



SUSTAINABILITY STATEMENT

for

4 No. Industrial Units

Pixmore Avenue, Letchworth

By

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1.0 INTRODUCTION

This report for the 4No. New Industrial Units at Pixmore Avenue, Letchworth is produced to be compliant with North Hertfordshire Council Local Plan and Sustainability supplementary Planning document.

The Sustainability supplementary planning document states that for Major non-residential developments the proposed design should maximise solar gain through site layout and orientation, as well as achieve an on-site reduction of 35% of CO₂ emissions over and above the Building Regulations Part L.

The document also requires that the proposed development shows that at least 20% renewable energy is provided from onsite renewable technologies.

1.1 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 35% on-site reduction of CO₂ (including 10% reduction through fabric first measures.
- (4) Achieve at least 20% renewable energy is provided from onsite renewable technologies.

1.2 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.
- Electric Panel and Convectors heaters serves the building's heating load.
- The occupied spaces are naturally ventilated, providing fresh air via opening windows 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 buildings also coincides with peak generation times increasing the system's viability and carbon emission reduction potential.

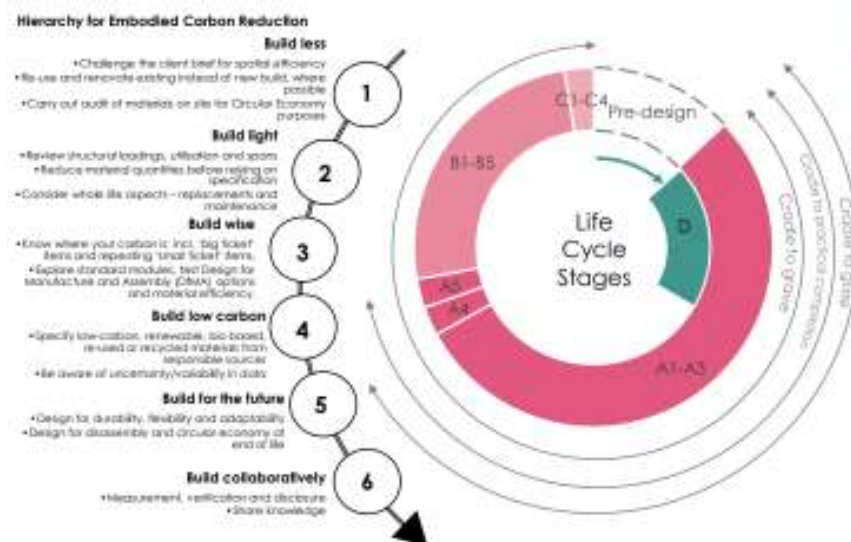
1.3 Methodology

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 buildings energy consumption in real-life operation.

The building will also be designed in accordance with the UKGBC framework methodology and the project will target <370kgCO₂/m² embodied carbon. This will be achieved by following the hierarchy for embodied carbon reduction as detailed below.



It is also proposed that a Whole life Carbon Assessment will be carried out to calculate the embodied carbon and demonstrate that the proposed development will achieve the benchmark set.

2.0 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 Wayman Architects dated November 2023.

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

2.1 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	Baseline Thermal Transmittance U-value (W/m ² .K)	Proposed Thermal Transmittance U-value (W/m ² .K)
Insulated wall elements	0.26	0.15
Glazing (incl. curtain walling)	1.60	1.20
Ground contact/Exposed floors	0.18	0.12
Roof	0.18	0.12
Personnel Doors	1.60	1.20
Vehicle Access Door	1.30	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%**

2.1.1 Air Permeability

An 'As-Built' building air permeability target of 5.0m³/hr.m² is targeted

2.1.2 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 120lm/W for the Warehouse spaces, 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** are proposed in Circulation zones, WCs, and Warehouse Zones – AutoON/AutoOFF.
- The use of **occupancy absence sensors** are proposed in Office Areas. – Manual On/Auto Off.
- The use of **daylight dimming sensors** are proposed in the Entrance Lobby and Office Areas.
- **Lighting control parasitic power consumptions** are to be minimised (<0.10W/m² per area/room served)

2.1.3 Thermal Mass

Exposed thermal mass (heavyweight building fabric) is an important thermal comfort design consideration, especially for naturally ventilated spaces. As the buildings are predominately naturally, thermal mass exposure is of concern, therefore 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.

2.1.4 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 proposed design measures/specifications are proposed to be implemented:

- **WC Extract specific fan powers (SFPS') are to be minimised** – in some instances this may require significant oversizing of units to enable efficient fan speed operation
 - **Zonal extract systems will target 0.5W/l/s**

2.1.5 DHW Generation

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

2.1.6 Space Heating

The Core Areas heating demand is proposed to be met with Electric panel heaters and the Warehouse heating demand is proposed to be met with Electric Fan Convectors

- Panel Efficiency 100%
- Fan Convectors Efficiency 100%

2.1.7 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	- 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	Considered – Not Recommended
Reasons	- Heating and Cooling demand is expected to be low - Significant additional capital cost

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 this is unlikely to be sufficient surplus energy to warrant the requirement for storage.

Measures to be Adopted

The use of photovoltaics panels will be implemented and the buildings will be designed to maximize the usefulness of this technology.

Various amounts of photovoltaic panels (panel efficiency of 21.0%) with an orientation permitted by the building's orientation (in brackets below) and an inclination of 15° have been assessed for the units.

The total amount of PV required for each unit to achieve 50% CO₂ reduction is detailed below;

- Unit 1 = 87m² (South East)
- Unit 2 = 72m² (South East)
- Unit 3 = 88m² (North East)
- Unit 4 = 84m² (North East)

3.0 Energy Modelling Inputs and Assessment Methodology

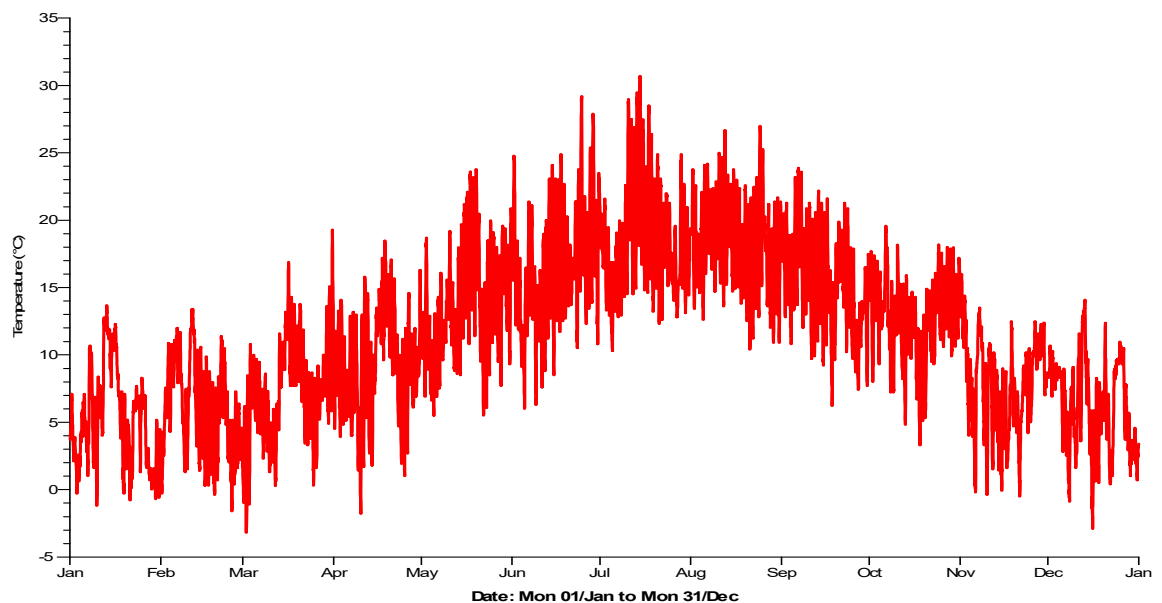
Analysis has been performed in order to assess the currently proposed architectural and engineering services strategy in terms of total annual operational energy consumption and associated carbon dioxide (CO₂) emissions.

As required, the performance of the proposed design has been benchmarked against the Part LV2 (2021) Notional target building. IES version. 2024.0.2.0, VE Compliance version. 7.0.27.0 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.

3.1 Weather Data

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



CIBSE London TRY Weather – External Dry Bulb Temperature

3.2 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.

3.3 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.

3.4 Architectural Drawings Details

The proposed buildings were developed based on the following architectural drawings as issued November 2023;

- 271-001 P10 Pixmore Ave - Proposed Site Plan
- 271-014 P6 Pixmore Ave - Proposed Elevations
- 271-016 P3 Pixmore Ave – Roof Plans

3.5 Thermal Model Visualisations

The following IESVE image illustrate the proposed development.



4. 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 >50% regulated CO2 emissions 'site wide' reduction vs a Part LV2 2021 compliant target emission rate (TER)**. It also shows that at **>28% of the reduction is from a Fabric first approach**.

	CO2 emissions (Tonnes CO2 per yr)				CO2 Improvement %	
	Baseline	Fabric First Approach	TER With Renewables (PV)	BER With Renewables (PV)	Fabric First Approach	With Renewables (PV)
Unit A	10.52	7.49	2.82	1.42	28.80	49.65
Unit B	11.11	8.13	3.36	1.68	26.82	50.00
Unit C	11.36	8.19	3.24	1.56	27.90	51.85
Unit D	10.86	7.77	2.98	1.45	28.45	51.34
Site Wide	10.93	7.87	3.08	1.52	28.03	50.66

This level of performance demonstrates compliance with Criterion 1 of Part LV2 (2021) and therefore also satisfies the requirement for the building to achieve 50% reduction in carbon emissions.

The regulated energy consumption and the energy produced from renewable technology of the proposed development can be seen below and shows that the PV proposed for the development produces **>97% of the regulated energy use**.

	Total Energy Consumption by End Use kWh/m2						Energy from Renewable Technology	
	Heating	Cooling	Auxiliary	Lighting	DHW	Total	Energy from PV kWh/m2	% of Energy from PV
Unit A	36.63	0.00	0.60	7.62	4.26	49.11	47.71	97.15
Unit B	39.99	0.00	0.60	8.63	4.25	53.47	50.73	94.88
Unit C	41.15	0.00	0.80	7.51	4.17	53.63	53.27	99.33
Unit D	38.44	0.00	0.78	7.45	4.20	50.87	50.76	99.78
Site Wide	38.89	0.00	0.69	7.79	4.22	51.59	50.43	97.74

This level of performance demonstrates compliance the sustainability criteria that at least 20% of the energy used in the development is produced by on-site renewable technologies.

Lifecycle Cost of Photovoltaics

For Life Cycle Costing Analysis and payback periods, the following fuel costs will be used, mains electricity 24p/kWh and natural gas 6p/kWh.

PV panels are still relatively expensive and only generate approximately 350-400 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 transported to other buildings on site or sold back to the national grid.

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

- Unit 1 = £12881
- Unit 2 = £13695
- Unit 3 = £14382
- Unit 4 = £13704

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. CONCLUSIONS

This Energy Strategy overview has assessed the service strategy and likely energy consumptions and CO₂ emissions for the new buildings at Pixmore Avenue, Letchworth

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 heating requirements met via Electric Panel and Electric Convectors.
- Green – implementing LZC technologies to further reduce the CO₂ emissions.

The proposed development has been shown to be able to meet the minimum for Part LV2 compliance and meets the sustainability requirements.