

Tate Consulting

ENERGY STATEMENT

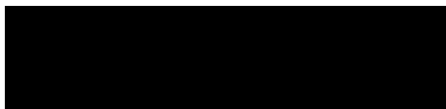
Proposed Employment Development

June 2014

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This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk

Executive Summary

Tate Consulting has been appointed by Bericote Properties Limited to prepare an Energy Statement in support of a Planning Application for a Proposed Employment Development on land adjacent to Shripney Road, Bognor Regis; and sets out the building energy strategy as aligned with local planning policy.

This Building Energy Statement specifically focuses on energy reduction and energy efficiency to reduce the energy consumption and carbon dioxide emissions of the proposed development. Once energy demand has been reduced through the application of energy efficiency measures, the residual energy requirement is met by low carbon energy strategies such as improved fabric performance, air tightness and natural lighting etc.,

Summary Performance Table

	Energy Demand kWh pa	Energy Reduction Achieved %	Regulated CO ₂ emissions Kg pa	CO ₂ Emissions Reduction Achieved %
Building Regulations Part L 2010 Compliance – TER (Baseline regulated energy demand and emissions)	183,628	N/A	50,877	N/A
Predicted Energy Demand (PED)				
Proposed scheme after residual energy demand and emissions measures	167,421	8.82%	47,657	6.33%
Predicted Energy Demand (PED)				
Proposed scheme after residual energy demand and emissions measures And energy efficiency measures	120,580	34.33%	38,426	24.47%

The application of energy reduction and energy efficiency measures means that the building will use 34% less energy and emit 25% less CO₂ than if constructed to the standards required for compliance with Approved Document L2.

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1 INTRODUCTION & BACKGROUND

1.1 Background

Tate Consulting has been appointed by Bericote Properties Limited in support of a Planning Application for an employment development on land adjacent to Shripney Road, Bognor Regis.

This Energy Statement accompanies the planning application and provides approaches to how the proposed development can be designed to meet national and local energy policies and objectives.

This report outlines the national and local planning policy relevant to the Proposed Employment Development. The report illustrates how energy efficiency measures will be incorporated into the development; provides a preliminary assessment of the predicted energy demand (PED) and predicted CO₂ emissions of the site.

Energy efficiency, low carbon energy measures are also examined in context of the development Planning Policy Context.

1.2 Site Location

The proposed development land is located on the eastern outskirts of Bognor Regis. The site is on land at Oldlands Farm, Shripney Road, Bognor Regis, West Sussex, PO22 9NN.

1.3 Development proposals

The development comprises the erection of two detached industrial/distribution units (B1(c)/B2/B8) including access and servicing arrangements, car parking, landscaping and associated flood compensation area at Oldlands Farm, Shripney Road, Bognor Regis, West Sussex, PO22 9NN

The proposed employment development will consist of up to 38,959 m² GEA

1.4 Implications of Policy and Regulations

Climate change has been recognised as one of the most immediate environmental challenges we currently face. Government legislation now includes numerous provisions to minimise climate change and mitigate the anticipated effects. These provisions include a reduction in the emission of greenhouse gases. CO₂ interim targets have also been set and the legislation around this issue is discussed below.

The UK Government's international commitment has been translated into national and local planning policy. These policies have sought to ensure that the carbon dioxide emissions associated with new buildings are reduced through energy demand reduction and the incorporation of low and zero carbon technologies to deliver electricity and heat.

The need to reduce energy usage within new buildings will be enforced through step changes in the Building Regulations Part L through to 2016 and beyond. The changes to Part L of the Building Regulations for non-domestic properties have been subject to a series of public consultations, although the final targets and definitions have not been produced. The expected changes in the Building Regulations for non-domestic buildings are presented in Table 1.

Table 1 Building Regulations for Non-Domestic Buildings

Development type	Commitment	Year of implementation
Commercial	Building Regulations Part L 2013 compliance (9% reduction in CO ₂ emissions measured against current Building Regulations)	2014
All non-domestic buildings	Building Regulations Part L 2016 "aggregated zero carbon" compliance (not yet defined)	2016
All publicly funded non domestic buildings	"Zero carbon" compliance (a further reduction in CO ₂ emissions measured against 2016 Building Regulations)	2018
All remaining buildings	Building Regulations part L 2019 "zero carbon" compliance (a further reduction in CO ₂ emissions measured against 2016 Building Regulations)	2019

It is important to note that these changes are not yet in statute, but being "worked towards". Therefore, any energy strategy needs to be conscious of the fact that the policy landscape is not definite.

Parallel to demand-side regulation, there is also a significant push in supply of low carbon and renewable energy generation. The Energy Act of 2008 provides the framework for the delivery of fiscal measures, such as the Renewable Obligation Order (amended 2011), Feed-in Tariff (2010) and Renewable Heat Incentive (2011), to ensure there is a low carbon transition for utility infrastructure.

The national policy agenda is driving both demand reduction and generation of low carbon energy within urban developments. Arun District Council has also set policies relating to the low carbon agenda

1.5 Local Planning Policy

The relevant local policies to be met through the energy strategy are set out in Arun's District Council Local Plan and specifically; Addressing Climate Change; Policy SP 17, and Policy SP 18 and Arun Local Plan (Publication Version, 2014) policies ECCSP1 and ECCSP2. The Building Regulations 2013 Part L will also apply.

Despite the revocation of the South East Plan, Arun District Council, will take forward the relevant policy requirement in policy ECCSP2 which requires 10% of energy to come from renewable or low carbon technologies for major residential development or commercial development 1000m² or larger unless it can be demonstrated that this is unviable or to consider 'allowable solutions' where it is clearly demonstrated that the provision of on site renewable or low carbon energy generation is unviable or not feasible.

It is noted that any emerging policy is subject to change, which the development will need to be resilient to. It is therefore important that these targets are reviewed and adjusted at key stages of the planning and development process.

2.0 Energy Strategy

In order to demonstrate compliance with the requirements a three-stage process has been undertaken

- i. Establish a baseline energy and CO₂ emissions rate. This has been done using the Part L CO₂ emissions rate calculations Target Emissions Rate (TER)
- ii. Further reduce the residual energy demand and carbon emissions through the application of Low Carbon technologies.
- iii. Make a further reduction against the TER in terms of energy demand through energy efficiency measures such as improved lighting performance and controls and HVAC system efficiencies and control.

2.1 Baseline Energy Demand

The baseline Carbon Dioxide emissions detailed in table 2 are based on the Target Emission Rate (TER) as defined in Approved Document L2A for a scheme compliant with the 2013 Building Regulations without any low or zero Carbon technologies on site. It has been calculated using an SBEM model, a copy of which is included in Appendix A. The baseline energy demand and CO₂ emissions have been taken from the Notional Building and TER results.

Reductions from the baseline energy demand figures have been calculated using the following Carbon Dioxide emission factors from the National Calculation Method:

Table 2: Carbon Dioxide emission figures for fuels

Gas	0.198 kgCO ₂ /kWh
Grid Supplied Electricity	0.517 kgCO ₂ /kWh
Grid Displaced Electricity	0.529 kgCO ₂ /kWh
Waste Heat	0.058 kgCO ₂ /kWh
Biomass	0.025 kgCO ₂ /kWh

A copy of all calculations used in establishing the savings from the baseline energy usage is included in this document.

2.2 Energy efficiency & Low Carbon Measures

Measures to be used in the building design to reduce energy demand requirements can be split into two categories, passive and active.

Passive measures

Low carbon design features from architectural and building fabric selection that inherently

reduces the building energy requirement and incorporated into the design of the buildings to reduce energy requirements:

- Reducing the air permeability and thermal bridging coefficient of the building envelope;
- Optimising U-Values of the external fabric to enable a reduction in energy loss (additional insulation);
- Minimising infiltration losses;
- Incorporating thermal mass to support “free cooling” during summer months;
- Optimising the ratio of roof-lights to maximise the use of natural day-lighting;
- Locating plant rooms away from southern elevations to avoid excessive heat gain and to allow maximum plant efficiency; and.
- Providing passive shading to avoid overheating

Active measures

Design features of the building and its services that will increase the efficiency of the energy used and will therefore reduce the building energy requirements.

The energy uses have been critically assessed and the opportunities to decrease energy use and matching the remaining energy requirements with the most appropriate application. Examples applied to this project include:

- Illumination levels will be reduced to the minimum levels in line with current best practice to minimise energy use.
- High efficiency LED lighting
- Use of variable speed drives to modulate fan and pump speeds to the minimum necessary.
- Heat recovery to air ventilation systems
- Carefully selected and set-up building management system
- Ductwork sizes will be increased and service routes will be optimized to minimise energy distribution through fan power.
- Gas burners will be modulating type so that the required demand can be met more efficiently with reduced energy consumption.
- High efficiency heating and cooling air conditioning systems, with high CoP and Seasonal EER will be used.
- High frequency control gear and energy efficient lamps will be used throughout.
- Where practical, dimmable and zoned lighting that works in conjunction with daylight linking will be used throughout the offices and warehouse, to reduce energy consumption.
- PIR activated lighting for selected areas will be incorporated to minimise energy use in unoccupied areas.

- Energy use data will be collected automatically from the site to enable the monitoring of the buildings performance from an environmental and financial point of view.
- White goods achieve a high rating in the EU Energy Efficiency Labelling Scheme or that information on this scheme is provided.
- Efficient lifts with regenerative motor drives

Guidance is based on passive and active elements that combine to give very well insulated airtight buildings with appropriate and efficient building services. More importantly, it highlights the importance of maximising long-lasting energy performance improvements to the fabric of a building, before adding the optimum low carbon energy solution if required.

The reduction from increased energy efficiency are summarised in the table 2 under

Table 3: Summary table

	Energy Demand kWh pa	Energy Reduction Achieved %	Regulated CO ₂ emissions Kg pa	CO ₂ Emissions Reduction Achieved %
Building Regulations Part L 2010 Compliance – TER (Baseline regulated energy demand and emissions)	183,628	N/A	50,877	N/A
Predicted Energy Demand (PED)				
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Predicted Energy Demand (PED)				
Proposed scheme after residual energy demand and emissions measures And energy efficiency measures	120,580	34.33%	38,426	24.47%

2.3 Conclusion

The application of energy reduction and energy efficiency measures means that the building will use 34% less energy and emit 25% less CO₂ than if constructed to the standards required for compliance with Approved Document L2.

Passive low carbon design features including reduced air permeability and infiltration, additional insulation and roof-lights etc., has reduced the predicted energy demand over building control compliance requirements by 8.82% and CO2 emissions by 6.33%.

Energy efficiency measures including, High efficiency LED lighting, variable speed drives to modulate fan and pump speeds, Heat recovery to air ventilation systems etc., further reduces the predicted energy demand by 25% and CO2 emissions by 18%.

Appendix A – Baseline BRUKL

BRUKL Output Document



Compliance with England and Wales Building Regulations Part L 2010

Project name

Proposed Employment Development

As designed

Date: Fri Jun 13 15:46:16 2014

Administrative Information

Building Details

Address: Oldlands Farm, Shripney Road, Bognor Regis,
West Sussex, Bognor Regis, PO22 9NN

Owner Details

Name: Bericole Properties Ltd

Telephone number: [REDACTED]

Address: 8 Hamilton Road, Wotton Bassett, Wotton Bassett, CV32 4LY

Certification tool

Calculation engine: SBEM

Calculation engine version: v4.1.e.5

Interface to calculation engine: Design Database

Interface to calculation engine version: v25.05

BRUKL compliance check version: v4.1.e.5

Certifier details

Name: Tate Consulting

Telephone number: 01423 538202

Address: Osborne House, 20 Victoria Avenue, Harrogate,
HG1 5QY

Criterion 1: The calculated CO₂ emission rate for the building should not exceed the target

1.1	CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	23.7
1.2	Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23.7
1.3	Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	17.9
1.4	Are emissions from the building less than or equal to the target?	BER =< TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	Surface where the maximum value occurs*
Wall**	0.35	0.21	0.61	OFFICE Partition 1
Floor	0.25	0.2	0.2	OFFICE Exposed Floor 1
Roof	0.25	0.15	0.15	OFFICE Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	1.48	2.19	WS1 Door 1
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
U _{a-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{a-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs.				
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.				
*** Display windows and similar glazing are excluded from the U-value check.				
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	2.5

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- HVAC 3

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency	
3.5	3.13	-	-	
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system				YES

2- HVAC 2

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
0.95	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			
NO			

3- HVAC 1

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
0.88	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			
YES			

1- Default DHW

Heating seasonal efficiency	Hot water storage loss factor [kWh/litre per day]
0.95	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
OFFICE	1	0.85	-
WC	-	-	1.5

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
OFFICE	1940	-
WC	520	-
WS1	5610	-

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
OFFICE	NO (-46%)	NO
WS1	NO (-95.7%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Area [m ²]	2146.7	2146.7	100	A1/A2 Retail/Financial and Professional services
External area [m ²]	6400.7	6400.7		A3/A4/A5 Restaurants and Outlets/Drinking Est./Taverns
Weather	PLY	PLY		B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	7		B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	1255.51	1979.62		B8 Storage or Distribution
Average U-value [W/m ² K]	0.2	0.31		C1 Hotels
Alpha value* [%]	7.66	25.9		C2 Residential Inst.: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				C2 Residential Inst.: Residential schools
				C3 Residential Inst.: Universities and colleges
				C2A Secure Residential Inst
				Residential spaces
				D1 Non-residential Inst.: Community/Day Centres
				D1 Non-residential Inst.: Libraries, Museums, and Galleries
				D1 Non-residential Inst.: Education
				D1 Non-residential Inst.: Primary Health Care Building
				D1 Non-residential Inst.: Crown and County Courts
				D2 General Assembly and Leisure, Night Clubs and Theatres
				Others: Passenger terminals
				Others: Emergency services
				Others: Miscellaneous 24hr activities
				Others: On-Port 24 hrs
				Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	30.67	61.08
Cooling	1.25	1.15
Auxiliary	1.49	0.81
Lighting	18.39	17.64
Hot water	4.37	4.87
Equipment*	31.22	31.22
TOTAL**	56.17	85.54

* Energy used by equipment does not count towards the total for calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m ²]	181.1	299.95
Primary energy* [kWh/m ²]	97.66	127.34
Total emissions [kg/m ²]	17.9	23.7

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	119.9	136.5	9.7	12.7	4.2	3.43	2.99	3.5	4
Notional	207.7	150.5	23.7	11.6	3.8	2.43	3.6	---	---
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	318.5	25.1	104.3	0	35	0.85	0	0.95	0
Notional	578.8	72.8	203	0	14.4	0.79 / 0.81	0	---	---
[ST] Multiburner radiant heaters, [HS] Radiant heater, [HFT] Natural Gas, [CFT] Electricity									
Actual	88	78.8	30.4	0	0	0.8	0	0.88	0
Notional	186.7	94.2	60.3	0	0	0.79 / 0.81	0	---	---

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	U _{typ}	U _{min}	Surface where the minimum value occurs*
Wall	0.23	0.15	OFFICE Wall 1
Floor	0.2	0.2	OFFICE Exposed Floor 1
Roof	0.15	0.15	OFFICE Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1.1	OFFICE Window 1
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{typ} = Typical individual element U-values [W/(m ² K)]			U _{min} = Minimum individual element U-values [W/(m ² K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m ³ /(h.m ²) at 50 Pa	5	2.5

Thermal bridges

There is at least one junction in the project whose linear thermal transmittance has been defined as having been calculated following a quality-assured accredited construction details approach in accordance with a scheme approved by the Secretary of State.

Appendix B –BRUKL Document Energy Reduction/Efficiency Measures

BRUKL Output Document



Compliance with England and Wales Building Regulations Part L 2010

Project name

Proposed Employment Development

As designed

Date: Fri Jun 13 15:40:35 2014

Administrative information

Building Details

Address: Oldlands Farm, Shripney Road, Bognor Regis,
West Sussex, Bognor Regis, PO22 9NN

Certification tool

Calculation engine: SBEM

Calculation engine version: v4.1.e.5

Interface to calculation engine: Design Database

Interface to calculation engine version: v25.05

BRUKL compliance check version: v4.1.e.5

Owner Details

Name: Bericote Properties Ltd

Telephone number: 01926 325615

Address: 8 Hamilton Terrace, Learnington Spa, CV32 4LY

Certifier details

Name: Tate Consultancy

Telephone number: [REDACTED]

Address: Osborne House, 20 Victoria Avenue, Harrogate,
HG1 5QY

Criterion 1: The calculated CO₂ emission rate for the building should not exceed the target

1.1	CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	23.7
1.2	Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23.7
1.3	Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	22.2
1.4	Are emissions from the building less than or equal to the target?	BER ≤ TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.21	0.61	OFFICE Partition 1
Floor	0.25	0.2	0.2	OFFICE Exposed Floor 1
Roof	0.25	0.15	0.15	OFFICE Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	1.46	2.19	WS1 Door 1
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs. ** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. *** Display windows and similar glazing are excluded from the U-value check. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	8.68

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- HVAC 3

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
3.5	3.13	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

2- HVAC 2

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
0.95	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

3- HVAC 1

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
0.88	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

1- Default DHW

Heating seasonal efficiency	Hot water storage loss factor [kWh/litre per day]
0.95	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
OFFICE	1	0.85	-
WC	-	-	1.5

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
OFFICE	1940	-
WC	520	-
WS1	5610	-

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
OFFICE	NO (-46%)	NO
WS1	NO (-95.7%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Area [m ²]	2146.7	2146.7	100	A1/A2 Retail/Financial and Professional services
External area [m ²]	6400.7	6400.7		AGAA/A5 Restaurants and Cafes/Dining Est./Takeaways
Weather	PLY	PLY		B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	9	7		B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	1255.51	1979.62		B8 Storage or Distribution
Average U-value [W/m ² K]	0.2	0.31		C1 Hotels
Alpha value* [%]	7.66	25.9		C2 Residential Inst.: Hospitals and Care Homes
				C2 Residential Inst.: Residential schools
				C2 Residential Inst.: Universities and colleges
				C2A Secure Residential Inst.
				Residential spaces
				D1 Non-residential Inst.: Community/Day Centres
				D1 Non-residential Inst.: Libraries, Museums, and Galleries
				D1 Non-residential Inst.: Education
				D1 Non-residential Inst.: Primary Health Care Building
				D1 Non-residential Inst.: Crown and County Courts
				D2 General Assembly and Leisure, Night Clubs and Theatres
				Others: Passenger terminals
				Others: Emergency services
				Others: Miscellaneous 24hr activities
				Others: Car Parks 24 hrs
				Others: Stand alone utility block

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	52.48	61.08
Cooling	1.25	1.15
Auxiliary	1.49	0.81
Lighting	18.39	17.64
Hot water	4.37	4.87
Equipment*	31.22	31.22
TOTAL**	77.99	85.54

* Energy used by equipment does not count towards the total for calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m ²]	225.27	299.95
Primary energy* [kWh/m ²]	119.92	127.34
Total emissions [kg/m ²]	22.2	23.7

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	119.9	136.5	9.7	12.7	4.2	3.43	2.99	3.5	4
Notional	207.7	150.5	23.7	11.6	3.8	2.43	3.6	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	318.5	25.1	104.3	0	35	0.85	0	0.95	0
Notional	578.8	72.8	203	0	14.4	0.79 / 0.81	0	----	----
[ST] Multiburner radiant heaters, [HS] Radiant heater, [HFT] Natural Gas, [CFT] Electricity									
Actual	160.4	57.1	55.5	0	0	0.8	0	0.88	0
Notional	186.7	94.2	60.3	0	0	0.79 / 0.81	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEEF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	U _{i,typ}	U _{i,min}	Surface where the minimum value occurs*
Wall	0.23	0.15	OFFICE Wall 1
Floor	0.2	0.2	OFFICE Exposed Floor 1
Roof	0.15	0.15	OFFICE Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1.1	OFFICE Window 1
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i,typ} = Typical individual element U-values [W/(m²K)]		U _{i,min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	8.68

Thermal bridges

There is at least one junction in the project whose linear thermal transmittance has been defined as having been calculated following a quality-assured accredited construction details approach in accordance with a scheme approved by the Secretary of State.