LTRO Wilbury Rd, Hove

Energy Strategy

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Revision Schedule

Revision No.	**Date**	**Details of Change**
Rev 00	29/03/2023	First Issue
Rev 01	31/03/2023	Typo corrected and MVHR included in assessment
Rev 02	12/02/2024	Updated to reflect revised scheme

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1.0 Introduction

Impact Sustainability Ltd has been instructed by Skep Projects Limited to prepare an energy strategy for the proposed development on land to the rear of Wilbury Road, Hove.

The proposed development is residential in nature and comprises 3no 2-storey houses. Two semi-detached houses will be located to the Northern end of the site, with a detached house to the Southern end of the site.

The two semi-detached houses will provide 2-bed accommodation, whilst the detached property will provide 3-bed accommodation.

Under Brighton and Hove's City Plan Part 1 Policy CP8 'Sustainable Buildings' it must be demonstrated that site wide CO_2 emissions are 19% below Part L requirements and that energy use has been minimised through the consideration of passive design measures, energy efficient design and Low or Zero Carbon (LZC) technologies.

This report therefore provides a summary of the energy assessment undertaken and the proposed energy strategy in accordance with local policy requirements. The energy strategy has been prepared following the energy hierarchy:

Be lean: use less energy

Be clean: supply energy efficiently

Be green: use renewable energy

This report has been completed by George Kent of Impact Sustainability Ltd, who is a registered Non-Domestic Low Carbon Energy Assessor (LCEA). George has 16 years continuous experience in energy simulation and consultancy and is not professionally connected or affiliated with any LZC technology or manufacturer. George is therefore considered to be an 'Energy Specialist'.

2.0 Planning Policy

The site falls within the authority of Brighton and Hove City Council and is subject to the B&HCC City Plan Part 1 (adopted March 2016). Within this document policy CP8 addresses 'Sustainable Buildings' and sets out a requirement for all residential development to reduce CO_2 emissions by at least 19% below the Part L 2013 baseline requirement. The following additional requirements are also set out in regard to energy strategy:

a. address climate change mitigation and adaptation

b. contribute to a reduction in the city's current level of greenhouse gas emissions by delivering significant reductions in fuel use and greenhouse gas emissions via passive design and orientation; fabric performance; energy efficiency measures and low carbon solutions

c. facilitate on-site low or zero carbon technologies, in particular renewable energy technologies

d. connect, make contributions to low and zero carbon energy schemes and/or incorporates provision to enable future connection to existing or potential decentralised energy schemes

In addendum to this, B&HCC City Plan Part 2 (adopted October 2022) includes Development Management Policy DM44 – Energy Efficiency and Renewables. Under this policy, the 19% reduction against Part L 2013 emissions should be calculated using SAP 10.1 emissions factors (or subsequent updates). In particular, these emissions factors take into consideration the current energy mix of grid supplied electricity, with lower a lower emissions factor achieved through a greater contribution from renewable technologies.

As the new Approved Document Part L 2021of the Building regulations came into effect in June 2022 the proposed development will be designed to meet this standard. This new standard utilises carbon factors that supersede those from SAP 10, and so is appropriate for use to demonstrate compliance with this policy.

It should be noted that Policy CP8 requires a 19% improvement against a Part L 2013 baseline. However, the new Part L 2021 improves on the 2013 TER baseline by 31%, meaning that compliance against Part L 2021 by any margin will also demonstrate compliance with local policy. This is not considered to be 'in the spirit' of the policy aims, and so a Part L 2021 baseline will be used within this energy assessment.

Under section 2.335 of the policy the following energy hierarchy is again referenced as a requirement to be followed:

Be lean: use less energy

Be clean: supply energy efficiently

Be green: use renewable energy

3.0 Baseline Assessment

3.1 Summary

To determine the potential energy and CO_2 savings available from the application of the energy hierarchy a baseline must first be established. This baseline is derived from an Approved Document Part L1 2021 compliance calculation and determining the Target Emission Rate (TER) from a Standard Assessment Procedure (SAP) calculation using NCM (National Calculation Methodology) approved software. This is the benchmark emission rate as calculated by the software that the dwelling must meet or exceed to comply with Building Regulations.

A SAP assessment has been completed upon each of the three proposed houses. The geometry data inputs to these calculations have been based upon the following planning issue drawings issued by ABIR Architects:

- 0697.PL.400 – Proposed Site Plan, Location & Block Plans
- 0697.PL.401 – Proposed Plans
- 0697.PL.402 – Proposed Front and Rear Elevations
- 0697.PL.403 – Proposed Side Elevations

3.2 Baseline Assessment Results

Table 3.1 below shows the CO_2 breakdown of the baseline compliance analysis. The baseline annual CO_2 emissions for the proposed development are 3,598 kg. This is the CO_2 emissions level achieved by an approved Document Part L1 2021 compliant development using approved compliance software and calculation methodology.

Unit Type	Total Area m^2	Part L 2021 TER ($kg/m^2/yr$)	Total CO_2 (kg/yr)
Unit 1	100.5	12.67	1,273
Unit 2	84.0	13.91	1,168
Unit 3	84.0	13.77	1,157
Baseline CO_2 emissions			**3,598**

Table 3.1 Annual Baseline CO_2 Emissions

4.0 'Be Lean' Assessment

4.1 Summary

The first step of the energy hierarchy is to improve a building's energy demand through the specification of thermally efficient building fabric and services. To reduce this energy demand from the building high performance thermal insulation will be specified where possible to reduce envelope u-values below what is required for AD L1 2021 compliance.

The building fabric construction details have been based upon design information provided by ABIR Architects and similar project experience. These have been included within the assessment models as shown in table 4.1 below. The adventitious air permeability rate from the building is 3 $m^3/hr/m^2$ at a pressure of 50 Pa.

Building Element	Construction	U-Value W/m^2K	Part L 2021 U-Value W/m^2K
Ground Floor	Concrete slab with Kingspan Kooltherm K103 board and screed above	0.12	0.18
Intermediate Floor	Timber or steel joists	N/A	N/A
External Walls	Ground floor – Brick slip facing on Isotex blockwork, plaster First Floor – Zinc cladding on timber frame, Kingspan Kooltherm K112, plaster skim	0.18	0.26
Roof	Zinc cladding on timber frame, Kingspan Kooltherm K112, plaster skim	0.12	0.18
Windows/ doors (g-value=0.63)	Powder coated aluminium framed double glazing, soft coat low-e	1.20	1.60
Partitions	Generally lightweight stud walls	N/A	N/A
Target thermal bridging Y value		0.08 or less	N/A

Table 4.1 Building Fabric Constructions

The building services strategy fully considers the opportunities for low regulated energy use within the building. An Air Source Heat Pump is proposed to deliver both space heating and hot water, which has a high efficiency (known as Coefficient Of Performance, or COP) compared to traditional gas-fired systems. This system will also utilise grid electricity, which has lower CO_2 emissions per kWh than mains gas.

The ventilation strategy adopted will be whole house mechanical ventilation with heat recovery (MVHR). This system supplies fresh air throughout the dwelling, whilst simultaneously extracting stale air from wet rooms. Both flows pass through a heat exchanger, where up to 90% of the thermal energy from the extract air is recovered and used to pre-heat the supply air. This heat recovery ensures ventilation heat loads are minimised, whilst also providing a continuous supply of fresh air. The fan energy used is very low when compared to the amount of thermal energy recovered. Lighting throughout the houses will be low energy LED.

Table 4.2 below provides details of the 'be lean' services strategy.

System	System Details	Delivery Method / Controls	Zones
Heating	Air Source Heat Pump (assumed Grant Aerona 3 in SAP calculation)	Underfloor heating or radiators	All areas
Ventilation	Whole house MVHR (assumed Nuaire MRXBOXAB ECO3 in SAP calculation)	Rigid ducting throughout houses	All areas
Hot water	From main heating system, assumed 210L storage volume	1.67 kWh losses per day	All areas
Lighting	LED, assumed 85 lms/W	Manual control	All areas

Table 4.2 Building Services Systems & Performance Data

4.2 Be Lean' Assessment Results

Table 4.3 below shows the CO_2 breakdown of the 'be lean' compliance models. The total annual CO_2 emissions resulting from this stage are 1,345kg, which is a 62.6% reduction below the baseline figure.

Unit Type	Total Area m^2	Part L 2021 TER ($kg/m^2/yr$)	Part L 2021 DER ($kg/m^2/yr$)	Total CO_2 (kg/yr)
Unit 1	100.5	12.67	5.01	504
Unit 2	84.0	13.91	4.88	410
Unit 3	84.0	13.77	5.14	432
Be Lean CO_2 emissions				**1,345**
Reduction below TER baseline				**62.6%**

Table 4.3 Annual 'Be Lean' CO_2 Emissions

5.0 'Be Clean' Assessment

5.1 District Heat Networks

Within B&HCC City Plan policy CP8 it is confirmed that the development should consider the viability of connection to heat networks.

At the time of writing, the only known heat network project in the area is the Shoreham Heat Network. However, it is understood this was found to be unviable and so will not proceeding. In any case, the network site is several miles away from the application site and sop connection to this is not a realistic prospect.

In order to allow provision for connection to a district heating system in the future the heating system would need to be designed with future connection capability in mind. This is better suited large scale development, where a communal heating strategy can be adopted. It would not be appropriate to have a shared energy strategy between three individual houses, and each is too small to warrant connection to a heat network in the future.

Therefore, connection to heat networks is not considered to be a viable option for the application site.

5.2 Combined Heat & Power

Combined heat and power (CHP), also known as cogeneration, is the simultaneous generation of thermal and electrical energy from a single stream of fuel. A CHP engine burns fuel to run a turbine, which in turn generates electricity. The 'waste' heat from the combustion process is then used to provide heating and hot water within the building. In this way electricity from conventional power stations is displaced and the substantial conversion, transmission and distribution losses are avoided. The resulting efficiency gives typical small-scale CHP installations a simple payback period of between 3 and 5 years, beyond which the units continue to save energy right up until the end of the life of the plant.

Systems must be 'heat lead' for high efficiency, which best suits applications to situations where there is a significant demand for heat for long periods of time, such as hospitals, hotels and leisure centres. As the development is residential in nature each house will have a relatively high hot water demand, although this will likely only be at peak times such as in the mornings and evenings. This usage profile is not well suited to CHP, as the engines require a continuous load to ensure they operate all the time and realise the potential carbon savings. Therefore, if CHP were to be utilised this would have to be micro scale to ensure the output matches the base hot water load of each building. Even with a micro-scale CHP engine it is likely that a large buffer vessel would be required to ensure continuous operation.

Furthermore, CHP does not perform particularly well against the new Part L2 2021 standard, as the gas used to generate the electricity within the unit actually has higher CO_2 emissions per kWh than grid supplied electricity. A CHP engine would therefore put the houses at a disadvantage in terms of building regulations and planning policy compliance.

For the reasons stated above no further reduction in emissions can be achieved from the 'be clean' stage of the analysis.

6.0 'Be Green' Assessment

6.1 Summary

The commentary below provides an overview of the potential LZC technologies available for specification within the development and present the associated opportunities and constraints.

- **Biomass Heating** – Fuel storage / access concerns and high level of maintenance required not suited to this development type. Also concerns surrounding local air quality. Not viable.
- **Ground Source Heat Pump** – Insufficient site area available for horizontal system and vertical system not financially viable on what is a relatively small scale site. Vertical bore holes are likely to interfere with existing below ground infrastructure in this urban setting. Not viable.
- **Air Source Heat Pump** – Air source heat pumps are viable and will be utilised to deliver the heating demand to the building. However, these have already been considered within the 'be lean' section. Viable and already included.
- **Wind Turbine** – Urban context of site and location within planning policy area means this technology would not be permitted in this location. Not viable.
- **Solar Thermal Panels** – Energy can only be used when there is a demand in the building, otherwise it is 'dumped' and hot water demand from the property will be low. Furthermore, the site is overshadowed by trees and tall buildings and this would significantly impact on performance. Not viable.
- **Photovoltaics** – Sufficient roof space is available to install a small array on each house. However, the site is overshadowed by trees and tall buildings and this would significantly impact on performance. Not viable.

7.0 Proposed Energy and LZC Technology Strategy

7.1 Recommended Strategy

An energy strategy for the proposed development site at LTRO Wilbury Road, Hove, has been assessed in accordance with Brighton and Hove City Plan Parts 1 and 2, based upon the energy hierarchy:

Be Lean: use less energy
Be Clean: supply energy efficiently
Be Green: use renewable energy

Following this approach has resulted in an energy efficient scheme that has minimised CO_2 emissions associated with the use of regulated energy through improvements to the thermal performance of the building envelope and high efficiency building services strategy. These measures have resulted in a reduction in annual CO_2 emissions of 62.6% below the Part L 2021 baseline.

Connection to a district heat network is not a viable option as there are no existing networks in the close vicinity of the site. The development type and scale is not well suited to a potential connection in the future and so a 'network ready' energy strategy nis not deemed to be appropriate.

An LZC technology appraisal has been completed, which concludes that an ASHP would be the most suitable option for inclusion. However, this has already been included in the 'be lean' assessment and so cannot be counted twice. As such, no further reductions can be achieved at the 'be green' stage of the energy hierarchy. It should, however, be noted that an ASHP is considered to be a Low and Zero carbon technology, since the heat source for the space heating and hot water is external ambient air, which is a renewable source. The development will therefore utilise LZC technology to meet Building Regulations and Planning Policy targets.

The results of the energy hierarchy analysis followed within this energy strategy are shown in table 7.1 and figure 7.1 below. These demonstrate that a reduction of 62.6% below the Part L 2021 baseline is achieved. Policy CP8 asks for a 19% reduction below the Part L 2013 baseline, and since Part L 2021 improves on the 2013 baseline by 31%, the results indicate that the improvement against the Part L 2013 baseline would in fact be 74.2%.

Energy Hierarchy Stage	CO_2 Emissions (kg/yr)	CO_2 Reduction (kg/yr)	Reduction from 2021 baseline (%)	Reduction from 2013 Baseline (%)
Part L 2013 Baseline	5,215			
Part L 2021 Baseline	3,598	1,617		31.0%
'Be Green' Development	1,345	2,253	62.6%	74.2%

Table 7.1 Results of energy hierarchy analysis using Part L1 2021

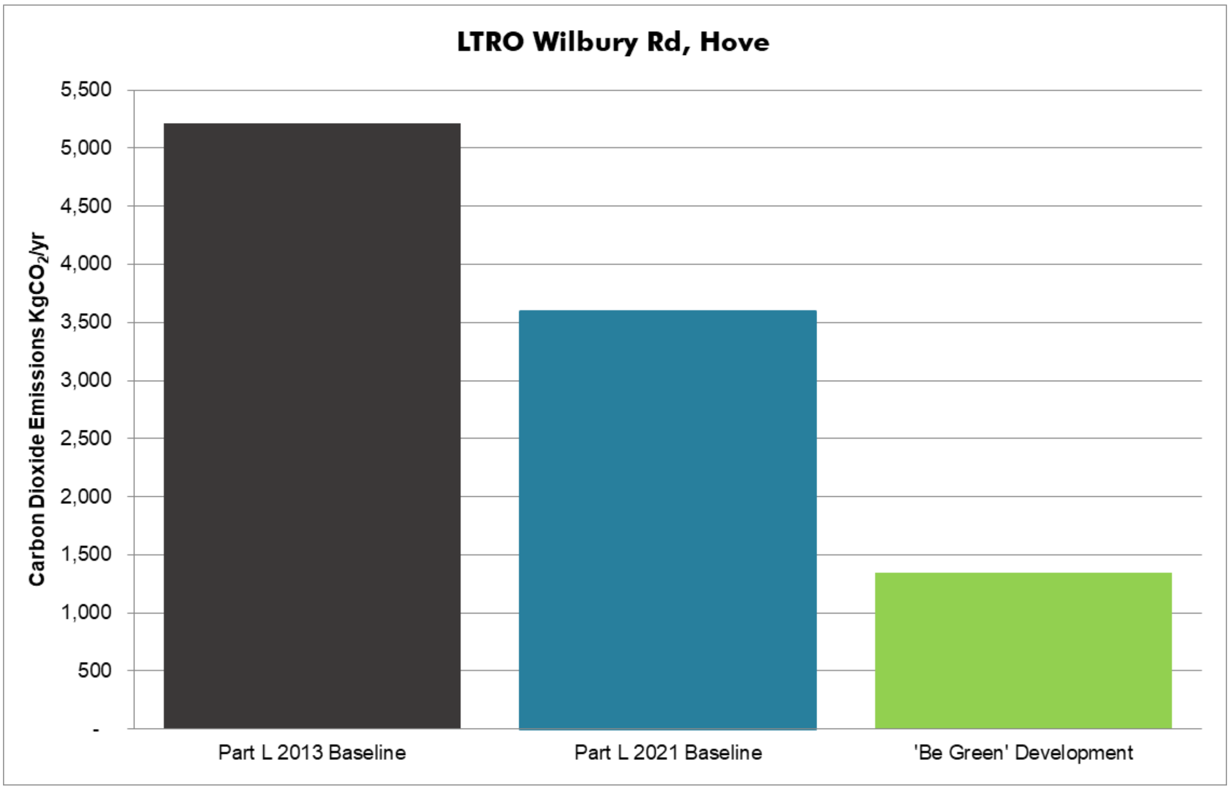

Figure 7.1 Graphical results of energy hierarchy analysis Part L1 2021