ENERGY STRATEGY

PROJECT:
Independence House, Richmond

PROJECT NUMBER:
P2738

DOCUMENT REF:
P2738-ENE-02

Revision	Date	Details	Authored	Checked
R1	25.09.2023	Issued for comment	W. Liu	C. Armstrong
R2	17.10.2023	Revised after comments	W. Liu	C. Armstrong

KENT (HQ)
Unit 3 Grove Dairy Farm Business Centre I Bobbing Hill I Bobbing I Sittingbourne I Kent I ME9 8NY

LONDON
One Bridge Wharf I 56 Caledonian Road I London I N1 9UU

CONTENTS

1.0 EXECUTIVE SUMMARY

QuinnRoss Energy was commissioned to develop an energy statement for the proposed development at *Independence House, 84 Lower Mortlake Rd, Richmond* that will outline how it intends to provide heating and power and meet the energy and carbon emission targets set by national and local policy. The development comprises 21 residential units with refuse, gym, cycle store and carpark spaces.

This strategy was prepared directly in line with the *London Borough of Richmond Upon Thames Local Plan* guidance on energy statements.

This development will be subject to the following requirements:

Requirement	Description / Summary
National Planning Policy Framework (2021)	The National Planning Policy Framework (NPPF) introduced a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities. The framework states that the purpose of planning is to help achieve sustainable development.
Building Regulations Part ADL1 2021	You are expected to improve building's energy efficiency, however there are no specific targets.
London Plan 2021	The London Plan 2021 outlines all major developments must have zero CO_2 emissions. A CO_2 reduction of at least 35% is expected. The remaining CO_2 to zero must be off-set with a cash in lieu contribution.
Richmond Upon Thames Local Plan 2018	The Richmond Upon Thames Local Plan 2018 Policy LP 22 All new major residential developments (10 units or more) should aim to reduce their carbon dioxide emissions in accordance with the levels set out in the London Plan.
Energy Assessment Guidance (June 2022)	Section 6.15 to 6.25 outlines the approach for refurbished buildings.

Table 01: Summary of energy and sustainability targets

To achieve the above targets, the following energy reduction methods will be required, using the London Plan's Energy Hierarchy:

Method	Description / Summary
Be Lean	
High performing building thermal envelope	Construction U-values performing substantially above the current building regulations, including triple glazing.
Low infiltration	Air tightness no higher than 3.0 m^3/m^2h.
Natural ventilation	Natural ventilation to be used with opening windows.
Highly efficient lighting with controls	LED lighting installed throughout.
Highly efficient HVAC systems	High efficiency heat pump for heating and hot water will be installed. No gas installations on site.
Insulated pipe work	All Internal heating pipework will be insulated to a standard beyond building regulation requirements.
Unregulated Energy Use	Efforts will be made to reduce the unregulated emissions by providing "best in class" ("A" rated or equivalent) white goods.
Be Clean	
District Heating	No existing DH networks are near the site and no future network is planned.
Combined Heat and Power (CHP)	The CO_2 savings from the proposed heat pump system will be significantly improved over an equivalent CHP system, therefore CHP is not considered.
Be Green	
Heat pumps	High efficiency exhaust air heat pump system for heating, ventilation and hot water will be installed. This is an internal unit with no external condensers required.
Solar panels	A 105m^2 photovoltaic (PV) array will be installed on roof space. This will be around 20.4 kWp.

Table 02: Summary of energy hierarchy Lean, Clean & Green methods

Thermal and Energy Modelling Results

The whole development has been analysed for its energy use using current 2021 Building Regulations in *Elmhurst SAP 10* and *IES VE Compliance* approved energy modelling software. The predicted CO_2 emissions, saved CO_2 emissions and cash-in-lieu sum is shown below:

Part L 2021 Results						
	New build commercial (includes major refurbishments assessed under Part L2A)		New build residential (includes major refurbishments assessed under Part L1A)		Overall area weighted reductions	
	Total tCO_2	% Reduction at each stage	Total tCO_2	% Reduction at each stage	Total tCO_2	% Reduction at each stage
Baseline	-	-	11	N/A	11	N/A
Be Lean	-	-	31	-197%	31	-197%
Be Clean	-	-	31	0%	31	0%
Be Green	-	-	6	238%	6	238%
TOTAL	**-**	**-**	**4**	**41%**	**4**	**41%**

Table 03: Summary carbon reductions calculations using current Build Regs

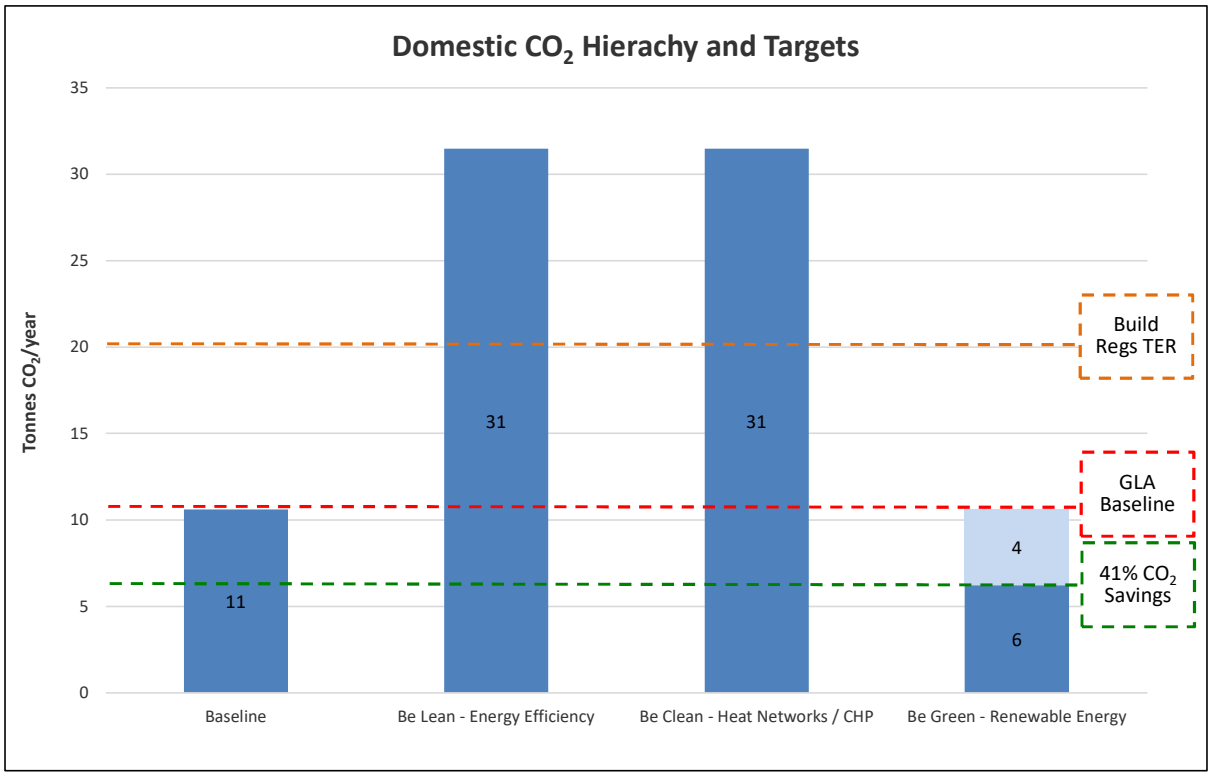


Figure 01: Carbon reductions comparison between current and future Build Regs

Please note the £ in lieu payment is based on £95 per tonne over 30 years as per GLA's Carbon Offset Funds: Monitoring Report 2020. All inputs, SAP outputs can be found in the appendices.

2.0 INTRODUCTION

QuinnRoss Energy was commissioned to develop an energy statement for the proposed development at *Independence House, 84 Lower Mortlake Rd, Richmond* that will outline how it intends to provide heating and power and meet the energy and carbon emission targets set by national and local policy. The development comprises 21 residential units with refuse, gym, cycle store and carpark spaces.

The site is located on London, in the borough of Richmond Upon Thames. See image below:

Figure 02: Google Map image of site

3.0 PLANNING POLICY AND LEGISLATION

This section describes the planning policies and regulations that will affect the proposed development. These are outlined below:

- National Planning Policy Framework (2021).
- Building Regulations Part ADL1, dwellings.
- London Plan 2021.
- Richmond Upon Thames Local Plan 2018
- Energy Assessment Guidance (June 2022)

Figure 03: Document front cover images of applicable policies

3.01 National Planning Policy Framework (NPPF) 2021

The NPPF sets out government planning policy for England. It was first published by the Department for Communities and Local Government (now the Ministry of Housing, Communities and Local Government (MHCLG)) on 27 March 2012.

The NPPF followed a commitment made in the 2010 Coalition Agreement to 'publish and present to Parliament a simple and consolidated national planning framework covering all forms of development and setting out national economic, environmental and social priorities'.

The NPPF introduces a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities. The framework states that the purpose of planning is to help achieve sustainable development.

Please note the NPPF does not state any specific energy or CO_2 targets, it outlines that local councils should produce their own (as outlined below).

3.02 Building Regulations Part ADL1 2021

The residential areas will be subject to the Building Regulations Conservation of Fuel and Power in new & existing dwellings. This policy does require refurbishment works to improve the building's energy efficiency. There are no specific targets or requirements that are mandatory to achieve other than to improve energy efficiency over the existing building.

3.03 London Plan 2021

The London Plan 2021 outlines a number of policies to underpin London's response to climate change. These policies cover adaptation, waste, aggregates, contaminated land, hazardous substances and most applicable to this development climate change mitigation. The key policies within the London Plan relating to energy consumption and CO_2 emissions include the following policies:

- SI2 Minimising greenhouse gas emissions.

3.03.01 Policy SI2 Minimising Greenhouse Gas Emissions

Policy SI2 above will have the most significant impact on this development as it outlines specific carbon emissions targets:

- All major development must have zero CO_2 emissions.
- CO_2 emissions must be at a minimum 40% lower than the Building Regulations Part L2A 2010 TER (which is 35% better than the current 2013 Building Regulations) then further short fall off-set through a cash in lieu payment.

3.04 Richmond Upon Thames Local Plan 2018

The Richmond Upon Thames Local Plan 2018 Policy LP22 All new major residential developments (10 units or more) should aim to reduce their carbon dioxide emissions in accordance with the levels set out in the London Plan.

It must be noted however the above policy does not contain any specific energy and CO_2 targets and Richmond Council themselves refer to the London Plan 2021 as their current guidance (outlined above).

3.05 Energy Assessment Guidance (June 2022).

The GLA's Energy Assessment Guidance (June 2022) outlines the approach for refurbished buildings and is outlined in the section below.

4.0 APPROACH FOR REFURBISHED BUILDINGS

This development is not a new-build, it's a refurbishment and change-of-use development. The approach for refurbishment is outlined in the GLA's *Energy Assessment Guidance (June 2022)* section 6.15 to 6.25. It clearly states that a "Baseline" building must be produced using the inputs outlined in Appendix C: Notional specification for existing buildings. The refurbishment works will be assessed against the performance of this Baseline building.

Although not a new-build development, it has been requested to also include the Part L 2021 Target Emissions Rate (TER) for information purposes.

5.0 ENERGY HIERACHY

As part of our aims to provide a sustainable development we will be following the energy hierarchy outlined in the London Plan policy. The hierarchy shown below guides our approach to minimising the energy use within the building and to create a comfortable internal environment. This consists of three best practice criteria: Be Lean, Be Clean and Be Green to achieve Low energy and carbon design.

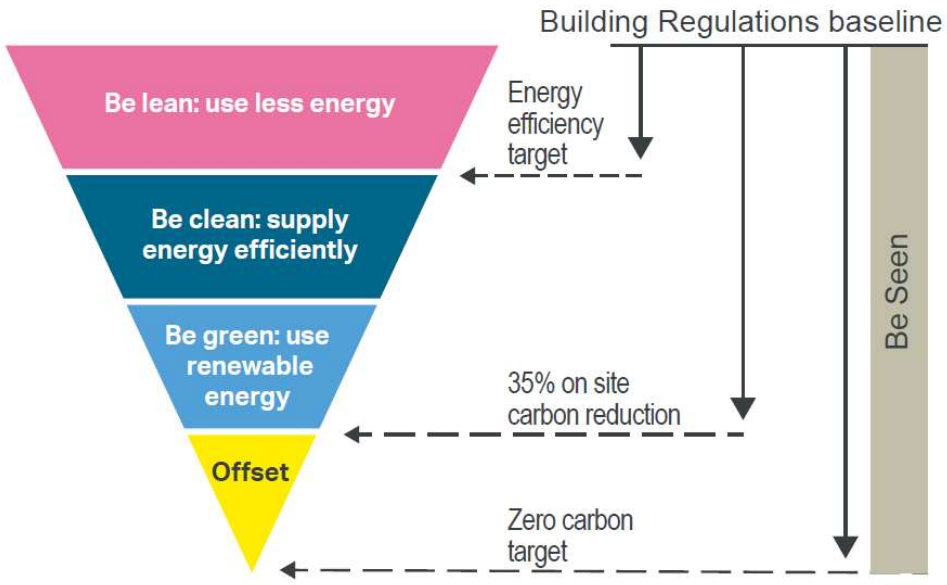


Figure 04: London Plan's energy hierarchy

The design team has taken the above criteria and applied the most feasible measures to the building.

5.01 Be Lean

5.01.01 Building Envelope Thermal Performance

The most effective way of keeping heating energy consumption to a minimum is to ensure the building uses high performing fabric properties. It is proposed the building is well insulated and uses high performing constructions above the current minimum requirement of the building regulations. As a result, the following construction U-values (W/m².K) are proposed:

Envelope Element	U-Value W/m².K
	Residential
Wall	0.15
Roof	0.10
Floor	0.10
Glazing	1.20

Table 04: Proposed U-values

The above figures will be achieved by adding substantial high performing insulation into the constructions and only using manufacturer's that have well insulated glazing products with deep air gaps between frames.

5.01.02 Air Infiltration

Uncontrolled air infiltration in a building can contribute to a sizeable proportion of heat losses particularly in well insulated modern buildings. An air permeability of no greater than 3.0 m^3/m^2h is proposed. This is done by ensuring all bridges, corners and air gaps in the façade or glazing are sealed as far as feasibly possible.

5.01.03 Energy efficient services

A number of energy efficient HVAC and lighting strategies are proposed for the development:

- Lighting – LED lighting will be installed throughout and be chosen to minimise over-illumination.
- Energy meters – energy meters will be installed for all major energy uses including water.
- User controls – Efficient and user-friendly controls will be specified throughout all buildings.
- Heating & hot water – The building will be highly insulated for low space heating requirements. Residential heating and hot water will be provided by a high efficiency exhaust air heat pump system.
- Natural ventilation – The dwellings are mainly naturally ventilated with exhaust ventilation for maximum comfort.

5.01.04 Insulated pipework

All Internal heating pipework, particularly those located in internal corridors, will be insulated to a standard beyond building regulation requirements. This will minimise issues of internal heat gain and avoid the need for any additional ventilation or cooling.

5.01.05 Unregulated energy use

In addition, efforts are being made to reduce the unregulated emissions by providing "best in class" ("A" rated or equivalent) white goods in each room to encourage energy consumption reduction.

Please note the benefits of high efficiency appliances cannot be included in any results shown in this report. These measures interact to some degree (e.g., more low energy lighting reduces the ancillary heat gains from lighting, so increases the space heating demand) so comparisons of individual results can produce apparent anomalies and are not provided as a result.

5.02 Be Clean

5.02.01 District Heating (DH) Networks

The next stage of the London Plan hierarchy is to look at the availability of decentralised heat networks within the vicinity of the development. Consideration should be given to connecting to these networks should there be one close to the development, or if a network is proposed for the local area. The image below shows the location of the site on the current London Heat Map (https://maps.london.gov.uk/webmaps/heatmap/):

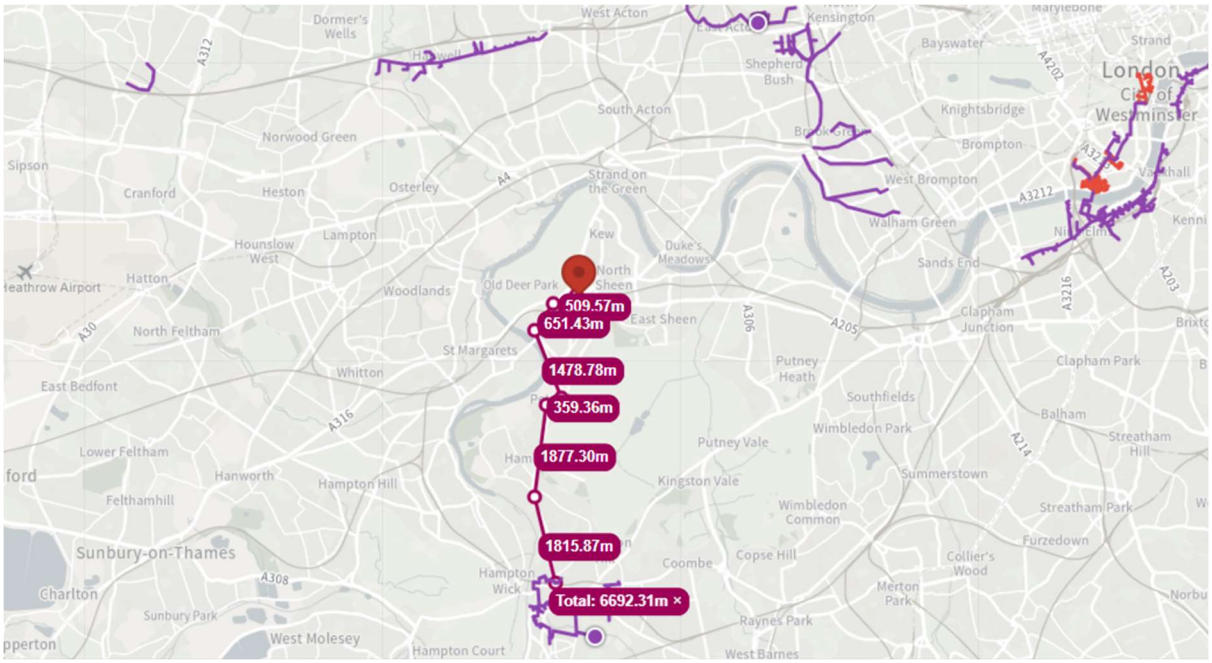


Figure 05: London heat map image showing site and proposed (Purple) and existing (red) networks

The site is not in a district heating priority area.

The site is 6km from the proposed heating network and 12km from existing heating network. There are no existing networks or proposed network within a reasonable distance. Therefore, district heating is not considered.

5.02.02 Combined Heat and Power (CHP)

The recent change (June 2022) in Building Regulations now favours electrical systems over gas fuelled ones, such as CHP, in line with the government policy to move away from natural resource consumption such as gas. Therefore, the CO_2 savings from the proposed heat pump system will be significantly improved over an equivalent CHP system, therefore CHP is not considered.

5.03 Be Green

The final part of the hierarchy is to minimise carbon dioxide emissions using renewable / Low or Zero Carbon (LZC) technologies. An initial LZC technology feasibility study has been carried out, shown in appendix A, and the most appropriate products available is heat pumps and solar panels.

5.03.01 Heat pumps

A high efficiency exhaust air heat pump system for space heating, ventilation and hot water will be used. This is an internal unit with no external condensers required.

5.03.02 Solar panels

A 105m^2 solar panel array will be installed at residential roof. This will be around 20.4 kWp.

5.04 Be Seen

Extensive monitoring and metering for all major plant and equipment will be installed. Individual equipment and services will be capable of being monitored individually and their energy consumption tabulated for review. All metering will also have pulsed outputs and be capable of warning of "out of range" values.

6.0 THERMAL & ENERGY MODELLING RESULTS

6.01 Part ADL1 Software Used

All residential apartments will be calculated using the Standard Assessment Procedure (SAP). The software used will be *Elmhurst Energy*'s (formerly NHER) *Design SAP 10* which is widely used for building energy calculations throughout the On-Construction industry. All versions of *Elmhurst's Design SAP* software are fully BRE tested, and Government approved; they calculate the necessary building regulations/standards for England (Part L), Wales (Part L), Northern Ireland (Part F) and Scotland (Section 6).

http://www.elmhurstenergy.co.uk/

An approved Elmhurst Energy On-Construction Domestic Energy Assessor (OCDEA) also conducted the calculations.

6.02 Baseline Building

Unlike with new-build developments, the target emission rate (TER) for existing building is not created automatically from notional building standards. A Baseline building must be created in line with the energy strategy guidance as outlined in Section 4.0 above.

See appendices for the inputs for the Baseline building.

6.03 Results

The Part ADL1 results under current Building Regulations 2021 are shown below:

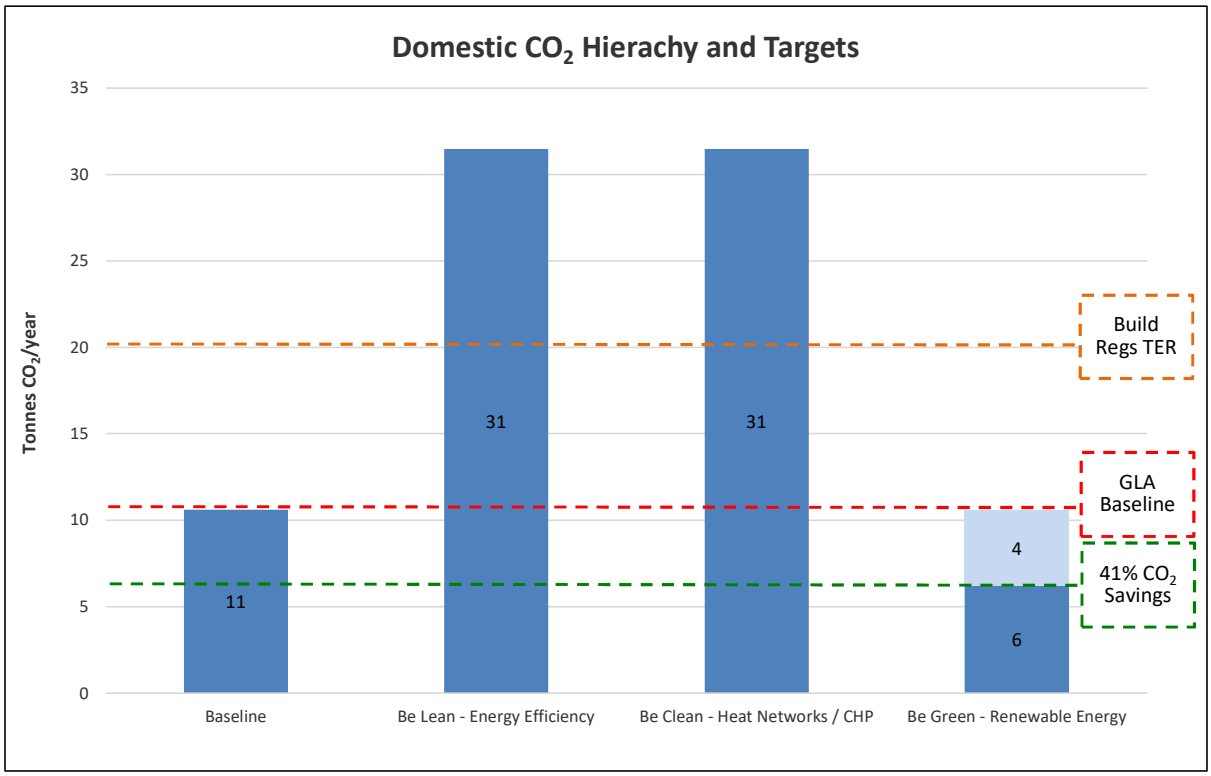


Figure 06: Part L1A results

Using the input data outlined in this report the residential areas will improve the GLA baseline building by 56%.

7.0 SUMMARY & CONCLUSION

The proposed development will achieve the following energy & sustainability targets:

Requirement	Description / Summary
National Planning Policy Framework (2021)	By conforming to the legal requirements of Part L 2021 and the local requirements of Hounslow Borough Council, as outlined below, the development can be considered compliant with the NPPF.
Building Regulations Part ADL1 2021	Using the inputs outlined in this report all residential spaces will be compliant with Part ADL1 2021.
London Plan 2021	Using the inputs outlined in this report the building will have CO_2 emissions 36% better than the GLA baseline building, exceeding the London Plan minimum requirements.
Richmond Upon Thames Local Plan 2018	Compliance with the London Plan 2021 (as outlined above) is achieved.

Table 05: Summary of energy and sustainability targets

To achieve the above emissions, the following energy reduction methods will be required, using the London Plan's Energy Hierarchy:

Be Lean

- **High performing building thermal envelope –** Construction U-values performing above the current building regulations. The following construction U-values will be used

Envelope Element	U-Value W/m².K
	Residential
Wall	0.15
Roof	0.10
Floor	0.10
Glazing	1.20

Table 06: Proposed U-values

- **Low Infiltration –** Air tightness no higher than 3.0 m³/m²h.
- **Highly efficient lighting with controls –** LED lighting installed throughout.
- **Highly efficient HVAC systems –** Only specifying a high efficiency exhaust air heat pump system.
- **Highly efficient hot water generator -** The hot water demand will be provided by the same heat pump used for space heating with built in hot water tank.

- **Insulated pipe work -** All Internal heating pipework will be insulated to a standard beyond building regulation requirements.

- **Unregulated Energy Use -** In addition, efforts are being made to reduce the unregulated emissions by providing "best in class" ("A" rated or equivalent) white goods in apartments.

Be Clean

- **District Heating (DH) –** There are no existing networks or proposed networks within a reasonable distance.

- **Combined Heat and Power (CHP) –** Although CHP is feasible, it would offer far inferior CO_2 savings over the proposed heat pumps and is not considered as a result.

Be Green

- **Heat Pumps –** Highly efficient exhaust air heat pump system for space heating, ventilation and hot water will be installed. This is an internal unit with no external condensers required.

- **Solar panels -** A 105 m^2 solar panel array will be installed at residential roof. This will be around 20.4 kWp.

Energy Modelling Results

The whole development has been analysed for its energy use using approved energy modelling software. The predicted tonnes of CO_2 are shown below:

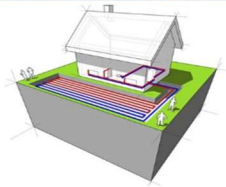
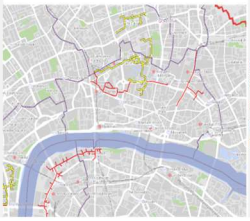
Part L 2021 Results						
	New build commercial (includes major refurbishments assessed under Part L2A)		New build residential (includes major refurbishments assessed under Part L1A)		Overall area weighted reductions	
	Total tCO_2	% Reduction at each stage	Total tCO_2	% Reduction at each stage	Total tCO_2	% Reduction at each stage
Baseline	-	-	11	N/A	11	N/A
Be Lean	-	-	31	-197%	31	-197%
Be Clean	-	-	31	0%	31	0%
Be Green	-	-	6	238%	6	238%
TOTAL	**-**	**-**	**4**	**41%**	**4**	**41%**

Table 07: Summary of CO_2 emissions and savings

As the results above show, when including all available technologies and methods, the building will achieve a 36% improvement over the GLA baseline.

8.0 APPENDICES

8.01 Appendix A – LZC Technology Feasibility Analysis

Technology		Feasibility	
Photovoltaic (PV) Panels		PV's use semiconductor technology to convert incident solar radiation into electrical power. The building is well suited for solar collection with a large flat roofs located several storeys above ground level. Any electricity that is generated and used on site is preferable as every kWh used is one that the development doesn't have to purhase. Any surplus electricity generated can be exported to the national grid, receiving a further export tariff in addition to the generation tariff. This development has lots of open roof ideal for solar panel placement.	High
Solar Thermal Panels		Solar thermal panels are a method of harvesting the sun's energy, commonly to provide a source of preheated water. As mentioned above, the building has a large area of roof providing an ideal location for solar thermal collection. The optimum size of a solar thermal array is to provide approximately a third of the daily stored demand, which would benefit the residential areas however it would be at the cost of PV panel area. Electricity demand reduction, from PV's, has a greater impact on CO_2 savings than hot water consumption making this tech feasible but less effective than other options.	Medium
Ground Source Heat Pump (GSHP)		A GSHP takes low-grade heat from the ground and uses electricity to convert it to useful heat (at approximately 40°C) that can be used to heat a building. The ground can also be used as a heat sink to provide cooling. The bore holes and length of pipework into the ground required for this tech make this option difficult to justify considering the developments suburban location.	Low
Air Source Heat Pump (ASHP)		Similar to the GSHP, ASHP utilises the external environment as a heat source. A heat pump uses electricity or gas to run a refrigerant cycle, extracting heat from external air to convert it to useful heat for space heating. ASHPs offer high efficiencies and are suited to institutional and commercial properties. Although these systems are typically not silent-running, must be located externally and require an area of flat roof, their high efficiencies are too beneficial to rule out.	High
Wind Turbines		Wind energy can be converted to electricity by using wind turbines. This renewable technology is suited to exposed areas free from obstructions where the average wind speeds are high. On the site there are plenty of obstructions which would lead to the wind having a turbulent nature resulting in poor output for turbines, plus they have significant visual and noise impacts on neighbouring areas. Hence they are unsuitable for this development.	Low
Biomass		Biomass fuel is usually wood chips or wood pellets, and as it comes from plants it is considered a low-carbon source of high-grade heat that can be used for space heating, domestic hot water and, with absorption chillers, cooling (this last option is very rarely implemented due to high capital cost). A biomass boiler needs to operate under a reasonably constant load being a solid fuel boiler; it is unable to respond to load fluctuations as quickly as a gas or oil boiler. This limits the boilers to being suitable to operate for the provision of the base load. This could still be suitable for this development for its likely large base load however biomass also has the potential to have a significantly detrimental effect on air quality in the local vicinity, frequent fuel deliveries are required which could be disruptive to residents and there are significant maintenance costs. Unless a free source of wood can be found, such as waste from a factory or forestry management operation, the biomass fuel is often the same price or more expensive than gas. This means that the additional capital outlay on top of the increased fuel, maintenance costs, air quality, running costs and maintenance issues make biomass less viable than other tech available.	Low
Combined Heat and Power		CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process, the heat being distributed in surrounding buildings instead of being wasted. CHP is best suited to buildings with large heating and DHW demands making it feasible for this development. Although CHP is feasible, it would not offer significantly better savings over the proposed heat pumps. It must also be noted that future Building Regs are widely predicted to be moving away from CHP and natural resource consumption, therefore CHP is not considered.	Medium
District Heating		DH tends to be large CHP units run by commercial energy firms supplying energy to local buildings through underground pipework. Though they offer the same benefits as an on site CHP, without maintenance costs (provided by the supplier), the limitations are the proposed site needs to be within reasonable distance of a network. The nearest proposed network is around 6km from the site. There are no existing DH networks within feasible distance of the site. Therefore DH is not considered.	Low

8.02 Appendix B –Input data used for BASELINE Calculations

Construction

Construction U-values W/m².K	
Floor	0.25
External wall	0.55
Roof	0.16
Front door	2.20

Glazing Parameters	
Overall U-value, including frame	1.60
g-value	0.63

Internal / Party Constructions	
Party wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity
Internal partitions	Internal partition plaster on dabs
Internal ceiling	Plasterboard ceiling, carpeted chipboards floor
Internal floor	Plasterboard ceiling, carpeted chipboards floor

Thermal Mass Parameter (TMP)	
TMP	Varies between apartments

Thermal Bridging	
Calculating source type	Calculated per apartment
All bridges	Default

Air Permeability

Pressure Test	
Pressure Test AP50	5.0

Ventilation

Natural Ventilation	
Type	Centralised mechanical extract ventilation
Duct type	Rigid
SFP W/l/s	0.65

Cooling

None	
-	-

Lighting

Lighting	
% of Low Energy Lighting (L.E.L.) fittings	100%
Efficacy	75 lm/W
Tariff	Standard

Heating System

Heat Source 1	
Heat source	Exhaust air heat pump
Heating use	Heating and hot water
Efficiency	358.0%
Code	Time and temperature zone control by arrangement

Domestic Hot Water

Water Heating	
Water heating	From main heating system
Heater type	-
Fuel type	-
Type	-

Hot Water Cylinder	
Volume	150.0
Storage losses kwh/day	1.68
Pipework	Fully insulated

Renewables

None	
-	-

8.03 Appendix C –Input data used for LEAN calculations

Construction

Construction U-values W/m².K	
Floor	0.10
External wall	0.15
Roof	0.10
Front door	1.40

Glazing Parameters	
Overall U-value, including frame	1.20
g-value	0.60

Internal / Party Constructions	
Party wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity
Internal partitions	Internal partition plaster on dabs
Internal ceiling	Plasterboard ceiling, carpeted chipboards floor
Internal floor	Plasterboard ceiling, carpeted chipboards floor

Thermal Mass Parameter (TMP)	
TMP	Varies between apartments

Thermal Bridging	
Calculating source type	Calculated per apartment
All bridges	Default

Air Permeability

Pressure Test	
Pressure Test AP50	3.0

Ventilation

Natural Ventilation	
-	-

Cooling

None	
-	-

Lighting

Lighting	
% of Low Energy Lighting (L.E.L.) fittings	100%
Efficacy	100 lm/W
Tariff	Standard

Heating System

Heat Source 1	
Heat source	Gas boiler combi
Heating use	Heating and hot water
Efficiency	78%
Code	Programmer, room thermostat and TRVs

Domestic Hot Water

Water Heating	
Water heating	From main heating system
Heater type	-
Fuel type	-
Type	-

Hot Water Cylinder	
-	

Renewables

None	
-	

8.04 Appendix D –Input data used for GREEN calculations

Construction

Construction U-values W/m².K	
Floor	0.10
External wall	0.15
Roof	0.10
Front door	1.40

Glazing Parameters	
Overall U-value, including frame	1.20
g-value	0.60

Internal / Party Constructions	
Party wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity
Internal partitions	Internal partition plaster on dabs
Internal ceiling	Plasterboard ceiling, carpeted chipboards floor
Internal floor	Plasterboard ceiling, carpeted chipboards floor

Thermal Mass Parameter (TMP)	
TMP	Varies between apartments

Thermal Bridging	
Calculating source type	Calculated per apartment
All bridges	Default

Air Permeability

Pressure Test	
Pressure Test AP50	3.0

Ventilation

Mechanical Ventilation	
Type	Centralised mechanical extract ventilation
Duct type	Rigid
SFP W/l/s	0.65

Cooling

None	
-	-

Lighting

Lighting	
% of Low Energy Lighting (L.E.L.) fittings	100%
Efficacy	100 lm/W
Tariff	Standard

Heating System

Heat Source 1	
Heat source	Exhaust air heat pump
Heating use	Heating and hot water
Efficiency	358%
Code	Time and temperature zone control by arrangement

Domestic Hot Water

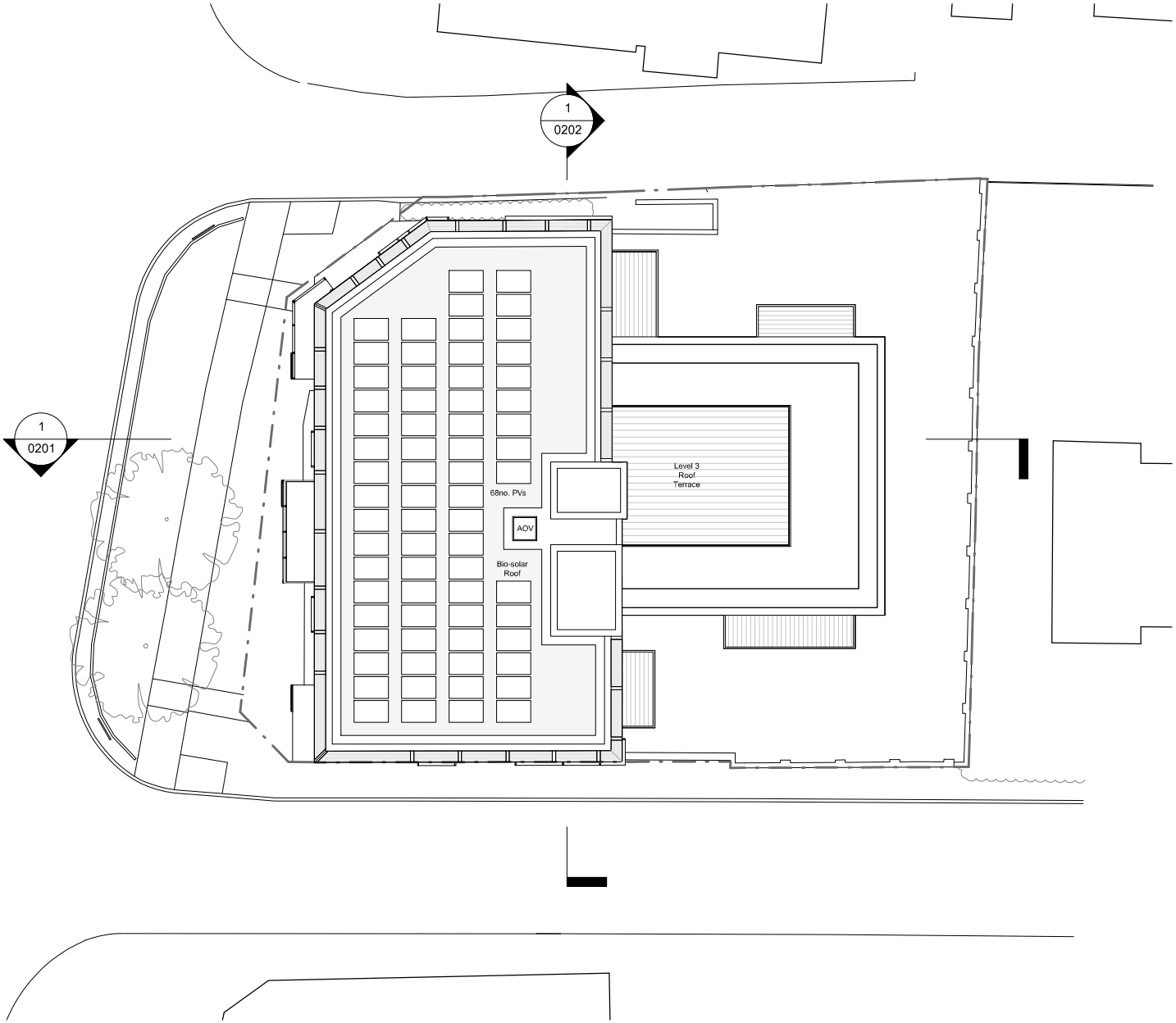
Water Heating	
Water heating	From main heating system
Heater type	-
Fuel type	-
Type	-

Hot Water Cylinder	
Volume	170.0
Storage losses kwh/day	1.56
Pipework	Fully insulated

Renewables

Photovoltaics (PV) Solar Panels	
No. of panels for whole site	68 no.
Orientation	Horizontal
Overshading	None or little
Connect to dwelling	Yes

8.05 Appendix E – PV Layout



N

0 1m 5m

DRAFT

Revision	Date	Description
B	24/08/23	Draft Issue
A	16/08/23	Draft Issue

project
Independance House

drawing title
Proposed Roof Plan

drawing number
WPA-0810-0114

revision
B

scale @ A3
1 : 200

first issue date
16/08/23

drawing purpose
SKETCH

WIMSHURST
PELLERITI
The Mews,
6 Putney Common, SW15 1HL
0208 780 2206
info@wp.uk.com
wimshurst-pelleriti.com

8.06 Appendix F – BASELINE SAP Outputs

Summary for Input Data

elmhurst energy

Property Reference	3rd_unit03	**Issued on Date**	17/10/2023
Assessment Reference	3rd_unit03_BASELINE	**Prop Type Ref**	
Property			

SAP Rating	69 C	**DER**		**TER**	
Environmental	93 A	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.54	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Northeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Top-floor flat
Which Floor	3
2.0 Number of Storeys	1
3.0 Date Built	1989
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	32.88 m	77.13 m²	3.26 m

8.0 Living Area 32.70 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	86.06	74.24	0.00	None	11.82	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	21.12	19.00	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	20.28		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	151.26

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	77.13	77.13	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)

Summary for Input Data

elmhurst energy

Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on insulation), carpeted		30.00	77.13

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							2.20
Window	Manufacturer	Window	Double glazed			0.63		0.70	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	North East	2.12	
Opening	Window	External Wall 1	South West	1.76	
Opening	Window	External Wall 1	South East	1.60	
Opening	Window	External Wall 1	North West	8.46	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	5.49	1.00	1.00	No
E16 Corner (normal)	Table K1 - Default	9.78	0.18	0.18	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.26	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	6.98	1.00	1.00	Yes
E3 Sill	Table K1 - Default	5.97	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	18.80	0.10	0.10	Yes
E7 Party floor between dwellings (in blocks of flats)	Table K1 - Default	32.88	0.28	0.28	Yes
E14 Flat roof	Table K1 - Default	32.88	0.16	0.16	Yes
E18 Party wall between dwellings	Table K1 - Default	6.52	0.24	0.24	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	5.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - centralised
MV Reference Number	500258
Configuration	1
Manufacturer SFP	0.65
Duct Type	Rigid
Wet Rooms	1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	5	375	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	100393	
Fuel Type	Electricity	
In Winter	0.00	

Summary for Input Data

In Summer	0.00	
Model Name	Fighter 470	
Manufacturer	NIBE Energy Systems Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
Is MHS Pumped	Pump in unheated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	
28.3 Waste Water Heat Recovery System		
29.0 Hot Water Cylinder	Internal Store	
Insulation Type	Measured Loss	
Cylinder Volume	170.00	L
Loss	1.56	kWh/day
In Airing Cupboard	No	
34.0 Small-scale Hydro	None	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Summary for Input Data

elmhurst energy

Property Reference	1st_unit01	**Issued on Date**	17/10/2023
Assessment Reference	1st_unit01_BASELINE	**Prop Type Ref**	
Property			

SAP Rating	76 C	**DER**		**TER**	
Environmental	95 A	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.38	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Southeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Mid-floor flat
Which Floor	1
2.0 Number of Storeys	1
3.0 Date Built	1989
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	17.71 m	64.38 m²	3.67 m

8.0 Living Area 25.80 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	59.67	46.56	0.00	None	13.11	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	5.32	3.20	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	68.23		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	162.14

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	64.38

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	64.38

Summary for Input Data

elmhurst energy

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							2.20
Window	Manufacturer	Window	Double glazed			0.63		0.70	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	South East	2.12	
Opening	Window	External Wall 1	North West	7.05	
Opening	Window	External Wall 1	North East	1.65	
Opening	Window	External Wall 1	South	4.41	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	3.65	1.00	1.00	No
E16 Corner (normal)	Table K1 - Default	11.01	0.18	0.18	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.67	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	7.50	1.00	1.00	Yes
E3 Sill	Table K1 - Default	6.49	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	15.80	0.10	0.10	Yes
E7 Party floor between dwellings (in blocks of flats)	Table K1 - Default	17.71	0.28	0.28	Yes
E18 Party wall between dwellings	Table K1 - Default	7.34	0.24	0.24	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	5.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	Yes	
Approved Installation	No	
Mechanical Ventilation data Type	Database	
Type	Mechanical extract ventilation - centralised	
MV Reference Number	500258	
Configuration	1	
Manufacturer SFP	0.65	
Duct Type	Rigid	
Wet Rooms	1	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	No	
22.0 Lighting		
No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	5	375	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	100393	
Fuel Type	Electricity	
In Winter	0.00	
In Summer	0.00	
Model Name	Fighter 470	

Summary for Input Data

elmhurst energy

Manufacturer	NIBE Energy Systems Ltd
System Type	Heat Pump
Controls SAP Code	2207
Is MHS Pumped	Pump in unheated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 None

26.0 Heat Networks None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Insulation Type	Measured Loss	
Cylinder Volume	170.00	L
Loss	1.56	kWh/day
In Airing Cupboard	No	

34.0 Small-scale Hydro None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Summary for Input Data

elmhurst energy

Property Reference	Grd_unit02	**Issued on Date**	17/10/2023
Assessment Reference	Grd_unit02_BEASELINE	**Prop Type Ref**	
Property			

SAP Rating	59 D	**DER**		**TER**	
Environmental	91 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.51	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Southwest
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Ground-floor flat
Which Floor	0
2.0 Number of Storeys	1
3.0 Date Built	1989
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	19.24 m	41.50 m²	3.67 m

8.0 Living Area 35.50 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	38.68	26.48	0.00	None	12.20	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	31.93	29.81	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	32.70		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	62.76

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	41.50

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Exposed Floor - Solid	Lowest occupied	Other	0.25	None	0.00	0.00	41.50

12.0 Opening Types

Summary for Input Data

elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							2.20
Window	Manufacturer	Window	Double glazed			0.63		0.70	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	South West	2.12	
Opening	Window	External Wall 1	North East	5.28	
Opening	Window	External Wall 1	South East	6.92	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.67	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	7.96	1.00	1.00	Yes
E3 Sill	Table K1 - Default	6.95	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	21.90	0.10	0.10	Yes
E5 Ground floor (normal)	Table K1 - Default	19.24	0.32	0.32	Yes
E16 Corner (normal)	Table K1 - Default	3.67	0.18	0.18	No
E18 Party wall between dwellings	Table K1 - Default	7.34	0.24	0.24	Yes
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	2.72	1.00	1.00	No

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	5.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	Yes	
Approved Installation	No	
Mechanical Ventilation data Type	Database	
Type	Mechanical extract ventilation - centralised	
MV Reference Number	500258	
Configuration	1	
Manufacturer SFP	0.65	
Duct Type	Rigid	
Wet Rooms	1	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	No	
22.0 Lighting		
No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	5	375	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	100393	
Fuel Type	Electricity	
In Winter	0.00	
In Summer	0.00	
Model Name	Fighter 470	
Manufacturer	NIBE Energy Systems Ltd	

Summary for Input Data

elmhurst energy

System Type	Heat Pump
Controls SAP Code	2207
Is MHS Pumped	Pump in unheated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Insulation Type	Measured Loss	
Cylinder Volume	170.00	L
Loss	1.56	kWh/day
In Airing Cupboard	No	

34.0 Small-scale Hydro — None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

8.07 Appendix G – LEAN SAP Outputs

Summary for Input Data

elmhurst energy

Property Reference	Grd_unit02	**Issued on Date**	17/10/2023
Assessment Reference	Grd_unit02_LEAN	**Prop Type Ref**	
Property			

SAP Rating	78 C	**DER**		**TER**	
Environmental	80 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.18	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Southwest
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Ground-floor flat
Which Floor	0
2.0 Number of Storeys	1
3.0 Date Built	1989
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	19.24 m	41.50 m²	3.67 m

8.0 Living Area 35.50 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	38.68	26.48	0.00	None	12.20	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	31.93	29.81	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	32.70		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	62.76

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	41.50

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Exposed Floor - Solid	Lowest occupied	Other	0.10	None	0.00	0.00	41.50

12.0 Opening Types

Summary for Input Data

elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							1.40
Window	Manufacturer	Window	Double glazed			0.60		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	South West	2.12	
Opening	Window	External Wall 1	North East	5.28	
Opening	Window	External Wall 1	South East	6.92	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.67	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	7.96	1.00	1.00	Yes
E3 Sill	Table K1 - Default	6.95	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	21.90	0.10	0.10	Yes
E5 Ground floor (normal)	Table K1 - Default	19.24	0.32	0.32	Yes
E16 Corner (normal)	Table K1 - Default	3.67	0.18	0.18	No
E18 Party wall between dwellings	Table K1 - Default	7.34	0.24	0.24	Yes
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	2.72	1.00	1.00	No

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	No	
22.0 Lighting		
No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	20

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Fuel Type	Mains gas	
SAP Code	104	
In Winter	84.00	
In Summer	75.00	
Controls SAP Code	2106	
Delayed Start Stat	No	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in unheated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
Boiler Interlock	No	

Summary for Input Data

elmhurst energy

Combi boiler type	Standard Combi
Combi keep hot type	Gas/Oil, time clock
25.0 Main Heating 2	None
26.0 Heat Networks	None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1
28.3 Waste Water Heat Recovery System	
29.0 Hot Water Cylinder	None
In Airing Cupboard	No
34.0 Small-scale Hydro	None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Summary for Input Data

elmhurst energy

Property Reference	1st_unit01	**Issued on Date**	17/10/2023
Assessment Reference	1st_unit01_LEAN	**Prop Type Ref**	
Property			

SAP Rating	81 B	**DER**		**TER**	
Environmental	83 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.26	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Southeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Mid-floor flat
Which Floor	1
2.0 Number of Storeys	1
3.0 Date Built	1989
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	17.71 m	64.38 m²	3.67 m

8.0 Living Area 25.80 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	59.67	46.56	0.00	None	13.11	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	5.32	3.20	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	68.23		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	162.14

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	64.38

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	64.38

Summary for Input Data

elmhurst energy

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							1.40
Window	Manufacturer	Window	Double glazed			0.60		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	South East	2.12	
Opening	Window	External Wall 1	North West	7.05	
Opening	Window	External Wall 1	North East	1.65	
Opening	Window	External Wall 1	South	4.41	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	3.65	1.00	1.00	No
E16 Corner (normal)	Table K1 - Default	11.01	0.18	0.18	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.67	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	7.50	1.00	1.00	Yes
E3 Sill	Table K1 - Default	6.49	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	15.80	0.10	0.10	Yes
E7 Party floor between dwellings (in blocks of flats)	Table K1 - Default	17.71	0.28	0.28	Yes
E18 Party wall between dwellings	Table K1 - Default	7.34	0.24	0.24	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	No	
22.0 Lighting		
No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	20

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Fuel Type	Mains gas	
SAP Code	104	
In Winter	84.00	
In Summer	75.00	
Controls SAP Code	2106	
Delayed Start Stat	No	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in unheated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	

Summary for Input Data

Boiler Interlock	No
Combi boiler type	Standard Combi
Combi keep hot type	Gas/Oil, time clock

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder — None

In Airing Cupboard	No

34.0 Small-scale Hydro — None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Summary for Input Data

elmhurst energy

Property Reference	3rd_unit03	**Issued on Date**	17/10/2023
Assessment Reference	3rd_unit03_LEAN	**Prop Type Ref**	
Property			

SAP Rating	79 C	**DER**		**TER**	
Environmental	80 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.65	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Northeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Top-floor flat
Which Floor	3
2.0 Number of Storeys	1
3.0 Date Built	1989
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	32.88 m	77.13 m²	3.26 m

8.0 Living Area 32.70 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	86.06	74.24	0.00	None	11.82	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	21.12	19.00	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	20.28		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	151.26

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	77.13	77.13	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)

Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on insulation), carpeted		30.00	77.13

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							1.40
Window	Manufacturer	Window	Double glazed			0.60		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	North East	2.12	
Opening	Window	External Wall 1	South West	1.76	
Opening	Window	External Wall 1	South East	1.60	
Opening	Window	External Wall 1	North West	8.46	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	5.49	1.00	1.00	No
E16 Corner (normal)	Table K1 - Default	9.78	0.18	0.18	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.26	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	6.98	1.00	1.00	Yes
E3 Sill	Table K1 - Default	5.97	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	18.80	0.10	0.10	Yes
E7 Party floor between dwellings (in blocks of flats)	Table K1 - Default	32.88	0.28	0.28	Yes
E14 Flat roof	Table K1 - Default	32.88	0.16	0.16	Yes
E18 Party wall between dwellings	Table K1 - Default	6.52	0.24	0.24	Yes

Y-value	0.00	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	20

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Fuel Type	Mains gas	
SAP Code	104	
In Winter	84.00	
In Summer	75.00	
Controls SAP Code	2106	
Delayed Start Stat	No	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in unheated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	

Summary for Input Data

elmhurst energy

Flow Temperature	Enter value
Flow Temperature Value	35.00
Boiler Interlock	No
Combi boiler type	Standard Combi
Combi keep hot type	Gas/Oil, time clock

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder — None

In Airing Cupboard — No

34.0 Small-scale Hydro — None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
			0	0
			0	0
			0	0

8.08 Appendix H – GREEN SAP Outputs

Summary for Input Data

elmhurst energy

Property Reference	1st_unit01	**Issued on Date**	17/10/2023
Assessment Reference	1st_unit01_GREEN	**Prop Type Ref**	
Property			

SAP Rating	85 B	**DER**		**TER**	
Environmental	97 A	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.24	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Southeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Mid-floor flat
Which Floor	1
2.0 Number of Storeys	1
3.0 Date Built	2024
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	17.71 m	64.38 m²	3.67 m

8.0 Living Area 25.80 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	59.67	46.56	0.00	None	13.11	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	5.32	3.20	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	68.23		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	162.14

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	64.38

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	64.38

Summary for Input Data

elmhurst energy

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							1.40
Window	Manufacturer	Window	Double glazed			0.60		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	South East	2.12	
Opening	Window	External Wall 1	North West	7.05	
Opening	Window	External Wall 1	North East	1.65	
Opening	Window	External Wall 1	South	4.41	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	3.65	1.00	1.00	No
E16 Corner (normal)	Table K1 - Default	11.01	0.18	0.18	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.67	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	7.50	1.00	1.00	Yes
E3 Sill	Table K1 - Default	6.49	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	15.80	0.10	0.10	Yes
E7 Party floor between dwellings (in blocks of flats)	Table K1 - Default	17.71	0.28	0.28	Yes
E18 Party wall between dwellings	Table K1 - Default	7.34	0.24	0.24	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	Yes	
Approved Installation	No	
Mechanical Ventilation data Type	Database	
Type	Mechanical extract ventilation - centralised	
MV Reference Number	500258	
Configuration	1	
Manufacturer SFP	0.65	
Duct Type	Rigid	
Wet Rooms	1	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	No	
22.0 Lighting		
No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	100393	
Fuel Type	Electricity	
In Winter	0.00	
In Summer	0.00	
Model Name	Fighter 470	

Summary for Input Data

elmhurst energy

Manufacturer	NIBE Energy Systems Ltd
System Type	Heat Pump
Controls SAP Code	2207
Is MHS Pumped	Pump in unheated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 None

26.0 Heat Networks None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Insulation Type	Measured Loss	
Cylinder Volume	170.00	L
Loss	1.56	kWh/day
In Airing Cupboard	No	

32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	No	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
1.03	Horizontal	Horizontal	None Or Little		No	1.00		

34.0 Small-scale Hydro None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Summary for Input Data

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Summary for Input Data

elmhurst energy

Property Reference	Grd_unit02	**Issued on Date**	17/10/2023
Assessment Reference	Grd_unit02_GREEN	**Prop Type Ref**	
Property			

SAP Rating	72 C	**DER**		**TER**	
Environmental	94 A	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.35	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Southwest
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Ground-floor flat
Which Floor	0
2.0 Number of Storeys	1
3.0 Date Built	2024
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	19.24 m	41.50 m²	3.67 m

8.0 Living Area 35.50 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	38.68	26.48	0.00	None	12.20	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	31.93	29.81	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	32.70		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	62.76

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete plank floor (screed laid on insulation), carpeted	30.00	41.50

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Exposed Floor - Solid	Lowest occupied	Other	0.10	None	0.00	0.00	41.50

12.0 Opening Types

Summary for Input Data

elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							1.40
Window	Manufacturer	Window	Double glazed			0.60		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	South West	2.12	
Opening	Window	External Wall 1	North East	5.28	
Opening	Window	External Wall 1	South East	6.92	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.67	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	7.96	1.00	1.00	Yes
E3 Sill	Table K1 - Default	6.95	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	21.90	0.10	0.10	Yes
E5 Ground floor (normal)	Table K1 - Default	19.24	0.32	0.32	Yes
E16 Corner (normal)	Table K1 - Default	3.67	0.18	0.18	No
E18 Party wall between dwellings	Table K1 - Default	7.34	0.24	0.24	Yes
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	2.72	1.00	1.00	No

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	Yes	
Approved Installation	No	
Mechanical Ventilation data Type	Database	
Type	Mechanical extract ventilation - centralised	
MV Reference Number	500258	
Configuration	1	
Manufacturer SFP	0.65	
Duct Type	Rigid	
Wet Rooms	1	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	No	
22.0 Lighting		
No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	100393	
Fuel Type	Electricity	
In Winter	0.00	
In Summer	0.00	
Model Name	Fighter 470	
Manufacturer	NIBE Energy Systems Ltd	

Summary for Input Data

elmhurst energy

System Type	Heat Pump
Controls SAP Code	2207
Is MHS Pumped	Pump in unheated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 None

26.0 Heat Networks None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Insulation Type	Measured Loss	
Cylinder Volume	170.00	L
Loss	1.56	kWh/day
In Airing Cupboard	No	

32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	No	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.66	Horizontal	Horizontal	None Or Little		No	1.00		

34.0 Small-scale Hydro None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact

Summary for Input Data

0	0
0	0
0	0

Summary for Input Data

elmhurst energy

Property Reference	3rd_unit03	**Issued on Date**	17/10/2023
Assessment Reference	3rd_unit03_GREEN	**Prop Type Ref**	
Property			

SAP Rating	82 B	**DER**		**TER**	
Environmental	96 A	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.31	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Christopher Armstrong	**Assessor ID**	P763-0001
Client			

SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	Northeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Top-floor flat
Which Floor	3
2.0 Number of Storeys	1
3.0 Date Built	2024
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	32.88 m	77.13 m²	3.26 m

8.0 Living Area 32.70 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	86.06	74.24	0.00	None	11.82	Enter Gross Area
Unheated Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	21.12	19.00	0.00	None	2.12	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	20.28		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	151.26

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	77.13	77.13	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)

Party Floor 1	Lowest occupied	Precast concrete plank floor (screed laid on insulation), carpeted		30.00	77.13

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor							1.40
Window	Manufacturer	Window	Double glazed			0.60		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Door	Unheated Wall	North East	2.12	
Opening	Window	External Wall 1	South West	1.76	
Opening	Window	External Wall 1	South East	1.60	
Opening	Window	External Wall 1	North West	8.46	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Table K1 - Default	5.49	1.00	1.00	No
E16 Corner (normal)	Table K1 - Default	9.78	0.18	0.18	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	3.26	0.00	0.00	No
E2 Other lintels (including other steel lintels)	Table K1 - Default	6.98	1.00	1.00	Yes
E3 Sill	Table K1 - Default	5.97	0.10	0.10	Yes
E4 Jamb	Table K1 - Default	18.80	0.10	0.10	Yes
E7 Party floor between dwellings (in blocks of flats)	Table K1 - Default	32.88	0.28	0.28	Yes
E14 Flat roof	Table K1 - Default	32.88	0.16	0.16	Yes
E18 Party wall between dwellings	Table K1 - Default	6.52	0.24	0.24	Yes

Y-value	0.00	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - centralised
MV Reference Number	500258
Configuration	1
Manufacturer SFP	0.65
Duct Type	Rigid
Wet Rooms	1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	100393	
Fuel Type	Electricity	
In Winter	0.00	

Summary for Input Data

In Summer	0.00
Model Name	Fighter 470
Manufacturer	NIBE Energy Systems Ltd
System Type	Heat Pump
Controls SAP Code	2207
Is MHS Pumped	Pump in unheated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2 None

26.0 Heat Networks None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1
Immersion Only Heating Hot Water	No

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Insulation Type	Measured Loss	
Cylinder Volume	170.00	L
Loss	1.56	kWh/day
In Airing Cupboard	No	

32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	No	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
1.23	Horizontal	Horizontal	None Or Little		No	1.00		

34.0 Small-scale Hydro None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Summary for Input Data

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0