

SUSTAINABILITY SERVICES

Energy Statement

Units A-F Logistics City, Saltbox, Bognor Regis

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Executive Summary

The proposed development comprises approximately 14,900 m² (GIA) of Class B2/ B8 floorspace (with ancillary office space) across six units (Units A-F) of varying sizes, along with areas of hardstanding, car parking and access roads for delivery vehicles.

This Energy Statement has been compiled to analyse the predicted energy consumption & carbon dioxide emissions of the proposed development and provide recommendations to increase efficiency and provide energy from renewable sources. Through application of the energy hierarchy, the proposed Energy Statement would result in an overall carbon dioxide emissions reduction of approximately **32%** (figure 1) through energy efficiency and renewable energy generation when compared to the worst allowable Building Regulations Approved Document L2A 2013 performance.

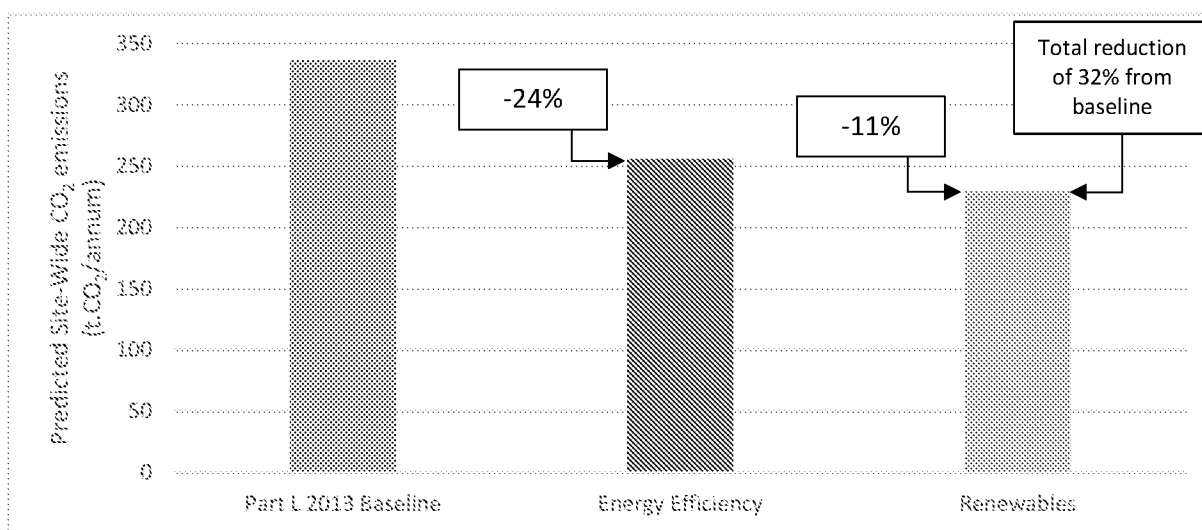


Figure 1: Predicted site-wide CO₂ emissions through application of the energy hierarchy

A renewable energy pre-feasibility study has been performed and found that Air Source Heat Pumps (VRF) and Solar PV are the most appropriate renewable energy technologies for the site. Air Source Heat Pumps (VRF) shall provide heating, cooling and hot water to the core areas while Solar PV (of a minimum site-wide capacity of 40 kWp) shall provide electricity to the units.

This Energy Statement demonstrates how the proposed development follows the principle of the energy hierarchy of implementing passive design measures, energy efficiency measures and low or zero carbon technologies to comply with the requirements of the Arun District Local Plan Policy ECC SP2. Through energy efficiency measures alone, the proposed development achieves a reduction in energy demand and carbon dioxide emissions of 27% and 24% respectively against a Building Regulations Part L2A 2013 baseline. The inclusion of on-site renewable and low carbon energy sources in the form of Air Source Heat Pumps (VRF) and 40kWp Solar PV can provide 10.4% of the energy requirements and increase the total carbon reduction by 11% providing a total carbon emissions reduction of 32% from energy efficiency & renewables combined.

Although amendments to Building Regulations Part L shall take effect on 15 June 2022 it is assumed that this building shall be registered against the current Part L 2013 standards. However, it is expected that the building would perform well against the new standards due to having building fabric and services designed to meet the interim standards.

Table of Contents

Executive Summary	3
1. Introduction	5
2. Shell and Core Developments	7
3. Policy background	7
4. Changes to Building Regulations and the Decarbonisation of Buildings.....	8
5. Baseline Energy Demand and Carbon Dioxide Emissions	9
6. Energy Efficient Design Measures	10
6.1 Layout and Orientation	10
6.2 Building Fabric Analysis	10
6.3 Building Services Analysis.....	11
6.4 Assumed Fit-Out Building Services	12
6.5 BREEAM Pre-Assessment	12
7. Energy Demand and Carbon Dioxide Emissions after Energy Efficiency.....	12
8. Renewable Energy Technologies.....	13
8.1 Proposed Technologies	14
9. Energy Demand and Carbon Dioxide Emissions after Renewables.....	15
10. Concluding Summary.....	16

1. Introduction

This Energy Statement considers the proposed industrial warehouse units at the Salt Box development in Bognor Regis.

Development description

The proposed development comprises approximately 14,900 sq. m (GIA) of Class B2/ B8 floorspace across six units (A-F) of varying sizes along with areas of hardstanding, car parking and access roads for delivery vehicles. All units shall be provided with a mezzanine level and ancillary core spaces.

The proposed site plan can be seen in Figure 2 below.

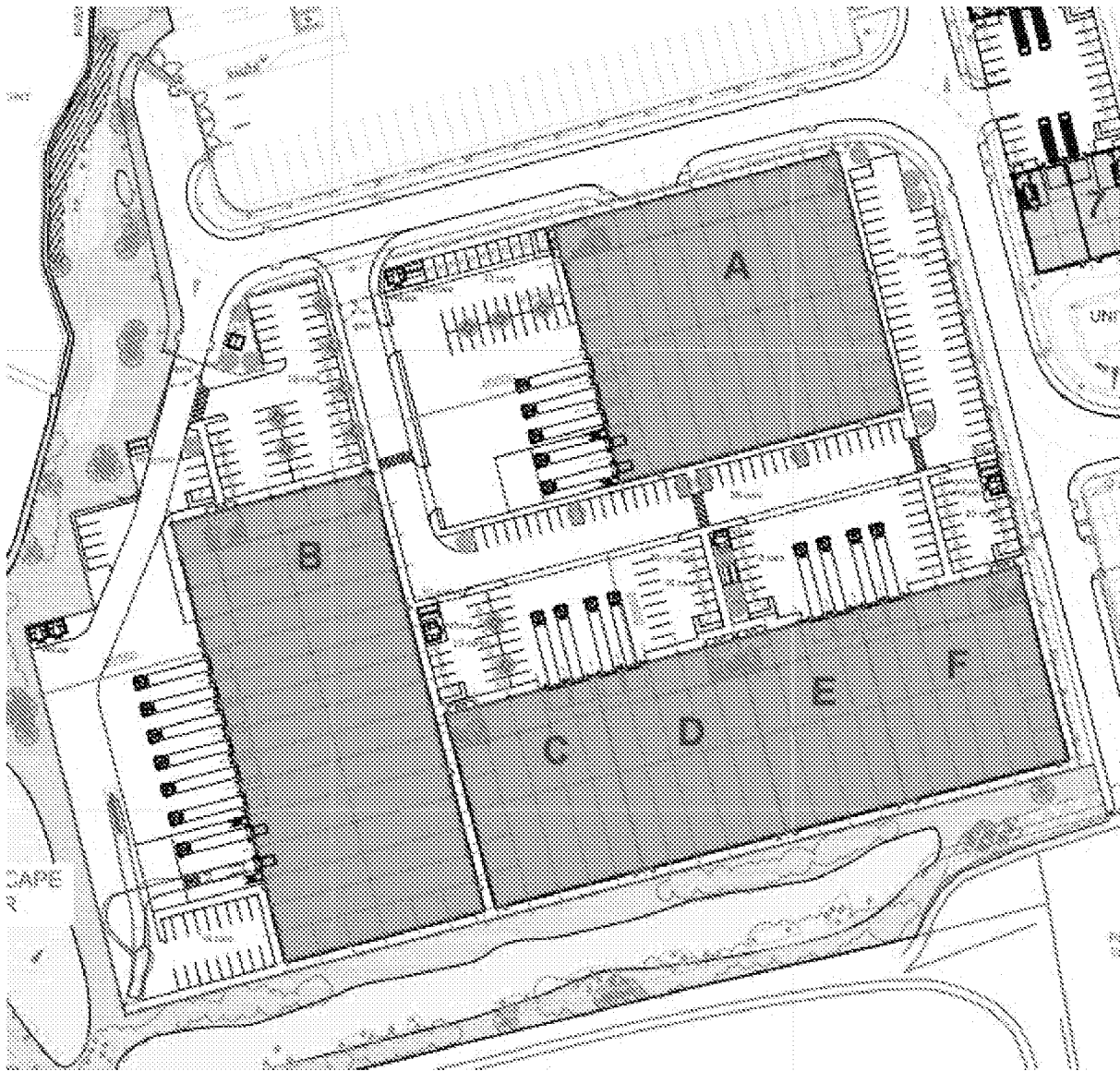


Figure 2: Proposed site plan

Purpose of the document

The purpose of this Energy Statement is to demonstrate that climate change mitigation measures shall be integrated into the scheme's design and that the proposed measures are appropriate to the site environment and energy demands of the development.

This document describes the policy context to which the Energy Statement responds before presenting the energy and carbon dioxide emissions and demonstrating how it is proposed to reduce this through energy efficient design; clean energy supply; and green on-site renewable energy generation.

Simplified Building Energy Model (SBEM) calculations have been performed to inform this Sustainable Energy Statement. This involves creating a three-dimensional model of the proposed building (Figure 3) and then populating the model with the building fabric and building services specification. The SBEM calculation is then run to simulate the building energy consumption and resultant carbon dioxide emissions due to the predicted operation of the building over a typical year.

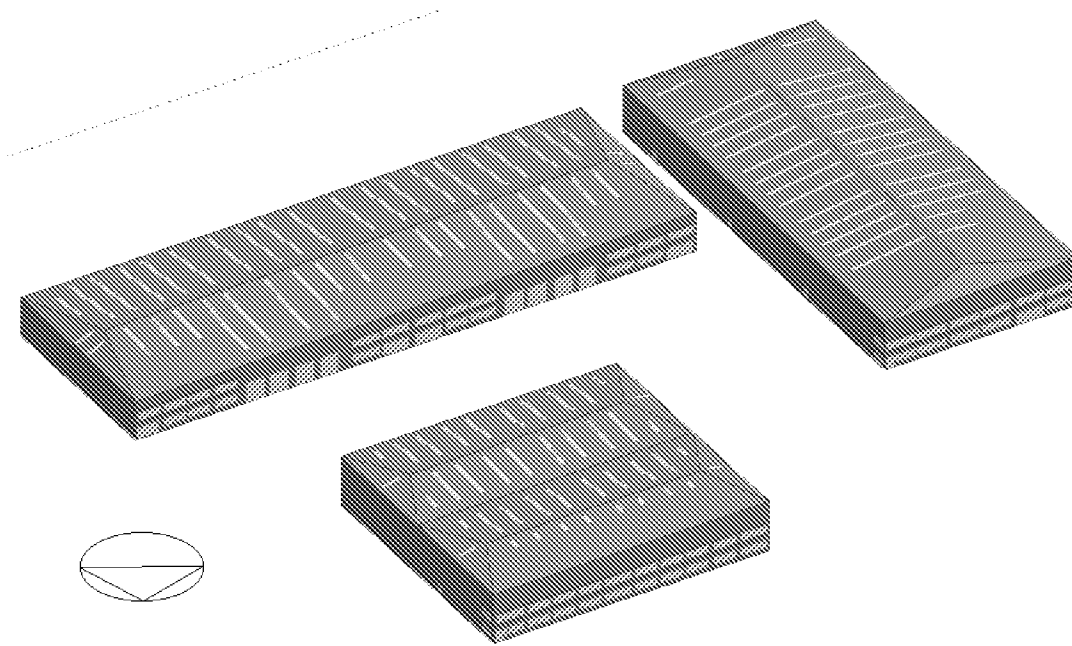


Figure 3: Proposed development modelled in DesignBuilder software

Methodology in the document

Design Stage SBEM energy modelling calculations have been performed based upon the planning drawings in order to produce the most accurate estimate of the site's energy demands.

The report is based on information provided in the following drawings by Ian C King Architects:

KP-281-Plot 1-RMA-PA-02-Site Plan
KP-281-Plot 1-RMA-PA-03-Unit A Plans
KP-281-Plot 1-RMA-PA-04-Unit A Elevations
KP-281-Plot 1-RMA-PA-05-Unit B Plans
KP-281-Plot 1-RMA-PA-06-Unit B Elevations
KP-281-Plot 1-RMA-PA-07-Unit C-F Plans
KP-281-Plot 1-RMA-PA-08-Unit C-F Elevations

2. Shell and Core Developments

The proposed development is a shell and core development as defined within paragraph 2.34 – 2.35 of Building Regulations Approved Document Part L2A (2013). This guidance states that the design stage SBEM submission should assume building services and efficiencies for the areas of the building that will be for fit-out by future tenants to demonstrate how the building shell could meet the energy efficiency requirements. However, at practical completion of the shell, the as-built SBEM submission shall be based only on the building and services as actually constructed.

The calculations within this report assume that the warehouse areas shall be heated following the tenant fit-out based on typical warehouse heating systems. The warehouse building fabric shall be designed to be sufficiently energy efficient.

It should be noted that it is only possible for the developers of a speculative shell and core building to influence the energy and carbon dioxide emissions of the building as constructed at practical completion, this is especially pertinent for speculative industrial buildings which could potentially have a wide range of fit out specifications depending on the end user.

This Energy Statement will emphasise a fabric first approach to energy demand reduction to ensure that the proposed development will be energy efficient regardless of the flexibility of future uses.

3. Policy background

National Planning Policy Framework

Achieving sustainable development is the main aim set in the National Planning Policy Framework (NPPF). This involves seeking improvements in the quality of the built, natural and historic environment.

There are three dimensions to sustainable development. These are:

1. Economic: Contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation.
2. Social: Supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment.
3. Environmental: Contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

Due to compelling evidence of climate change, the government formed the Climate Change Act 2008 which targets reductions in greenhouse gas and CO₂ emissions. National Planning Policies have continued to put renewable energy at the top of the agenda in addressing climate change. Planning Policy Statement 22 'Renewable Energy' PPS 22 stresses that an increased development of renewable

energy resources is vital to facilitating the delivery of the Government's commitments on both climate change and renewable energy.

Arun Local Plan 2018

The Local Plan was adopted by Arun District Council on 18th July 2018. The plan sets out a spatial vision, objectives and a sustainable strategy for delivering the needed growth of the District over the period 2011- 2031

The key policy outlined in the Arun District Council Local Plan in terms of Sustainable Development for Non-Domestic applications is as follows:

Policy ECC SP2: Energy & Climate Change Mitigation

All new residential and commercial development (including conversions, extensions and changes of use) will be expected to be energy efficient and to demonstrate how they will:

- a. Achieve energy efficiency measures that reflect the current standards applicable at the time of submission;
- b. Use design and layout to promote energy efficiency; and
- c. Incorporate decentralised, renewable and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.

All major developments must produce 10% or the total predicted energy requirements from renewable or low carbon energy generation on site, unless it can be demonstrated that this is unviable. Energy efficiency measures will be taken into consideration when the total predicted energy requirements are calculated. The Council will 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.

4. Changes to Building Regulations and the Decarbonisation of Buildings

The Future Buildings Standard

The energy efficiency requirements of the Building Regulations, Part L (Conservation of Fuel and Power), is due to be updated as part of the Future Buildings Standard which the Government has committed to introduce in 2025. This standard aims to improve on building energy efficiency requirements and transition to low-carbon heating sources for the decarbonisation of buildings to achieve the Government's target of net-zero by 2050.

While the full document has not been issued, the Future Buildings Standard is expected to restrict use of fossil fuels for heating and reduce carbon emissions by up to 80% against the current standards.

Part L 2021

In order to give the industry time to adapt to the Future Buildings Standards in 2025, an interim standard (Part L 2021) in the form of amendments to the current Part L has been issued and will take effect on 15th June 2022. This requires a 27% reduction in carbon emissions for all new non-domestic buildings compared to the current Part L 2013 standards.

There is a 12-month grace period which means that the new regulations do not apply to work subject to a building notice, full plans application or initial notice submitted before 15 June 2022 provided the work is started on site before 15 June 2023. It is envisioned that this project will begin on site prior to this date and therefore the building shall be assessed against the current Part L 2013.

Net Zero Carbon Buildings

While there are currently no legislative requirements for a building to achieve net-zero carbon certification, there have been a number of frameworks published to set a path to achieve net zero carbon buildings in both construction and operation (in-use energy performance). The UK Green Building Council's definition of net zero in operation is:

"When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset."

5. Baseline Energy Demand and Carbon Dioxide Emissions

The baseline energy demand of the proposed development is based on initial design stage SBEM calculations. The baseline energy demand and carbon dioxide emissions are based on the 'notional emissions' that are the worst allowable under Building Regulations Approved Document Part L2A (2013).

Please note that all total figures include regulated consumption assessed within Building Regulations only, equipment energy is not calculated within Building Regulations as the developer is unable to directly influence this end-use.

SBEM calculations have been performed to generate energy demand and resultant carbon dioxide emissions for the proposed development. The results are then multiplied by the floor area of the development to give an estimate of the site-wide emissions. These calculations are shown in Table 1 below.

Carbon emissions are calculated based on the 2013 National Calculation Methodology fuel factors.

Table 1: Predicted baseline energy consumption and carbon dioxide emissions

	Energy End Use (MWh/ annum)				
	Heating	Cooling	Auxiliary	Lighting	Hot Water
Total	716.62	36.35	1.35	295.18	71.36

	Energy Use (MWh/annum)	CO ₂ Emissions (t.CO ₂ / annum)
Total	1,121	337

6. Energy Efficient Design Measures

Energy efficiency design measures to reduce energy demand have been considered in three stages; layout and orientation; building fabric; and building services. The proposals to reduce energy at each of these stages are described within this section.

6.1 Layout and Orientation

The opportunities for orientation and layout of this site have been maximised, the units shall benefit from having glazing on the north-east to north-west elevations. This allows for natural daylight to enter the building, reducing the reliance on artificial lighting as well as providing acceptable limits of solar gain to reduce the heating demands. It is also proposed that the unit shall have roof lights in order to maximise the availability of natural daylight. This strategy reduces the demand for artificial lighting and saves energy. It also helps create a visually stimulating and productive environment for building occupants

The site shall be sheltered by the existing buildings surrounding the site. These buildings will provide significant shelter from prevailing winds and protection to the proposed development.

6.2 Building Fabric Analysis

Building U-values

In order to reduce the demand for heat energy it is proposed to construct the development with a highly thermal efficient building envelope.

It is proposed to improve the building fabric U-values and air tightness significantly upon the minimum requirements of Building Regulations; the scale of improvements is demonstrated in Table 2.

Table 2: Proposed U-values and improvements over worst allowable Building Regulations performance.

Element	Proposed	Worst Allowable L2A 2013	Improvement over L2A2013
Roof	0.16 W/m ² .K	0.25 W/m ² .K	36 %
External Wall	0.26 W/m ² .K	0.35 W/m ² .K	26 %
Floor	0.18 W/m ² .K	0.25 W/m ² .K	28 %
Window Glazing	1.60 W/m ² .K	2.20 W/m ² .K	27 %
Spandrel Panel	0.50 W/m ² .K	2.20 W/m ² .K	77 %
Rooflights	1.40 W/m ² .K	2.20 W/m ² .K	36 %
Pedestrian Doors	1.40 W/m ² .K	2.20 W/m ² .K	36 %
Vehicle Access Doors	0.9 W/m ² .K	1.50 W/m ² .K	40 %
Air Permeability	5m ³ /(hr.m ²)	10 m ³ /(hr.m ²)	50 %

Beneficial solar gains & Natural lighting

The building has been designed and orientated to utilise solar gain (with no risk of overheating) and to take maximum advantage of the sun's potential energy. The first-floor office windows are facing the South-West orientation while the main reception glazing faces the south-east orientation. This provides an appropriate balance of beneficial solar gains while encouraging the admission of natural daylighting; direct sunlight and diffuse skylight in order to reduce electric lighting, thus reducing energy demand. This also helps create a visually stimulating and productive environment for building occupants.

Thermal bridges

The thermal efficiency of the proposed development is intended to be further enhanced through the specification of Improved Construction Details in order to reduce thermal bridging.

It is recommended to work closely with the metal cladding system manufacturers, as in some cases they can provide enhanced construction details that limit heat losses to such an extent that envelope U-values may be slightly relaxed. If non-standard details are required, then a bespoke calculation of the Ψ -values should be carried out to inform the as-built SBEM/EPC calculations.

6.3 Building Services Analysis

Further energy savings can be achieved through specification of energy efficient building services.

The following building services specification at handover is assumed to be as follows:

Space Heating & Domestic Hot Water

Within the baseline and lean scenarios, a notional gas-fired boiler is assumed to give a fair baseline to compare renewable heat against.

Cooling

The core spaces shall be provided with cooling from an A-rated air source heat pump with an SEER of 5.1.

Ventilation

The WC areas shall be provided by extract ventilation with fans selected to have a specific fan power (SFP) of no greater than 0.4 W/(l/s). The warehouse, circulation and office spaces shall be naturally ventilated.

Lighting

Energy efficient lighting and controls shall be installed throughout the building in order to reduce energy consumption. All lighting shall have an efficacy of no less than 95 lumens per circuit Watt.

The warehouse and mezzanine offices shall be provided with photoelectric dimming and PIR (passive infra-red) sensors to provide occupancy control to ensure that artificial lighting shall not be utilised when there is sufficient natural light or spaces are unoccupied.

The lighting in the WC's, changing areas and circulations areas shall be provided with PIR (passive infra-red) sensors to provide auto on/off control to ensure that lighting is only used when spaces are occupied.

6.4 Assumed Fit-Out Building Services

Although the units shall be handed over to the occupier with no fixed services within the shell areas, the calculations used within this report have assumed that these areas are heated and have lighting.

The figures used are based upon the worst allowable figures found in the Non-Domestic Building Services Compliance Guide.

6.5 BREEAM Pre-Assessment

In addition to the significant environmental and economic benefits of energy efficient design and services, there are a host of other areas of sustainability, and these are considered in more detail within the BREEAM Pre-Assessment by CHB Sustainability.

7. Energy Demand and Carbon Dioxide Emissions after Energy Efficiency

Table 3 shows the reduction in energy and carbon dioxide emissions due to the energy efficiency measures, and this is compared with the baseline energy consumption and carbon dioxide emissions in table 2.

Table 3: Predicted energy consumption and carbon dioxide emissions after energy efficiency measures

	Energy End Use (MWh/ annum)				
	Heating	Cooling	Auxiliary	Lighting	Hot Water
Total	472.76	26.33	0.90	246.40	71.36

	Energy Use (MWh/annum)	CO ₂ Emissions (t.CO ₂ / annum)
Total	828	226
Reduction on baseline	27%	24%

Table 3 above demonstrates that the National Standards (Building Regulations Part L 2013) carbon emission target is surpassed through energy efficient design alone.

8. Renewable Energy Technologies

The options available for the inclusion of Low and Zero Carbon (LZC) technologies in the proposed development are discussed in the renewable energy technical feasibility matrix shown in Table 4.

Table 4: Renewable energy technical feasibility matrix.

Technology	Pre-Feasibility
Solar	
Solar Hot Water	There is sufficient solar resource and suitable shade free facing roof available for this technology. However, the proposed development is expected to have a low demand for domestic hot water.
Solar Photovoltaic	There is suitable shade free roof space available and sufficient electricity demand for the proposed development.
Water	
Small Scale Hydro Power	No potential hydro resource on-site.
Wave and Tidal Power	Site not located in a coastal location.
Wind	
Wind Turbine	The average wind speed in the area of the proposed development is 4.8m/s at 10m hub height (NOABL Wind Map). This is less than 5 m/s minimum required for further investigation.
Biomass	
Biomass Boiler	Due to the lack of plant space and speculative nature of the development, this technology would not be suitable. There would also be a requirement for personnel to administer and maintain the biomass boilers which is not a practical solution for the proposed development.
Combined Heat and Power CHP	
CHP	This technology requires a predictable and constant heat demand with high operational hours, such as a swimming pool. The office and amenity areas of the proposed development annual baseload heat demands are not considered sufficient for combined heat and power generation.
District Heating	
Biomass Community Heating Scheme	There are no nearby biomass heating schemes. In addition, the anticipated heating and hot water demand means other technologies would deliver greater energy savings and carbon emissions reductions.
CHP Community Heating Scheme	There are no potential heat sources for district heating networks. In addition, the anticipated heating and hot water demand means other technologies would deliver greater energy savings and carbon emissions reductions.

Heat Pumps	
Water Source Heat Pump	There is a small stream to the west of the site but from initial investigation appears to be too small to implement water source heat pumps. In addition, water source heat pumps are generally complex systems to install and are better suited to bespoke developments. Cooling towers are prone to freezing and require additional maintenance in winter months. The high maintenance requirement of such systems makes them less appealing to possible tenants.
Ground Source Heat Pump	Ground source heat pumps could provide heating, hot water and cooling (<i>if required</i>) to the office and amenity areas of the proposed development by using the relatively stable temperature in the ground. However, due to high installation costs, it is only economically feasible for larger office areas with a greater energy demand.
Geothermal	The proposed development shall not have heating and hot water demands to benefit from this source of energy. Exploratory investigation would incur high costs due to drilling to the required depths and therefore, this is not considered to be a feasible option.
Air Source Heat Pump (VRF)	Air source heat pumps could provide space heating and hot water to the core areas of the proposed development. There are no technical feasibility restraints to this technology.
Others	
Waste Heat	The proposed development will not involve processes which generate waste heat. Also, there are no potential high-grade heat sources known.
Transpired Solar Air Collectors	Transpired solar collectors could be used to pre-heat the building. However, due to the proposed openings on the south-east and south-west sides of the building and shading from the proposed landscape buffer there is minimal available south facing wall available.
Hydrogen Fuel Cell	Hydrogen is an energy storage medium and environmental benefits are only found where hydrogen is generated from renewable energy sources. However, there is limited market available, high capital and maintenance costs and life expected from fuel stacks is less than 10 years.

8.1 Proposed Technologies

The following technologies have been proposed and would be assessed in more detail within the later section of this report.

1. Solar PV
2. Air source heat pumps (VRF)

Photovoltaic (PV) solar panels, convert sunlight into electricity, which can then be used to meet the demands for the proposed development due to appliances and lighting. This technology would be suited to the proposed development as there are no technical feasibility restraints.

Air source heat pumps (VRF) - can provide space heating, cooling and domestic hot water with efficiencies of well over 300% by capturing ambient heat within the atmosphere. This technology would be suited to the proposed development as there are no technical feasibility restraints.

It is proposed that the air source heat pumps with a SCOP of 3.4 and SEER of 5.1 shall be used to provide heating, cooling and hot water to the units. In addition, solar PV arrays with a minimum site-wide capacity of 40 kWp capacity have also been proposed to ensure the 10% requirement is met.

9. Energy Demand and Carbon Dioxide Emissions after Renewables

Table 5 shows the reduction in energy and carbon dioxide emissions due to the proposals to incorporate energy efficiency measures and renewable technology, and this is compared against the residual energy and carbon dioxide emissions.

Table 5: Predicted site-wide energy consumption by end-use

	Energy End Use (MWh/ annum)					
	Heating	Cooling	Auxiliary	Lighting	Hot Water	PV
Total	409.48	26.33	0.90	246.40	20.35	-27.98

	Energy Use (MWh/annum)	CO ₂ Emissions (t.CO ₂ / annum)
Total	675	229
Reduction on Energy Efficiency	17%	11%
Reduction on baseline	40%	32%

The results show that a total reduction in energy and carbon dioxide emissions of 40% and 36% respectively can be achieved against the baseline building through the implementation of energy efficiency measures and renewable energy technology.

Table 6 below shows the contribution from each of the proposed renewable energy technologies to the building's energy requirements.

Table 6: Predicted energy contribution from renewable energy technologies

	Air Source Heat Pump	Solar PV
Energy provided (kWh/yr)	45,503	29,277
% Energy provided	6.2%	4.2%

This confirms that renewable energy sources are capable of providing approximately 10.4% of the building's energy requirements.

10. Concluding Summary

This Energy Statement demonstrates that the development is committed to sustainable development principles.

In order to accurately assess the energy demands of the site design stage SBEM calculations have been performed. All energy end-uses are considered in the calculations except for any end-uses unregulated by the Building Regulations, such as equipment energy.

The development has been designed to maximise available opportunities for reducing energy demand and carbon emissions through layout and orientation for passive energy reduction. The building fabric and services shall be specified to achieve further reductions in energy demand.

Once the proposed energy efficiency measures have been considered the overall site energy and carbon emissions are estimated to be reduced by approximately 27% and 24% respectively when compared to Building Regulations Approved Document Part L2A (2013).

A renewable energy pre-feasibility study has been performed and found that Solar PV and Air Source Heat Pumps are the most appropriate renewable energy technologies for the site. The Air Source Heat Pumps (VRF) shall provide heating, cooling and domestic hot water to the core areas while a Solar PV array with a minimum site-wide capacity of 40 kWp has been proposed. The Air Source Heat Pumps (VRF) and Solar PV shall provide a total of **10.4%** of the development's expected energy requirements.

Assuming a renewable energy strategy based on Air Source Heat Pumps (VRF) and Solar Photovoltaics is implemented, the total energy demand and residual carbon dioxide emissions can be further reduced by 17% and 11% respectively.

This strategy would result in an overall site-wide energy demand and carbon dioxide emissions reduction of approximately 40% and 32% through energy efficiency and renewable energy generation when compared to the worst allowable Building Regulations Approved Document L2A 2013 performance.

This Energy Statement confirms that the proposed development shall meet the requirements of Arun District Councils Local Plan Policy ECC SP2 by providing 10.4% of energy from low and zero carbon technologies, exceeding the 10% requirement.

Although amendments to Building Regulations Part L shall take effect on 15 June 2022 it is assumed that this building shall be registered against the current Part L 2013 standards. However, it is expected that the building would perform well against the new standards due to the all-electric nature of the core services as well as having building fabric and services designed to meet the interim uplift towards the Future Buildings Standards