

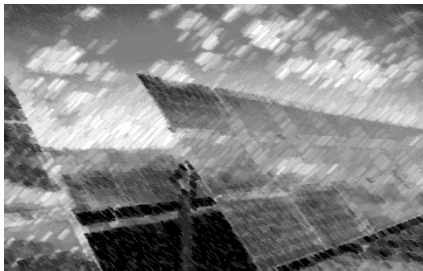
ENERGY STATEMENT

for

ONE NEW-BUILD INDUSTRIAL UNIT

at

FISHPONDS ROAD, WOKINGHAM



PREFACE

This report has been prepared for the specific purpose stated therein and for the exclusive use of Indurant. This document is issued only to the persons stated and on the understanding that HBa Consulting Engineers Ltd (HBa) is not held responsible for the actions of others who obtain any unauthorised disclosure of its contents, or place reliance on any part of its findings, facts, or opinions, be they specifically stated or implied.

REVISION SHEET

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Issue	Date	Description	By	Authorised
P1	23/02/2024	For planning	FAB	TPH
P2	25/06/2025	Revised to incorporate PV amount to 15% of roof area	FAB	TPH
P3	23/07/2025	Revised to incorporate client comments	FAB	TPH
P4	25/07/2025	Revised to incorporate client comments	FAB	TPH

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1.00 INTRODUCTION

This report for the 1No. New Industrial Unit at Fishponds Road, Wokingham is produced to be compliant with BREEAM 2018 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.

The report is also required to satisfy condition 20.

“Prior to above ground construction works of the development hereby approved, details of the buildings of setting a minimum 10 percent reduction in carbon emissions through renewable energy or low carbon technology for major developments shall be submitted to and approved in writing by the Local Planning Authority. The details thereby agree shall be implemented and maintained thereafter.”

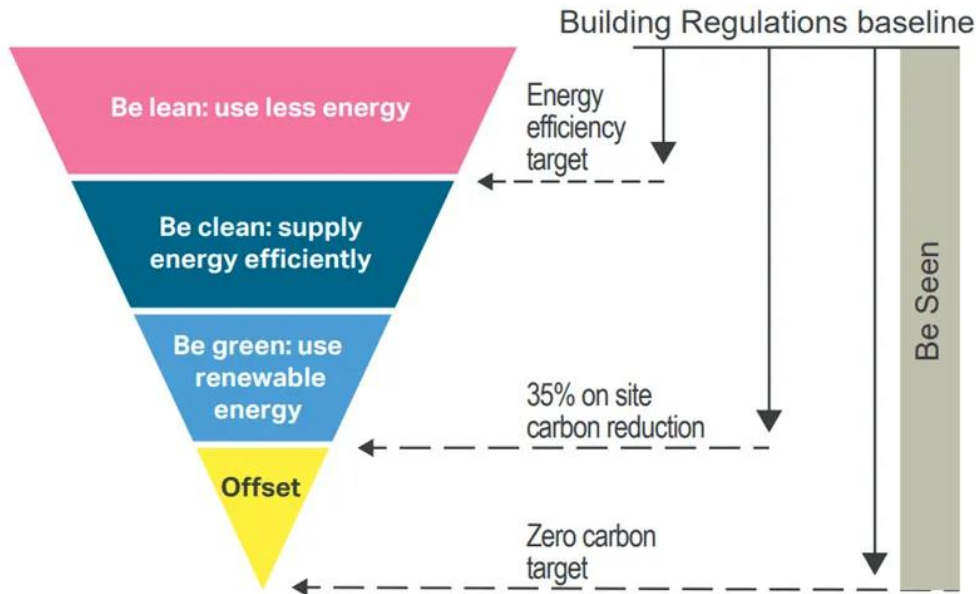
1.01 Sustainability Targets

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 Net Zero Carbon Emissions and an EPC rating of A+

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 building has 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 building's heating load 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 building. 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.

2.00 PART L MODELLING INPUTS

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

The model geometry has been created following drawings issued by HTC Architects dated January 2024.

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
Ground contact floors	0.18
Exposed floors	0.18
Roof	0.18
Personnel Doors	1.60
Rooflights	2.20
Vehicle Access Doors	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 (30%) and Light Transmittance rating of 70%

2.01.1 Air Permeability

An 'As-Built' building air permeability target of 5.0m³/hr.m² 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 building. 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 the 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** is proposed in Circulation zones, WCs, and Stores – AutoON/AutoOFF.
- The use of **occupancy absence sensors** is proposed in Office Areas. – Manual On/Auto Off.

- **Lighting control parasitic power consumptions** are to be minimised ($<0.10\text{W/m}^2$ per area/room served).
- Photocell automatic daylight dimming will be included in the Offices, and Entrance Lobbies.

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:

- **Mechanical Ventilation 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 & cooling demand is proposed to be met with high-efficiency VRF systems.

- SCOP: 3.8 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 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 extract 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 | <ul style="list-style-type: none"> - 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 building and this 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 photovoltaic panels will be implemented and the building will be designed to maximize the usefulness of this technology.

The amount of PV proposed for the building is 505.95m² which equates to approximately 87.22kWp.

The PV panels have a minimum efficiency of 20.1%, an inclination of 6° and an orientation of South West.

3.00 ENERGY MODELLING INPUTS AND ASSESSMENT METHODOLOGY

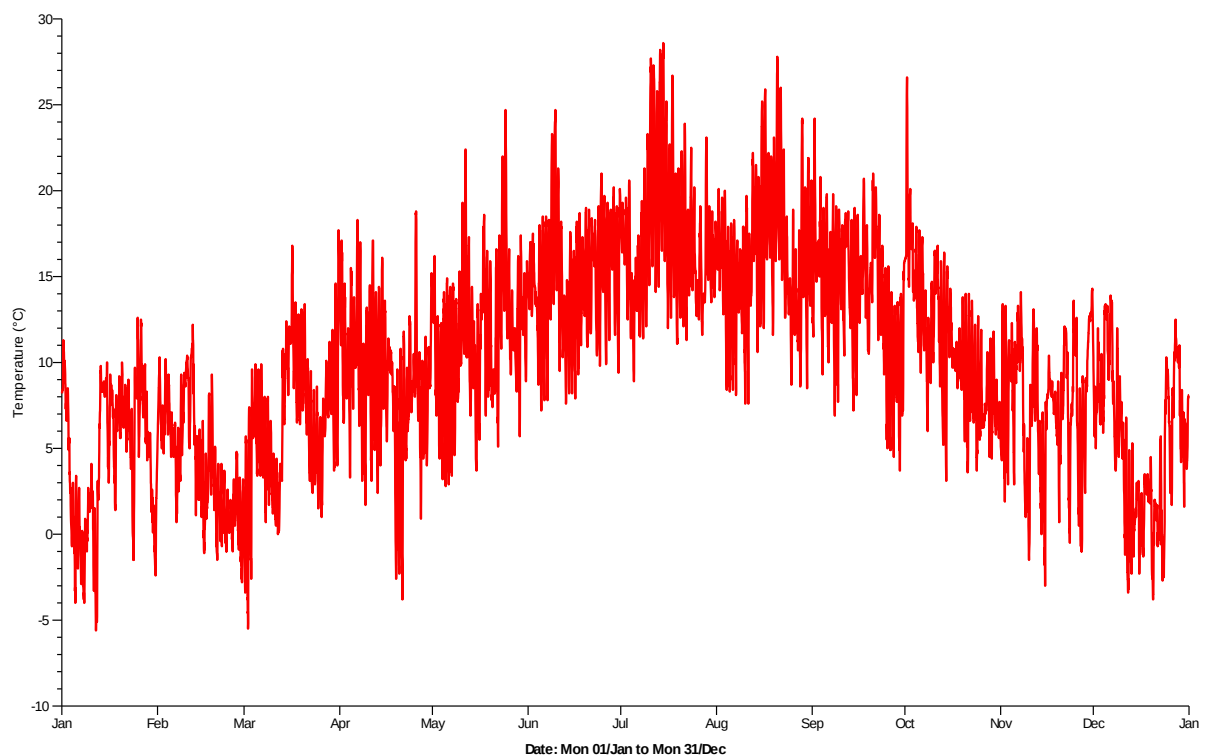
Analysis has been performed in order to assess the currently proposed architectural and engineering services strategy in terms of total annual operational energy consumption and associated carbon dioxide (CO₂) emissions.

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.

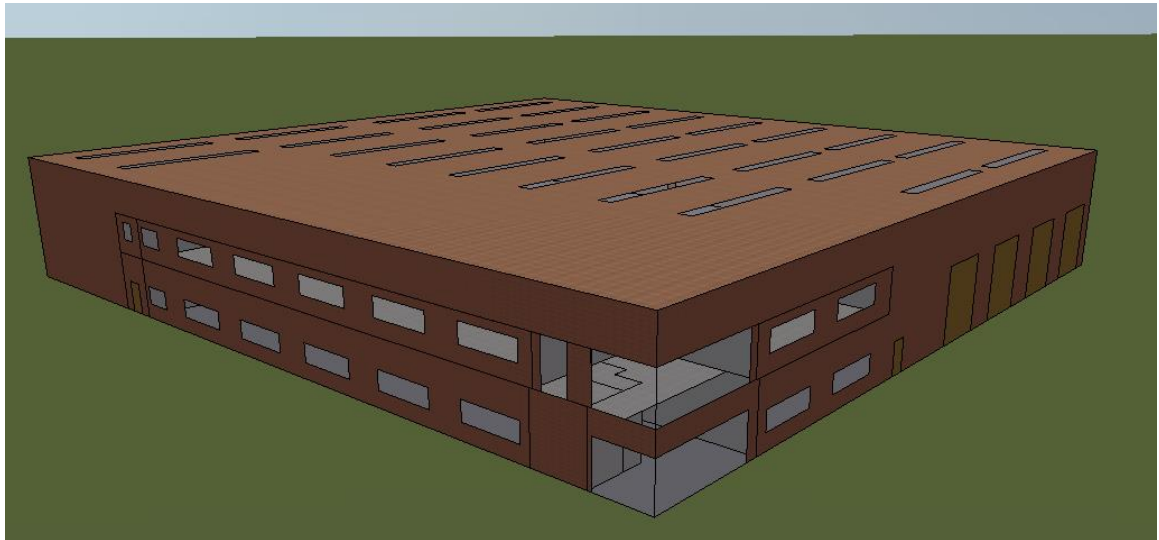
3.04 **Architectural Drawings Details**

The proposed building was developed based on the following architectural drawings as issued January 2024.

- 3286-P100-A Proposed Floor Plan
- 3286-P110-A Proposed Roof Plan
- 3286-P200-B Proposed Elevation
- 3286-P300-A Proposed Section

3.05 Thermal Model Visualisations

The following IESVE image illustrates a typical new build unit.



Typical New Build Unit, Wokingham – Perspective View

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 **achieves >100% reduction of regulated CO2 emissions vs a Part LV2 2021 compliant target emission rate (TER).**

	Carbon dioxide emissions (Tonnes CO2 per annum)		Primary Energy Consumption (kWh/m ² per annum)	
	Baseline: Part L 2021	Proposed Design	Baseline: Part L 2021	Proposed Design
Unit 1	1.39	-0.88	14.57	-11.53

This level of performance demonstrates compliance with Criterion 1 of Part LV2 (2021) and therefore also satisfies the requirement for the building to achieve Part L compliance, Net Zero Carbon emissions and an EPC rating of A+.

Lifecycle Cost of Photovoltaics

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

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 building to use it, but what electricity is not used can be sold back to the national grid or stored.

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

- Unit 1 = £21,091

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 building at Fishponds Road, Wokingham.

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 achieve Part L compliance and Net Zero Carbon emissions.

The proposed building has been shown to be able to meet the minimum for Part LV2 compliance and Net Zero Carbon emissions and demonstrates a greater than 10% reduction in carbon emissions will be achieved.

- End of Report -