	-24.1826	-70.9603	-98.1423	-120.9931	-119.5648	-116.8936	-105.6852	-76.9483	-44.9765	-10.9153	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	272.4389	222.5276	188.9502	122.7235	85.4664	63.8579	62.3241	82.8855	121.4114	182.7013	234.9731	275.8802 (64)
	Total per year (kWh/year) = Sum(64)m =											1916.1403 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	111.5448	98.9225	104.4689	88.3784	81.3676	73.1923	72.2009	75.7458	81.5266	93.7515	99.8557	110.4313 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702	162.9702 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.9611	30.1640	24.5310	18.5715	13.8824	11.7201	12.6640	16.4612	22.0942	28.0536	32.7427	34.9050 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	376.6991	380.6081	370.7576	349.7872	323.3158	298.4364	281.8154	277.9065	287.7569	308.7273	335.1988	360.0782 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132	54.0132 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468	-108.6468 (71)
Water heating gains (Table 5)	149.9257	147.2061	140.4151	122.7478	109.3650	101.6559	97.0442	101.8089	113.2314	126.0101	138.6885	148.4292 (72)
Total internal gains	668.9226	666.3147	644.0403	599.4431	554.8998	520.1490	499.8603	504.5131	531.4191	571.1276	614.9666	651.7489 (73)

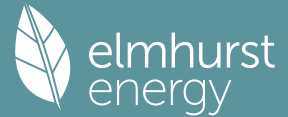
6. Solar gains

[Jan]												Gains
					Area	Solar flux		g	FF		Access	
					m2	Table 6a		Specific data	Specific data		factor	W
						W/m2		or Table 6b	or Table 6c		Table 6d	
Northeast					4.1300	15.4678		0.6800	0.7000		0.7700	21.0727 (75)
Southeast					7.6900	47.5950		0.6800	0.7000		0.7700	120.7335 (77)
Southwest					5.7200	47.5950		0.6800	0.7000		0.7700	89.8044 (79)
Northwest					6.8800	15.4678		0.6800	0.7000		0.7700	35.1041 (81)
Southeast					1.6200	51.0923		0.6800	0.7000		1.0000	35.4585 (82)
Solar gains	302.1731	456.0719	676.6698	958.1591	1119.6383	1231.5100	1158.9989	1009.9294	816.9957	553.7603	353.1936	246.0013 (83)
Total gains	971.0957	1122.3866	1320.7101	1557.6022	1674.5381	1751.6590	1658.8592	1514.4425	1348.4148	1124.8880	968.1601	897.7502 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.7186	5.7711	5.8007	5.8378	5.8196	5.8553	5.8466	5.8638	5.8378	5.8007	5.8007	5.7711
alpha	1.3812	1.3847	1.3867	1.3892	1.3880	1.3904	1.3898	1.3909	1.3892	1.3867	1.3867	1.3847
util living area	0.7743	0.7367	0.6675	0.5695	0.4597	0.3399	0.2638	0.2656	0.4152	0.5903	0.7199	0.7870 (86)
Living	17.9043	18.1525	18.7355	19.4189	20.0407	20.4595	20.6348	20.6466	20.3447	19.6762	18.7360	17.8815
Non living	16.4331	16.7244	17.4029	18.1856	18.8740	19.3131	19.4756	19.4917	19.2138	18.5005	17.4252	16.4151
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	19.4558	18.1525	18.7355	19.4189	20.0407	20.4595	20.6348	20.6466	20.3447	19.6762	18.7360	18.3319 (87)
Th 2	19.7850	19.7946	19.8000	19.8067	19.8034	19.8098	19.8082	19.8113	19.8067	19.8000	19.8000	19.7946 (88)
util rest of house	0.7558	0.7164	0.6422	0.5371	0.4160	0.2836	0.1936	0.1889	0.3530	0.5476	0.6936	0.7691 (89)
MIT 2	18.4021	16.7244	17.4029	18.1856	18.8740	19.3131	19.4756	19.4917	19.2138	18.5005	17.4252	17.0073 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	18.7415	17.1844	17.8321	18.5829	19.2498	19.6824	19.8490	19.8637	19.5781	18.8792	17.8475	17.4340 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7415	17.1844	17.8321	18.5829	19.2498	19.6824	19.8490	19.8637	19.5781	18.8792	17.8475	17.4340 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7378	0.6620	0.5931	0.4996	0.3939	0.2771	0.1961	0.1925	0.3400	0.5096	0.6409	0.7256 (94)
Useful gains	716.4615	743.0169	783.3217	778.1137	659.5190	485.4478	325.3852	291.5911	458.4556	573.2547	620.4501	651.3705 (95)
Ext temp.	5.7000	5.9000	7.4000	9.6000	12.6000	15.3000	17.1000	17.4000	15.2000	12.2000	8.8000	5.9000 (96)
Heat loss rate W	1746.1708	1497.1492	1377.0132	1178.1859	874.9122	573.0679	360.0093	321.7059	574.2282	881.6384	1194.2412	1530.2626 (97)
Space heating kWh	766.1037	506.7769	441.7065	288.0520	160.2526	0.0000	0.0000	0.0000	0.0000	229.4375	413.1296	653.8957 (98a)
Space heating requirement - total per year (kWh/year)												3459.3545
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	766.1037	506.7769	441.7065	288.0520	160.2526	0.0000	0.0000	0.0000	0.0000	229.4375	413.1296	653.8957 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3459.3545
Space heating per m2										(98c) / (4) =		35.4442 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												333.7876 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	766.1037	506.7769	441.7065	288.0520	160.2526	0.0000	0.0000	0.0000	0.0000	229.4375	413.1296	653.8957 (98)
Space heating efficiency (main heating system 1)	333.7876	333.7876	333.7876	333.7876	333.7876	0.0000	0.0000	0.0000	0.0000	333.7876	333.7876	333.7876 (210)
Space heating fuel (main heating system)	229.5183	151.8262	132.3316	86.2980	48.0103	0.0000	0.0000	0.0000	0.0000	68.7376	123.7702	195.9017 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	272.4389	222.5276	188.9502	122.7235	85.4664	63.8579	62.3241	82.8855	121.4114	182.7013	234.9731	275.8802 (64)
Efficiency of water heater (217)m	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000	173.7000 (216)
Fuel for water heating, kWh/month	156.8445	128.1103	108.7796	70.6526	49.2035	36.7633	35.8803	47.7176	69.8972	105.1821	135.2752	158.8257 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945 (231)
Lighting	29.7260	23.8473	21.4718	15.7312	12.1512	9.9276	11.0847	14.4084	18.7150	24.5552	27.7350	30.5521 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-49.1205	-62.6655	-93.0492	-108.1660	-112.2667	-101.5221	-99.5439	-95.2060	-85.9071	-74.7546	-52.4007	-40.4833 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1036.3940 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.7000
Water heating fuel used												1103.1320 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
pump for solar water heating												80.0000 (230g)
Total electricity for the above, kWh/year												80.0000 (231)
Electricity for lighting (calculated in Appendix L)												239.9055 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-975.0856 (233)
Wind generation												0.0000 (234)

Full SAP Calculation Printout



Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1484.3459 (238)

10a. Fuel costs - using BEDF prices (596)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1036.3940	27.6700	286.7702 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1103.1320	27.6700	305.2366 (247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	27.6700	22.1360 (249)
Energy for lighting	239.9055	27.6700	66.3819 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-975.0856	27.6700	-269.8062
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-269.8062 (252)
Total energy cost			410.7185 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1036.3940	0.1550	160.5980 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1103.1320	0.1470	162.1908 (264)
Space and water heating			322.7888 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	239.9055	0.1443	34.6258 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-975.0856	0.1350	-131.6103
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-131.6103 (269)
Total CO2, kg/year			236.9013 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1036.3940	1.5736	1630.9125 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1103.1320	1.5439	1703.1574 (278)
Space and water heating			3334.0699 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	239.9055	1.5338	367.9751 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-975.0856	1.4989	-1461.5150
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1461.5150 (283)
Total Primary energy kWh/year			2361.5540 (286)