

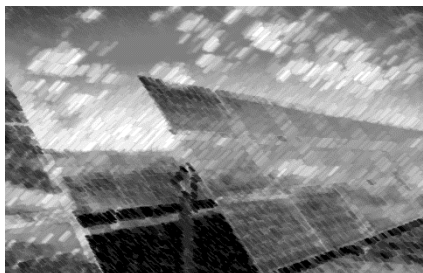
ENERGY STATEMENT (LZC REPORT)

for

7 No. INDUSTRIAL UNITS

at

**OBSERVER PARK, OBSERVER WAY,
ARBORFIELD, READING**



Project No. 0748

PREFACE

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CONTENTS

1.00	INTRODUCTION	5
2.00	PART L MODELLING INPUTS	8
3.00	ENERGY MODELLING INPUTS AND ASSESSMENT METHODOLOGY	12
4.00	ENERGY HIERARCHY – ENERGY AND CARBON EMISSIONS BY USE.....	15
5.00	CONCLUSIONS.....	17

1.00 INTRODUCTION

This report for the 7 No New Industrial Units at Observer Park, Observer Way, Arborfield, Reading is produced to be compliant with BREEAM UKNC Version 6.1 Requirements Issue ENE 04 Low and Zero Carbon Technologies.

The aim of ENE 04 is to reduce carbon emissions and atmospheric pollution by encouraging local generation from renewable sources to supply a significant proportion of the energy demand.

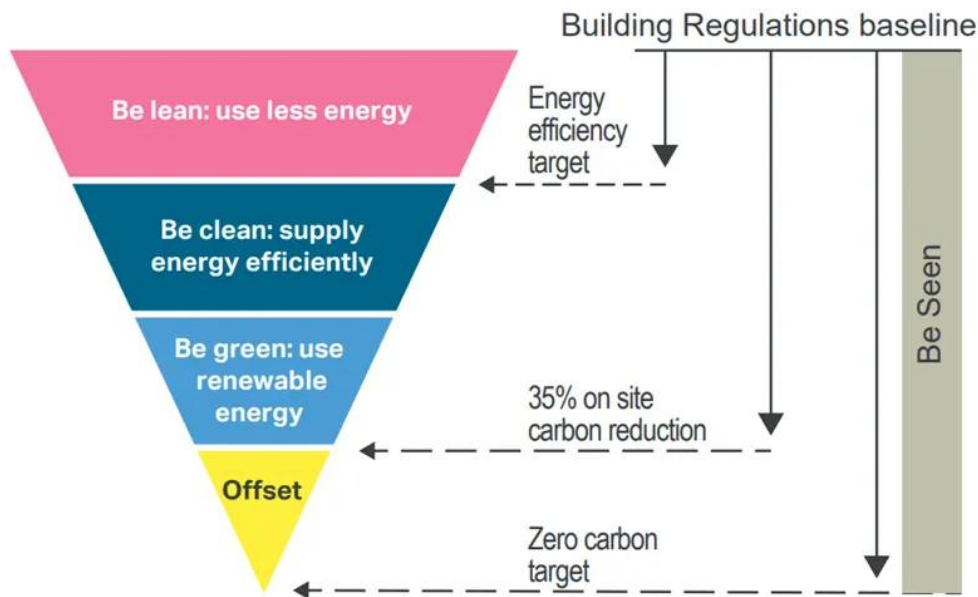
1.01 Sustainability Targets

The sustainability targets set for the development are as follows.

- 1) Achieve a Building Emission Rating (BER) that is lower than the Target Emission Rating (TER) for compliance with the Building Regulations Part L 2021.
- 2) Achieve a Building Primary Energy Rating (BPER) that is lower than the Target Primary Energy Rating (TPER) for compliance with the Building Regulations Part L 2021.
- 3) Achieve 10% of the regulated energy requirement from renewable sources.

1.02 Design Approach

The design team's approach to energy strategy is to follow the industry's best practice guidance and can be generally summarized using energy hierarchy and principles of "be lean, be clean and be green" for energy management. The philosophy behind the approach is to reduce the building's demand for natural resources using passive design measures, before using low carbon and renewable technologies.



Be Lean:

- The buildings have been designed to have a high fabric efficiency and air permeability target. All external elements will show a significant improvement of the Building Regulations Part L 2021 U value targets resulting in low wintertime heating loads.
- The spaces are equipped with large glazing units to improve daylight provision and reduce artificial lighting use.
- Exposed thermally massive ceiling and roof elements provide thermal mass to mitigate summertime overheating further.

Be Clean:

- The proposed system specification capitalizes on the ongoing grid decarbonization in providing an all-electric building solution.
- A high-efficiency central air source heat pump serves the buildings' heating loads through ventilation units.
- The occupied spaces are served by Mechanical Ventilation Heat Recovery, providing fresh air if and when required to maintain comfortable internal conditions.

Be Green:

- A solar PV array is proposed to cover the roof of the buildings. Favourably orientated and with minimal overshadowing, the array will complement the building's all-electric energy generation. The operational schedule of the building also coincides with peak generation times increasing the system's viability and carbon emission reduction potential.

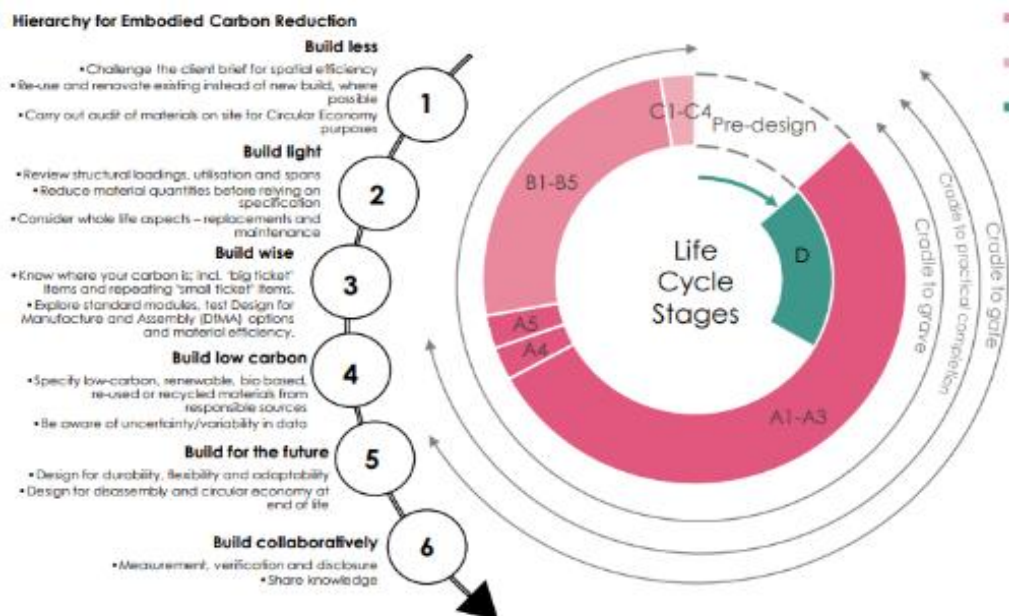
1.03 Methodology

The National Calculation Methodology (NCM) used to determine the CO₂ emission rates and Primary Energy Rates was IESVE 2021 producing a Building Regulations UK Part L (BRUKL) report. The Part L assessment software produces evaluations of energy use in non-residential buildings for compliance with the Building Regulations and Building Energy Performance Certification (EPC) purposes.

A Notional Building of the same geometry, space use, construction, and specific features for HVAC, DHW and Lighting systems is generated along with the actual building that is assessed. Compliance with Part L is based on the comparison between the energy use and Target Emission Rate (TER) and Target Primary Energy Rate (TPER) derived from the notional and the energy use and the actual Building Emission Rate and actual Building Primary Energy Rate where the actual building emission rate and actual building primary energy rate must be less than or equal to the target emission rate and target primary building rate respectively.

Please note that the NCM calculations are designed as a compliance tool only and do not necessarily represent the finished building's energy consumption in real-life operation.

The building will also be designed in accordance with the UKGBC framework methodology, and the project will target <300kgCO₂/m² embodied carbon. This will be achieved by following the hierarchy for embodied carbon reduction as detailed below.



2.00 PART L MODELLING INPUTS

This section details the parameters and assumptions used in modelling the proposed buildings.

The model geometry has been created following drawings issued by HTC Architects dated May 2025.

Dynamic thermal modeling has been undertaken using approved modelling software IESVE, using the approved CIBSE Swindon TRY weather file.

2.01 Building Fabric

Building envelope performance is key to demonstrating Part LV2 (2021) compliance. The enhancement of U-values whilst limiting thermal bridging and uncontrolled air ingress/leakage (air permeability) can significantly reduce the energy demand of the building. As such the building envelope is proposed to achieve an excellent standard of thermal insulation with limited thermal bridging* and optimised air tightness.

The following table summarises the proposed building fabric U-value performances:

Building Element	Thermal Transmittance U-value (W/m ² .K)
Insulated wall elements	0.26
Glazing (incl. curtain walling)**	1.60
Roof Lights ***	2.20
Ground contact/Exposed floors	0.18
Roof	0.18
Personnel Doors	1.60
Vehicle Access Door	1.30

* Default Part LV2 (2021) thermal bridging factors applied to all thermal elements (10%)

** All glazing modelled with a G-value of 0.40 (40%) and Light Transmittance rating of 70%

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2.01.1 Air Permeability

An 'As-Built' building air permeability target of $5.0\text{m}^3/\text{hr.m}^2$ is targeted.

2.01.2 Lighting Scheme Efficiency and Associated Controls

Lighting energy consumption represents the main source of 'regulated' (Part LV2) CO₂ emissions and for this reason the proposed compliance strategy is heavily reliant upon the specification of highly efficient (ambient lighting) luminaires throughout the buildings. It is currently proposed that LED luminaires are to be specified which help to achieve demanding performance targets.

In summary, it is proposed that **luminaire lumens/circuit watt values** are 100lm/W for offices and 95lm/W in all other spaces and that brightness (Lux) levels are both carefully specified as not to be excessive whilst still meeting specific design requirements.

In terms of lighting controls:

- The use of **occupancy presence sensors with daylight dimming** is proposed in Circulation zones, WCs, and Warehouse Zones – AutoON/AutoOFF.
- The use of **occupancy absence sensors with daylight dimming** is proposed in Office Areas – Manual On/Auto Off.
- **Lighting control parasitic power consumptions** are to be minimised ($<0.10\text{W}/\text{m}^2$ per area/room served).

2.01.3 Thermal Mass

Exposed thermal mass (heavyweight building fabric) is an important thermal comfort design consideration, especially for naturally ventilated spaces. As the building is predominately mechanically ventilated, thermal mass exposure becomes less of a concern, however, the architectural design is encouraged to expose building thermal mass where at all possible as this serves to help maintain a more stable and thermally comfortable internal environment.

2.01.4 Auxiliary Energy (Fans/Pumps/Controls)

'Auxiliary energy' (fans/pumps/controls) consumption is a key Part LV2 consideration of 'regulated' (Part LV2) CO₂ emissions. For this reason, the following design measures/specifications are proposed to be implemented:

- **Air Handling Unit (AHU) specific fan powers (SFPS') are to be minimised** – in some instances this may require significant oversizing of units in order to enable efficient fan speed operation.
 - **Central balanced supply and extract systems with heating, cooling and heat recovery will target 1.6W/l.s**
 - **High efficiency heat recovery ($\geq 80\%$) is also proposed on all supply and return AHUs**

2.01.5 DHW Generation

It is proposed that DHW will be met by Electric Point of Use Water Heaters.

2.01.6 Space Heating and Cooling

The office heating and cooling demand is proposed to be met with high-efficiency VRF systems.

- SCOP: 3.5 kW/kW
- SEER: 5.0 kW/kW

Other unoccupied spaces are proposed to be heated by electric panel heaters.

The Warehouse is assumed to be unheated.

2.01.7 Renewables

The feasibility of effectively and efficiently incorporating renewable technologies into the development has been analysed. An overview of each of the renewable energy technologies assessed in this study are as follows. The technologies have been given a feasibility status of: 'Recommended,' Considered,' or 'Not Recommended' for the described reasons. Wind power has been discounted as there are no viable locations to locate wind turbines, and they would likely cause noise nuisance for occupants of the site and surrounding buildings. Biofuel has also been

discounted as biomass deliveries by heavy goods vehicles are not feasible due to site constraints and would have associated noise and safety considerations.

Combined Heat and Power

Overview	A CHP engine maximises fuel and converts it into electricity, increasing the efficiency of a power generation system. Waste heat is recovered from the engine by removal from the exhaust, water jacket and oil cooling circuits, and is redirected as useful heat energy. This reduces energy consumption and resulting in carbon dioxide emissions.
Status	Not Recommended
Reasons	Electrical output from CHP can be very small. Larger units are typically more noisy.

Solar/Photovoltaics

Overview	Photovoltaics (PV) modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases silicon. When sunlight shines on the cell it creates an electric field causing electricity to flow: the greater the light intensity, the greater the flow of electricity. Individually, PV cells only provide a small amount of electricity, and they are generally grouped together into a module for convenience and higher output.
Status	Recommended
Reasons	- The orientation of the building and the roof structure means space is available to implement this system. - The roof is not overshadowed and will be of suitable construction to accommodate this type of system.

Ground Source Heat Pump

Overview	Space heating and cooling can be provided by circulating water through the ground or via subterranean water. Ground water cooling and heating makes use of the relatively stable ground/water temperatures throughout the year, typically ranging between 10-14°C. The heat pump extracts or dumps heat to the ground via a ground contacting heat exchanger. Ground source heat pumps require no flues and have no acoustic issues.
Status	Considered – Not Recommended
Reasons	- Constrained site with no obvious location to site bore holes - Significant additional capital cost

Air Source Heat Pump

Overview	Works in a very similar way to a ground source heat pump extracting heat energy from the air to provide heating to a building or hot water system. The heat pump extracts or dumps heat to the outside air via a heat exchanger. Air source heat pumps require no flue.
Status	Recommended
Reasons	- High Efficiency and able to provide a stable environment during summer and winter months.

2.01.8 Energy Storage

Energy storage, such as solar battery storage, is available for this development due to potential on-site generation from photovoltaic panels. However, it is not currently recommended as the amount of energy potentially generated from the photovoltaic panels will be used in the general operation of the buildings and there is unlikely to be sufficient surplus energy to warrant the requirement for storage.

2.01.9 Measures to be Adopted

ASHP will be fully adopted. In addition, the use of photovoltaics panels will be implemented, and the buildings will be designed to maximize the usefulness of this technology.

The photovoltaic panels required to achieve Part L Compliance, 10% regulated energy from renewable sources and an A rated EPC is as follows:

Unit 1 = 55m ²	Unit 5 = 65m ²
Unit 2 = 25m ²	Unit 6 = 65m ²
Unit 3 = 30m ²	Unit 7 = 65m ²
Unit 4 = 55m ²	

The Panel parameters include a panel efficiency of 20.1% with an orientation permitted by the build's orientation (Units 1-6 South - 175°, Unit 7 West – 265°) and an inclination of 6° have been assessed for the buildings.

3.00 ENERGY MODELLING INPUTS AND ASSESSMENT METHODOLOGY

Analysis has been performed in order to assess the currently proposed architectural and engineering services strategy in terms of total annual operational energy consumption and associated carbon dioxide (CO₂) emissions.

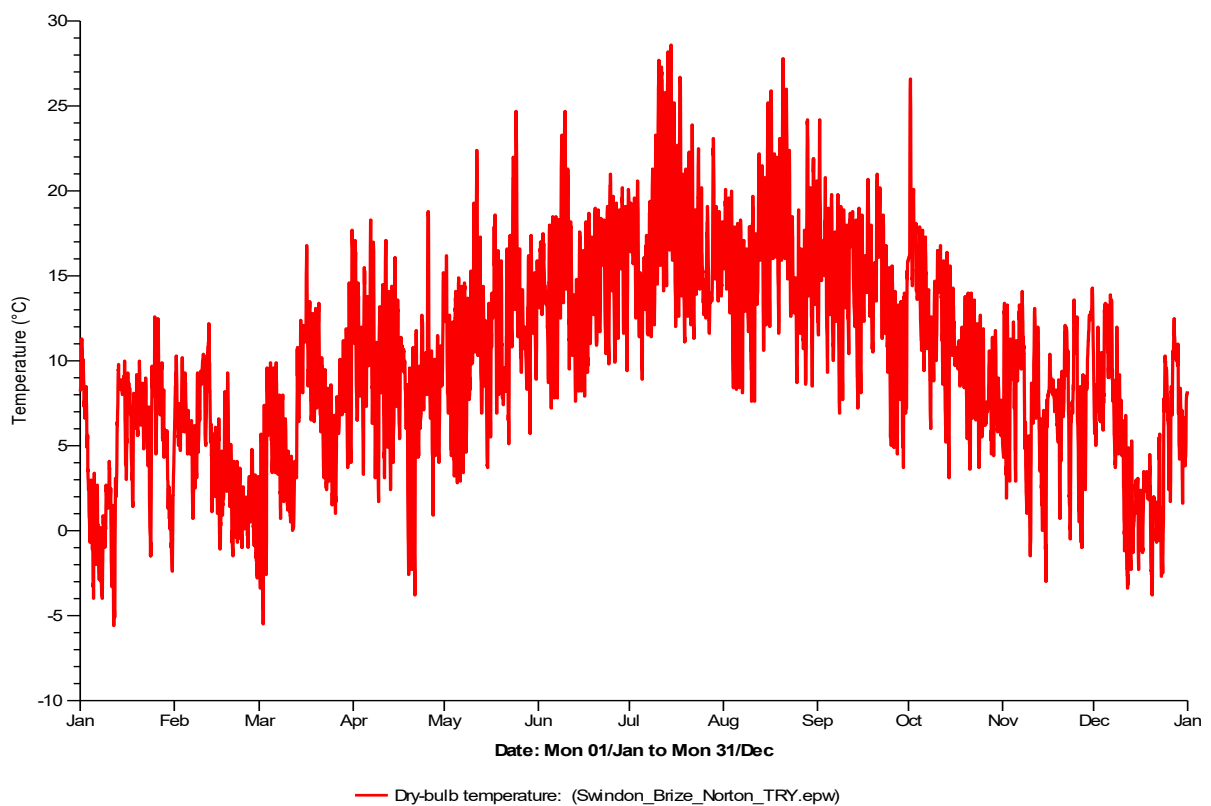
As required, the performance of the proposed design has been benchmarked against the Part LV2 (2021) Notional target building. IES version. 2024.1.0.0, VE Compliance version. 7.0.28.0 has been used, and specifically the following modules:

- 3D Modeller – to create the building model data such as geometry, site location and orientation.

- Building Simulator - used to assign proposed fabric performances, assign room usage type templates.
- Daylight Analysis – to calculate the daylight factors for each space.
- UK Building Regulation 2021 Studio – used to define the proposed HVAC and lighting strategies and perform the annual operational energy/CO2 emissions calculations for both the 'Actual' design and the Part LV2 2021 Notional Building.

3.01 Weather Data

Iterative annual simulations adopted the mandatory Part LV2 2021 national calculation methodology (NCM) and the CIBSE Swindon TRY weather data set:



CIBSE Swindon TRY Weather – External Dry Bulb Temperature

3.02 Assigned NCM Building Class:

- **New Office/Industrial Process Building:** B8 Warehouse & Storage

Building geometry, fabric constructions and HVAC/LZC systems have been input in accordance with the National Calculation Methodology and represent the proposed architectural, mechanical, and electrical design.

3.03 **Regulated and Non-Regulated Energy**

Building Regulations Part LV2 (2021) compliance calculations are concerned with measuring the performance of the actual building against a 'Notional' compliant building in terms of 'regulated' energy/CO2 emissions only.

Regulated energy includes that associated with:

1. Space heating and cooling generation
2. DHW generation
3. Auxiliary energy (fans/pumps/controls)
4. Internal Lighting (external lighting is excluded)

In line with Part LV2 a 'regulated energy' approach to calculating the energy demand/CO2 emissions has been taken.

3.04 **Architectural Drawings Details**

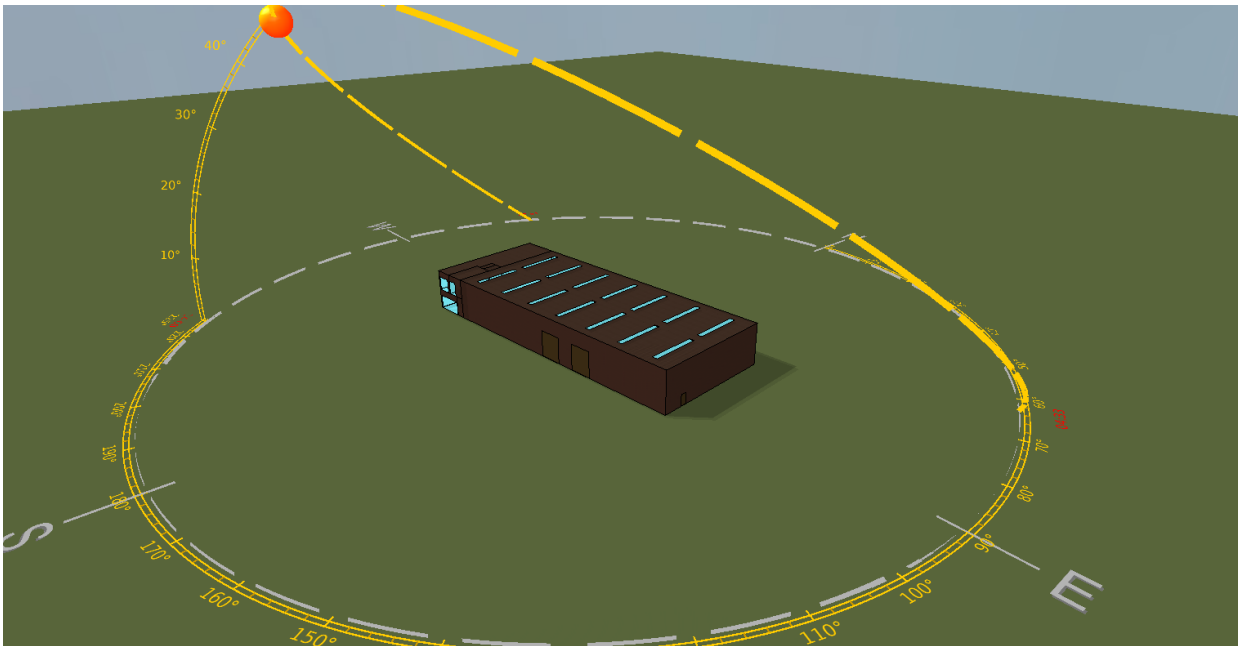
The proposed building was developed based on the following architectural drawings as issued May 2025.

- 3389-P403-K – Illustrative Masterplan
- 3389-P1-3-100A – Unit 1-3 Proposed Floor Plan
- 3389-P1-3-110A – Unit 1-3 Proposed Roof Plan
- 3389-P1-3-200A – Unit 1-3 Proposed Elevations
- 3389-P1-3-300A – Unit 1-3 Proposed Sections
- 3389-P4-5-100A – Unit 4-5 Proposed Floor Plan
- 3389-P4-5-110A – Unit 4-5 Proposed Roof Plan
- 3389-P4-5-200A – Unit 4-5 Proposed Elevations
- 3389-P6-100A – Unit 6 Proposed Floor Plan
- 3389-P6-110A – Unit 6 Proposed Roof Plan
- 3389-P6-200A – Unit 6 Proposed Elevations

- 3389-P7-100A – Unit 7 Proposed Floor Plan
- 3389-P7-110A – Unit 7 Proposed Roof Plan
- 3389-P7-200A – Unit 7 Proposed Elevations

3.05 Thermal Model Visualisations

The following IESVE image illustrates a typical building at the proposed development.



4.00 ENERGY HIERARCHY – ENERGY AND CARBON EMISSIONS BY USE

In summary and as shown within the energy hierarchy performance tables and summary chart below the combined Lean, Clean and Green Buildings **achieve a reduction in regulated CO2 emissions reduction vs a Part LV2 2021 compliant target emission rate (TER) between 2-5%.**

	CO2 emissions (Tonnes CO2 per yr)		Primary Energy Consumption (kWh/m ² per yr)		% of Regulated Energy Generated from Renewables
	Baseline: Part L 2021	Proposed Design	Baseline: Part L 2021	Proposed Design	
Unit 1	1.92	1.86	19.98	19.05	37%
Unit 2	2.28	2.26	23.59	23.09	33%
Unit 3	2.44	2.38	25.15	24.16	36%
Unit 4	2.18	2.15	22.55	21.55	42%
Unit 5	2.08	1.99	21.49	19.81	45%
Unit 6	1.72	1.65	17.92	16.92	39%
Unit 7	1.91	1.88	19.78	18.93	40%

This level of performance demonstrates compliance with Criterion 1 of Part LV2 (2021) and therefore also satisfies the requirement the buildings achieve 10% regulated energy from renewable sources.

Lifecycle Cost of Photovoltaics

For Life Cycle Costing Analysis and payback periods, the following fuel costs will be used, mains electricity 25p/kWh and natural gas 7p/kWh.

PV panels are still relatively expensive and only generate approximately 300-400 watts per m² of panel area, so a considerable area of panels is required to generate a meaningful electrical supply.

The generation of the electrical supply is constant, even if there is no electrical load in the buildings to use it, but what electricity is not used can be transported to other buildings on site or sold back to the national grid.

The annual generation from the PV systems is as follows

Unit 1 = 9744 kWh

Unit 5 = 10968 kWh

Unit 2 = 4219 kWh

Unit 6 = 10974 kWh

Unit 3 = 5067 kWh

Unit 7 = 10532 kWh

Unit 4 = 9285 kWh

The fuel cost saving from the PV system being adopted is as follows;

Unit 1 = £2436	Unit 5 = £2742
Unit 2 = £1055	Unit 6 = £2744
Unit 3 = £1267	Unit 7 = £2633
Unit 4 = £2321	

The typical cost of the PV arrays are as follows;

Unit 1 = £15,000	Unit 5 = £17,500
Unit 2 = £7,000	Unit 6 = £17,500
Unit 3 = £8,000	Unit 7 = £17,500
Unit 4 = £15,000	

Therefore, the typical payback for these PV arrays is between 6-7 years.

Available Grants

The installation of renewable technologies and LZC systems are being actively encouraged by central Government and grants to help with cost of installing systems are often available. However, many grants have limited funds or run for limited periods depending on the technology being encouraged at the time the development is constructed.

Presently the only fund available is the Industrial Energy Transformation Fund (IETF).

The above grant can be found on the BEIS website, www.gov.uk

5.00 CONCLUSIONS

This Energy Strategy overview has assessed the service strategy and likely energy consumptions and CO2 emissions for the new buildings at Observer Park, Observer Way, Arborfield, Reading.

This document demonstrates how improvement on the baseline carbon emissions has been achieved, in accordance with the energy hierarchy (lean, clean, and green):

- Lean – Measures include U-values that better Part LV2 (2021) requirements, minimised thermal bridging, and robust air tightness.
- Clean – Space, DHW and air heating and cooling requirements met via ASHP.
- Green – implementing LZC technologies to further reduce the CO2 emissions from the building by 10%.

The proposed buildings have been shown to be able to meet the minimum for Part LV2 compliance and 10% regulated energy from renewable sources.

- *End of Report* -