

ENERGY STATEMENT

**Proposed development at:
Land to the rear of 13 Wolseley Road, London, N8 8RR**



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¹ Achieve Green and Energytest are trading names of Energytest (Commercial) Ltd, Company Registration No. 7013944

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1. Executive Summary

This Energy Statement has been prepared by Achieve Green in support of a full planning application for new-build development of a single 5-bedroom house at Land to the rear of 13 Wolseley Road, London, N8 8RR.

The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 software.

A base case has been developed, against which potential savings can be assessed. For this development the base case is the notional building developed for the Building Regulations (2021) assessment and is quantified in terms of CO₂ emissions as the Target Emission Rate (TER) for each dwelling.

This proposed development features improved insulation standards when compared against the compliance requirements of Approved Document L1 2021 of the Building Regulations. In addition, this proposed development will incorporate a mechanical and electrical specification that surpasses the requirements of Approved Document L1 2021. These combined energy efficiency measures lead to a reduction in CO₂ emissions equivalent to 13% of the baseline. This surpasses the target reduction of 10%, as required by the London Plan.

Having minimised energy consumption in the first instance, the efficient delivery of the remaining energy demands has been considered with reference to the heating and cooling hierarchy in the London Plan. Using the London Heat Map as reference it is evident this proposed development is neither within the coverage of an existing district heating network, nor is there an expectation that a district heating network will be developed at this site in the near future.

Due to its size, this development is not suitable for combined heat and power.

An assessment has been carried out to determine the potential for renewable energy systems to reduce CO₂ emissions further. There is potential for an air source heat pump to be installed to meet all of the dwelling's heating and Domestic Hot Water demand, and a solar photovoltaic system to be installed on the available roof area of the building, in order to meet the expectations of the planning policy. This development will seek to achieve a reduction in CO₂ emissions equivalent to 66% of the baseline through the installation of an air source heat pump and a 3.3 kWp PV system.

The total reduction in carbon emissions resulting from energy efficiency measures and the installation of renewable technology is 79% compared to the baseline. This surpasses the target reduction of 35%, as required by the London Plan.

The one-off cash in lieu contribution required to achieve a 100% reduction in regulated CO₂ emissions has been calculated to be £2,752.

2. Introduction

Energy use in buildings is a significant contributor to global CO₂ emissions and global warming. Designing energy efficient buildings and incorporating low and zero carbon energy generation is a vital part of ensuring this development incorporates sustainability as a core part of its design.

This report is produced in line with the requirements of the document “Energy Assessment Guidance - Greater London Authority guidance on preparing energy assessments as part of planning applications (June 2022)”.

The purpose of the report is to assist evaluating parties to understand the energy consumption and performance of the proposed development and consider its performance against the “lean, clean, green” performance standard.

This application seeks by its design to surpass the CO₂ emission target of the baseline by 35% of the regulated energy consumption.

2.1. Overview of the proposed development

The proposed development consists of one dwelling. By virtue of its size, the proposed development is not deemed to be a major development.

The proposed development is located in Couch End within the London borough of Haringey and within the Greater London area.

Proposed basement floor plan:



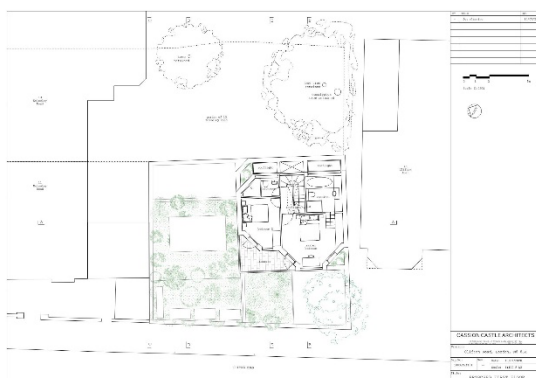
Proposed lower ground floor plan:



Proposed upper ground floor plan:



Proposed first floor plan:



3. Policies and Drivers

3.1. National and International Policy

The Climate Change Act (2008) sets a legally binding target for reducing UK carbon dioxide (CO₂) emissions to zero by 2050. It also provides for a Committee on Climate Change, which sets out carbon budgets binding on the Government for 5-year periods.

The National Planning Policy Framework (NPPF) 2021, reflects the requirements of the Climate Change Act 2008 in paragraphs 153 and 155 as follows:

“Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.”

“New development should be planned for in ways that:

- a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
- b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.”

“To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.”

3.2. Regional Policy: London Plan

The GLA London Plan requires new major developments to reduce their carbon emissions by 100% compared to Part L 2021 Building Regulations standard, with a minimum on-site target reduction of 35%, and an option for any shortfall to net-zero carbon to be offset through a carbon offset payment.

The London Plan is the overall strategic plan for London. It sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2041. It forms part of the development plan for Greater London. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

The key London Plan policies which are relevant to this energy strategy are summarised below:

- Policy SI 2 Minimising greenhouse gas emissions
- Policy SI 3 Energy infrastructure
- Policy SI 4 Managing heat risk

3.2.1. Policy SI 2 Minimising greenhouse gas emissions

Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- i. Be lean: use less energy and manage demand during operation.
- ii. Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
- iii. Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.
- iv. Be seen: monitor, verify and report on energy performance.

Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

A minimum on-site reduction of at least 35% beyond Building Regulations is required for major development. Residential development should achieve 10%, and non-residential development should achieve 15% through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

- 1) through a cash in lieu contribution to the borough's carbon offset fund, or

- 2) off-site provided that an alternative proposal is identified and delivery is certain.

3.2.2. Policy SI 3 Energy infrastructure

Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system:

- 1) the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
 - a) connect to local existing or planned heat networks
 - b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
 - c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
 - d) use ultra-low NOx gas boilers
- 2) CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of Policy SI 1 Improving air quality
- 3) where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.

3.2.3. Policy SI 4 Managing heat risk

This policy states that major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1. reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2. minimise internal heat generation through energy efficient design
3. manage the heat within the building through exposed internal thermal mass and high ceilings
4. provide passive ventilation
5. provide mechanical ventilation

6. provide active cooling systems.

3.2.4. Local Policy: Haringey Council

The London Plan is key to Haringey Council planning policy and should be considered with every planning application.

3.2.5. Project policy

Planning policy leads to an on-site target reduction equal to:

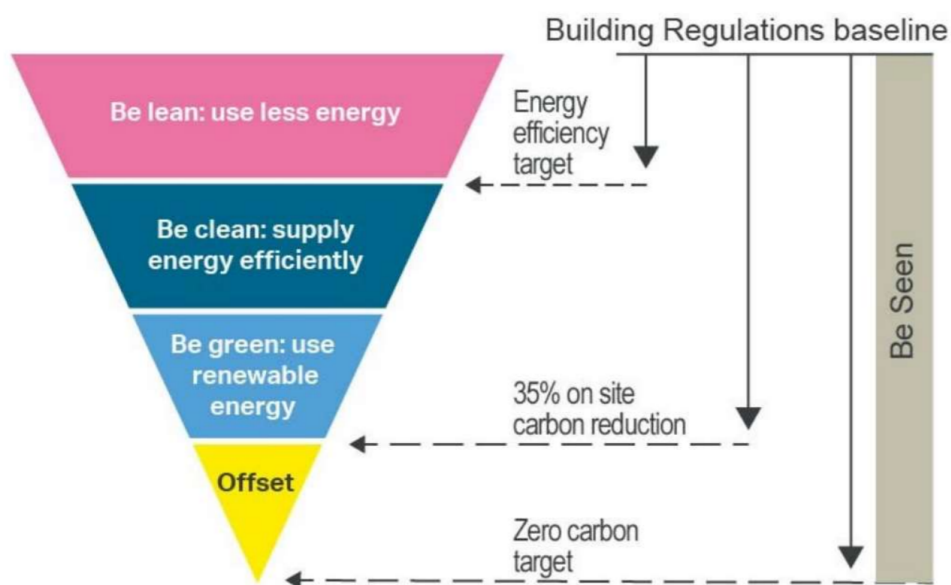
- 10% below those of a development compliant with Part L 2021 of the Building Regulations through energy efficiency measures alone ("Be Lean" stage); and
- 35% of the Regulated CO₂ emissions compared to the baseline through the application of the Energy Hierarchy.

Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall (including to net-zero carbon, where applicable) will be provided off-site or through a cash in lieu contribution to the relevant borough.

4. Energy hierarchy

In line with best practice the proposed energy strategy for this development will follow the principals of the energy hierarchy.

The energy hierarchy has three priorities, seeking to reduce energy use before meeting remaining demand by the cleanest means possible:



- 1) Be lean – use less energy: Optimise the building fabric, glazing, and structure to minimise energy consumption in the first instance by using low U-values and good air tightness, and ensure that active systems run as energy efficiently as possible.
- 2) Be clean – supply energy efficiently: Further reduce carbon emissions through the use of decentralised energy where feasible, such as combined heat and power (CHP).
- 3) Be green – use renewable energy: When the above design elements have been reasonably exhausted, supply energy through renewable sources where practical.

5. Establishing the baseline

For dwellings that are wholly new in construction, the baseline is the Target CO₂ Emission Rate (TER) from Approved Document L1.

The baseline calculations are based on buildings that are the same size and shape as the proposed buildings and have the same exposed facades.

6. Energy efficient design measures (“be lean”)

Enhancing the thermal performance of the building envelope helps to future-proof the structure and also yields the greatest CO₂ savings. Adding renewable technology will then yield maximum carbon reductions with lower long-term costs for the developer.

The proposed development will achieve compliance with Approved Document L1 of the Building Regulations (2021) without reliance on the contribution of renewable technology².

The following energy-efficient design measures are proposed:

	Proposed development	L1 2021 requirements
External wall U-value (W/m ² K)	0.18	0.26
Roof U-value (W/m ² K)	0.13	0.16
Ground floor U-value (W/m ² K)	0.10	0.18
Window U-value (W/m ² K)	1.20	1.60
Rooflights U-value (W/m ² K)	1.20	1.60
Air permeability	3.5 m ³ /h.m ²	8 m ³ /h.m ²
Thermal bridging	Y=0.06	Y=0.20

Having reduced energy demand through improvements to the fabric, this development shall seek to reduce energy consumption further through the specification of mechanical and

² Under Approved Document L1 2021, the notional dwelling specification that is used to calculate the TER includes on-site renewable generation from PV. For the purpose of estimating savings from “Be Lean” measures only, the DER calculation for this stage of the energy hierarchy includes PV savings matched to the notional dwelling.

electrical systems with efficiencies that surpass the requirements of Approved Document L1 2021:

	Proposed development	L1 2021 requirements
Lighting efficacy	80 lm/W	75 lm/W
Heating controls	Time and temperature zone controls	Programmer, thermostat and TRVs.
Mechanical Ventilation with heat recovery	SFP = 1.36 W/Ls ⁻¹ Efficiency = 87%	SFP < 1.5 W/Ls ⁻¹ Efficiency = 80%

7. Energy efficient systems (“be clean”)

7.1. Combined heat and power

Combined heat and power (CHP) systems use relatively cheap and clean fuels (such as natural gas) to generate heat and electricity on site. A typical CHP system uses combustion of natural gas to drive a turbine that produces electricity. The heat generated is captured and used to produce hot water.

As losses are minimised the carbon footprint of the energy generated is very low. However this is dependent on there being sufficient year-round local heat demand to fully utilise the heat generated by the CHP plant. An example would be developments of at least 500 dwellings, universities or hospitals.

Due to its size, this development is not suitable for combined heat and power.

7.2. District heating networks

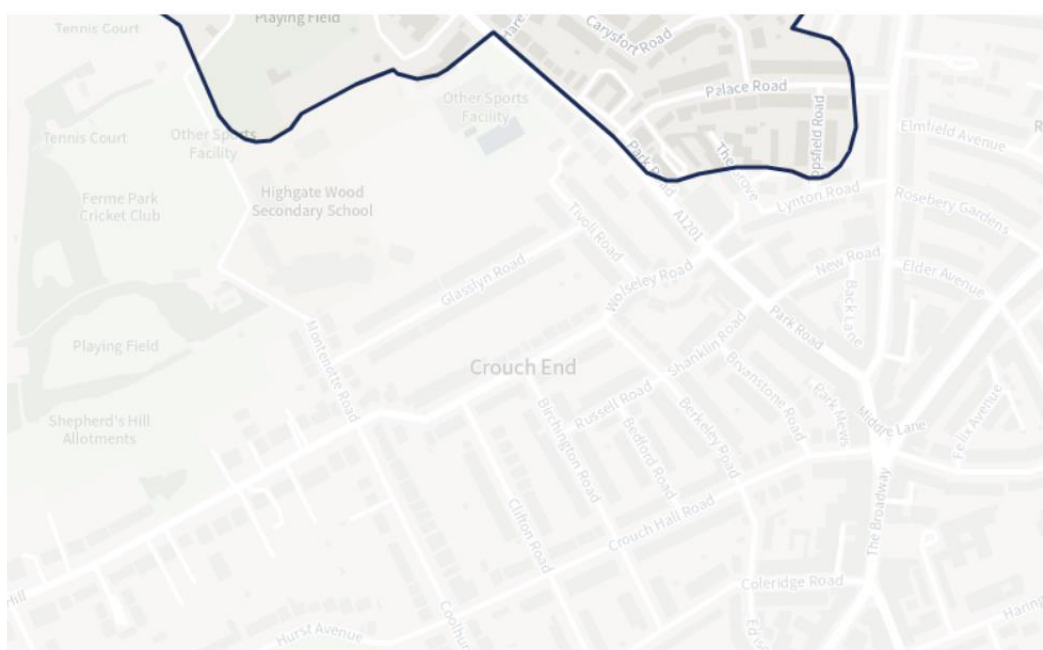
In a district heating network heat is supplied from one or more central energy centres to multiple buildings within the network. Supply to multiple buildings guarantees high year-round local heat demand which in turn allows the use of low carbon technologies within the energy centre, such as combined heat and power systems. Large plant and aggregated demand allows systems within the energy centre to run more efficiently.

Hot water is distributed within the network via highly insulated pipes. To connect to the network individual boilers are replaced with separately metered heat exchangers.

London Plan Policy 5.6 requires new developments to connect to an existing district heating network if one is available. Where there is no existing network, but potential for a future network has been identified, major developments should incorporate the infrastructure required to connect to the network. This may include installing centralised heating plant connected to individual heat exchangers within each dwelling.

Having reviewed the London Heat Map it is evident this proposed development is neither within the coverage of an existing district heating network, nor is it within the coverage of a proposed future district heating network. Connection to a district heating network in the short term is therefore not feasible.

London Heat Map showing existing and proposed district heating networks, energy centres, proposed transmission routes and the Heat Network Priority Area:



Due to its size and location, this development is not suitable for district heating.

8. Low and zero carbon energy sources ("*be green*")

8.1. Photovoltaics

Solar photovoltaics (PV) capture the sun's energy using photovoltaic cells. The cells convert sunlight into electricity, which can be utilised on site or transferred into the National Grid. PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on a roof.

The power of a PV cell is measured in kilowatts peak (kWp). This is the rate at which the cell generates energy at peak performance in full direct sunlight.

Photovoltaics offer high CO₂ savings, are simple to install and suitable for most buildings. The only limiting factor for PV is the availability of suitable roof space.

8.2. Heat Pumps

Heat pumps collect low temperature heat from renewable sources (such as the air or ground) and concentrate the heat to a usable temperature via a reverse refrigeration cycle. Useable heat is transferred to the dwelling via a heat exchanger and can be used for low temperature central heating and domestic hot water, though an immersion top-up may be required for DHW.

Heat pumps have some impact on the environment as they generally use grid supplied electricity to run the pumps. It is common for heat pumps to have a coefficient of performance of three, meaning that for every 1kWh of electricity used, over 3kWh of heat can be generated. The renewable component of the output is therefore taken as the difference between the output energy and the input energy, in this scenario the heat pump will be deemed to have delivered 2kWh of renewable energy.

Ground source heat pumps require external horizontal ground loops, or as is more likely in built-up environments, vertical loops fed into bore holes. The application of ground source heat pumps is therefore constrained by site ground conditions and available space.

Air source heat pumps have a slightly lower seasonal efficiency than ground source heat pumps, but require less space. Noise and space considerations should be assessed when determining an appropriate site for external condensing units.

8.3. Solar thermal

Solar thermal systems, use free heat from the sun to warm domestic hot water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable.

Solar thermal systems are most appropriate for buildings with high year-round domestic hot water demand.

Although a typical solar thermal system will be able to meet half the annual domestic hot water demand for a dwelling, many will use electricity to run pumps within the system.

8.4. Wind turbines

Wind turbines use blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized wind turbine: Pole mounted and building mounted. Pole mounted turbines are free standing and are erected in a suitably exposed position, and are often about 5kW to 6kW in size. Building mounted turbines are smaller and can be installed on the

roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Large scale turbines, in exposed locations offer one of the best financial returns of all renewable energy systems as the payback of the system increases dramatically with the size of the turbine. However small-scale systems offer much lower levels of performance and recent studies have questioned the viability and output from such systems, particularly in urban environments.

8.5. Biomass

Biomass heating systems, burn wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. The carbon dioxide emitted when wood is burned is the same amount that was absorbed over the months and years that the plant was growing. The process is sustainable as long as new plants continue to grow in place of those used for fuel. There are some carbon emissions caused by the cultivation, manufacture and transportation of the fuel, but as long as the fuel is sourced locally, these are much lower than the emissions from fossil fuels.

When specifying biomass heating systems is important to consider the potential technical issues surrounding delivery and storage of fuel.

Although the CO₂ savings from biomass are substantial, the high levels of NO_x emissions can make biomass systems unsuitable for urban environments.

8.6. Proposed low and zero carbon energy sources

With carbon emissions within the building already reduced through an enhanced fabric and energy efficient systems, it is proposed that a further reduction will be achieved through the installation of an **air source heat pump** to serve all of the heating and Domestic Hot Water requirements and the installation of **photovoltaic arrays totalling 3.3 kWp**.

Roof plan showing photovoltaic installations:



9. Results: Calculated CO₂ savings

9.1. Regulated CO₂ savings

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	4.6	

After energy demand reduction (be lean)	4.0	
After heat network connection (be clean)	4.0	
After renewable energy (be green)	1.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.6	13%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	3.0	66%
Cumulative on site savings	3.6	79%
Annual savings from off-set payment	1.0	-
	(Tonnes CO₂)	
Cumulative savings for off-set payment	29	-

Cash in-lieu contribution (£)	2,752	
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*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

10. 'Zero-carbon' homes

For all domestic developments submitted to Planning after 1 October 2016 within the London Borough of Haringey, any remaining regulated carbon dioxide emissions, to 100 per cent, are to be off-set through a one-off cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere (in line with policy 5.2E). The carbon off-set price for the London Borough of Haringey is currently £95 per tonne of carbon dioxide for a period of 30 years.

The one-off cash in lieu contribution required to achieve a 100% reduction in regulated CO₂ emissions has been calculated to be £2,752.

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11. Appendix A: BREL Report

12. Appendix B:

part_I_2021_gla_carbon_emission_reporting_spreadsheet_v1.2_beta.xls

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Wed 08 Mar 2023 09:08:18

Project Information			
Assessed By	Harry Davey	Building Type	House, End-terrace
OCDEA Registration	EES/020345	Assessment Date	2023-03-08

Dwelling Details			
Assessment Type	As designed	Total Floor Area	383 m ²
Site Reference	6168	Plot Reference	Green
Address	13 Rear of Wolseley Road, N8 8RR		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	12.05 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	2.87 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	64.1 kWh _{PE} /m ²		
Dwelling primary energy	31.84 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	52.0 kWh/m ²		
Dwelling fabric energy efficiency	49.8 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.1	Heatloss Floor 1 (0.1)	OK
Roofs	0.16	0.13	Roof (1) (0.13)	OK
Windows, doors, and roof windows	1.6	1.2	Opening (1.2)	OK
Rooflights	2.2	1.2	Opening, West (1.2)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Walls (1)	141.082	0.18	
Exposed wall: Walls (2)	241.332	0.18	
Party wall: Party Wall (1)	11.57	0 (!)	
Basement floor: Heatloss Floor 1, Heatloss Floor 1	177.22	0.1 (!)	
Exposed roof: Roof (1)	151.301	0.13	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, Window	8.784	South	0.7	1.2
Opening, Window	2.064	East	0.7	1.2
Opening, Window	4.8	East	0.7	1.2
Opening, Window	4.8	East	0.7	1.2
Opening, Window	1.92	East	0.7	1.2
Opening, Window	5.88	East	0.7	1.2
Opening, Window	7.608	East	0.7	1.2
Opening, Window	1.92	East	0.7	1.2
Opening, Window	4.08	East	0.7	1.2
Opening, Window	15.36	West	0.7	1.2
Opening, Window	1.44	West	0.7	1.2
Opening, Window	1.44	West	0.7	1.2

Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, Window	6.12	North	0.7	1.2
Opening, Window	2.16	North East	0.7	1.2
Opening, Window	2.16	North East	0.7	1.2
Opening, Window	2.16	South East	0.7	1.2
Opening, rooflight	11.481	West	0.7	1.2
Opening, rooflight	1.2	West	0.7	1.2
Opening, rooflight	1.288	West	0.7	1.2
Opening, rooflight	1.615	West	0.7	1.2
Opening, rooflight	1.615	West	0.7	1.2
Opening, rooflight	2.52	West	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))

Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.05	
External wall	E3: Sill	Calculated by person with suitable expertise	0.05	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.05	
Roof	R11: Upstands or kerbs of rooflights	SAP table default	0.24	
External wall	E22: Basement floor	Calculated by person with suitable expertise	0.07	
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0 (!)	
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.24	
External wall	E13: Gable (insulation at rafter level)	Calculated by person with suitable expertise	0.06	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.07	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.09	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.09	
External wall	E25: Staggered party wall between dwellings	Calculated by person with suitable expertise	0.06	
Party wall	P4: Roof (insulation at ceiling level)	SAP table default	0.48	
Party wall	P8: Exposed floor (inverted)	SAP table default	0.48	
Roof	R6: Flat ceiling	SAP table default	0.12	
Roof	R7: Flat ceiling (inverted)	SAP table default	0.12	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))

Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	3.5 m ³ /hm ² , Design value (!)	OK
Air permeability test certificate reference		

4 Space heating

Main heating system 1: Heat pump with radiators or underfloor heating - Electricity

Efficiency	305.7%
Emitter type	Both radiators and underfloor
Flow temperature	45°C
System type	Heat Pump
Manufacturer	Mitsubishi Electric Europe B.V.
Model	Ecodan 8.5 kW
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water		
Cylinder/store - type: Cylinder		
Capacity	250 litres	
Declared heat loss	2.1 kWh/day	
Primary pipework insulated	Yes	
Manufacturer		
Model		
Commissioning		
Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		
6 Controls		
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: Cylinder thermostat		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	80 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	1.5 W/(l/s)	
Specific fan power	1.36 W/(l/s)	OK
Minimum permitted heat recovery efficiency	73%	
Heat recovery efficiency	87%	OK
Manufacturer/Model	MRXBOXAB-ECO3	
Commissioning		
9 Local generation		
Technology type: Photovoltaic system (1)		
Peak power	3.3 kWp	
Orientation	Horizontal	
Pitch	Horizontal	
Overshading	None or very little	
Manufacturer		
MCS certificate		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	

b. Client Declaration
N/A

The applicant should complete all the light blue cells including information on the modelled units, the area per unit, the number of units, the baseline energy consumption figures, the TER and the TFE.

RESIDENTIAL ENERGY CONSUMPTION AND CO₂ ANALYSIS (PART L1)

Unit identifier (e.g. plot number, dwelling type etc.)	Total area represented by model (m²)			VALIDATION CHECK		REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - SAP TER WORKSHEET																	REGULATED CO ₂ EMISSIONS PER UNIT (kgCO ₂ p.a.)										Fabric Energy Efficiency (FEE)	
				Calculated TER (kgCO ₂ / m²)	TER Worksheet TER (kgCO ₂ / m²)	Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Space Heating (Heat source 2)	Fuel type Space Heating	Domestic Hot Water (Heat source 2)	Fuel type Domestic Hot Water	Space and Domestic Hot Water from CHP	Fuel type CHP	Total Electricity generated by CHP (-)	Fuel factors for electricity generated by CHP	Secondary Heating system	Fuel type Secondary Heating	Electricity generated by renewable (-)	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP	Electricity generated by CHP	Lighting	Auxiliary	Cooling	Electricity generated by renewable technology (-)	Part L 2021 CO ₂ emissions (kgCO ₂ p.a.)	Target Fabric Energy Efficiency (TFEE) (kWh/m²)	
TER Worksheet (Row 4)			TER Worksheet (Row 273)		TER Sheet [Row 307b + (Row 307b x 0.01)] OR Row 211	Select fuel type	TER Sheet [Row 310b + (Row 307b x 0.01)] OR Row 219	Select fuel type	TER Sheet [Row 307c + (Row 307c x 0.01)]	Select fuel type	TER Sheet [Row 310c + (Row 307c x 0.01)]	Select fuel type	TER Sheet [(Row 307a + 310a) x (Row 361 + 362)]	Select fuel type	TER Sheet Row 309	Select fuel type	TER Sheet Row 333	TER Sheet Row 332 OR Row 232	TER Sheet (Row 313 + 331) OR Row 231	N/A														
383.34	1	383.34	12.0	12.1	19759.8564	Natural Gas	3241.1544	Natural Gas									-2224.732	442.688	86		4,150	681			60	12		-303	4,600					
Sum	1	383	12.0	-	19,760	N/A	3,241	N/A	0	N/A	0	N/A	0	0	0	N/A	-2,225	443	86	0	4,150	681	0	0	60	12	0	-303	4,600	0.00				

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SITE-WIDE ENERGY CONSUMPTION AND CO ₂ ANALYSIS									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370
371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410
411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	42	

Total Area (m²)	Calculated TER (kgCO ₂ / m²)	-	REGULATED ENERGY CONSUMPTION																REGULATED CO ₂ EMISSIONS			
			Space Heating (kWh p.a.)	N/A	Domestic Hot Water (kWh p.a.)	N/A	Space Heating (Heat source 2) (kWh p.a.)	N/A	Domestic Hot Water (Heat source 2) (kWh p.a.)	N/A	Space and Domestic Hot Water from CHP (kWh p.a.)	N/A	Electricity generated by CHP (kWh p.a.) <i>If applicable</i>	Secondary Heating system (kWh p.a.)	N/A	Electricity generated by renewable (kWh p.a.) <i>If applicable</i>	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)	Part L 2021 CO ₂ emissions (kgCO ₂ p.a.)		
Sum	383	12.0	-	19,760		3,241		0		0		0	0		-2,225	443	86	0		4,600		

The applicant should complete all the light blue cells including information on the 'be lean' energy consumption figures, the 'be lean' DER, the DFEE and the regulated energy demand of the 'be lean' scenario.

RESIDENTIAL ENERGY CONSUMPTION AND CO ₂ ANALYSIS (PART L1)																																	
Unit identifier (e.g. plot number, dwelling type etc.) Model total floor area (m²) Number of units Total area represented by model (m²)				VALIDATION CHECK		REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE LEAN' SAP DER WORKSHEET															REGULATED CO ₂ EMISSIONS PER UNIT (kgCO ₂ p.a.)										Fabric Energy Efficiency (FEE)		
				Calculated DER (kgCO ₂ / m²)	DER Worksheet DER (kgCO ₂ / m²)	Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Space Heating (Heat source 2)	Fuel type Space Heating	Domestic Hot Water (Heat source 2)	Fuel type Domestic Hot Water	Space and Domestic Hot Water from CHP	Fuel type CHP	Total Electricity generated by CHP (-)	Fuel factors for electricity generated by CHP	Secondary Heating system	Fuel type Secondary Heating		Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP	Electricity generated by CHP	Lighting	Auxiliary	Cooling	Electricity generated by renewable technology (notional building)	Part L 2021 CO ₂ emissions (kgCO ₂ p.a.)	Dwelling Fabric Energy Efficiency (DFEE) (kWh/m²)
				DER Sheet (Row 384)		DER Sheet (Row 307b + (Row 367b x 0.01))	Select fuel type	DER Sheet (Row 310b + (Row 367b x 0.01))	Select fuel type	If applicable DER Sheet (Row 307c + (Row 367c x 0.01))	Select fuel type	If applicable DER Sheet (Row 310c + (Row 367c x 0.01))	Select fuel type	If applicable DER Sheet [(Row 307a + 310a) + (Row 362 x 0.01)]	Select fuel type	If applicable DER Sheet [(Row 307a + 310a) x (Row 361 + 362)]	Select fuel type	DER Sheet Row 309	Select fuel type		DER Sheet Row 332	DER Sheet (Row 313 + 331)	DER Sheet Row 315		If applicable	If applicable							
383.341383.34				11.2	11.2	14181.2657Natural Gas		4140.9973Natural Gas													543.92612749.7612			2,978870		74374		-302.563552	3,993				
Sum1383				11.2-		14,181N/A		4,141N/A		0N/A		0N/A		00	00	0N/A					5442,7500			2,978870		00	74374		0-303	3,993	0.00		

NON-RESIDENTIAL ENERGY CONSUMPTION AND CO₂ ANALYSIS (PART L2)

Building Use Model Area (m²) Number of units			VALIDATION CHECK		REGULATED ENERGY CONSUMPTION BY END USE (kWh/m² p.a.) 'BE LEAN' BER - SOURCE: 'SIM.CSV FILE										REGULATED CO₂ EMISSIONS BY FUEL TYPE (kgCO₂/m² p.a.) - BER BRUKL - SOURCE: 'SIM.CSV FILE										Part L 2021 CO₂ emissions (kgCO₂ p.a.)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
			Calculated BER (kgCO₂ / m²)	BRUKL BER (kgCO₂ / m²)	Space Heating (kWh/m² p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m² p.a.)	Fuel type Domestic Hot Water	Lighting (kWh/m² p.a.)	Auxiliary (kWh/m² p.a.)	Cooling (kWh/m² p.a.)	Natural Gas	Grid Electricity	Bespoke DH Factor	Enter Carbon Factor 1	Enter Carbon Factor 2	Enter Carbon Factor 3	Electricity generated by renewable technology (notional building)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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RESIDENTIAL ENERGY CONSUMPTION AND CO₂ ANALYSIS (PART L1)

NON-RESIDENTIAL ENERGY CONSUMPTION AND CO₂ ANALYSIS (PART L2)

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SITE-WIDE ENERGY CONSUMPTION AND CO ₂ ANALYSIS									
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RESIDENTIAL ENERGY CONSUMPTION AND CO₂ ANALYSIS (PART L1)[illegible][illegible]

Part L 2021 Performance

ResidentialNon-residential

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	4.6	
After energy demand reduction (be lean)	4.0	
After heat network connection (be clean)	4.0	
After renewable energy (be green)	1.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.6	13%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	3.0	66%
Cumulative on site savings	3.6	79%
Annual savings from off-set payment	1.0	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	29	-
Cash in-lieu contribution (£)	2,752	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Total Cumulative Savings	0.0	0%
Annual savings from off-set payment	0.0	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	0	-
Cash in-lieu contribution (£)	0	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SITE-WIDE

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	4.6		
Be lean	4.0	0.6	13%
Be clean	4.0	0.0	0%
Be green	1.0	3.0	66%
Total Savings	-	3.6	79%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	29.0	-

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	0.00	0.00	

	Area weighted non-residential cooling demand (MJ/m²)	Total area weighted non-residential cooling demand (MJ/year)
Actual		
Notional		

EUI & space heating demand (predicted energy use)

Building type	EUI (kWh/m²/year) (excluding renewable energy)	Space heating demand (kWh/m²/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m²/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m²/ye ar) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)
Residential						