



9 Upper Crown
Street, Reading
RG1 2SS

Energy Strategy Report

August 2023

Ref: 23-11459



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This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

Revision	Initial	Rev A	Rev B	Rev C
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Abbreviations

ASHP:	Air Source Heat Pump
BER:	Building Emission Rate
CO ₂ :	Carbon Dioxide
CHP:	Combined Heat and Power
CSH:	Code for Sustainable Homes
DHW:	Domestic Hot Water
ESR:	Energy Strategy Report
GHG:	Green House Gas
GSHP:	Ground Source Heat Pump
GLA:	Great London Authority
HVAC:	Heating, Ventilation, and Air Conditioning
IES VE:	Integrated Environmental Solutions Virtual Environment
KWp:	Kilo Watt Power
KWh:	Kilo Watt Hour
LZC:	Low Zero Carbon
MVHR:	Mechanical Ventilation Heat Recovery
MCS:	Microgeneration Certification Scheme
NPPF:	National Planning Policy Framework
NCM:	National Calculation Methodology
OSM:	Open Street Map
PV:	Photovoltaic
SBEM:	Simplified Building Energy Modelling
SFP:	Specific Fan Power
TER:	Target Emission Rate

1. Executive Summary

This Energy Strategy Report demonstrates the predicted energy performance and carbon emissions of the proposed development located in **9 Upper Crown Street, Reading RG1 2SS**. The figures presented in this study are based on the most up to date information provided by the design team. The development will comprise of **3 Residential blocks containing 46 dwellings**. The overall analysis took into consideration the national building regulations (i.e. **Part L1A**) and the local policy requirements. Based on the study assumptions, the project shall comply with the council local policies and buildings regulations.

1.1 Buildings Policy Requirements

The national building regulations require buildings to comply with the energy efficiency requirements. This shall be accomplished through capping the project carbon emissions below the regulated target. In addition to the above, the **Reading Borough** council requires new developments to incorporate sustainable design and construction measures. The table below summarises the best practice building regulations and local policy requirements the assessment adopted for the development.

Table 1: National and Local Policy Requirements

Policy:	Requirement	Compliance Check
Part L 1A (Criterion 1)	<i>The calculated CO₂ emissions rate for the dwellings (i.e. DER) must not be greater than the Target CO₂ Emissions Rate (i.e. TER).</i>	<i>The project achieved criterion 1 by measures of improving fabric thermal performance and efficient building services.</i>
Best Practice requirements (for new buildings)	<i>Improved energy efficiency of building over and above the Building Regulations and further increase carbon savings.</i>	<i>The proposed scheme has achieved carbon reduction over Building Regulation via efficient energy measures and improved envelope thermal performance.</i>
Local plan : Reading Borough	<i>The council Local Plan promotes sustainable, high-quality design and construction and alternative energy supplies. The council requires all new-build housing to achieve a minimum 19% improvement over building regulations target.</i>	<i>The project makes the best use of improved thermal performance fabric materials. In addition to incorporating energy efficiency and renewable technology measures.</i>

1.2 Assessment Methodology and Strategies

The adopted methodology to mitigate the development CO₂ emissions is in alignment with the best practice Efficient Energy Hierarchy Guidance. The development has been assessed using the best practice energy hierarchy strategies which by default demonstrates Part L compliance. Models and simulation assumptions have been carried out using **SAP** calculation method which complies with the National Calculation Methodologies (NCM).

Table 3 below explains the Energy Hierarchy stages and the suggested strategies to help the proposed development achieve the required carbon targets.

Stages	Strategies
BE LEAN Carbon Efficient Design (Minimising energy demand)	- Improved fabric U-values beyond Part L1 requirements. - Airtight thermal envelope. - Energy efficient lighting fittings (i.e. LED).
BE CLEAN (Availability of CHP and communal heating systems)	Analysis for local CHPs and communal heating systems has been assessed. Further information can be found in the Be Clean Section.
BE GREEN On-site renewable technologies (i.e. ASHP, PVs, etc)	Provision of efficient building services through use of ASHP and PV. Further information will be presented in Be Green section below.
BE SEEN In-use monitoring	Installation of Smart Meters is recommended to monitor the actual operational energy use, manage it effectively and mitigate the performance gap.

Table 2: Energy Hierarchy stages to achieve reductions over Part L requirement.

1.3 Assessment Results

The new build residential development has been simulated under four conditions to analyse the improvements hierarchy. The first simulation assesses the dwellings under the building specifications defined as limiting values by Part L 2021. The function of this first simulation is to generate the regulated carbon target (TER) and the actual Dwelling Emission Rate (DER). The second calculation analyses the carbon reductions achieved after improving the building fabric thermal performance by adopting improved thermal U-values and airtightness (i.e. Be Lean). The third stage of simulation assesses the feasibility of adopting local low-carbon energy sources like CHPs (i.e. Be Clean stage). The fourth stage analysed the carbon reductions after considering renewable technologies to achieve the reductions beyond Part L 1A requirements (i.e. Be Green).

	Notional TER	Baseline BER	Be-Lean BER (KgCO ₂ /m ² .annum)	Be-Clean BER	Be-Green BER
Building 1A	11.87	6.72	4.39	4.39	4.39
Building 1B	10.18	6.07	3.8	3.8	3.8
Building 1C	10.18	6.07	3.8	3.8	3.8
Building 1D	11.87	6.72	4.39	4.39	4.39
Building 2	13.95	6.39	4.41	4.41	4.12
Building 3	15.84	7.06	4.77	4.77	4.37

Table 3: Impact on Domestic Carbon Emissions of each dwelling after every stage of the proposed strategy

Results of the simulations show that the development is able to meet the overall criteria of the national and local policies.

2. Introduction

This Energy Strategy Report (ESR) focuses on the energy strategies explored for the proposed scheme in order to make it comply with national and local policy requirements. The report presents how the annual energy consumption and related carbon emissions will be minimised to meet the regulated targeted carbon emissions (i.e. **Part L1A TER**).

The assessed development is located in the **Reading Borough Council**. The development proposal has a total built up area of **2855.5 m²** with **3 residential blocks containing 46 dwelling** located at **9 Upper Crown Street, Reading RG1 2SS**.

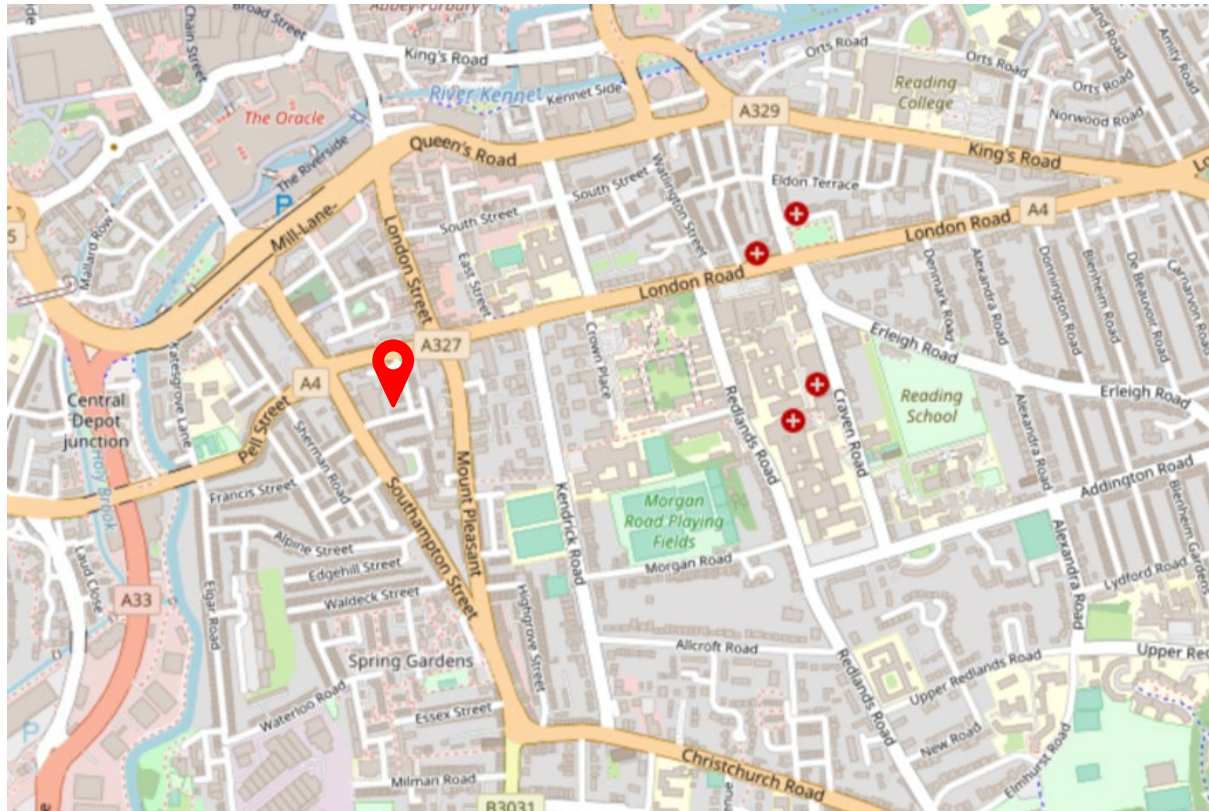


Figure 1: OSM urban view map of the Site Location.

The domestic and non-domestic sector plays an important role in the UK economy, both as a direct (and indirect) employer and generator of output, and in providing other sectors such as retailers and financial and business services with a critical factor of production – the physical location from which to do business. This ESR report analyses the project using research and policies guidance to make sure this development is built up to achieve positive economic, social and environmental impacts.

3. Planning Policy

3.1 National Planning Policy Framework (NPPF, February 2021)

The National Planning Policy Framework is a key part of our reforms to make the planning system less complex and more accessible. These actions been taken for the purpose of protecting the environment and promoting a sustainable growth of the built environment.

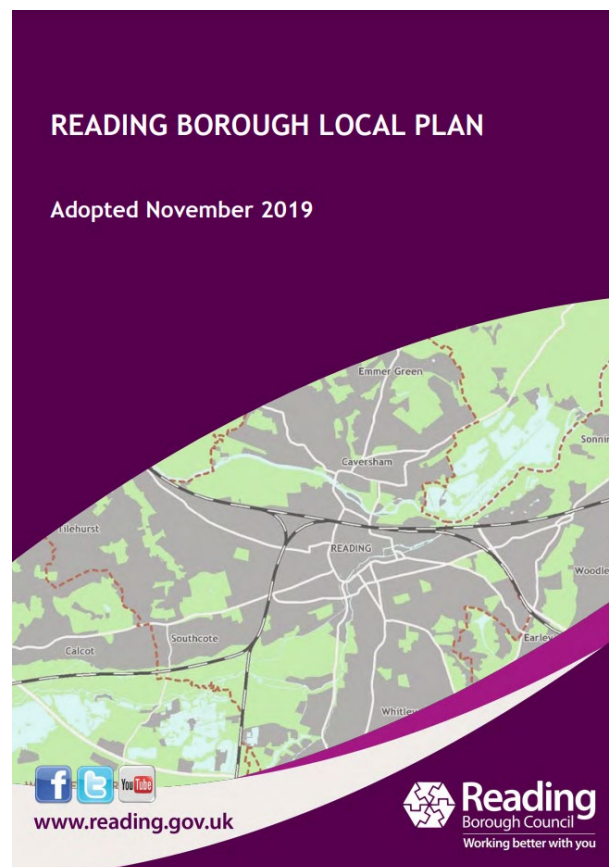
3.2 Best Practice Energy Strategies for guidance only

Minimising greenhouse gas emissions Hierarchy

Developments should reduce the overall embodied greenhouse gas emissions and operational carbon emissions. In addition to minimising both annual and peak energy demands in accordance with the following energy hierarchy:

- A. **Be Lean:** make buildings use less energy and manage demand during operational phases.
- B. **Be Clean:** exploit local energy supply resources (i.e. District and communal heating) to deliver energy efficiently.
- C. **Be Green:** exploring opportunities for renewable energy resources by producing, storing and using renewable energy on-site.
- D. **Be Seen:** monitor, verify and report on energy performance (Part L Criteria 4 and 5).

3.3 Reading Borough Local Plan



H5: STANDARDS FOR NEW HOUSING

New build housing should be built to the following standards, unless it can be clearly demonstrated that this would render a development unviable:

- a. All new build housing outside the Central Area as defined on the Proposals Map will comply with the nationally-described space standard.***
- b. All new build housing will be built to the higher water efficiency standard under Regulation 36(3) of the Building Regulations³².***
- c. All major new-build residential development should be designed to achieve zero carbon homes.***
- d. All other new build housing will achieve at a minimum a 19% improvement in the dwelling emission rate over the target emission rate, as defined in the 2013 Building Regulations.***
- e. All new build housing will be accessible and adaptable in line with M4(2) of the Building Regulations, unless it is built in line with M4(3) (see below).***
- f. On developments of 20 or more new build dwellings, at least 5% of dwellings will be wheelchair user dwellings in line with M4(3) of the Building Regulations. Any market homes provided to meet this requirement will be 'wheelchair adaptable' as defined in part M, whilst homes where the Council is responsible for allocating or nominating an individual may be 'wheelchair accessible'.***

4. Assessment Methodology

4.1 The Energy Hierarchy

The energy hierarchy is a classification of different methods to improve energy performance in a parallel sequence. This includes primarily a focus on reducing energy use by avoiding unnecessary consumption, to then improving the efficiency of energy systems to minimise loss. This is followed by exploiting renewable energy sources and low carbon energy solutions for energy needs. Finally, any remaining demand can be catered for by conventional fuel sources and carbon offsetting solutions.

The Energy Strategy adopts a set of principles to guide design development and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. The following hierarchy should be used to assess applications:

- **BE LEAN** – By using less energy and considering the further energy efficiency measure in comparison to the baseline building.
- **BE CLEAN** – By supplying energy efficiently. Clean energy use looks at further carbon dioxide emission savings over the lean building by taking into consideration the use of decentralise energy (e.g. CHP, District Heat Networks).
- **BE GREEN** – By integrating renewable energy into the scheme which can further reduce the carbon dioxide emission rate.
- **BE SEEN** – By monitoring, verifying, and reporting on energy performance to use energy mode effectively.

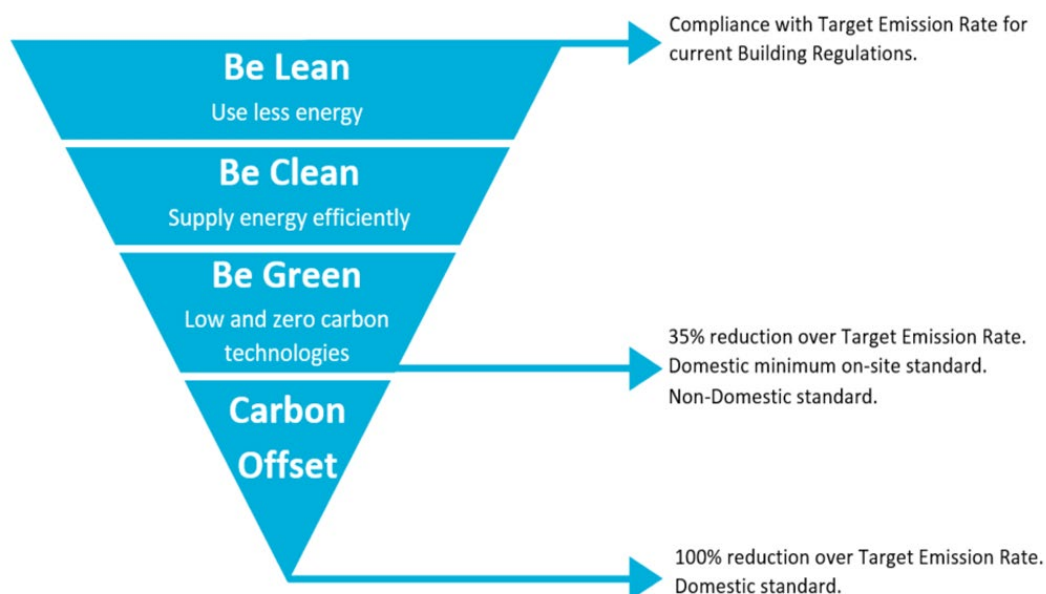


Figure 2: Energy Hierarchy

4.2 Modelling strategy

The Government approved software, **SAP 10** has been utilised to carry out the project compliance simulations (i.e., **SAPs**) according to the National Calculation Methodology (NCM). Simulated Models are built to assess the actual building BER against the notional building TER. The notional building used to determine carbon dioxide targets (TER) is the same size and shape as the actual buildings, constructed to concurrent regulated specifications (i.e. **Part L1**).

The actual building has been modelled entirely to the notional building specifications in order to meet the carbon targets and the limiting fabric and buildings services parameters. However, for differences in fabric design and glazing areas, actual buildings sometimes are expected to exceed the notional TER. Therefore, further improvements to the actual building parameters (e.g. fabric, HVAC, lightings, renewables) are made to meet the required compliance targets. The approved document (i.e. **Part L**) however encourages developers to vary the specification provided the same overall level of carbon dioxide emissions is achieved or bettered. It is important to note that SAP is not intended to be used as a building design tool but to inform the designers design decisions.

Syntegra received architectural drawings and project relevant documents. Received information is used to undertake the ultimate energy assessments and supporting the modelling assumptions. The document references are listed in the table below.

No.	Document Name	Format	Received Date
1	CA-222-P001-3	dwg	8-08-2023
2	CA-222-P002-1	dwg	8-08-2023
3	CA-222-P003-1	dwg	8-08-2023
4	CA-222-P004-1	dwg	8-08-2023
5	CA-222-P005-1	dwg	8-08-2023
6	CA-222-P006-1	dwg	8-08-2023
7	CA-222-P007-1	dwg	8-08-2023
8	CA-222-P008-3	dwg	8-08-2023
9	CA-222-P009-3	dwg	8-08-2023
10	CA-222-P010-3	dwg	8-08-2023
11	CA-222-P011-3	dwg	8-08-2023
12	CA-222-P012-3	dwg	8-08-2023
13	CA-222-P013-3	dwg	8-08-2023
14	CA-222-P014-3	dwg	8-08-2023
15	CA-222-P015-3	dwg	8-08-2023

Table 4: Documents list, as used for energy analysis

5. BASELINE - Target Emission Rate (TER) & Actual Building Rate (DER)

The baseline (known as Target Emission Rate), as calculated in line with the Building Regulation 2021, is the maximum amount of carbon dioxide a development is allowed to emit. The Target Emission Rate (TER) includes carbon dioxide emissions which are covered by Part L2 of the Building Regulations, known as regulated emissions (space and water heating, ventilation, lighting, pumps, fans & controls). The baseline energy uses and resulting CO₂ emissions rates of the development have been assessed using the Government approved software (**SAP 10**). This run of simulation assessed the models under the same notional building specifications. The function of this first run is to generate the regulated carbon target (TER) and the actual building emission rate (BER). Part L threshold specifications are used for the first run of simulation to limit the fabric thermal heat losses.

The baseline regulated CO₂ emissions for the development are presented in the tables below:

Building	TER (KgCO ₂ /m ² .annum)	DER at Be Lean (KgCO ₂ /m ² .annum)
Building 1A	11.87	6.72
Building 1B	10.18	6.07
Building 1C	10.18	6.07
Building 1D	11.87	6.72
Building 2	13.95	6.39
Building 3	15.84	7.06

Table 5: Regulated Energy Use and Carbon Emissions TER at Baseline

6. BE LEAN - Energy Efficient Design

This section outlines the project condition analysis and energy efficient measures taken in order to minimise the building's energy demand. The analysis helps reducing the energy use and CO₂ emissions further than the Baseline results and achieving TER compliance (Building Regulations 2021 **Part L 1A** compliance).

6.1 Site location



Figure 3: Urban view of the site surroundings (source: Google Earth)

The proposed project site is located at **9 Upper Crown Street, Reading RG1 2SS** in the county of **Reading**. The surrounding is majorly two to three storeys residential buildings in the major vicinity.

6.2 Site weather and Microclimate

The local weather microclimate usually influences buildings' energy performance. Urban design has a significant impact on microclimate and outdoor thermal comfort. Several studies in different climate regions have concluded that ventilation and shade are crucial to improve urban thermal comfort. Often the thermal conditions are improved as a consequence of good urban design including exist of proper shade and sufficient ventilation. This in turn leads to decreased occurrence of heat stress and heat-related diseases as well as grown performance of both mental and physical tasks.

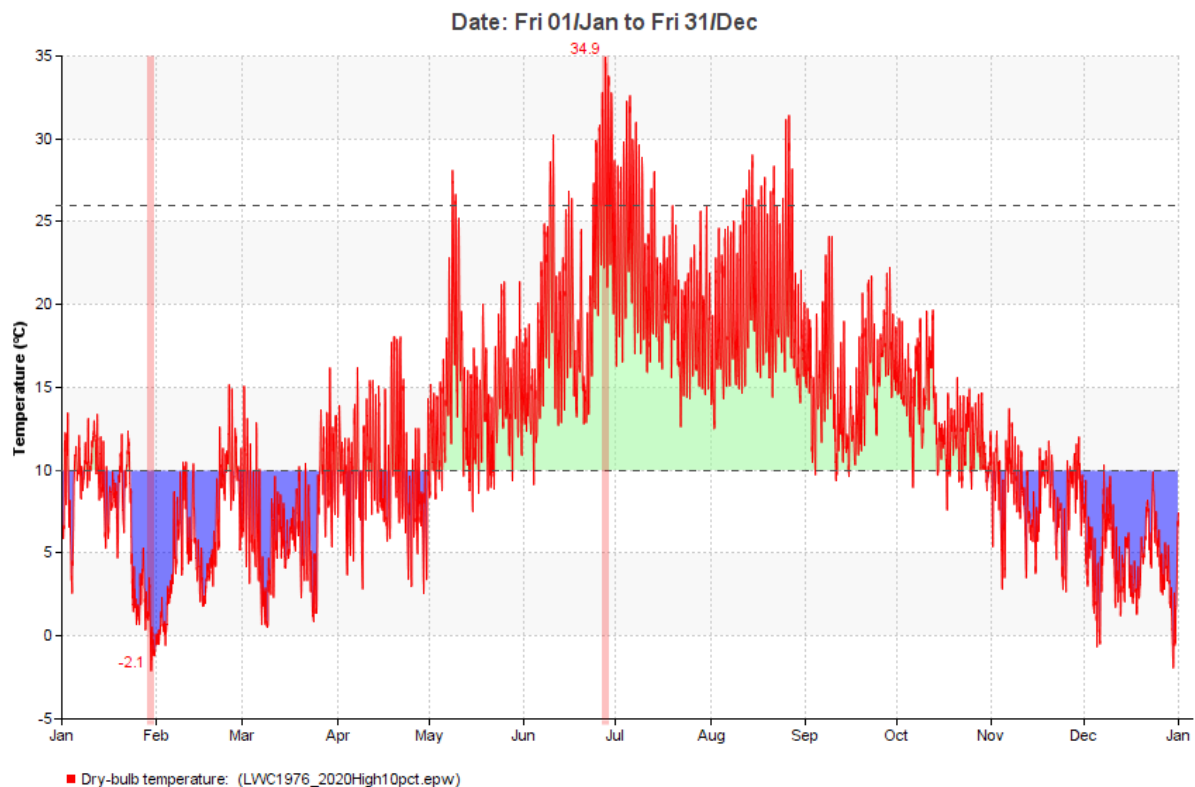


Figure 4: IES Annual Dry Bulb Temperature according to London weather file TRY05.fwt

The nearest weather station is in London (approx. 30 miles away), and this will be used for thermal and energy simulations. Figure 4 represents the annual dry bulb temperature in London City. Maximum temperatures can reach up to 33.6 C in late Jun, and minimum temperatures can reach down to -7.8C in the early December. The buildings in this location are generally low rise, and the site is not expected to suffer from the Urban Heat Island effects.

The site's landscape also affects the energy demand of a building. Vegetation, landform, and any existing buildings can provide shade to a new development. For instance, if located to the south of the building, deciduous trees can be advantageous, providing shade in the summer but allowing sunshine through in the winter when they lose their leaves. However, any tree used for energy conservation should be considered as part of a much larger landscape.

6.3 Building Orientation, layout, and form

Building layout, orientation and form can influence many key features of the development. The design should provide for an effective use of space and appealing layout, with opportunities to benefit from natural daylight balanced with achieving solar gain without overheating. In general, a higher thermal performance can be achieved by limiting the surface area to volume ratio as this minimises heat loss through the wall area.

It should be noted that where the building footprint is extremely tight, for example in a city centre location, then the building form and orientation may have to be dictated by the available space and not by implementation of best practice measures. Invariably, planning constraints and/or the functional relationships of specific areas will result in some measure of deep planning, thus reducing the opportunity for natural ventilation.

Planning the internal layout of buildings and space to maximise the benefits of solar gain and minimise the disadvantages is essential. Spaces where overheating would be critical can be placed on the north side of the building or overhangs used to protect from excessive solar gain.



Figure 5: Proposed site plan

The primary axis of the individual dwellings runs roughly from **North to South**; with the windows facing East and West. The Southwest facing rooms are expected to experience higher solar heat gains, which can be capitalized during the winter months but need to be shaded for the summer.

6.4 Building Design – Energy Efficiency Design Measures

• Enhancing Building Fabric Thermal Performance

At the 'BE LEAN' stage of the energy hierarchy, energy efficient building elements have been incorporated into the model. The heat loss of different building element is dependent upon their U-value, air permeability, and thermal bridging Y-values. Therefore, better U-values and air permeability figures than the minimum values set in the **Part L1A** 2021 have been suggested in this stage of simulation. Table 6 below presents the different U-values used for the **residential building**. The **Part L1A** figures are used for the first run of simulation (i.e. Baseline). Part L1A figures are stated by the NCM modelling guide to limit the fabric thermal heat losses. Be lean U-values are the improved values beyond Part L requirements to improve the new build energy performance. The overall figures mentioned in the table below are the assumptions for the second run of simulation.

Building Type		Residential	
Category Specification		Part L 1A Notional	Be-lean Improved values
U-value (W/m ² K)	Wall	0.18	0.11
	Windows/Roof windows	1.2	1.00
	Floor	0.13	0.11
	Roof	0.11	0.11
	Doors	1.00	1.00
Thermal Bridging (W/mk)	Lintels	1	0.02
	Sill and Jamb	0.1	0.01
	Party Wall between dwellings (Building 1)	0.24	0.09
Air Permeability (m ³ /h.m ² at 50 Pa)		5.00	2.5

Table 7: Proposed fabric and building Elements

The development will be adopting the following measures for the fabric thermal performance:

- Enhanced envelope U-values - to reduce the building's heat losses and demand.
- Providing a well-sealed envelope to minimize the infiltration of cold winter air and warm air in summer.
- Minimizing thermal bridging by using accredited construction details to avoid heat losses.
- Adopting a window to wall ratio that prioritizes daylight but controls solar gain and glare – to reduce electric lighting energy consumption while mitigating overheating.
- Providing exposed thermal mass to provide passive cooling – suppresses summertime overheating to acceptable levels without the need for high energy consuming and expensive to run and maintain mechanical cooling systems.

6.5 Building occupancy type

The building occupancy type is dependent on the NCM building type. **C3 Residential** building type has been identified for the building. Accordingly, the occupancy capacity and profiles, internal gains are following each space identified activity.

6.6 Daylighting and Solar Shading Strategy

The scheme benefits from the usage of solar performance glazing. The glazing specification is carefully selected to ensure the internal environment is pleasant on all orientations by varying the g-value.

6.7 Ventilation strategy

Mechanical Ventilation with Heat Recovery

All spaces will utilise MVHR units to provide background and boost ventilation. This heat recovery units that utilise the warm exhausted air to pre-heat the fresh incoming supply air. This helps to significantly reduce the heat loss of the building by retaining heat within the thermal envelope.

Be Lean – Active Design Measures

The table below shows the applied 'Be Lean' active design measures incorporated within the design to demonstrate the energy strategy approach.

No.	Measure	Explanation
1	Heat recovery ventilation	The ventilation strategy utilises heat recovery ventilation which is deployed to maximise energy efficiency. The following specification are suggested for the MVHR system - Specific Fan Power (SFP): 0.75 Efficiency: 85% Duct Installation Specification: Level 1 Duct Type: Rigid It is crucial to ensure that the system is installed inside the heating envelope to ensure optimum efficiency levels.
2	On-demand control	The room by room heating and lighting controls ensure that energy efficiency is maximised in almost all spaces where the amount of air delivered is variable to suit the space.
3	Variable speed pumping	Variable speed pumping on all secondary circuits reduces energy consumption associated with distribution significantly.
4	Lighting Efficiency	LED's have been appraised for their suitability as part of the design development and have been found to be a cost-effective measure to reduce lighting electrical energy use.

Table 8: Proposed active design measures adopted at the Be Lean stage.

❖ BE LEAN STAGE

Building	TER (KgCO ₂ /m ² .annum)	DER at Be Lean (KgCO ₂ /m ² .annum)
Building 1A	11.87	4.39
Building 1B	10.18	3.8
Building 1C	10.18	3.8
Building 1D	11.87	4.39
Building 2	13.95	4.41
Building 3	15.84	4.77

Table 9: Regulated Carbon Emissions (DER) at Be Lean Stage

At the 'BE LEAN' stage of the energy hierarchy, energy efficient building elements have been incorporated into the model. The heat loss of different building element is dependent upon their U-value, air permeability, and thermal bridging Y-values.

7. BE CLEAN – CHP & Decentralised Energy Networks

The Energy Hierarchy encourages the use of local CHP system and connection to District Heating systems to reduce CO₂ emissions further.

7.1 Decentralised Energy Network

District and community heating systems are favoured because they offer:

- Potential economies of scale in respect of efficiency and therefore reduced carbon emissions;
- Greater potential for future replacement with Low or Zero Carbon (LZC) technologies.

The feasibility of connecting into an existing heating network or providing the building with its own combined heat and power plant has been assessed alongside the London Heat Map Study as part of this assessment. The study identifies that the site is not located near the existing district heating networks. This is demonstrated clearly from the London Heat Map (<https://maps.london.gov.uk/heatmap>) snapshot below.

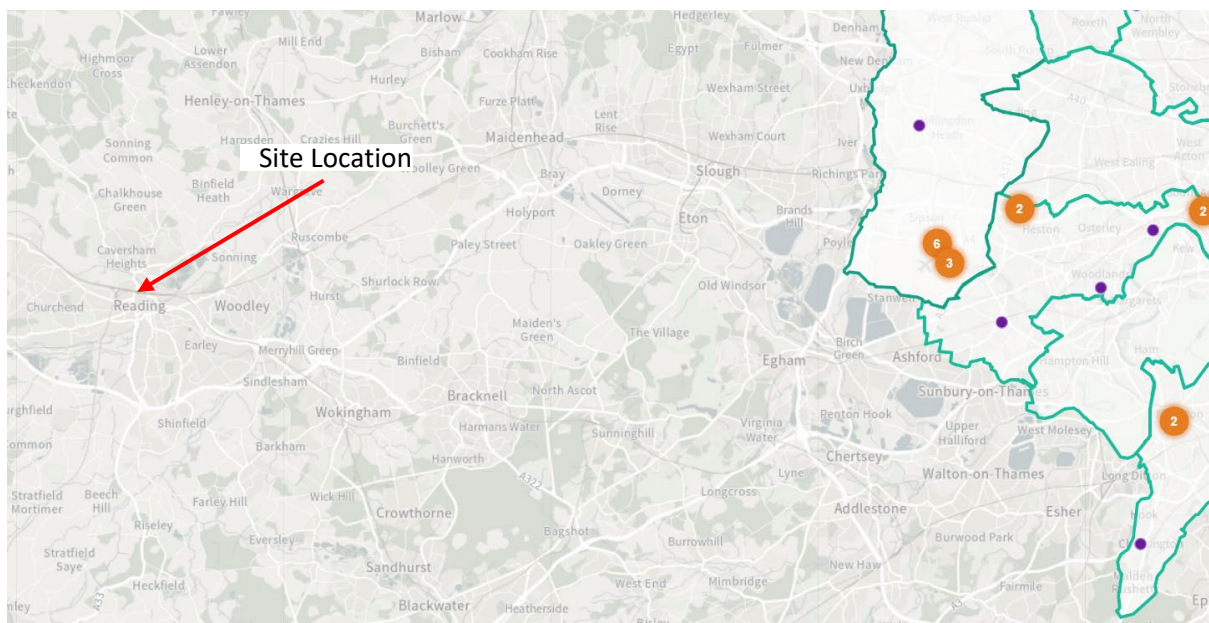


Figure 6 : London Heat Map near the site

7.2 Combined Heat and Power (CHP)

The Energy Hierarchy identifies the combined heat and power (CHP) as a method of producing heat and electricity with much lower emissions than separate heat and power. Also, it encourages the creation of district heating systems supplied by CHP. The implementation of a CHP strategy should be decided according to good practice design. Key factors for the efficient implementation of the CHP system are:

- Development with high heating load for most of the year.
- CHP operation based on maximum heat load for minimum 10 hours per day.
- CHP operation at maximum capacity of 90% of its operating period.

To ensure that CHP is financially viable it is essential that the unit is selected to meet the base heat load and that this load is maintained over a large proportion of the day (a figure of 14 – 17 hours per

day is often quoted subject to the load profiles and gas and electricity prices) to ensure that the additional costs (maintenance) associated with running a CHP unit can be recovered. This needs to run the CHP plant, as far as possible continuously makes the building load profile of prime importance when reviewing the viability of such solutions and in particular the summertime heat load profile. To enable the CHP plant to run continuously when it is operating, a thermal store is often used so that excess CHP capacity can be used.

Generally, developments consist of at least 50 residential units would obtain the benefits of the micro-CHP system. As such, the implementation of a CHP has not been considered of this development design strategy. In addition, if the design team considers installing this technology, further information regarding the local system storage space will be needed.

❖ BE CLEAN STAGE

Building	TER (KgCO ₂ /m ² .annum)	DER at Be Lean (KgCO ₂ /m ² .annum)
Building 1A	11.87	4.39
Building 1B	10.18	3.8
Building 1C	10.18	3.8
Building 1D	11.87	4.39
Building 2	13.95	4.41
Building 3	15.84	4.77

Table 10: Regulated Carbon Emissions at Be Clean Stage

- **Cooling Hierarchy**

The building regulation energy compliance outlines a hierarchy of measures which should be followed in order to reduce the demand for cooling within the development. These have been included as follows:

Multiple strategies have been considered for this development to reduce the cooling demand and the overheating risks.

- ✓ Firstly, **internal heat losses shall be reduced through energy efficient design** during design development. It will include minimising duct lengths and adopting pipe configurations which minimise heat loss (e.g., twin pipes).
- ✓ Minimising Internal Heat Gains – DHW circulation pipe recommended to be eliminated in the communal areas of the development.
- ✓ Reducing Solar Gains – As stated previously, low G-Values have been targeted in order to minimise solar gains.
- ✓ Thermal Mass – Thermal mass is being incorporated through the floor slabs, external walls and roof however further investigation will be undertaken as to the design of these finishes to try to capitalise on the thermal massing wherever possible, so as to help regulate the internal temperature.
- ✓ Lastly, a **mix of passive ventilation and mechanical extraction strategies will be adopted with extract fans in wet rooms** (e.g., toilets, and food preparation) to remove the hot humid air and help free cooling.

8. BE GREEN – Renewable Energy Appraisal

In this section the viable renewable energy technologies that could reduce the development's CO₂ emissions are examined. In determining the appropriate renewable technology for the site, the following factors are considered.

- Renewable energy resources or fuel availability of the LZC technology on the site.
- Implementation with regards the overall M&E design strategy for building type.
- Capital, operating and maintenance cost available for the project.
- Planning Permission from the local council.
- Available Grants.

The table below summarises the various low zero carbon technologies considered for the projects, and we have identified that **Air Source Heat Pumps (ASHP) and Photovoltaic (PV)** would be the most appropriate option in this development.

The Government has outlined its ambitions for residential and non-domestic developments to be delivered to a zero-carbon standard. It is anticipated that zero carbon development will be realised predominantly through energy efficiency measures and the use of on-site low or zero carbon energy and connected heat. However, it is recognised that it will be difficult to deliver all the carbon savings necessary to meet zero carbon standards on site through these measures alone.

Technology Name:	Carbon Payback	Feasibility
Photovoltaic (PV)	High	HIGH
Air Source Heat Pumps (ASHP)	High	HIGH
Biomass	High	MEDIUM
Wind Power	Low	MEDIUM
Hydro Power	None	MEDIUM
Solar Thermal	Low	HIGH
Ground Source Heat Pumps (GSHP)	Medium	LOW

Table 11: Feasibility Study of LZC Technologies

8.1 Non-feasible Technology

- **Ground Source Heat Pumps (GSHP)**

Ground source heat pump would be a feasible option to meet the space heating requirements, however, it requires ground space for bore holes to extract the ground heat in order to be utilized for space heating requirements. However, this has not been discounted due to unknown ground conditions/ contamination statues and expensive CAPEX cost for investigating.

- **Solar Thermal**

The use of solar thermal for this development would be limited to domestic hot water only. The use of solar thermal for space heating would not be practical as it is not required when solar thermal is at its most effective during the summer months. Moreover, according to the scheme scale the expected carbon offset from the system is generally lower compared to other LZC technologies.

- **Hydro power**

There is a river (river Medway) within the development site proximity. However, small-scale hydroelectric will not be studied any further because of the location and the spatial limitations of the development.

- **Wind Power**

Wind turbines need extensive planning requirements, and they are only feasible at consistent wind speed. Moreover, there is no available wind grid located near the project location (<http://www.renew-reuse-recycle.com/noabl.pl?n=503>). Hence this option has been discounted.

Please note that the NOABL windspeed dataset is a model of windspeeds across the country, assuming completely flat terrain. It isn't a database of measured windspeeds. Other factors such as hills, houses, trees and other obstructions in the vicinity of the site need to be considered as well, as they can have a significant effect. In case you're installing a wind turbine is being considered, measurements using an anemometer need to be carried out to determine what the actual figures are.

- **Biomass**

A biomass system designed for this development would be fueled by wood pellets which have a high energy content. However, a biomass system would not be an appropriate technology for the site for the following reasons:

- The burning of wood pellets releases substantially more NOx emissions when compared to similar gas boilers. As the development is situated within an urban area, the installation of a biomass boiler would further impact on the air quality in this area.
- Pellets would need to be transported from local pellet suppliers, which causes carbon emissions into the air.
- The site doesn't have an adequate storage space impacting layout and logistics arrangements.

However, if a biomass system is considered at further detailed design stage, local suppliers can be found near the site as shown in the map below (<http://biomass-suppliers-list.service.gov.uk>).

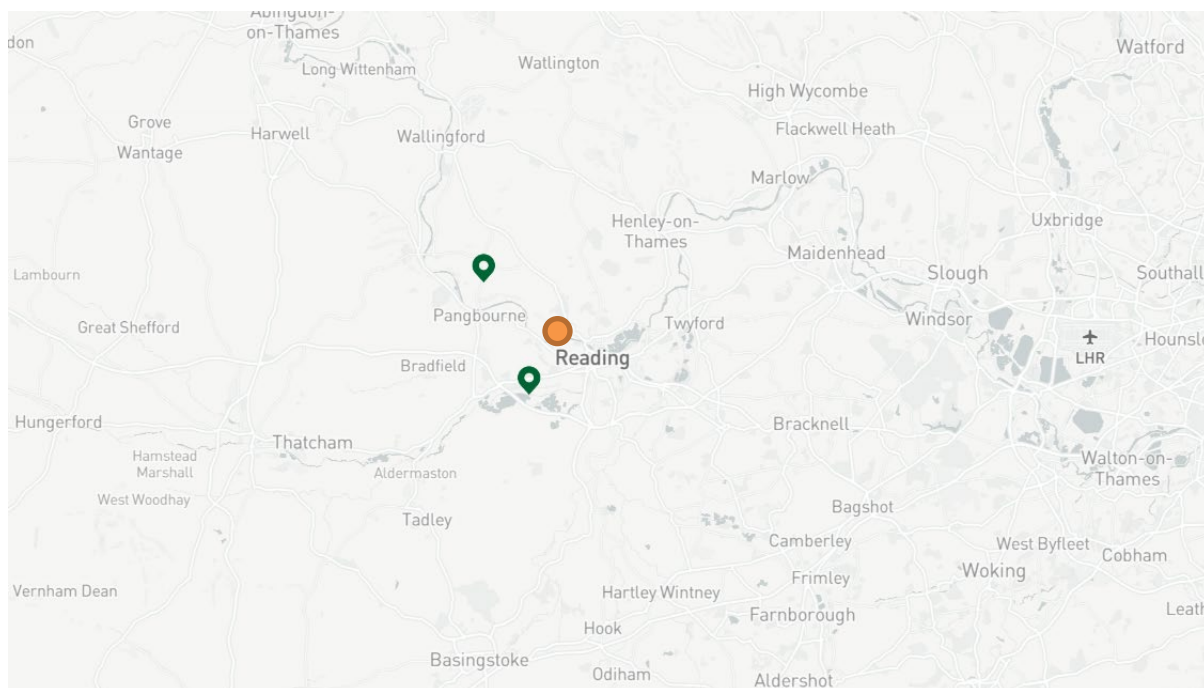


Figure 7: Biomass suppliers locations proximity to the project location.

Company name	Postcode	Contact	Fuel Supplied	Telephone	
AMP Biomass Fuel Ltd	CM19 5LE	www.ampcleanenergy.com hello@ampcleanenergy.com	Chip	03332531256	
AMP Biomass Fuel Ltd	WD6 5PH	www.ampcleanenergy.com hello@ampcleanenergy.com	Chip	+448001577331	
ATBone and Sons Ltd	SG13 8NS	becky@atbone.co.uk	Chip	01707642178	
Foxhill Partnership	BR2 6AN	foxhillfirewood@aol.co.uk	Firewood	07887902148	
PelTrade Ltd	RM18 7EH	www.peltrade.com info@peltrade.com	Pellets	02037619698	
PelTrade Ltd	RM18 7EH	www.peltrade.com info@peltrade.com	Pellets	02037619698	
PelTrade Ltd	RM18 7EH	www.peltrade.com info@peltrade.com	Pellets	02037619698	
Peltrade (Velsk)	RM18 7EH	www.peltrade.com info@peltrade.com	Pellets	02037619698	
Pure Biofuel / Simply Wood Pellets	RM18 7EH	www.purebiofuel.co.uk info@purebiofuel.co.uk	Pellets	020 3287 3835	
Pure Biofuel / Simply Wood Pellets	RM18 7EH	https://www.purebiofuel.co.uk info@purebiofuel.co.uk	Pellets	08004337037	

Figure 8: Local Biomass suppliers contact details

8.2 Proposed Technology

• Air Source Heat Pumps

An ASHP, specified **BS EN 14511-3**, can meet the space heating demands on site efficiently in comparison with gas boilers. Although this low carbon technology consumes electricity to operate, due to higher efficiency the heat output is much greater. Therefore, it has been suggested for the space heating, and hot water demand. The design stage specifications used for energy calculations are in the table below. However, the ASHP was proposed only for simulation, detailed ASHP specifications will be provided by a mechanical engineer during the design development. The system must be certified under the Microgeneration Certification Scheme (MCS).

ASHP Air Distribution system recommended minimum standards.

In order to limit air leakage, ventilation ductwork should be made and assembled so as to be reasonably airtight. Ways of meeting this requirement would be to comply with the specifications given in:

- i. B&ES DW/144⁴³. Membership of the B&ES specialist ductwork group or the Association of Ductwork Contractors and Allied Services is one way of demonstrating suitable qualifications, or
- ii. British Standards such as BS EN 1507:2006⁴⁴, BS EN 12237:2003⁴⁵ and BS EN 13403:2003⁴⁶.

In order to limit air leakage, air handling units should be made and assembled so as to be reasonably airtight. Ways of meeting this requirement would be to comply with Class L2 air leakage given in BS EN 1886:2007⁴⁷.

The **specific fan power** of air distribution systems at the design air flow rate should be no worse than in Table 35 for new and existing buildings. **Specific fan power** is a function of the system resistance that the fan has to overcome to provide the required flow rate. BS EN 13779 Table A8 provides guidance on system pressure drop. To minimise **specific fan power** it is recommended that the 'low range' is used as a design target.

Where the primary air and cooling is provided by central plant and by an air distribution system that includes the additional components listed in Table 36, the allowed **specific fan powers** may be increased by the amounts shown in Table 36 to account for the additional resistance.

A minimum controls package should be provided in new and existing buildings as in Table 37.

Ventilation fans driven by electric motors should comply with European Commission Regulation No 327/2011 implementing Directive 2009/125/EC with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW.

Figure 9: Air Distribution System Specs (Building Services Compliance Guide)

• Photovoltaic (PV)

Based on the feasibility study above, PV is an additional renewable Technology proposed for the scheme for the following reasons:

- i. The installation of PV is much simpler when compared to other renewable technologies
- ii. There is sufficient roof space available to install enough PV modules to have a significant impact on carbon emissions of the development.
- iii. PV panels sited on the roof within an urban area are less visually intrusive when compared to wind turbines.

The tables below illustrate the indicative PV panel's detail, should it be feasible to implement:

Table 12: Suggested PV details

Orientation	South	Numbers of Panels	30 panels (Building 2) 17 panels (Building 3)
Inclination	30°	Power Output	250 watt per panel
Overshading	Modest	Plant Size	7.5 kWp (Building 2) 4.25 kWp (Building 3)

In summary, **30 and 17** high efficiency 250W monocrystalline PV panels on building 2 and building 3 respectively could be installed at 30° inclination (depending on availability of roof) , facing South to go provide further saving in CO₂ emissions through on-site renewable energy. The proposed PV panels are subject to further consideration at detailed design stages. In order to qualify both the installer and the equipment, the system must be certified under the Microgeneration Certification Scheme (MCS).

Given the proposed LZC technologies on the site (i.e., **ASHP** and **PV**), the overall CO₂ reduction at BE GREEN stage can be calculated as shown below.

Building	TER (KgCO ₂ /m ² .annum)	DER at Be Green (KgCO ₂ /m ² .annum)	Carbon Savings at Be-Green (ASHP+PV) (%)
Building 1A	11.87	4.39	63
Building 1B	10.18	3.8	62.67
Building 1C	10.18	3.8	62.67
Building 1D	11.87	4.39	63
Building 2	13.95	4.12	70.46
Building 3	15.84	4.37	72.4

Table 13: Regulated Carbon Reduction at Be-Green Stage (ASHP+PV)

9. Conclusion

This report assesses the predicted energy performance and carbon dioxide emissions of the proposed development at **9 Upper Crown Street, Reading RG1 2SS**.

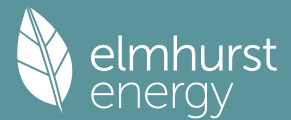
Based on the information provided by the design team, the study has been done on the **3 Residential blocks containing 46 dwellings**. The study results show that **efficient thermal performance building fabric and heating systems** are keys to achieve building regulations compliance. Moreover, **ASHP and PV** technology proved to be a major measure to achieve the reductions beyond **Part L** requirements. The carbon savings from each stage are shown in the table below. Given the total cumulative carbon savings, the proposed development shall meet the planning requirements.

❖ Development Overall Carbon Savings

	Notional TER	Baseline BER	Be-Lean BER (KgCO ₂ /m ² .annum)	Be-Green BER	% Reduction
Building 1A	11.87	6.72	4.39	4.39	63
Building 1B	10.18	6.07	3.8	3.8	62.67
Building 1C	10.18	6.07	3.8	3.8	62.67
Building 1D	11.87	6.72	4.39	4.39	63
Building 2	13.95	6.39	4.41	4.12	70.46
Building 3	15.84	7.06	4.77	4.37	72.4

10. Appendix – SAP Reports

Block Compliance



Block Reference	Baseline	Issued on Date	21/08/2023
Block Name	1A		
Calculation Type	New Build (As Designed)		

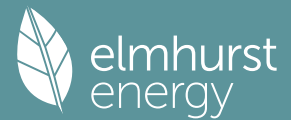
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Baseline		Block Name: 1A		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1A - 00001	102.00	6.72	11.87	43.39 %
Totals:	102.00	6.72	11.87	
Average DER = 6.72 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 11.87 kgCO ₂ /m ²	43.39 %			

Block Compliance Report - DFEE				
Block Reference: Baseline		Block Name: 1A		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1A - 00001	102.00	57.09	40.96	-39.38 %
Totals:	102.00	57.09	40.96	
Average DFEE = 57.09 kWh/m ² /yr	% DFEE/TFEE	FAIL		
Average TFEE = 40.96 kWh/m ² /yr	-39.38 %			

Block Compliance Report - DPER				
Block Reference: Baseline		Block Name: 1A		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1A - 00001	102.00	69.38	62.10	-11.72 %
Totals:	102.00	69.38	62.10	
Average DPER = 69.38 kWh/m ² /yr	% DPER/TPER	FAIL		
Average TPER = 62.10 kWh/m ² /yr	-11.72 %			

Block Compliance



Block Reference	Be Lean	Issued on Date	21/08/2023
Block Name	1A		
Calculation Type	New Build (As Designed)		

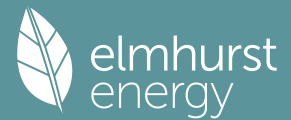
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Be Lean		Block Name: 1A		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1A - 00001_Copy	102.00	4.39	11.87	63.02 %
Totals:	102.00	4.39	11.87	
Average DER = 4.39 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 11.87 kgCO ₂ /m ²	63.02 %			

Block Compliance Report - DFEE				
Block Reference: Be Lean		Block Name: 1A		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1A - 00001_Copy	102.00	38.19	40.96	6.78 %
Totals:	102.00	38.19	40.96	
Average DFEE = 38.19 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 40.96 kgCO ₂ /m ²	6.78 %			

Block Compliance Report - DPER				
Block Reference: Be Lean		Block Name: 1A		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1A - 00001_Copy	102.00	45.89	62.10	26.10 %
Totals:	102.00	45.89	62.10	
Average DPER = 45.89 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 62.10 kgCO ₂ /m ²	26.10 %			

Block Compliance



Block Reference	Baseline	Issued on Date	21/08/2023
Block Name	1B		
Calculation Type	New Build (As Designed)		

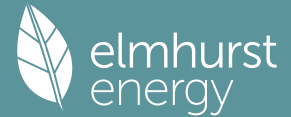
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Baseline		Block Name: 1B		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1B - 00002	102.00	6.07	10.18	40.37 %
Totals:	102.00	6.07	10.18	
Average DER = 6.07 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 10.18 kgCO ₂ /m ²	40.37 %			

Block Compliance Report - DFEE				
Block Reference: Baseline		Block Name: 1B		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1B - 00002	102.00	48.80	33.28	-46.63 %
Totals:	102.00	48.80	33.28	
Average DFEE = 48.80 kgCO ₂ /m ²	% DFEE/TFEE	FAIL		
Average TFEE = 33.28 kgCO ₂ /m ²	-46.63 %			

Block Compliance Report - DPER				
Block Reference: Baseline		Block Name: 1B		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1B - 00002	102.00	62.79	52.99	-18.49 %
Totals:	102.00	62.79	52.99	
Average DPER = 62.79 kgCO ₂ /m ²	% DPER/TPER	FAIL		
Average TPER = 52.99 kgCO ₂ /m ²	-18.49 %			

Block Compliance



Block Reference	Be Lean	Issued on Date	21/08/2023
Block Name	1B		
Calculation Type	New Build (As Designed)		

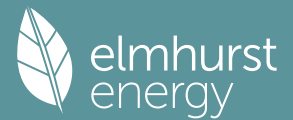
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Be Lean		Block Name: 1B		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1B - 00002_Copy	102.00	3.80	10.18	62.67 %
Totals:	102.00	3.80	10.18	
Average DER = 3.80 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 10.18 kgCO ₂ /m ²	62.67 %			

Block Compliance Report - DFEE				
Block Reference: Be Lean		Block Name: 1B		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1B - 00002_Copy	102.00	31.44	33.28	5.52 %
Totals:	102.00	31.44	33.28	
Average DFEE = 31.44 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 33.28 kgCO ₂ /m ²	5.52 %			

Block Compliance Report - DPER				
Block Reference: Be Lean		Block Name: 1B		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1B - 00002_Copy	102.00	39.89	52.99	24.72 %
Totals:	102.00	39.89	52.99	
Average DPER = 39.89 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 52.99 kgCO ₂ /m ²	24.72 %			

Block Compliance



Block Reference	Baseline	Issued on Date	21/08/2023
Block Name	1C		
Calculation Type	New Build (As Designed)		

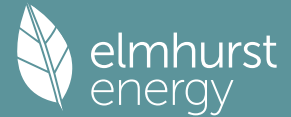
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Baseline	Block Name: 1C			
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1C - 00002_Copy	102.00	6.07	10.18	40.37 %
Totals:	102.00	6.07	10.18	
Average DER = 6.07 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 10.18 kgCO ₂ /m ²	40.37 %			

Block Compliance Report - DFEE				
Block Reference: Baseline	Block Name: 1C			
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1C - 00002_Copy	102.00	48.80	33.28	-46.63 %
Totals:	102.00	48.80	33.28	
Average DFEE = 48.80 kgCO ₂ /m ²	% DFEE/TFEE	FAIL		
Average TFEE = 33.28 kgCO ₂ /m ²	-46.63 %			

Block Compliance Report - DPER				
Block Reference: Baseline	Block Name: 1C			
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1C - 00002_Copy	102.00	62.79	52.99	-18.49 %
Totals:	102.00	62.79	52.99	
Average DPER = 62.79 kgCO ₂ /m ²	% DPER/TPER	FAIL		
Average TPER = 52.99 kgCO ₂ /m ²	-18.49 %			

Block Compliance



Block Reference	Be Lean	Issued on Date	21/08/2023
Block Name	1C		
Calculation Type	New Build (As Designed)		

Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Be Lean		Block Name: 1C		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1C - 00002_Copy_Copy	102.00	3.80	10.18	62.67 %
Totals:	102.00	3.80	10.18	
Average DER = 3.80 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 10.18 kgCO ₂ /m ²	62.67 %			

Block Compliance Report - DFEE				
Block Reference: Be Lean		Block Name: 1C		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1C - 00002_Copy_Copy	102.00	31.44	33.28	5.52 %
Totals:	102.00	31.44	33.28	
Average DFEE = 31.44 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 33.28 kgCO ₂ /m ²	5.52 %			

Block Compliance Report - DPER				
Block Reference: Be Lean		Block Name: 1C		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1C - 00002_Copy_Copy	102.00	39.89	52.99	24.72 %
Totals:	102.00	39.89	52.99	
Average DPER = 39.89 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 52.99 kgCO ₂ /m ²	24.72 %			

Block Compliance



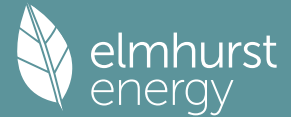
Block Reference	Baseline	Issued on Date	21/08/2023
Block Name	1D		
Calculation Type	New Build (As Designed)		
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Baseline	Block Name: 1D			
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1D - 00001_Copy	102.00	6.72	11.87	43.39 %
Totals:	102.00	6.72	11.87	
Average DER = 6.72 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 11.87 kgCO ₂ /m ²	43.39 %			

Block Compliance Report - DFEE				
Block Reference: Baseline	Block Name: 1D			
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1D - 00001_Copy	102.00	57.09	40.96	-39.38 %
Totals:	102.00	57.09	40.96	
Average DFEE = 57.09 kWh/m ² /yr	% DFEE/TFEE	FAIL		
Average TFEE = 40.96 kWh/m ² /yr	-39.38 %			

Block Compliance Report - DPER				
Block Reference: Baseline	Block Name: 1D			
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1D - 00001_Copy	102.00	69.38	62.10	-11.72 %
Totals:	102.00	69.38	62.10	
Average DPER = 69.38 kWh/m ² /yr	% DPER/TPER	FAIL		
Average TPER = 62.10 kWh/m ² /yr	-11.72 %			

Block Compliance



Block Reference	Be Lean	Issued on Date	21/08/2023
Block Name	1D		
Calculation Type	New Build (As Designed)		

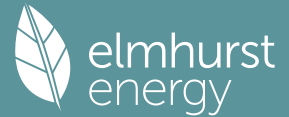
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Be Lean		Block Name: 1D		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
1D - 00001_Copy_Copy	102.00	4.39	11.87	63.02 %
Totals:	102.00	4.39	11.87	
Average DER = 4.39 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 11.87 kgCO ₂ /m ²	63.02 %			

Block Compliance Report - DFEE				
Block Reference: Be Lean		Block Name: 1D		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
1D - 00001_Copy_Copy	102.00	38.19	40.96	6.78 %
Totals:	102.00	38.19	40.96	
Average DFEE = 38.19 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 40.96 kgCO ₂ /m ²	6.78 %			

Block Compliance Report - DPER				
Block Reference: Be Lean		Block Name: 1D		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
1D - 00001_Copy_Copy	102.00	45.89	62.10	26.10 %
Totals:	102.00	45.89	62.10	
Average DPER = 45.89 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 62.10 kgCO ₂ /m ²	26.10 %			

Block Compliance



Block Reference	Baseline	Issued on Date	18/08/2023
Block Name	B2		
Calculation Type	New Build (As Designed)		

Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Baseline		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
Flat 1 - 00001	61.00	6.86	15.67	56.22 %
Flat 2 - 00002	50.60	7.00	15.81	55.72 %
Flat 4 - 00004	50.30	7.29	17.11	57.39 %
Flat 5 - 00005	50.10	7.21	16.90	57.34 %
Flat 6 - 00006	70.00	6.85	14.53	52.86 %
Flat 12 - 00012	61.10	5.97	13.03	54.18 %
Flat 25 - 00025	86.10	6.24	13.82	54.85 %
Flat 27 - 00027	87.10	6.39	14.11	54.71 %
Flat 3 - 00003	50.60	7.00	15.81	55.72 %
Flat 8 - 00008	50.10	7.21	16.90	57.34 %
Flat 7 - 00007	70.00	6.85	14.53	52.86 %
Flat 9 - 00009	61.00	6.04	12.81	52.85 %
Flat 10 - 00010	50.60	6.03	13.19	54.28 %
Flat 11 - 00011	50.60	6.63	14.63	54.68 %
Flat 13 - 00013	50.10	6.31	13.98	54.86 %
Flat 14 - 00014	70.00	5.94	11.90	50.08 %
Flat 15 - 00015	70.00	5.94	11.90	50.08 %
Flat 16 - 00016	50.10	6.31	13.98	54.86 %
Flat 26 - 00026	86.10	6.24	13.82	54.85 %
Flat 28 - 00028	87.10	6.39	14.11	54.71 %
Flat 17 - 00017	61.00	6.04	12.81	52.85 %
Flat 18 - 00018	50.60	6.03	13.19	54.28 %

Block Compliance

Flat 19 - 00019	50.60	6.63	14.63	54.68 %
Flat 20 - 00020	61.10	5.97	13.03	54.18 %
Flat 21 - 00021	50.10	6.31	13.98	54.86 %
Flat 22 - 00022	70.00	5.94	11.90	50.08 %
Flat 23 - 00023	70.00	5.94	11.90	50.08 %
Flat 24 - 00024	50.10	6.31	13.98	54.86 %
Totals:	1726.10	179.87	393.96	
Average DER = 6.39 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 13.95 kgCO ₂ /m ²	54.17 %			

Block Compliance Report - DFEE				
Block Reference: Baseline		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
Flat 1 - 00001	61.00	50.85	42.82	-18.75 %
Flat 2 - 00002	50.60	50.76	38.99	-30.20 %
Flat 4 - 00004	50.30	51.88	43.89	-18.21 %
Flat 5 - 00005	50.10	52.06	43.48	-19.73 %
Flat 6 - 00006	70.00	51.47	40.83	-26.06 %
Flat 12 - 00012	61.10	43.16	31.25	-38.10 %
Flat 25 - 00025	86.10	47.54	41.39	-14.85 %
Flat 27 - 00027	87.10	49.68	43.11	-15.26 %
Flat 3 - 00003	50.60	50.76	38.99	-30.20 %
Flat 8 - 00008	50.10	52.06	43.48	-19.73 %
Flat 7 - 00007	70.00	51.47	40.83	-26.06 %
Flat 9 - 00009	61.00	41.85	29.80	-40.47 %
Flat 10 - 00010	50.60	40.18	26.96	-49.05 %

Block Compliance

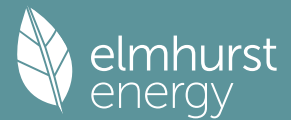
Flat 11 - 00011	50.60	46.72	33.60	-39.05 %
Flat 13 - 00013	50.10	42.22	30.10	-40.27 %
Flat 14 - 00014	70.00	41.45	28.98	-43.02 %
Flat 15 - 00015	70.00	41.45	28.98	-43.02 %
Flat 16 - 00016	50.10	42.22	30.10	-40.27 %
Flat 26 - 00026	86.10	47.54	41.39	-14.85 %
Flat 28 - 00028	87.10	49.68	43.11	-15.26 %
Flat 17 - 00017	61.00	41.85	29.80	-40.47 %
Flat 18 - 00018	50.60	40.18	26.96	-49.05 %
Flat 19 - 00019	50.60	46.72	33.60	-39.05 %
Flat 20 - 00020	61.10	43.16	31.25	-38.10 %
Flat 21 - 00021	50.10	42.22	30.10	-40.27 %
Flat 22 - 00022	70.00	41.45	28.98	-43.02 %
Flat 23 - 00023	70.00	41.45	28.98	-43.02 %
Flat 24 - 00024	50.10	42.22	30.10	-40.27 %
Totals:	1726.10	1284.29	981.85	
Average DFEE = 45.97 kgCO ₂ /m ²	% DFEE/TFEE	FAIL		
Average TFEE = 35.46 kgCO ₂ /m ²	-29.65 %			

Block Compliance Report - DPER				
Block Reference: Baseline	Block Name: B2			
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
Flat 1 - 00001	61.00	71.11	83.38	14.72 %
Flat 2 - 00002	50.60	72.61	84.29	13.86 %
Flat 4 - 00004	50.30	75.77	91.45	17.15 %
Flat 5 - 00005	50.10	74.84	90.22	17.05 %

Block Compliance

Flat 6 - 00006	70.00	70.95	77.10	7.98 %
Flat 12 - 00012	61.10	62.02	69.16	10.32 %
Flat 25 - 00025	86.10	64.67	73.26	11.73 %
Flat 27 - 00027	87.10	66.20	74.75	11.44 %
Flat 3 - 00003	50.60	72.61	84.29	13.86 %
Flat 8 - 00008	50.10	74.84	90.22	17.05 %
Flat 7 - 00007	70.00	70.95	77.10	7.98 %
Flat 9 - 00009	61.00	62.81	67.96	7.58 %
Flat 10 - 00010	50.60	62.74	70.22	10.65 %
Flat 11 - 00011	50.60	68.87	77.96	11.66 %
Flat 13 - 00013	50.10	65.72	74.48	11.76 %
Flat 14 - 00014	70.00	61.67	62.94	2.02 %
Flat 15 - 00015	70.00	61.67	62.94	2.02 %
Flat 16 - 00016	50.10	65.72	74.48	11.76 %
Flat 26 - 00026	86.10	64.67	73.26	11.73 %
Flat 28 - 00028	87.10	66.20	74.75	11.44 %
Flat 17 - 00017	61.00	62.81	67.96	7.58 %
Flat 18 - 00018	50.60	62.74	70.22	10.65 %
Flat 19 - 00019	50.60	68.87	77.96	11.66 %
Flat 20 - 00020	61.10	62.02	69.16	10.32 %
Flat 21 - 00021	50.10	65.72	74.48	11.76 %
Flat 22 - 00022	70.00	61.67	62.94	2.02 %
Flat 23 - 00023	70.00	61.67	62.94	2.02 %
Flat 24 - 00024	50.10	65.72	74.48	11.76 %
Totals:	1726.10	1867.86	2094.35	
Average DPER = 66.39 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 74.14 kgCO ₂ /m ²	10.45 %			

Block Compliance



Block Reference	BE LEAN	Issued on Date	18/08/2023
Block Name	B2		
Calculation Type	New Build (As Designed)		

Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: BE LEAN		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
Flat 1_Copy - 00001_Copy	61.00	4.84	15.77	69.31 %
Flat 10_Copy - 00010_Copy	50.60	4.10	13.19	68.92 %
Flat 11_Copy - 00011_Copy	50.60	4.52	14.63	69.10 %
Flat 12_Copy - 00012_Copy	61.10	4.08	13.03	68.69 %
Flat 13_Copy - 00013_Copy	50.10	4.43	13.98	68.31 %
Flat 14_Copy - 00014_Copy	70.00	3.85	11.90	67.65 %
Flat 15_Copy - 00015_Copy	70.00	3.85	11.90	67.65 %
Flat 16_Copy - 00016_Copy	50.10	4.30	13.98	69.24 %
Flat 2_Copy - 00002_Copy	50.60	5.11	16.04	68.14 %
Flat 25_Copy - 00025_Copy	86.10	4.51	13.82	67.37 %
Flat 26_Copy - 00026_Copy	86.10	4.38	13.82	68.31 %
Flat 27_Copy - 00027	87.10	4.44	14.11	68.53 %
Flat 28_Copy - 00028_Copy	87.10	4.44	14.11	68.53 %
Flat 3_Copy - 00003_Copy	50.60	5.11	16.04	68.14 %
Flat 4_Copy - 00004_Copy	50.30	5.22	17.24	69.72 %
Flat 5_Copy - 00005_Copy	50.10	5.15	17.06	69.81 %
Flat 6_Copy - 00006_Copy	70.00	4.74	14.71	67.78 %
Flat 7_Copy - 00007_Copy	70.00	4.74	14.71	67.78 %
Flat 8_Copy - 00008_Copy	50.10	5.15	17.06	69.81 %
Flat 9_Copy - 00009_Copy	61.00	4.09	12.81	68.07 %
Flat 17 - 00017	61.00	4.09	12.81	68.07 %
Flat 18 - 00018	50.60	4.10	13.19	68.92 %

Block Compliance

Flat 19 - 00019	50.60	4.52	14.63	69.10 %
Flat 20 - 00020	61.10	4.08	13.03	68.69 %
Flat 21 - 00021	50.10	4.30	13.98	69.24 %
Flat 22 - 00022	70.00	3.85	11.90	67.65 %
Flat 23 - 00023	70.00	3.85	11.90	67.65 %
Flat 24 - 00024	50.10	4.30	13.98	69.24 %
Totals:	1726.10	124.14	395.33	
Average DER = 4.41 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 14.00 kgCO ₂ /m ²	68.51 %			

Block Compliance Report - DFEE				
Block Reference: BE LEAN		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
Flat 1_Copy - 00001_Copy	61.00	36.08	43.30	16.67 %
Flat 10_Copy - 00010_Copy	50.60	25.25	26.96	6.32 %
Flat 11_Copy - 00011_Copy	50.60	30.48	33.60	9.29 %
Flat 12_Copy - 00012_Copy	61.10	27.77	31.25	11.14 %
Flat 13_Copy - 00013_Copy	50.10	29.14	30.10	3.20 %
Flat 14_Copy - 00014_Copy	70.00	26.54	28.98	8.43 %
Flat 15_Copy - 00015_Copy	70.00	26.54	28.98	8.43 %
Flat 16_Copy - 00016_Copy	50.10	27.53	30.10	8.53 %
Flat 2_Copy - 00002_Copy	50.60	37.36	40.03	6.67 %
Flat 25_Copy - 00025_Copy	86.10	36.38	41.39	12.11 %
Flat 26_Copy - 00026_Copy	86.10	34.96	41.39	15.53 %
Flat 27_Copy - 00027	87.10	36.07	43.11	16.33 %
Flat 28_Copy - 00028_Copy	87.10	36.07	43.11	16.33 %
Flat 3_Copy - 00003_Copy	50.60	37.36	40.03	6.67 %
Flat 4_Copy - 00004_Copy	50.30	37.73	44.50	15.20 %

Block Compliance

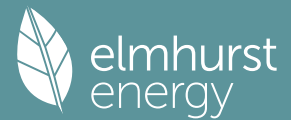
Flat 5_Copy - 00005_Copy	50.10	37.49	44.18	15.14 %
Flat 6_Copy - 00006_Copy	70.00	36.83	41.63	11.53 %
Flat 7_Copy - 00007_Copy	70.00	36.83	41.63	11.53 %
Flat 8_Copy - 00008_Copy	50.10	37.49	44.18	15.14 %
Flat 9_Copy - 00009_Copy	61.00	27.35	29.80	8.22 %
Flat 17 - 00017	61.00	27.35	29.80	8.22 %
Flat 18 - 00018	50.60	25.25	26.96	6.32 %
Flat 19 - 00019	50.60	30.48	33.60	9.29 %
Flat 20 - 00020	61.10	27.77	31.25	11.14 %
Flat 21 - 00021	50.10	27.53	30.10	8.53 %
Flat 22 - 00022	70.00	26.54	28.98	8.43 %
Flat 23 - 00023	70.00	26.54	28.98	8.43 %
Flat 24 - 00024	50.10	27.53	30.10	8.53 %
Totals:	1726.10	880.21	988.00	
Average DFEE = 31.64 kgCO ₂ /m²	% DFEE/TFEE	PASS		
Average TFEE = 35.66 kgCO ₂ /m²	11.27 %			

Block Compliance Report - DPER				
Block Reference: BE LEAN		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
Flat 1_Copy - 00001_Copy	61.00	50.90	83.94	39.36 %
Flat 10_Copy - 00010_Copy	50.60	43.55	70.22	37.98 %
Flat 11_Copy - 00011_Copy	50.60	47.76	77.96	38.74 %
Flat 12_Copy - 00012_Copy	61.10	43.17	69.16	37.58 %
Flat 13_Copy - 00013_Copy	50.10	46.90	74.48	37.03 %
Flat 14_Copy - 00014_Copy	70.00	40.81	62.94	35.16 %
Flat 15_Copy - 00015_Copy	70.00	40.81	62.94	35.16 %
Flat 16_Copy - 00016_Copy	50.10	45.58	74.48	38.80 %

Block Compliance

Flat 2_Copy - 00002_Copy	50.60	53.75	85.51	37.14 %
Flat 25_Copy - 00025_Copy	86.10	47.31	73.26	35.42 %
Flat 26_Copy - 00026_Copy	86.10	46.03	73.26	37.17 %
Flat 27_Copy - 00027	87.10	46.60	74.75	37.66 %
Flat 28_Copy - 00028_Copy	87.10	46.60	74.75	37.66 %
Flat 3_Copy - 00003_Copy	50.60	53.75	85.51	37.14 %
Flat 4_Copy - 00004_Copy	50.30	54.93	92.17	40.40 %
Flat 5_Copy - 00005_Copy	50.10	54.17	91.04	40.50 %
Flat 6_Copy - 00006_Copy	70.00	49.79	78.05	36.21 %
Flat 7_Copy - 00007_Copy	70.00	49.79	78.05	36.21 %
Flat 8_Copy - 00008_Copy	50.10	54.17	91.04	40.50 %
Flat 9_Copy - 00009_Copy	61.00	43.31	67.96	36.27 %
Flat 17 - 00017	61.00	43.31	67.96	36.27 %
Flat 18 - 00018	50.60	43.55	70.22	37.98 %
Flat 19 - 00019	50.60	47.76	77.96	38.74 %
Flat 20 - 00020	61.10	43.17	69.16	37.58 %
Flat 21 - 00021	50.10	45.58	74.48	38.80 %
Flat 22 - 00022	70.00	40.81	62.94	35.16 %
Flat 23 - 00023	70.00	40.81	62.94	35.16 %
Flat 24 - 00024	50.10	45.58	74.48	38.80 %
Totals:	1726.10	1310.25	2101.61	
Average DPER = 46.51 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 74.38 kgCO ₂ /m ²	37.46 %			

Block Compliance



Block Reference	BE GREEN 2	Issued on Date	21/08/2023
Block Name	B2		
Calculation Type	New Build (As Designed)		

Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: BE GREEN 2		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
Flat 1_Copy_Copy - 00001_Copy_Copy	61.00	4.55	15.77	71.15 %
Flat 10_Copy_Copy - 00010_Copy_Copy	50.60	3.75	13.19	71.57 %
Flat 11_Copy_Copy - 00011_Copy_Copy	50.60	4.17	14.63	71.50 %
Flat 12_Copy_Copy - 00012_Copy_Copy	61.10	3.79	13.03	70.91 %
Flat 13_Copy_Copy - 00013_Copy_Copy	50.10	4.08	13.98	70.82 %
Flat 14_Copy_Copy - 00014_Copy_Copy	70.00	3.60	11.90	69.75 %
Flat 15_Copy_Copy - 00015_Copy_Copy	70.00	3.60	11.90	69.75 %
Flat 16_Copy_Copy - 00016_Copy_Copy	50.10	3.95	13.98	71.75 %
Flat 17_Copy - 00017_Copy	61.00	3.80	12.81	70.34 %
Flat 18_Copy - 00018_Copy	50.60	3.75	13.19	71.57 %
Flat 19_Copy - 00019_Copy	50.60	4.17	14.63	71.50 %
Flat 2_Copy_Copy - 00002_Copy_Copy	50.60	4.76	16.04	70.32 %
Flat 20_Copy - 00020_Copy	61.10	3.79	13.03	70.91 %
Flat 21_Copy - 00021_Copy	50.10	3.95	13.98	71.75 %
Flat 22_Copy - 00022_Copy	70.00	3.60	11.90	69.75 %
Flat 23_Copy - 00023_Copy	70.00	3.60	11.90	69.75 %
Flat 24_Copy - 00024_Copy	50.10	3.95	13.98	71.75 %
Flat 25_Copy_Copy - 00025_Copy_Copy	86.10	4.30	13.82	68.89 %
Flat 26_Copy_Copy - 00026_Copy_Copy	86.10	4.17	13.82	69.83 %
Flat 27_Copy_Copy - 00027_Copy	87.10	4.23	14.11	70.02 %
Flat 28_Copy_Copy - 00028_Copy_Copy	87.10	4.23	14.11	70.02 %
Flat 3_Copy_Copy - 00003_Copy_Copy	50.60	4.76	16.04	70.32 %

Block Compliance

Flat 4_Copy_Copy - 00004_Copy_Copy	50.30	4.87	17.24	71.75 %
Flat 5_Copy_Copy - 00005_Copy_Copy	50.10	4.80	17.06	71.86 %
Flat 6_Copy_Copy - 00006_Copy_Copy	70.00	4.48	14.71	69.54 %
Flat 7_Copy_Copy - 00007_Copy_Copy	70.00	4.48	14.71	69.54 %
Flat 8_Copy_Copy - 00008_Copy_Copy	50.10	4.80	17.06	71.86 %
Flat 9_Copy_Copy - 00009_Copy_Copy	61.00	3.80	12.81	70.34 %
Totals:	1726.10	115.78	395.33	
Average DER = 4.12 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 14.00 kgCO ₂ /m ²	70.56 %			

Block Compliance Report - DFEE				
Block Reference: BE GREEN 2		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
Flat 1_Copy_Copy - 00001_Copy_Copy	61.00	36.08	43.30	16.67 %
Flat 10_Copy_Copy - 00010_Copy_Copy	50.60	25.25	26.96	6.32 %
Flat 11_Copy_Copy - 00011_Copy_Copy	50.60	30.48	33.60	9.29 %
Flat 12_Copy_Copy - 00012_Copy_Copy	61.10	27.77	31.25	11.14 %
Flat 13_Copy_Copy - 00013_Copy_Copy	50.10	29.14	30.10	3.20 %
Flat 14_Copy_Copy - 00014_Copy_Copy	70.00	26.54	28.98	8.43 %
Flat 15_Copy_Copy - 00015_Copy_Copy	70.00	26.54	28.98	8.43 %
Flat 16_Copy_Copy - 00016_Copy_Copy	50.10	27.53	30.10	8.53 %
Flat 17_Copy - 00017_Copy	61.00	27.35	29.80	8.22 %
Flat 18_Copy - 00018_Copy	50.60	25.25	26.96	6.32 %
Flat 19_Copy - 00019_Copy	50.60	30.48	33.60	9.29 %
Flat 2_Copy_Copy - 00002_Copy_Copy	50.60	37.36	40.03	6.67 %
Flat 20_Copy - 00020_Copy	61.10	27.77	31.25	11.14 %
Flat 21_Copy - 00021_Copy	50.10	27.53	30.10	8.53 %
Flat 22_Copy - 00022_Copy	70.00	26.54	28.98	8.43 %
Flat 23_Copy - 00023_Copy	70.00	26.54	28.98	8.43 %

Block Compliance

Flat 24_Copy - 00024_Copy	50.10	27.53	30.10	8.53 %
Flat 25_Copy_Copy - 00025_Copy_Copy	86.10	36.38	41.39	12.11 %
Flat 26_Copy_Copy - 00026_Copy_Copy	86.10	34.96	41.39	15.53 %
Flat 27_Copy_Copy - 00027_Copy	87.10	36.07	43.11	16.33 %
Flat 28_Copy_Copy - 00028_Copy_Copy	87.10	36.07	43.11	16.33 %
Flat 3_Copy_Copy - 00003_Copy_Copy	50.60	37.36	40.03	6.67 %
Flat 4_Copy_Copy - 00004_Copy_Copy	50.30	37.73	44.50	15.20 %
Flat 5_Copy_Copy - 00005_Copy_Copy	50.10	37.49	44.18	15.14 %
Flat 6_Copy_Copy - 00006_Copy_Copy	70.00	36.83	41.63	11.53 %
Flat 7_Copy_Copy - 00007_Copy_Copy	70.00	36.83	41.63	11.53 %
Flat 8_Copy_Copy - 00008_Copy_Copy	50.10	37.49	44.18	15.14 %
Flat 9_Copy_Copy - 00009_Copy_Copy	61.00	27.35	29.80	8.22 %
Totals:	1726.10	880.21	988.00	
Average DFEE = 31.64 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 35.66 kgCO ₂ /m ²	11.27 %			

Block Compliance Report - DPER				
Block Reference: BE GREEN 2		Block Name: B2		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
Flat 1_Copy_Copy - 00001_Copy_Copy	61.00	47.59	83.94	43.30 %
Flat 10_Copy_Copy - 00010_Copy_Copy	50.60	39.64	70.22	43.55 %
Flat 11_Copy_Copy - 00011_Copy_Copy	50.60	43.85	77.96	43.75 %
Flat 12_Copy_Copy - 00012_Copy_Copy	61.10	39.87	69.16	42.35 %
Flat 13_Copy_Copy - 00013_Copy_Copy	50.10	42.95	74.48	42.33 %
Flat 14_Copy_Copy - 00014_Copy_Copy	70.00	37.89	62.94	39.80 %
Flat 15_Copy_Copy - 00015_Copy_Copy	70.00	37.89	62.94	39.80 %
Flat 16_Copy_Copy - 00016_Copy_Copy	50.10	41.63	74.48	44.11 %

Block Compliance

Flat 17_Copy - 00017_Copy	61.00	40.01	67.96	41.13 %
Flat 18_Copy - 00018_Copy	50.60	39.64	70.22	43.55 %
Flat 19_Copy - 00019_Copy	50.60	43.85	77.96	43.75 %
Flat 2_Copy_Copy - 00002_Copy_Copy	50.60	49.82	85.51	41.74 %
Flat 20_Copy - 00020_Copy	61.10	39.87	69.16	42.35 %
Flat 21_Copy - 00021_Copy	50.10	41.63	74.48	44.11 %
Flat 22_Copy - 00022_Copy	70.00	37.89	62.94	39.80 %
Flat 23_Copy - 00023_Copy	70.00	37.89	62.94	39.80 %
Flat 24_Copy - 00024_Copy	50.10	41.63	74.48	44.11 %
Flat 25_Copy_Copy - 00025_Copy_Copy	86.10	44.90	73.26	38.71 %
Flat 26_Copy_Copy - 00026_Copy_Copy	86.10	43.62	73.26	40.46 %
Flat 27_Copy_Copy - 00027_Copy	87.10	44.21	74.75	40.86 %
Flat 28_Copy_Copy - 00028_Copy_Copy	87.10	44.21	74.75	40.86 %
Flat 3_Copy_Copy - 00003_Copy_Copy	50.60	49.82	85.51	41.74 %
Flat 4_Copy_Copy - 00004_Copy_Copy	50.30	50.98	92.17	44.69 %
Flat 5_Copy_Copy - 00005_Copy_Copy	50.10	50.21	91.04	44.85 %
Flat 6_Copy_Copy - 00006_Copy_Copy	70.00	46.87	78.05	39.95 %
Flat 7_Copy_Copy - 00007_Copy_Copy	70.00	46.87	78.05	39.95 %
Flat 8_Copy_Copy - 00008_Copy_Copy	50.10	50.21	91.04	44.85 %
Flat 9_Copy_Copy - 00009_Copy_Copy	61.00	40.01	67.96	41.13 %
Totals:	1726.10	1215.45	2101.61	
Average DPER = 43.25 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 74.38 kgCO ₂ /m ²	41.86 %			

Block Compliance



Block Reference	Baseline	Issued on Date	18/08/2023
Block Name	Building 3		
Calculation Type	New Build (As Designed)		
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: Baseline		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
Flat 1 - 00001	66.30	6.70	15.78	57.54 %
Flat 2 - 00002	37.40	8.06	20.28	60.26 %
Flat 3 - 00003	38.40	8.90	21.82	59.21 %
Flat 4 - 00004	63.00	6.11	12.82	52.34 %
Flat 5 - 00005	50.60	6.71	14.05	52.24 %
Flat 6 - 00006	38.40	8.21	18.57	55.79 %
Flat 13 - 00013	71.80	6.71	15.72	57.32 %
Flat 14 - 00014	51.50	7.90	18.59	57.50 %
Flat 7 - 0007	63.00	6.11	12.82	52.34 %
Flat 10 - 00010	63.00	6.11	12.82	52.34 %
Flat 8 - 00008	50.60	6.71	14.05	52.24 %
Flat 11 - 00011	50.60	6.71	14.05	52.24 %
Flat 9 - 00009	38.40	8.21	18.57	55.79 %
Flat 12 - 00012	38.40	8.21	18.57	55.79 %
Totals:	721.40	101.36	228.51	
Average DER = 7.06 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 15.84 kgCO ₂ /m ²	55.40 %			

Block Compliance Report - DFEE				
Block Reference: Baseline		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
Flat 1 - 00001	66.30	50.81	43.96	-15.58 %
Flat 2 - 00002	37.40	56.53	45.76	-23.52 %

Block Compliance

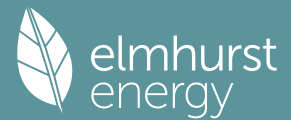
Flat 3 - 00003	38.40	68.18	54.30	-25.56 %
Flat 4 - 00004	63.00	43.79	29.33	-49.28 %
Flat 5 - 00005	50.60	47.43	29.57	-60.38 %
Flat 6 - 00006	38.40	60.50	40.08	-50.96 %
Flat 13 - 00013	71.80	52.93	45.46	-16.42 %
Flat 14 - 00014	51.50	62.44	50.62	-23.35 %
Flat 7 - 0007	63.00	43.79	29.33	-49.28 %
Flat 10 - 00010	63.00	43.79	29.33	-49.28 %
Flat 8 - 00008	50.60	47.43	29.57	-60.38 %
Flat 11 - 00011	50.60	47.43	29.57	-60.38 %
Flat 9 - 00009	38.40	60.50	40.08	-50.96 %
Flat 12 - 00012	38.40	60.50	40.08	-50.96 %
Totals:	721.40	746.05	537.07	
Average DFEE = 52.07 kgCO ₂ /m ²	% DFEE/TFEE	FAIL		
Average TFEE = 37.75 kgCO ₂ /m ²	-37.93 %			

Block Compliance Report - DPER				
Block Reference: Baseline	Block Name: Building 3			
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
Flat 1 - 00001	66.30	69.30	84.25	17.74 %
Flat 2 - 00002	37.40	83.90	109.58	23.43 %
Flat 3 - 00003	38.40	92.34	117.48	21.40 %
Flat 4 - 00004	63.00	63.30	68.41	7.47 %
Flat 5 - 00005	50.60	69.60	75.28	7.55 %
Flat 6 - 00006	38.40	85.23	99.95	14.73 %
Flat 13 - 00013	71.80	69.42	83.88	17.24 %

Block Compliance

Flat 14 - 00014	51.50	81.72	99.68	18.02 %
Flat 7 - 0007	63.00	63.30	68.41	7.47 %
Flat 10 - 00010	63.00	63.30	68.41	7.47 %
Flat 8 - 00008	50.60	69.60	75.28	7.55 %
Flat 11 - 00011	50.60	69.60	75.28	7.55 %
Flat 9 - 00009	38.40	85.23	99.95	14.73 %
Flat 12 - 00012	38.40	85.23	99.95	14.73 %
Totals:	721.40	1051.07	1225.79	
Average DPER = 73.22 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 84.87 kgCO ₂ /m ²	13.73 %			

Block Compliance



Block Reference	BE LEAN	Issued on Date	18/08/2023
Block Name	Building 3		
Calculation Type	New Build (As Designed)		

Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: BE LEAN		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
Flat 1_Copy - 00001_Copy	66.30	4.38	15.78	72.24 %
Flat 10_Copy - 00010_Copy	63.00	3.93	12.82	69.34 %
Flat 11_Copy - 00011_Copy	50.60	4.48	14.05	68.11 %
Flat 12_Copy - 00012_Copy	38.40	5.59	18.57	69.90 %
Flat 13_Copy - 00013_Copy	71.80	4.60	15.72	70.74 %
Flat 14_Copy - 00014_Copy	51.50	5.65	18.59	69.61 %
Flat 2_Copy - 00002_Copy	37.40	5.74	20.28	71.70 %
Flat 3_Copy - 00003_Copy	38.40	6.20	21.82	71.59 %
Flat 4_Copy - 00004_Copy	63.00	3.93	12.82	69.34 %
Flat 5_Copy - 00005_Copy	50.60	4.48	14.05	68.11 %
Flat 6_Copy - 00006_Copy	38.40	5.85	18.57	68.50 %
Flat 7_Copy - 00007_Copy	63.00	3.93	12.82	69.34 %
Flat 8_Copy - 00008_Copy	50.60	4.48	14.05	68.11 %
Flat 9_Copy - 00009_Copy	38.40	5.59	18.57	69.90 %
Totals:	721.40	68.83	228.51	
Average DER = 4.77 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 15.84 kgCO ₂ /m ²	69.88 %			

Block Compliance Report - DFEE				
Block Reference: BE LEAN		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
Flat 1_Copy - 00001_Copy	66.30	32.92	43.96	25.11 %
Flat 10_Copy - 00010_Copy	63.00	27.22	29.33	7.21 %

Block Compliance

Flat 11_Copy - 00011_Copy	50.60	31.96	29.57	-8.08 %
Flat 12_Copy - 00012_Copy	38.40	41.64	40.08	-3.88 %
Flat 13_Copy - 00013_Copy	71.80	37.19	45.46	18.19 %
Flat 14_Copy - 00014_Copy	51.50	45.76	50.62	9.61 %
Flat 2_Copy - 00002_Copy	37.40	41.56	45.76	9.20 %
Flat 3_Copy - 00003_Copy	38.40	48.29	54.30	11.06 %
Flat 4_Copy - 00004_Copy	63.00	27.22	29.33	7.21 %
Flat 5_Copy - 00005_Copy	50.60	31.96	29.57	-8.08 %
Flat 6_Copy - 00006_Copy	38.40	44.48	40.08	-10.97 %
Flat 7_Copy - 00007_Copy	63.00	27.22	29.33	7.21 %
Flat 8_Copy - 00008_Copy	50.60	31.96	29.57	-8.08 %
Flat 9_Copy - 00009_Copy	38.40	41.64	40.08	-3.88 %
Totals:	721.40	511.02	537.07	
Average DFEE = 35.38 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 37.75 kgCO ₂ /m ²	6.29 %			

Block Compliance Report - DPER				
Block Reference: BE LEAN		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
Flat 1_Copy - 00001_Copy	66.30	46.06	84.25	45.33 %
Flat 10_Copy - 00010_Copy	63.00	41.54	68.41	39.28 %
Flat 11_Copy - 00011_Copy	50.60	47.28	75.28	37.19 %
Flat 12_Copy - 00012_Copy	38.40	58.85	99.95	41.12 %
Flat 13_Copy - 00013_Copy	71.80	48.24	83.88	42.49 %
Flat 14_Copy - 00014_Copy	51.50	59.13	99.68	40.68 %
Flat 2_Copy - 00002_Copy	37.40	60.42	109.58	44.86 %
Flat 3_Copy - 00003_Copy	38.40	64.98	117.48	44.69 %
Flat 4_Copy - 00004_Copy	63.00	41.54	68.41	39.28 %

Block Compliance

Flat 5_Copy - 00005_Copy	50.60	47.28	75.28	37.19 %
Flat 6_Copy - 00006_Copy	38.40	61.45	99.95	38.52 %
Flat 7_Copy - 0007_Copy	63.00	41.54	68.41	39.28 %
Flat 8_Copy - 00008_Copy	50.60	47.28	75.28	37.19 %
Flat 9_Copy - 00009_Copy	38.40	58.85	99.95	41.12 %
Totals:	721.40	724.44	1225.79	
Average DPER = 50.21 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 84.87 kgCO ₂ /m ²	40.83 %			

Block Compliance



Block Reference	BE GREEN	Issued on Date	18/08/2023
Block Name	Building 3		
Calculation Type	New Build (As Designed)		
Assessor Details	Mr. Ishita Bhatnagar	Assessor ID	X001-6834
Client			

Block Compliance Report - DER				
Block Reference: BE GREEN		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
Flat 1_Copy_Copy - 00001_Copy_Copy	66.30	3.89	15.78	75.35 %
Flat 10_Copy_Copy - 00010_Copy_Copy	63.00	3.64	12.82	71.61 %
Flat 11_Copy_Copy - 00011_Copy_Copy	50.60	4.13	14.05	70.60 %
Flat 12_Copy_Copy - 00012_Copy_Copy	38.40	5.15	18.57	72.27 %
Flat 13_Copy_Copy - 00013_Copy_Copy	71.80	4.14	15.72	73.66 %
Flat 14_Copy_Copy - 00014_Copy_Copy	51.50	5.03	18.59	72.94 %
Flat 2_Copy_Copy - 00002_Copy_Copy	37.40	5.28	20.28	73.96 %
Flat 3_Copy_Copy - 00003_Copy_Copy	38.40	5.75	21.82	73.65 %
Flat 4_Copy_Copy - 00004_Copy_Copy	63.00	3.64	12.82	71.61 %
Flat 5_Copy_Copy - 00005_Copy_Copy	50.60	4.13	14.05	70.60 %
Flat 6_Copy_Copy - 00006_Copy_Copy	38.40	5.40	18.57	70.92 %
Flat 7_Copy_Copy - 00007_Copy_Copy	63.00	3.64	12.82	71.61 %
Flat 8_Copy_Copy - 00008_Copy_Copy	50.60	4.13	14.05	70.60 %
Flat 9_Copy_Copy - 00009_Copy_Copy	38.40	5.15	18.57	72.27 %
Totals:	721.40	63.10	228.51	
Average DER = 4.37 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 15.84 kgCO ₂ /m ²	72.42 %			

Block Compliance Report - DFEE				
Block Reference: BE GREEN		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
Flat 1_Copy_Copy - 00001_Copy_Copy	66.30	32.92	43.96	25.11 %
Flat 10_Copy_Copy - 00010_Copy_Copy	63.00	27.22	29.33	7.21 %

Block Compliance

Flat 11_Copy_Copy - 00011_Copy_Copy	50.60	31.96	29.57	-8.08 %
Flat 12_Copy_Copy - 00012_Copy_Copy	38.40	41.64	40.08	-3.88 %
Flat 13_Copy_Copy - 00013_Copy_Copy	71.80	37.19	45.46	18.19 %
Flat 14_Copy_Copy - 00014_Copy_Copy	51.50	45.76	50.62	9.61 %
Flat 2_Copy_Copy - 00002_Copy_Copy	37.40	41.56	45.76	9.20 %
Flat 3_Copy_Copy - 00003_Copy_Copy	38.40	48.29	54.30	11.06 %
Flat 4_Copy_Copy - 00004_Copy_Copy	63.00	27.22	29.33	7.21 %
Flat 5_Copy_Copy - 00005_Copy_Copy	50.60	31.96	29.57	-8.08 %
Flat 6_Copy_Copy - 00006_Copy_Copy	38.40	44.48	40.08	-10.97 %
Flat 7_Copy_Copy - 00007_Copy_Copy	63.00	27.22	29.33	7.21 %
Flat 8_Copy_Copy - 00008_Copy_Copy	50.60	31.96	29.57	-8.08 %
Flat 9_Copy_Copy - 00009_Copy_Copy	38.40	41.64	40.08	-3.88 %
Totals:	721.40	511.02	537.07	
Average DFEE = 35.38 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 37.75 kgCO ₂ /m ²	6.29 %			

Block Compliance Report - DPER				
Block Reference: BE GREEN		Block Name: Building 3		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
Flat 1_Copy_Copy - 00001_Copy_Copy	66.30	40.51	84.25	51.92 %
Flat 10_Copy_Copy - 00010_Copy_Copy	63.00	38.34	68.41	43.96 %
Flat 11_Copy_Copy - 00011_Copy_Copy	50.60	43.38	75.28	42.38 %
Flat 12_Copy_Copy - 00012_Copy_Copy	38.40	53.82	99.95	46.15 %
Flat 13_Copy_Copy - 00013_Copy_Copy	71.80	43.05	83.88	48.68 %
Flat 14_Copy_Copy - 00014_Copy_Copy	51.50	52.17	99.68	47.66 %
Flat 2_Copy_Copy - 00002_Copy_Copy	37.40	55.25	109.58	49.58 %
Flat 3_Copy_Copy - 00003_Copy_Copy	38.40	59.94	117.48	48.98 %
Flat 4_Copy_Copy - 00004_Copy_Copy	63.00	38.34	68.41	43.96 %

Block Compliance

Flat 5_Copy_Copy - 00005_Copy_Copy	50.60	43.38	75.28	42.38 %
Flat 6_Copy_Copy - 00006_Copy_Copy	38.40	56.41	99.95	43.56 %
Flat 7_Copy_Copy - 0007_Copy_Copy	63.00	38.34	68.41	43.96 %
Flat 8_Copy_Copy - 00008_Copy_Copy	50.60	43.38	75.28	42.38 %
Flat 9_Copy_Copy - 00009_Copy_Copy	38.40	53.82	99.95	46.15 %
Totals:	721.40	660.13	1225.79	
Average DPER = 45.69 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 84.87 kgCO ₂ /m ²	46.16 %			