FHP | Energy and Sustainability Statement

July 2024

PARTICULARS

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1 EXECUTIVE SUMMARY

The London Plan approach of "Be lean" – "Be clean" – "Be green" is fully adopted by implementing:

- Passive measures (low U-values, air permeability, thermal bridging)
- High efficiency services, i.e., high efficiency ventilation, high efficiency lighting
- Renewable sources: Air source heat pumps

Excluded renewable sources are:

- Solar hot water
- Biomass
- Wind turbines
- Solar PV

The proposed development will achieve:

- 45% overall regulated CO2 reduction against 2021 Part L compliant baseline
- 19% regulated CO2 reduction by renewable sources
- 26% regulated CO2 reduction by efficiency measures ("Be Lean" stage of the energy hierarchy)

1.1 About the Energy Statement

FHP ESS have been appointed to provide an Energy Statement for the proposed development.

This statement covers possible active and passive measures including renewable energy sources to make this development sustainable and environmentally friendly.

Specific requirements of London Plan on Energy Efficiency and Renewable Energy will be met through a combination of passive design features, energy efficient building services and renewable energy sources. This is to comply fully with the London Plan Policies and ensure they are following the "Energy Hierarchy".

Baseline and all estimated energy consumptions have been calculated using a SAP 10.2 of all residential units and SBEM v6.1 assessment of proposed non-residential spaces in accordance with Part L procedures.

The tables below show a summary of energy requirements for baseline scheme and reduction proposed to be achieved by passive measures, efficient services and on-site renewable energy sources.

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	6.6	2.0
After energy demand reduction (be lean)	5.3	2.0
After renewable energy (be green)	1.6	2.0

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	1.3	19.9%
Be green: savings from renewable energy	3.7	56%
Cumulative on site savings	**5.0**	**76%**

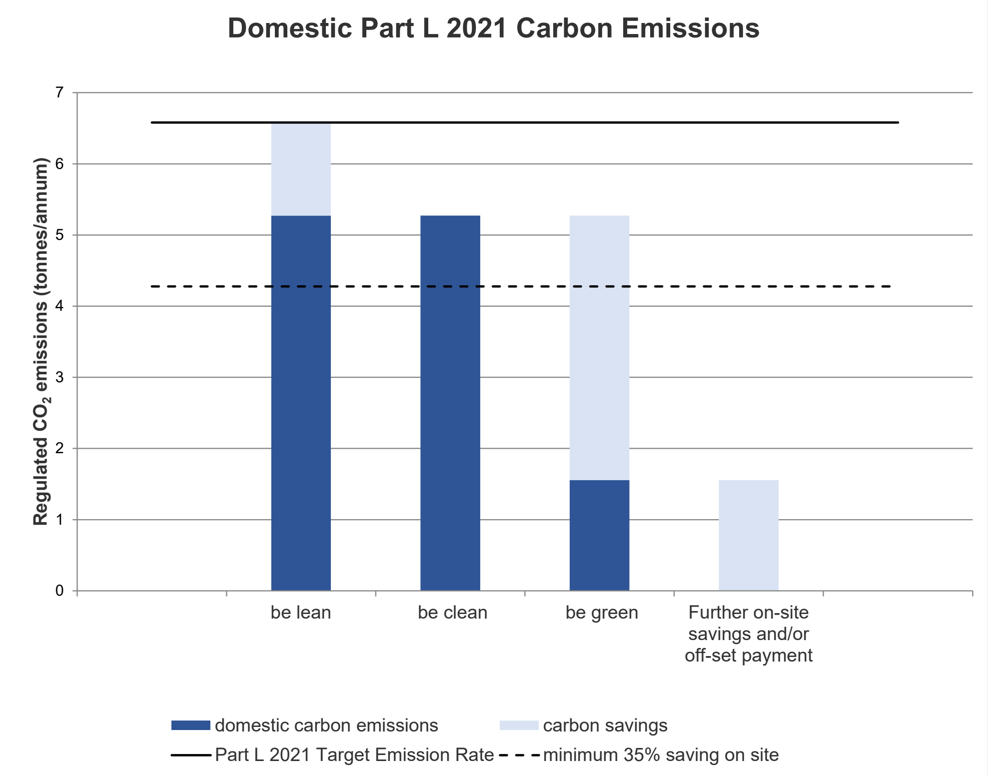
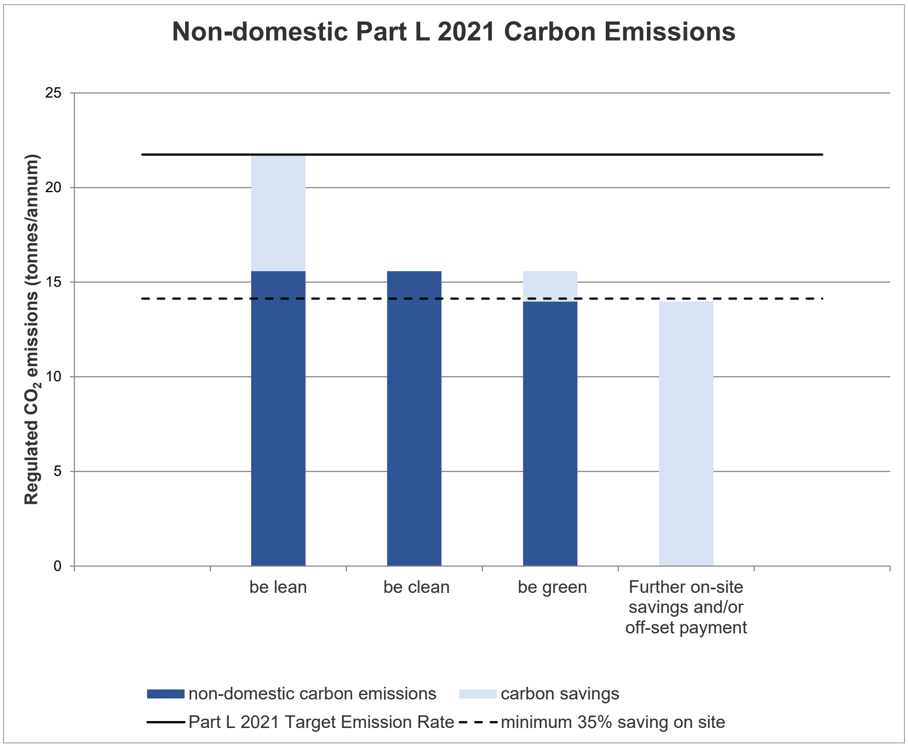


Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	21.7	2.4
After energy demand reduction (be lean)	15.6	2.4
After renewable energy (be green)	14.0	2.4

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	6.2	28%
Be green: savings from renewable energy	1.6	7%
Total Cumulative Savings	**7.8**	**36%**



SITE-WIDE

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2021 baseline	28.3		
Be lean	20.9	7.5	26%
Be green	15.5	5.3	19%
Total Savings	-	12.8	45%

SAP and SBEM results summary of the proposed development

RESIDENTIAL CO_2 ANALYSIS (PART L1)															
		Baseline		'Be Lean'	'Be Clean'	'Be Green'	Fabric Energy Efficiency (FEE)		Baseline		'Be Lean'			'Be Green'	
Unit identifier (e.g. plot number, dwelling	Model total floor area	TER	Energy saving/generation technologies (-)	DER	DER	DER	Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	Part L 2021 CO_2 emissions	Energy saving/generation technologies	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO_2 emissions	'Be Green' savings
	(m^2)	($kgCO_2$ / m^2)	($kgCO_2$ p.a.)	($kgCO_2$ / m^2)	($kgCO_2$ / m^2)	($kgCO_2$ / m^2)	(kWh/m²)	(kWh/m²)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)
FLAT 01	112	17.05	0.00	12.18	12.18	3.14	51.94	37.85	1,910	0	1,364	1,364	545	352	1,012
FLAT 02	89	19.85	0.00	15.00	15.00	3.75	57.34	43.75	1,767	0	1,335	1,335	432	334	1,001
FLAT 03	75	10.44	-239.86	12.41	12.41	3.00	31.26	30.46	783	-240	931	691	92	225	466
FLAT 04	77	11.07	-246.26	13.05	13.05	3.21	34.69	33.50	852	-246	1,005	759	94	247	511
FLAT 05	125	10.15	-399.56	12.20	12.20	3.19	41.13	40.57	1,269	-400	1,525	1,125	143	399	727
Sum		13.8	0.0	12.9	12.9	3.3	44.1	37.8	6,580	-886	6,160	5,274	1,306	1,556	3,718
NON-RESIDENTIAL CO_2 ANALYSIS (PART L2)															
		Baseline		'Be Lean'	'Be Clean'	'Be Green'			Baseline		'Be Lean'			'Be Green'	
Building Use	Model Area	BRUKL TER	BRUKL Displaced electricity (-)	BRUKL BER	BRUKL BER	BRUKL BER			Part L 2021 CO_2 emissions	Energy saving/generation technologies	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO_2 emissions	'Be Green' savings
	(m^2)	($kgCO_2$ / m^2)	(kWh / m^2)	($kgCO_2$ / m^2)	($kgCO_2$ / m^2)	($kgCO_2$ / m^2)			($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)
Offices	475.68	45.70	0.00	32.75	32.75	29.39			21,739	0.00	15,579.19	15,579	6,160	13,978	1,601
Sum		45.7	0.0	32.8	32.8	29.4			21,739	0	15,579	15,579	6,160	13,978	1,601
SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS															
Total Sum		-	-	-	-	-			28,320	-886	21,739	20,853	7,466	15,534	5,319

Table 5: SAP and SBEM calculation specification for each stage of the energy hierarchy

Specification	Notional Baseline	Efficient Baseline (Be Lean)	Proposed Development (Be Green)
Newly constructed External Wall U-value (W/m2K) (including walls separating flats from unheated communal areas)	0.18	0.18	
Upgraded existing external wall U-value (W/m2K)	0.30	0.30	
Upgraded roof (terrace) above 3rd floor U-value	0.16	0.11	
New Roof U-value (W/m2K)	0.11	0.11	
Windows U-value - commercial (W/m2K)	1.6	1.3	
Windows U-value - residential existing (W/m2K)	1.4	1.2	
Windows U-value - residential new (W/m2K)	1.2	1.2	
Entrance doors to flats	1.0	1.0	
Air Permeability Flats 1-2 (m3/h.m2)	15 (default)	5 (air tightness tests to be carried out on completion)	
Air Permeability Flats 3-5 (m3/h.m2)	5	3 (air tightness tests to be carried out on completion)	
Air Permeability Offices (m3/h.m2)	25 (default)	7 (air tightness tests to be carried out on completion)	
Thermal bridging - new build flats 3-5	y-value 0.05 W/m2K	y-value 0.05 W/m2K Detailed thermal bridging calculations will be required at detailed design stage	
Space Heating System - Flats	Gas combi boiler, 89.5% SEDBUK 2009 efficiency, underfloor heating, time and temperature zone control, delayed start thermostat	Gas combi boiler, 89.5% SEDBUK 2009 efficiency, underfloor heating, time and temperature zone control, delayed start thermostat	Individual ASHP's DAIKIN EDLA06EV3 or equivalent, underfloor heating or low temperature radiators with 45°C flow temperature, time and temperature zone control, weather compensator
Hot water system - Flats	Gas combi boiler, 89.5% SEDBUK 2009 efficiency	Gas combi boiler, 89.5% SEDBUK 2009 efficiency	Indirect cylinder DAIKIN EKHWS 200(U)D3V3 or equivalent; showers flow rate 8 l/min
Ventilation System - Flats	Natural ventilation with intermittent mechanical extracts	MVHR Nuaire MRXBOXAB-Eco3 or equivalent approved by SAP assessor; Supply and extract duct to and from exterior has to be insulated with 25mm insulation if less than 2m long or 50mm thickness for ducts over 2m long; rigid duct	
Lighting - Flats	Lighting power 2.3 W/m2; Efficacy of all fixed lighting = 80 lm/W	Lighting power 2.3 W/m2; Efficacy of all fixed lighting = 80 lm/W	
Space Heating and cooling system - Offices	ASHP VRF system with heating SCoP of 2.5, cooling SEER 5.0	ASHP VRF system with heating SCoP of 2.64, cooling SEER 6.0	ASHP VRF system with heating SCoP of 4.0, cooling SEER 6.0
Hot water system - Offices	Instantenous electric water heaters		
Ventilation System - Offices	Natural ventilation	Natural ventilation	
Lighting - Offices	Average efficacy 95 lm/W, occupancy sensors	Average efficacy 120 lm/W, occupancy sensors, photoelectric control, metering of electricity for lighting with 'out of range' alarm	
% Improvement in CO2 over Building regulations compliant baseline	**0.0%**	**26.4%**	**45%**

2 INTRODUCTION

2.1 Background

FHP ESS have been appointed to provide an Energy Statement for the proposed development.

This statement covers possible active and passive measures including renewable energy sources to make this development sustainable and environmentally friendly.

2.2 Description of the Site

The proposal comprises refurbishment and extension of existing 4-storey office building at 2-6 Camden High Street. The proposal will result in

- 2 No office spaces on the 1st and 2nd floor
- 2 No apartments on the 3rd floor formed partially by change of use of existing office space and by extension
- 3 No apartments in newly constructed rooftop extension on the 4th and 5th floor

3 PLANNING FRAMEWORK

3.1 National Policy

DCLG sets out basis for local policies in section 14 of National Planning Policy Framework. It requires new development to be planned in ways that can help to reduce greenhouse gas emissions, such as through its location, orientation and design. To help increase the use and supply of renewable and low carbon energy and heat, plans are encouraged to:

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
c) 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 The new London Plan

The London Plan is the name given to the Mayor's spatial development strategy. The current version of London Plan was adopted in March 2021. The aim is to develop London as an exemplary sustainable world city, based on three interwoven themes.

- Strong, diverse long term economic growth
- Social inclusivity to give all Londoners the opportunity to share in London's future success
- Fundamental improvements in London's environment and use of resources.

This energy statement is prepared in line with the New London Plan and the latest GLA Energy Assessment Guidance 2022

Specific requirements on development sustainability are set out in the following policies:

3.3 Policy SI 2 Minimising CO2 emissions

A. Major development should be net zero-carbon.151 This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

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

B. 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.

C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations 152 is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent 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.

D. Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

3.4 Policy SI 3 D – Energy Infrastructure

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

A. the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:

1) connect to local existing or planned heat networks
2) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
3) 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)
4) use ultra-low NOx gas boilers

B. 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

C. 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.

3.5 Policy SI 4 – Managing Heat Risk

A. Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B. 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.

4 OVERHEATING ASSESSMENT

Overheating assessment for newly constructed flats 3-5 has been carried out to check compliance with CIBSE TM59 and building regulations Part O overheating criteria.

The proposed dwellings comply with CIBSE TM59 (Part O) criteria under DSY1 weather data set, with natural ventilation through openable windows.

4.1 Inputs

The building fabric parameters applied are as follows and are in line with the SAP calculation and energy statement presented in Table 5

Building Elements	U Values	Thermal mass
Flat roof	0.11 W/m²K	Timber roof construction
Pitched roof	0.11 W/m²K	Timber roof construction
Newly constructed external walls	0.18 W/m²K	Lightweight framed walls
Internal walls	N/A	Lightweight partitions
Internal floors	N/A	Lightweight timber joist or steel joist floor
Windows and glazed doors	1.2 W/m²K	N/A
Glazing g-value	0.63	N/A
Infiltration rate	0.5 AC/hr	N/A

Natural ventilation through openable openings is included in the model,

Lighting: 2 W/m2 (6pm – 11pm)

Window blinds are not included in the model (in line with BR Part O)

Weather data set used for the simulation is CIBSE DSY1 (design summer year) London Weather Centre for the 2020s, high emissions, 50% percentile scenario

Occupancy density equipment gains and schedules are modelled as per CIBSE TM59 guidance:

Unit/ room type	Occupancy	Equipment load
Studio	2 people at all times	Peak load of 450 W from 6 pm to 8 pm*. 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room/kitchen	1 person from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room	1 person at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
1-bedroom apartment: kitchen	1 person at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: living room	2 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
2-bedroom apartment: kitchen	2 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room	3 people at 5% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
3-bedroom apartment: kitchen	3 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm base load of 50 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm 1 person at full gain in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single bedroom (too small to accommodate double bed)	1 person at 70% gains from 11 pm to 8 am 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours
Communal corridors	Assumed to be zero	Pipework heat loss only; see section 3.1 above

* All times in GMT

4.2 Method

Compliance is based on passing both of the following criteria:

Criterion 4.2a: Hours of Exceedence (He):

For living rooms, kitchens and bedrooms:

Same as CIBSE TM52 Criterion 1. The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1 K or more during the occupied hours of a typical non-heating season (1 May to 30 September).

The number of hours (He) during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours.

Criterion 4.2b:

For bedrooms only:

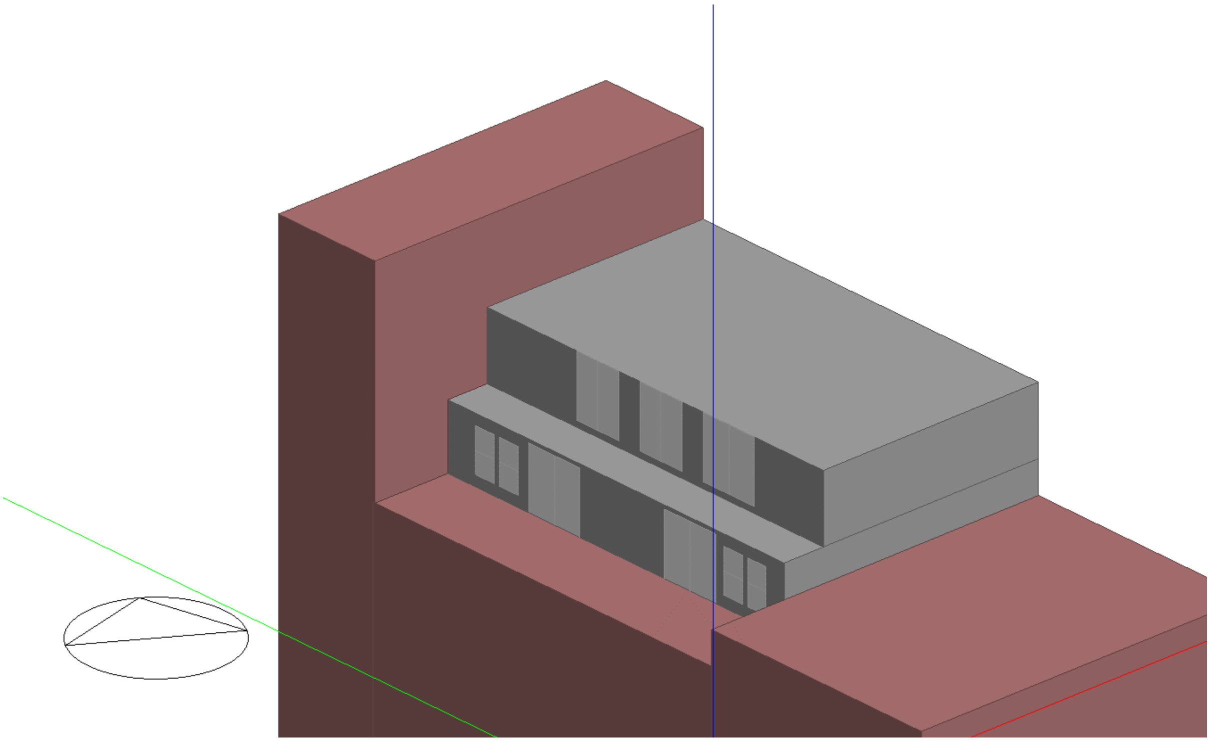
to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

The Design Summer Years (DSY1) weather dataset represents a set of weather conditions that are specifically designed to simulate the hottest and most extreme summer conditions that a building might experience. This dataset is used to assess the risk of overheating in buildings during peak hot weather periods. It provides hourly weather data for a chosen location, focusing on a design summer year that reflects the conditions that buildings need to be prepared for to ensure occupant comfort and well-being.

The DSY1 weather data takes into account factors like high outdoor temperatures, solar radiation, and other relevant parameters that contribute to overheating. This data is used in dynamic thermal simulation software to model how a building responds to these extreme summer conditions and how its design features, insulation, glazing, ventilation systems, and other elements interact to influence indoor temperatures.

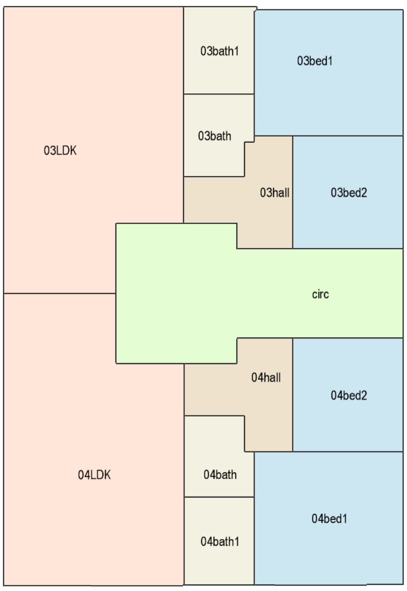
The dynamic thermal simulation has been carried out using DesignBuilder software with EnergyPlus v8.9 engine.

Axonometric View of the modelled building

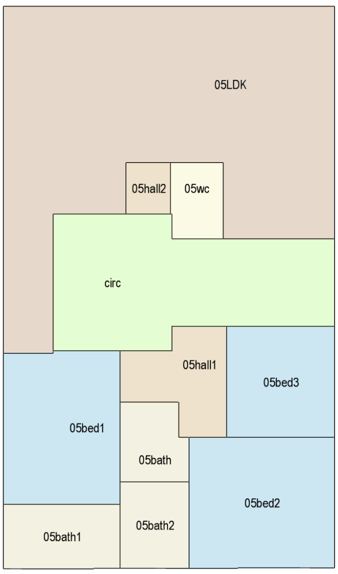


Layouts of the modelled building

4th floor



5th floor



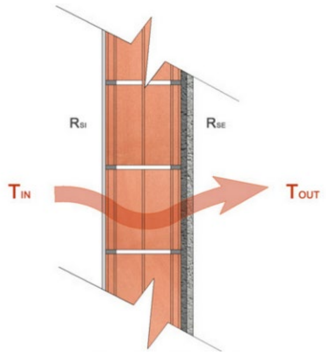
4.3 Overheating assessment results

Criteria for predominantly naturally ventilated homes				
Block	Zone	Criterion A (%)	Criterion B (hr)	Pass/Fail
4th	03LDK	1.7	N/A	Pass
4th	03bed1	0.22	23	Pass
4th	03bed2	0.37	21.5	Pass
4th	04LDK	1.95	N/A	Pass
4th	04bed1	0.22	22.5	Pass
4th	04bed2	0.37	22	Pass
5th	05LDK	1.11	N/A	Pass
5th	05bed1	1.93	22.5	Pass
5th	05bed2	0.29	24.5	Pass
5th	05bed3	0.37	22.5	Pass

5 BE LEAN: PASSIVE DESIGN AND EFFICENT SERVICES

Number of passive design measures and measures improving energy efficiency of building services have been included in the design to underline the "Passive first" approach in the scheme design. Implemented measures are summarised in Table 5 of this report and include:

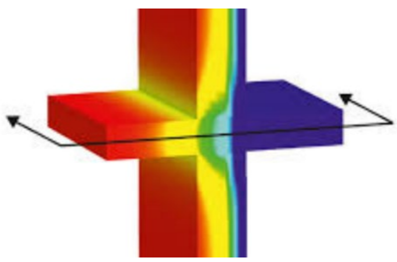
5.1 Low U-values of building fabric



Thermal performance of fabric is the most important aspect of passive measures mosaic. Low U-values ensure, that the amount of heat transmitted through building external elements is minimised. This is achieved by using highly insulated building materials with low thermal conductivity.

Notional dwelling U-values set out in 2021 Part L1 are generally followed.

5.2 Avoidance of Thermal Bridging

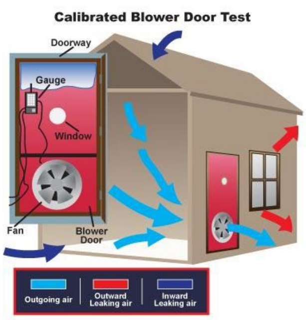


Thermal bridges occur at all junctions between building thermal elements, typically at junctions between wall/floor, wall/roof etc. Recent changes in the building regulations have emphasized the significance of thermal bridging in building design.

Continuity of insulation has to be maximised in order to minimise thermal bridging. Calculations presented in this energy statement for the newly constructed flats are based on thermal bridging y-value of 0.05 W/m2K (same as 2021 Part L1 notional dwelling). Psi-values of all applicable junctions will be assessed by a suitably qualified assessor at the detailed design stage by either:

- Custom Psi-value calculation by 2D thermal modelling
- Psi value from database of approved details

5.3 Air Tightness



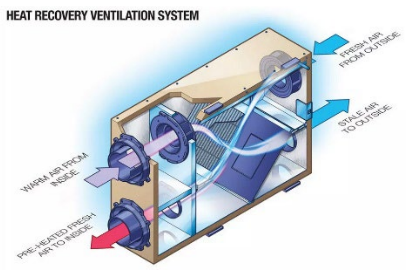
Air tight buildings minimise their heat loss through infiltration of cold air through gaps and cracks in building envelope. Air tightness of buildings is expressed as air permeability rate. Following air permeabilities are targeted in the developments:

- Offices: 7 m3/h.m2

- Converted flats 1-2: 5 m3/h2.m
- New flats 3-5: 3 m3/h2.m2

These target values have to be confirmed by post-construction air tightness testing.

5.4 Mechanical Ventilation with Heat Recovery



Building regulations Part F recommends mechanical ventilation for dwellings with design air permeability of 5 or less. The most efficient form of mechanical ventilation is the heat recovery ventilation, where warm air extracted from bathrooms and kitchen passes the heat on to the supply air in heat exchanger. Supply air is then distributed to habitable rooms (bedrooms, living rooms).

To meet a good practice for MVHR efficiency, the installed units have to have hight heat recovery efficiency and low specific fan power. Such performance can be verified by choosing units from SAP Product Characteristics Database. Ductwork between the unit and exterior (supply and extract) has to be insulated to “Level 1” standard, i.e. 25mm insulation if less than 2m long or 50mm thickness for ducts over 2m long.

5.5 High Efficiency Lighting

While previous versions of Part L1 recognised low energy lighting to certain degree, the impact of low energy lighting is more accurate and more significant in the new 2021 Part L. All installed light fittings need to be included in detail in the assessment. To meet the efficiency level of notional reference dwelling, the installed power density shouldn’t exceed 2.3 W/m2 and all light fittings should achieve a luminaire efficacy of at least 80 lm/W

5.6 Water Efficiency

Reducing general water consumption in dwellings also reduces amount of energy needed to provide hot water. New Part L1 notional building therefore allows for overall water consumption of 125 l/person.day and more specifically, showers with flow rate of 8 l/min.

6 BE CLEAN: DISTRICT HEATING AND CHP

5.1 Combined Heat and Power

Although gas CHP's used to help to reduce CO2 emissions by delivering heat and electricity locally and reducing the losses that normally occur by conventional power plants. This is no longer true, after significant grid electricity de-carbonisation in recent years. Any local electricity generation using fossil fuels (e.g. mains gas) will deliver electricity with higher carbon footprint than grid electricity. Combined heat and power is therefore no longer considered a low carbon technology.

5.2 District Heating Connection

District heating connection is ruled out due to technical constraints (existing building)

7 BE GREEN: ON-SITE RENEWABLE ENERGY SOURCES

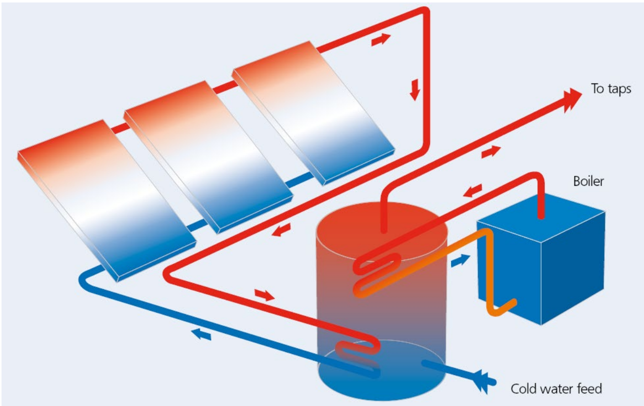
6.1 Be Green: On-Site Renewable Energy Sources – Solar Hot Water

6.1.1 General Information

Solar hot water systems for dwellings use collector which provides a separate heating circuit for hot water cylinder. This is usually backed up by electric immersion heater or other source of heat.

Two types of collectors are available:

- Flat Plate – less expensive, less efficient
- Evacuated Tube – more expensive and more efficient



6.1.2 Recommendations Specific to this Development

Solar hot water system has been ruled out due to high installation cost maintenance requirements space requirement. Other renewable technology (ASHP) is preferred for hot water heating.

6.2 Be Green: On-site renewable energy source - Air source heat pumps

6.1.1 General Information

Heat pumps are considered a form of renewable energy because they leverage natural heat sources, which are continuously replenished by solar energy.
Heat pumps are highly efficient because they move heat rather than generating it directly through combustion. Typically, for every unit of electricity consumed, a heat pump can transfer three to five units of heat, giving them a coefficient of performance (COP) of 3 to 5. This means that the majority of the heat they provide comes from renewable sources (the environment) rather than the electricity itself.

There are two main types of ASHP:

Air to Water System

Air-to-water system uses the heat to warm water. Heat pumps heat water to a lower temperature than a standard boiler system would, so they are more suitable for underfloor heating systems than radiator systems. Although some ASHP systems are capable of heating the water to the higher temperature, the efficiency is higher when using low temperature underfloor heating or low temperature fan convectors.

Air-to-air system

Air-to-air system uses the heat to warm the indoor air. The air is heated through individual fan-coils or centrally and then distributed to rooms via ductwork.

6.2.1 Recommendations specific to this development

It is proposed to install individual monobloc air source heat pumps for the flats which will be DAIKIN EDLA06EV3 or equivalent.

The proposed heat pumps will provide space heating through wet underfloor heating and hot water through indirect hot water cylinders.

Heating and cooling in the offices will be provided by VRF (carriable refrigerant flow) air-to-air heat pumps. Only the heating element of the proposed heat pumps is considered a renewable energy source.

6.3 Be Green: On-site renewable energy source - Solar photovoltaics

6.3.1 General information

This system uses semi-conductor cells to convert solar energy into electricity. Two main types of PV panels are available:

- Monocrystalline – More expensive and more efficient
- Polycrystalline – Less expensive and less efficient

Depending on type, the output of 1 kWp (kilowatt peak) can be achieved by panels with area between 6 and 20 m2.

The use of PV panels generally requires relatively large unshaded roof area where they can be mounted facing south, ideally having between 30° and 40° inclination.

6.3.2 Recommendations specific to this development

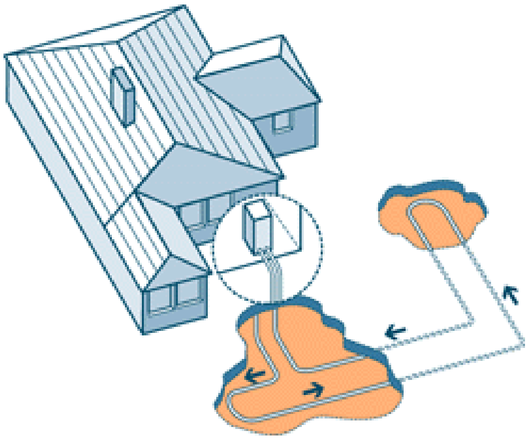
Solar PV is not proposed as all of the suitable roof area is likely to be taken up by the heat pumps serving offices and flats.

6.4 Be Green: On-site renewable energy source - Ground source heat pump

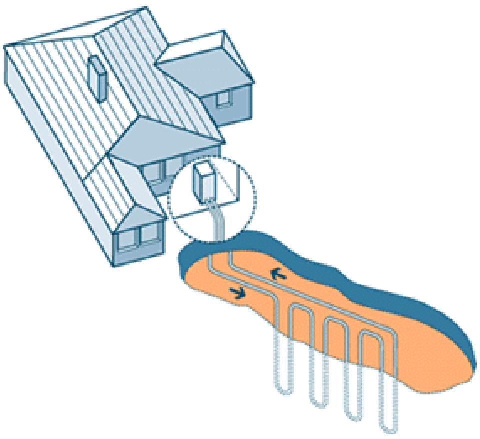
6.4.1 General information

Ground source heat pumps use a buried ground loop which transfers heat from the ground into the building through heating distribution system. GSHP technology can be used both for heating and cooling. Two main types of GSHP are available:

- Horizontal loop is suitable for applications where sufficient area is available to accommodate horizontally buried pipes



- Vertical loop system can be used where ground space is limited, but will require boreholes typically 15-150m deep, and is consequently more expensive to install than horizontal systems.



6.4.2 Recommendations specific to this development

Ground source heat pumps have been ruled out due technical constraints (existing building)

6.5 Be Green: On-site renewable energy source - Biomass / Biofuels

6.5.1 General information

Producing energy from biomass has both environmental and economic advantages. It is a carbon neutral process as the CO2 released when energy is generated from biomass is balanced by that absorbed during the fuel's production.

There are two main ways of using biomass to heat a domestic property:

- Standalone stoves providing space heating for a room. These can be fuelled by logs or pellets but only pellets are suitable for automatic feed. Generally they are 6-12 kW in output, and some models can be fitted with a back boiler to provide water heating.

- Boilers connected to central heating and hot water systems. These are suitable for pellets, logs or chips, and are generally larger than 15 kW.

6.5.2 Recommendations Specific to this Development

Biofuels are ruled out due to negative impact on air quality and environmental issues surrounding liquid biofuels as currently there are no established standards relating to the sustainability of biofuels.

6.6 Be Green: On-site renewable energy source - Wind energy

6.6.1 General Information

Wind power is a clean, renewable source of energy which produces no carbon dioxide emissions or waste products. The turbines can have horizontal or vertical axis (Darrieus type). Wind turbines use the wind's lift forces to rotate aerodynamic blades that turn a rotor which creates electricity. Most small wind turbines generate direct current (DC) electricity and are not connected to the national grid. A special inverter and controller is required to convert DC electricity to AC at a quality and standard acceptable to the grid if the turbine is to be connected to national grid.

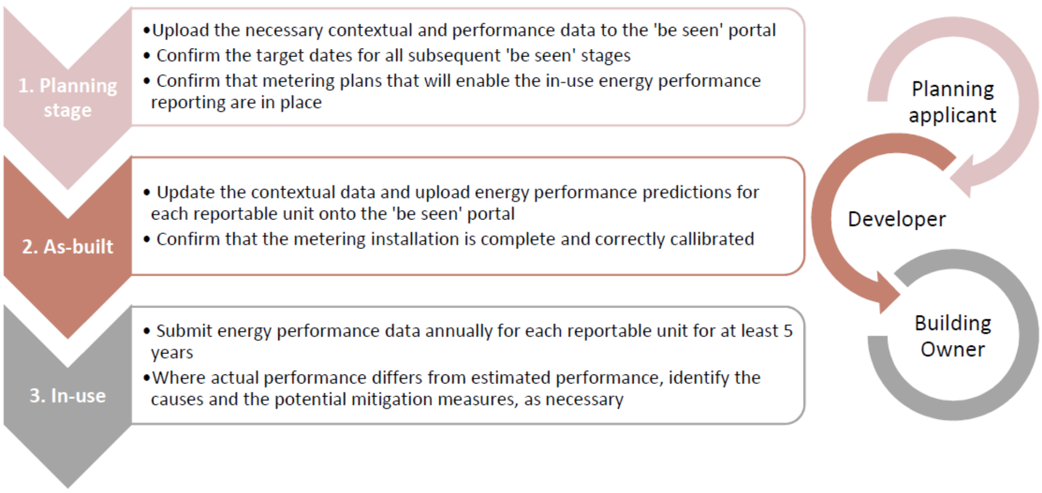
6.6.2 Recommendations Specific to this Development

Wind energy systems will not be considered due to negative visual effects, interference, flicker and noise risk. Exposure to wind would be limited by surrounding buildings.

8 BE SEEN: ENERGY MONITORING

New London Plan Policy SI 2 sets out the 'be seen' requirement for all major development proposals to monitor and report on their actual operational energy performance. The 'be seen' policy will help to understand the performance gap and identify ways of closing it while ensuring compliance with London's net zero-carbon target.

To fully address the "be seen" requirements, the development will be designed to enable post construction monitoring and the information set out in the 'be seen' guidance will be submitted to the GLA's portal at the appropriate reporting stages



9 WATER EFFICENY

Internal Water consumption in flats will be reduced by specification of water efficient fittings. The water consumption in the proposed flats will be reduced to 105 litres per person per day or less by specifying water fittings with the following parameters:

- WC's: All dual flush capacity 3/6 Litres or less
- Kitchen taps flow rate: 8 l/min or less
- Bathroom taps flow rate: 6 l/min or less
- Bath capacity to overflow: 140 l or less
- Showers flow rate: 8 l/min or less
- Dishwasher consumption: 0.5 Litres per place setting or less
- Washing machine consumption: 6 litres per kg dry load or less

10 CONCLUSION

The London Plan approach of "Be lean" – "Be clean" – "Be green" is fully adopted by implementing:

- Passive measures (low U-values, air permeability, thermal bridging)
- High efficiency services, i.e., high efficiency ventilation, high efficiency lighting
- Renewable sources: Air source heat pumps

Excluded renewable sources are:

- Solar hot water
- Biomass
- Wind turbines
- Solar PV

The proposed development will achieve:

- 45% overall regulated CO_2 reduction against 2021 Part L compliant baseline
- 19% regulated CO_2 reduction by renewable sources
- 26% regulated CO_2 reduction by efficiency measures ("Be Lean" stage of the energy hierarchy)