

58 FERRINGHAM LANE

FERRING

BN12 5LU

ENERGY STATEMENT

FOR

FOULKES ARCHITECTURE & DESIGN LTD

September 2020

Project no. 11364



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FERRING

BN12 5LU

ENERGY ASSESSMENT

FOULKES ARCHITECTURE & DESIGN LTD

REVISION	DATE	PREPARED BY	REVIEWED BY	COMMENTS
0	11/09/2020	Tracey Walsh	M Heptonstall	For Comment

The current report provides a brief overview of the wide range of opportunities for renewable energy and is not intended as detailed design advice. As such data and information should only be treated as INDICATIVE at this stage of the process. Further investigation can be undertaken when more accurate and detailed information is required on specific measures.

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1.0 Introduction

1.1 About C80 Solutions Ltd

C80 Solutions are independent Sustainability and Energy Consultants providing carbon reduction solutions to help the UK achieve its carbon emission reduction target of 80% by 2050 - as set out in the Government's Climate Change Act 2008.

Our range of affordable but comprehensive solutions for the construction industry are broken down into two sectors; i) Building Compliance and ii) Consultancy.

Building Compliance:

Our Building Compliance services include; Code for Sustainable Homes Assessments, SAP Calculations, On Construction Energy Performance Certificates, Water Efficiency Calculations, SBEM Calculations, Commercial EPCs, BREEAM assessments and Air Tightness Testing.

Consultancy:

Our experience and exposure to building compliance combined with previous experience and IEMA accredited training means we have built up a vast amount of knowledge which enables us to provide our clients with invaluable advice. Our Consultancy services include; Renewable Energy Feasibility Reports, Energy Statements for planning, Sustainability Statements and Building Compliance Advisory Reports.

1.2 Introduction to Developments

C80 Solutions have been instructed to prepare an Energy Statement by Foulkes Architecture & Design Ltd for the proposed new build residential development at 58 Ferringham Lane, Ferring, BN12 5LU.

The project anticipates the provision of 1no 5 bed semi-detached property, over 2-storeys.

The site is located in the beachside residential area of Ferring.

The plan of the proposed development can be seen in Figure 1-5 below.

Figure 1: Site plan



Figure 2: Ground Floor plan

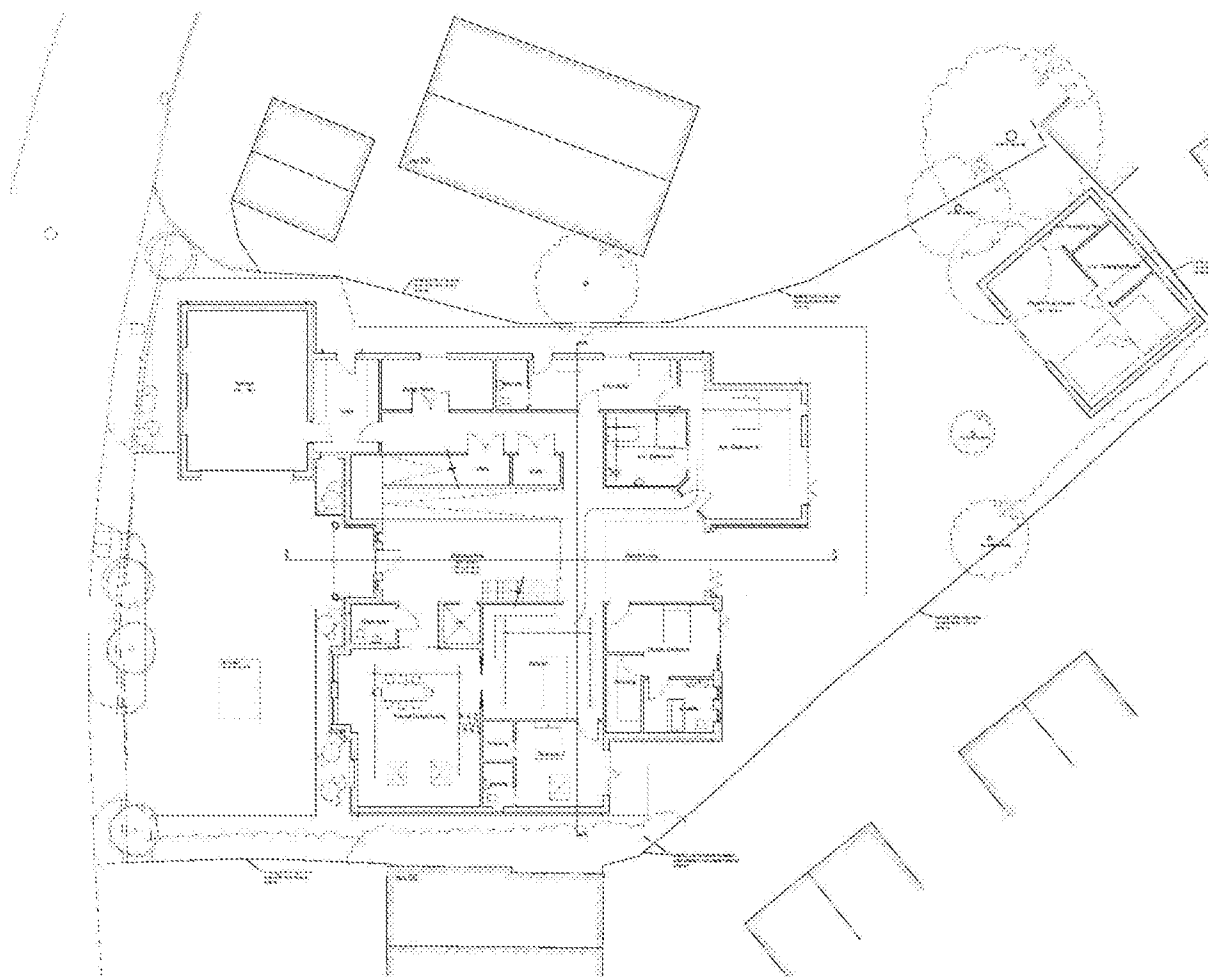


Figure 3: First floor & roof plans

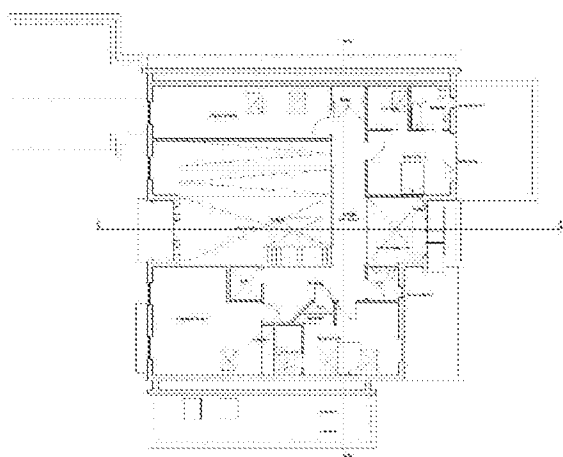
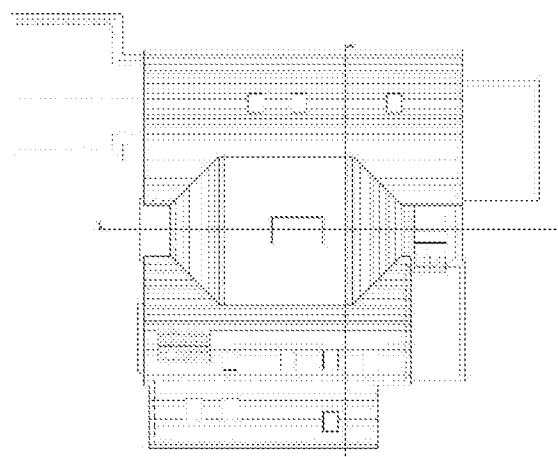
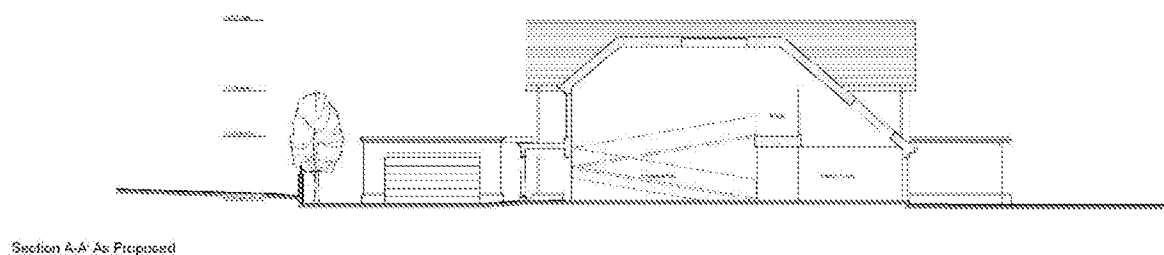
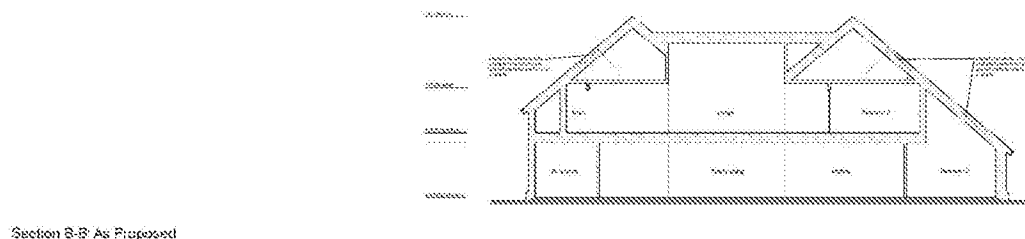


Figure 4: Elevation plans



Figure 5: Section plans



This statement will demonstrate how the predicted CO₂ emissions of the proposed development will be reduced compared with a typical 2013 Building Regulations Part L compliant building, as required by Adur District Council.

1.3 Planning Policy

QUALITY OF THE BUILT ENVIRONMENT AND PUBLIC REALM

- 4.2 The quality of new design plays an important part in creating successful developments – well-designed developments relate well to existing buildings and spaces around them, are pleasant to use and take account of local distinctiveness without necessarily replicating what is already there. The National Planning Policy Framework seeks to secure high quality design and makes clear that poor design that fails to take the opportunity to improve the character and quality of an area and the way it functions should not be approved. Existing poor design should not set a precedent.
- 4.3 New developments should be well-designed and integrated into the landscape and townscape, and contribute positively to Adur's character and distinctiveness. These matters should be taken account of when developing proposals for new development. The urban areas of Adur have differing characters (see Appendix 2: A Spatial Portrait of Adur), which should be taken account of, and be respected by, new development. Good design encompasses architectural design, form, height, scale, siting, layout, density, orientation, materials, parking and open space/green infrastructure.
- 4.4 The Council has adopted Development Management Standard No. 2 "Extensions and Alterations to Dwellings"¹ which sets out planning principles and standards for extensions to dwellings. Any proposal will be expected to comply with its criteria. Should this be amended or superseded by other Council or Government guidance this new guidance will be used to assess relevant applications.
- 4.5 Improvements to the public realm (streets and public spaces) provide an opportunity to enhance the quality, character and distinctiveness of an area, and can be an important part of regeneration and renewal schemes. Good use of 'natural surveillance', natural and artificial light, and careful siting of buildings and street furniture can improve the layout of an area, reduce perceived and actual crime and opportunities for anti-social behaviour, and make an area more pleasant to use. Advertisements also form part of the public realm and need to be designed sensitively.
- 4.6 Private residential gardens are now excluded from the definition of previously developed land. However, this does not mean that applications for this type of development will not be considered. Where these sites lie within the Built Up Area, development may be appropriate. A range of issues, including the size and shape of the garden, impact on neighbouring dwellings, biodiversity,

density, and the character of the area, will all be taken into account, and each case will be determined on its own merits.

- 4.7 A Public Art Strategy for Adur and Worthing was published in 2009. This is intended to provide guidance and direction on the opportunities for future investment and commissioning of public art in Adur and Worthing. The policy below requires public art to be provided, in some form, as a part of major developments; it will also be encouraged on smaller sites. The Council will have regard to a range of other documents, standards and advice such as 'By Design' (DETR/CABE) and CABE's 'Building in Context' toolkit. The Commission for Architecture and the Built Environment (CABE) have published 'Buildings for Life' standards for residential development applications the use of which will be encouraged.
- 4.8 Lighting is an important element of design quality; whilst necessary for safety reasons it can also add character and highlight elements of architectural quality. However, it is also important to ensure that light shines on its 'target' and does not waste energy or contribute to 'skyglow', which detracts from the night sky's natural state and is a form of visual pollution.
- 4.9 Shopfronts can have a significant impact on the streetscene. The Council's guidance note 'Design Bulletin 3: Shopfront Security' describes the range of shopfront security devices which the Council considers to be acceptable.

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Sustainable Design

- 4.15 Building-related energy consumption is a significant contributor to greenhouse gas emissions. The need to achieve higher levels of energy efficiency and locally produced clean, low carbon and renewable energy related to new development is an important aspect of sustainable construction. However, sustainable construction for new and refurbished buildings incorporates more than just aspects of energy use. It also relates to other environmental impacts that buildings and inhabitants cause, for example, on water drainage and usage, waste generation, and the use of unsustainable construction materials. Improved design of buildings and developments can also lead to benefits in terms of ecology and quality of life for residents.
- 4.16 As part of the Housing Standards Review, the Government have withdrawn the Code for Sustainable Homes and confirmed that energy efficiency in new homes will be dealt with via a "Building Regulations only" approach, with no optional additional local standards in excess of the provisions set out in Part L of the Regulations. This approach will be implemented through an amendment to the Planning and Energy Act 2008 which is anticipated in late 2016. The energy efficiency requirements under Building Regulations are currently set at a level equivalent to Level 3 of the Code for Sustainable Homes.

1.4 Methodology

The methodology that has been applied in this report is as follows:

1. Prepare baseline energy calculations for the site based on a Part L 2013 compliant construction specification designed for the development.
2. From the baseline energy calculations, the predicted energy demand for the development in kWh/year and the predicted CO₂ emissions in kgCO₂/year for the site can be established.
3. Multiplying the site wide predicted CO₂ emissions figure by % will provide the CO₂ reduction target required.
4. Apply energy efficient design principles (improved fabric spec) in order to reduce the energy demand and CO₂ emissions of the site. Prepare energy calculations using the improved fabric specification.
5. From these improved calculations, the reduced energy demand for the development in kWh/year and the predicted CO₂ emissions in kgCO₂/year for the site can be established.
6. Carry out a renewable energy feasibility study to ascertain which LZC technologies would be suitable for the development in order to reach the minimum 10% reduction (via renewables) required.

Establish the sizing of suitable renewable technologies to ensure the CO₂ emission reduction target is met.

2.0 Predicted Annual Carbon Emissions

Baseline SAP 2012 calculations were prepared based on the construction specification shown in table 1 below.

Aspect		New Build
	External Walls	0.20
	Flat Roof	0.20
	Pitched Roof	0.20
	Ground Floor	0.20
	Windows (All)	1.8
	External Doors	1.8
	Thermal Bridging	Yes
Ventilation	Airtightness m ³ /(hr.m ²)	9
Heating	Heating	ASHP to radiators
	Hot Water	As Per Heating with cylinder
	Controls	Time & Temperature Zone Control
Low energy lighting		100%
Ventilation		Natural
Renewables / LZC	None	N/A

Table 1: Part L compliant construction specifications

The conducted SAP calculations have shown the proposed development will generate **12,605 kgCO₂/year**. In order to satisfy the planning policies on CO₂ reduction, the developer is committed to reduce predicted site wide CO₂ emissions a minimum of which 10% should be via renewables.

Therefore, since the development's predicted CO₂ emissions is 12,605 kgCO₂/yr, this would equate to a reduction target of **1,261 kgCO₂/yr**. In other words, providing the total site emissions comes to equal to or less than **11,344 kgCO₂/yr** (12,605-11,344) is achieved once improvements have been made to the calculations, this would prove that the 10% reduction target has been met.

3.0 Predicted Annual Energy Demand

Based on using the specification outlined in table 1 above, this would create a total predicted energy demand for the development of **24,285 kWh/year**. The breakdown of this predicted energy demand can be seen in table 2 below. The figures quoted have been derived from the Design Stage SAP 2012 Calculations for the development.

			Total Predicted Energy Requirement (kWh/yr)			Total Predicted Energy Requirement (kWh/yr)
			Space Heating	Water Heating	Lighting, Pumps, Fans	
Plot	No.	Units	Gas	Gas	Electric	
No 58	1	kWh/yr	21,456	1,536	1,293	24,285
Total			21,456	1,536	1,293	24,285

Table 2: Baseline Predicated Annual Energy Demand

4.0 Reducing Carbon Emissions through Energy Reduction

The Energy Hierarchy sets out the most effective way to reduce a dwelling's CO₂ emissions. Firstly by reducing energy demand, then by using energy efficiently and lastly by incorporating LZC/Renewable technologies.

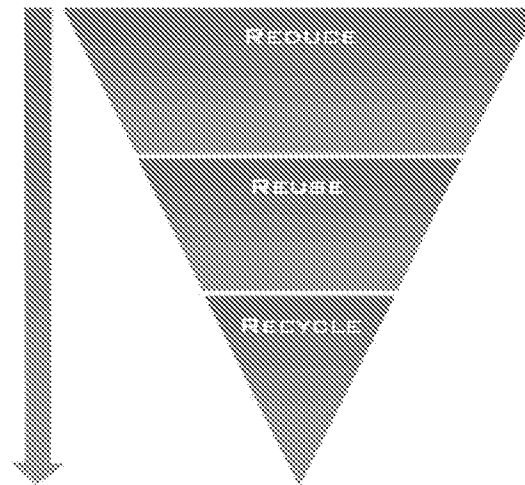


Figure 3: The Energy Hierarchy

Reducing the need for energy usage in the dwelling's design:

The first and most cost beneficial action is to reduce the amount of energy needed by the occupants of the dwelling whilst still maintaining or even improving the comfort conditions. A lot can be achieved through passive design, improving the dwelling's external fabric and following principles to reduce air infiltration.

The developer is attempting to reduce the energy demand and CO₂ emissions of the development by making the following fabric and energy efficiency improvements to their standard Part L 2013 building specification:

Energy reduction strategies include:

- Adopting enhanced fabric specifications
- Installing high efficiency gas boiler
- Incorporating energy-efficient lighting: 100% of all new lighting to be energy efficient
- Adopting principles of airtight construction
- All new windows will be double -glazed
- Passive Solar Design – Solar gain, solar shading, thermal mass
- Natural / Passive Ventilation strategy

5.0 Feasibility Study of Renewable Technologies

This section will assess the technical viability of the following renewable energy technologies for the site in order to rule out unfeasible options:

- Mast mounted wind turbines
- Roof mounted wind turbines
- Solar PV (Photovoltaic) Panels
- Solar Thermal Panels
- ASHP (Air Source Heat Pump)
- GSHP (Ground Source Heat Pump)
- Biomass
- CHP

The following observations have been made with regard to the technical feasibility of integrating renewable energy technologies into this development.

Renewable Technology	Feasible	Reasons
Mast Mounted Wind Turbine	No	There is no sufficient open land for a mast mounted wind turbine to be installed on site.
		The site is situated in a densely populated area. Surrounding properties aren't far enough away to be unaffected by turbine noise, reflected light and shadow flicker.
		The site area is surrounded by buildings and other obstructions that could cause uneven and turbulent wind patterns. Turbulent air conditions may reduce lifespan of components.
		Currently the BWEA suggests a large wind turbine to be viable where wind speed is 7m/s or above. According to the NOABL database the average wind speeds for the site is: 5.1 m/s at 10m, 6 m/s at 25m and 6.5 m/s at 45m height for the property postcode (BN12 5LU). Therefore, the wind speeds are not sufficient for a mast mounted wind turbine to be viable.
Roof Mounted Wind Turbine	No	The site area is surrounded by buildings and other structures that could cause uneven and turbulent wind patterns. Turbulent air conditions may reduce lifespan of components.
		Roof mounted wind turbines are not yet a proven technology and a number of technical problems have been identified by manufacturers which are being investigated to rectify these issues. Vibration that can be transmitted to the building structure. Noise from a turbine may cause irritation to

		<p>occupants of the dwelling and adjacent buildings. Noise may also adversely affect ventilation strategy.</p> <p>Currently the BWEA suggests a large wind turbine to be viable where wind speed is 7m/s or above. According to the NOABL database the average wind speeds for the site is: 5.1 m/s at 10m, 6 m/s at 25m and 6.5 m/s at 45m height for the property postcode (BN12 5LU). Therefore, the wind speeds are not sufficient for a roof mounted wind turbine to be viable</p>
Solar PV (Photovoltaic) Panels/Tiles	Yes	<p>The proposed development has sufficient flat roof area for solar panels accommodation.</p> <p>Most of the roofs should be free from overshadowing for most of the day from other buildings, structures or trees.</p> <p>The site is located in the region with high level of global horizontal irradiation (1,000-1050 kWh/m2/year)</p>
Solar Thermal Collectors	No	<p>The proposed development has sufficient flat roof area that can accommodate solar thermal panels.</p> <p>Most of the roofs should be free from overshadowing for most of the day from other buildings, structures or trees.</p> <p>The site is located in the region with high level of global horizontal irradiation (1,000-1050 kWh/m2/year)</p> <p>Solar thermal collectors would be compatible with the planned heating system.</p> <p>There will be a year round hot water demand.</p> <p>In practical domestic solar hot water systems, the solar hot water system is usually run in conjunction with, rather than instead of, a backup conventional boiler and as a result the carbon intensity of the combined system is high relative to other renewables. Moreover the high efficiency of modern condensing boilers, which can convert over 90% of means that the carbon intensity of these heat sources is relatively low at 200-300 gCO₂/kWhth. As a result domestic solar water heating systems are a relatively expensive way of mitigating carbon emissions when they replace heat from efficient modern boilers. For this reason they are not recommended.</p>
ASHP (Air Source Heat Pump)	No	<p>The proposed development has been designed to accommodate the space for a hot water cylinder.</p>

		<p>The building is suitable for a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).</p> <p>Condenser units can be noisy and also blow out colder air to the immediate environment causing nuisance to the residents.</p> <p>An external ASHP will have to be installed close to the bedrooms, causing noise issues.</p> <p>There are reported performance issues with this technology. During the heating season the outside air temperature is often less than the ground temperature. This lower temperature has the effect of reducing the COP. For an air-to-water heat pump the standard specifies test conditions of 70C outdoor air temperature (source temperature). At external air temperatures lower than this, the COP will fall, as will the heating output of the heat pump. Depending on the application this reduction may be significant, such as during a cold winter morning when building pre-heat is needed.</p>
GSHP (Ground Source Heat Pump)	No	<p>It may be possible to drill a limited number of vertical or horizontal boreholes for GSHP on the site.</p> <p>It is possible for developments to accommodate a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).</p> <p>The site and neighbourhood contain mature trees. Drilling boreholes on the site create the risk of damaging their roots.</p> <p>There is not sufficient space inside all the proposed dwellings for the heat pump equipment.</p>
Biomass Boiler	No	<p>There is an established fuel supply chain for the area.</p> <p>There isn't sufficient space for a delivery vehicle (vehicular access to fuel storage, turning circle etc)</p> <p>There isn't sufficient space in the proposed buildings for a wood-fuel boiler and associated auxiliary equipment.</p> <p>There isn't sufficient space for fuel storage to allow a reasonable number of deliveries.</p> <p>Biomass systems are management intensive (fuel sourcing, transport, storage) and require adequate expertise from users.</p>
CHP	No	<p>Given the proposed building use there won't be a high demand for heat for most of the year, therefore CHP won't be suitable.</p>

	A CHP unit only generates economic and environmental savings when it is running at least 4,500 hours per year. This equates to an average heat demand of about 17 hours a day for five days a week throughout the year. The proposed development energy and heat demand profile does not match this requirement.
	CHP is typically utilized on buildings with high electricity and heating demand for most of the year such as local authority buildings, leisure centres, universities, hotels, and district heating schemes where CHP is used to provide electricity, space and water heating.
	CHP should be considered wherever there is demand for electricity and an appropriate demand for heat in the near vicinity.

Table 4: Feasibility Study of Renewable Technologies

Based on the feasibility study in table 4 above, the following technologies have been identified as being feasible for the proposed development:

- Photovoltaic Panels



6.0 Improvements to Provide % CO₂ Reduction

Prior to the addition of any renewable energy, the developer has focused on the fabric of the property and heating improvements and looked at ways in which to improve this, which are as follows:

▪ Glazing	1.4 W/m²K
▪ External Walls	0.18 W/m²K
▪ Ground Floor	0.13 W/m²K
▪ Pitched (Rafters)	0.14 W/m²K
▪ Pitched (Joists)	0.13 W/m²K
▪ Air pressure result	5

The fabric improvements shown above would ensure a reduction in CO₂ emissions of 2,284 kgCO₂/year.

The developer is also proposing to install solar photovoltaic panels onto the roof of the building:

- A 2kWp PV installation onto the development will ensure that the target of 10% CO₂ emissions reduction via renewables is met.

According to calculation results, installation of the 2kWp PV will generate a further CO₂ reduction of 1,096 kgCO₂/yr.

Therefore, the proposed fabric improvements and PV installation will allow the development to achieve a 26.8% reduction in the total CO₂ emissions over Building Regulations 2013. This achievement therefore satisfies the requirements of the Adur District Council.

Table 5 below shows the percentage reduction in CO₂ emissions following the proposed heating and fabric improvements.

	<i>Associated Total CO₂ (kgCO₂/yr)</i>
Baseline (2)	12,605
With fabric improvements	10,302
With PV	9,224
Reduction in CO ₂ (1)	3,381
% Reduction (1) / (2) x 100	26.8%

Table 5: Percentage Reduction in Carbon Emissions following the above improvements

