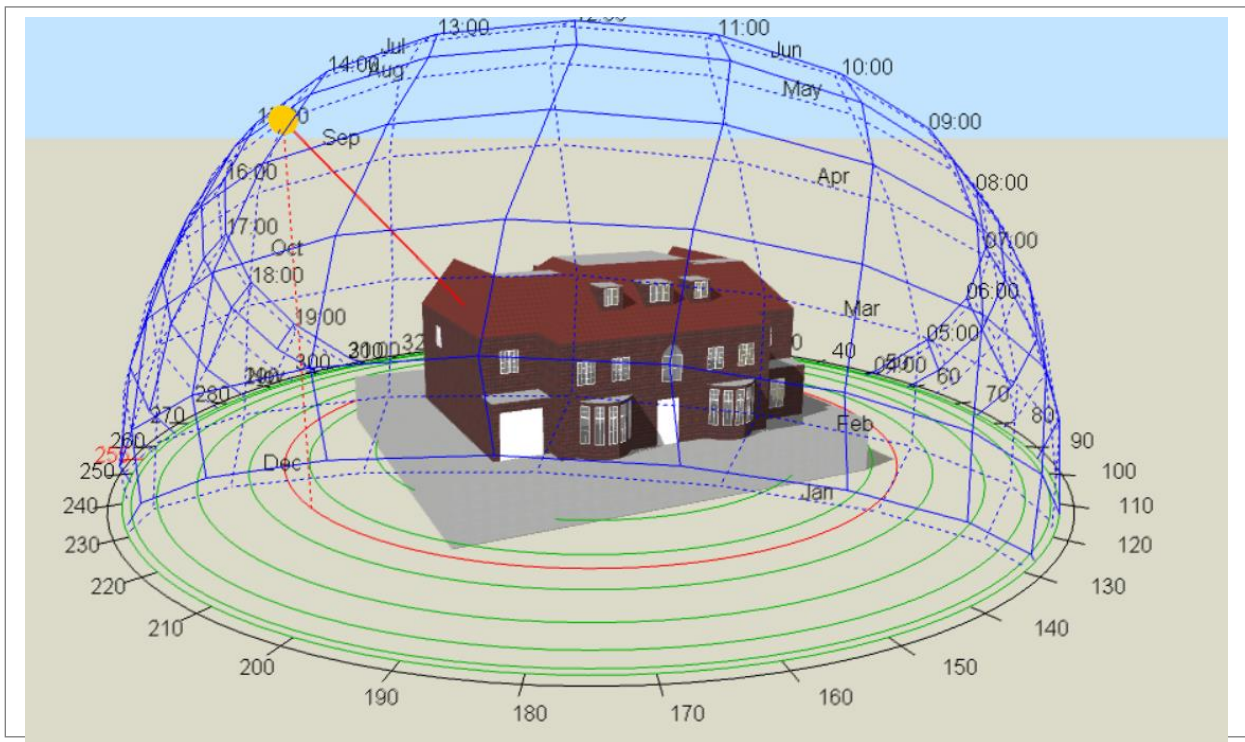




Technical Analysis – Energy Use Intensity Calculation

41 Sheldon Avenue
London
N22 5AR

26/09/2024

Document Status

Client: Eva Stengaard and Mark Tognolini

Site: 41 Sheldon Avenue, London

Proposals: The construction of a new build four-storey dwelling

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1 Executive Summary

This report has been prepared in support of the planning application for the construction of the proposed development which comprises a new-build 4-storey detached dwelling at 41 Sheldon Avenue in London.

In order to assess against the LETI targets, we have modelled the Space Heat Demand, Operational Energy and Thermal Comfort of the development, below we have highlighted our findings.

Assessment Findings:

- Space Heating Demand – 7.7 kWh/m²
- Energy Use Intensity – 36.6 kWh/m²

It is proposed that a 5.3kWp photovoltaic system is installed on the roof. This system can contribute as much as 5.6kWh/m² towards the energy demands.

It is important to note that with any modelling exercise there are assumptions and approximations that have to be made. As far as possible, details of all assumptions and approximations are supplied within the report. These were predominantly informed by information provided by Marek Wojciechowski Architects.

Overview of Design Parameters	
Roof	0.11 (W/m ² K)
Floor	0.11 (W/m ² K)
Wall	0.13 (W/m ² K)
Windows and Roof lights	1.20 (W/m ² K) –Glazing G value 0.40
Internal Walls	0.0 (W/m ² K)
Heating	ASHP/VRV system
Hot Water	From main heating system
Ventilation & Cooling	- MVHR to basement - Cooling to family room/bedrooms
Lighting	100% LED (no auto controls)
Air Leakage	5.0 m ³ (h.m ²)
Overall PSI Value Thermal Bridging	0.053

2 Introduction

The development site is located on Sheldon Avenue in London.

The development proposals are for the construction of a new-build 4-storey residential dwelling.

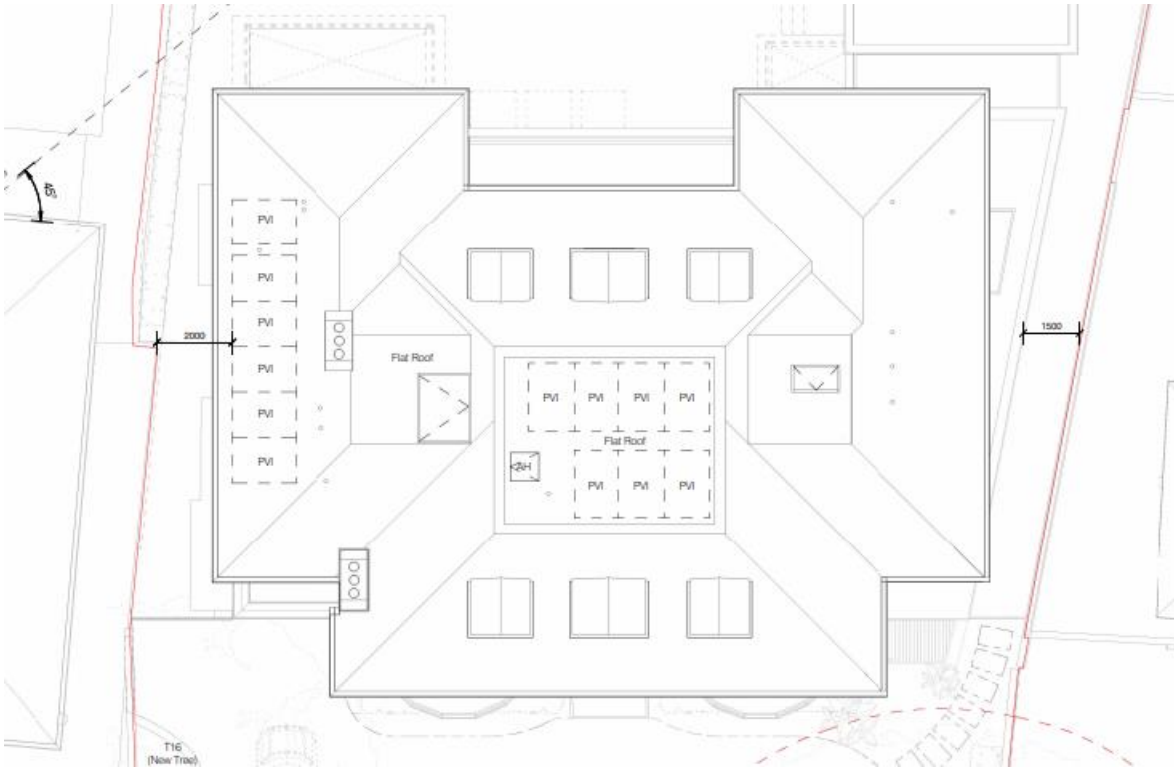


Figure 01.- Site Plan

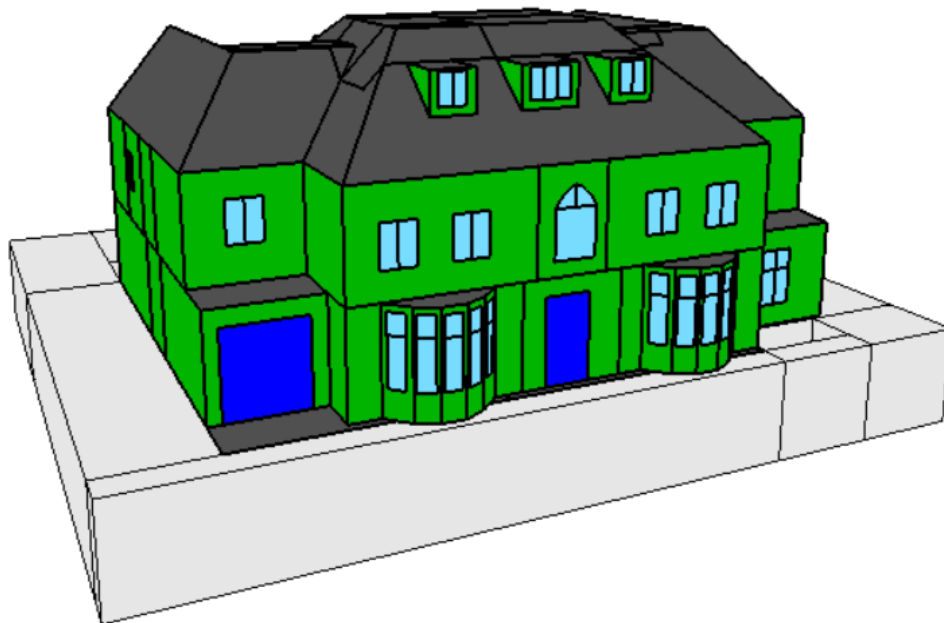


Figure 02.- DesignBuilder Model of proposed development

3 What is LETI?

The London Energy Transformation Initiative (LETI) was established in 2017 to support the transition of the capital's built environment to net zero carbon, providing guidance that can be applied to the rest of the United Kingdom (UK).

We are in a climate emergency, and urgently need to reduce carbon emissions. Here in the UK, 49% of annual carbon emissions are attributable to buildings. Over the next 40 years, the world is expected to build 230 billion square metres of new construction adding the equivalent of Paris to the planet every single week – so we must act now to meet the challenge of building net zero developments. LETI, along with others such as the World Green Building Council and Architecture 2030, believe that in order to meet our climate change targets all new buildings must operate at net zero carbon by 2030 and all buildings must operate at net zero carbon by 2050. This document provides practical solutions to set out a definitive journey, beyond climate emergency declarations, into a net zero future. To this end, the solution to meeting our climate change targets must be:

- Scalable: Energy consumption targets are set so that there is enough renewable energy to power all buildings in the UK.
- Achievable: A comprehensive modelling study has been undertaken, and in-use data from buildings have been analysed, so that the targets, while ambitious to achieve, are deemed achievable for most projects.
- Verifiable: Targets are measured in-use.
- Whole Life: Embodied carbon and operational carbon must both be considered.

For this document net zero carbon means whole life carbon. Whole life carbon is formed of two key components:

- Operational Carbon: a new building with net zero operational carbon does not burn fossil fuels, is 100% powered by renewable energy, and achieves a level of energy performance in-use in line with our national climate change targets.
- Embodied Carbon: Best Practice targets for embodied carbon are met, and the building is made from re-used materials and can be disassembled at its end of life in accordance with the circular economy principle

The built environment industry, together with current regulations and practices, are seriously lagging behind the carbon trajectory required to protect life on planet earth. Everyone's future is at stake. As an industry we must be absolutely confident that all new buildings can operate at net zero carbon from 2030.

In order to achieve this, LETI believes that by 2025, 100 percent of new buildings must be designed to deliver net zero carbon, and the whole construction industry will need to be equipped with the knowledge and skills necessary. To set us on this trajectory, LETI believes that in 2020, 10 percent of all new buildings need to be designed to deliver net zero carbon.

4 Design Criteria

4.1 Fabric Performance

For the proposed development, we have used the following fabric U-values:

Design Measures to be Incorporated	
Element	U-Values and G Value (W/m ² K)
Roof	0.11
Floor	0.11
Wall	0.13
Windows and Roof lights	1.20
Internal Walls	0.00

4.2 Efficiency Measures

The following efficiency measures have been modelled:

Design Measures to be Incorporated	
Air tightness (m ³ / (h m ²) @ 50Pa)	5.0
Thermal Bridging	0.053
G-value	0.40

4.3 Heating and Hot Water

The heating and hot water are to be provided by an Air Source Heat Pump which follows the LETI guidance to ensure heating and hot water generation is fossil fuel free.

Heating and hot water

Implement the following measures:



Fuel

Ensure heating and hot water generation is fossil fuel free



Heating

Maximum 10 W/m² peak heat loss (including ventilation)



Hot water

Maximum dead leg of 1 litre for hot water pipework

'Green' Euro Water Label should be used for hot water outlets (e.g.: certified 6 L/min shower head – not using flow restrictors).

Design Measures to be Incorporated	
Fuel	All Electric
Heating	ASHP/VRV
Hot Water	ASHP

5 Internal Gains, Occupation, Hot Water Usage, Heating and Ventilation

5.1 Internal Gains, Occupation

Space	Occupancy	Occupied Hours (5 Days Week)	Sensible Heat Gain (W)	Lighting (W/m ²) 18:00-23:00	Plug in Equipment (W/per hour)
Living Rooms/Kitchen	5 People	9:00-16:00	90	2	105 (1 and 2 Bed) 140 (3 Bed)
Bedrooms	2 People	22:00-07:00	90	2	13.8
Bathroom	N/A	N/A	N/A	2	0
Hall/Landing/Stores	N/A	N/A	N/A	2	0

5.2 Plug in equipment

Space	Equipment	Usage
Kitchen / Living	Oven – 970W Hob – 725W Fridge Freezer – 100W Microwave – 900W Kettle – 110W Per Cycle W/Machine – 800W Per Cycle	60 mins 30 mins All day 4 cycles a day 4 cycles a day 1 cycle a day
Family Room	TV – 200W	4 hours
Media / Family Room	TV – 200W Router – 10W	4 hours All day
Office/Study Rooms	Laptop – 100W Monitor – 50W	4 hours 4 hours
Bedrooms	2 x Lamp – 7W 2 x Phone Charger – 10W 1 Hair Dryer 1200W	1 Hour 8 Hours 5 Mins
Bathroom	N/A	N/A
Hall/Landing/Stores	N/A	N/A

5.3 Heating and Ventilation

Space	Heating Set Point	Heating Times	Ventilation
Kitchen/Living Rooms	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Extract – 13 l/s (basement MVHR supply 20 l/s)
Bedrooms	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Natural Ventilation
Bathrooms	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	Extract 8l/s
Hall/Landing/Stores	21°C	06:00 – 22:00 (2 Days) 06:00-09:00 & 17:00 -22:00 (5 Days)	N/A

5.4 Hot Water Usage

105 litres per person per day

Swimming pool heating/pump energy assumed to be 10,000 kWh per annum and included within 'other process' end-use.

6 EUI Results

To meet compliance with GLA/LETI standards, the Energy Use Intensity (EUI) must be below 35 kWh/m²/year excluding renewable contributions and the space heating demand must be below 15kWh/m²/year. The results from the EUI calculations are detailed in the table below. This includes an estimate of unregulated energy including energy consumption used by the swimming pool.

	Pumps and fans (kWh)	Service Water Heating (kWh)	Space Heating (kWh)	Other Process (kWh)	Interior Lighting (kWh)	Space Cooling (kWh)	Total	PV Generation (kWh)
Jan 01-31	133.4	404.8	1141.9	1131.9	382.4	0.0	3194.4	-134.0
Feb 01-28	120.3	372.7	958.9	1102.7	345.2	0.0	2899.8	-201.0
Mar 01-31	133.9	423.1	782.5	1131.6	381.8	10.9	2863.8	-414.0
Apr 01-30	129.1	394.1	688.9	1122.0	370.0	19.8	2723.9	-560.0
May 01-31	133.4	404.8	226.7	1131.6	382.4	151.8	2430.8	-666
Jun 01-30	128.6	412.4	170.9	1122.0	369.4	177.8	2381.0	-689.0
Jul 01-31	133.4	404.8	97.1	1131.6	382.4	295.4	2444.8	-659.0
Aug 01-31	133.2	413.9	138.6	1131.6	382.1	197.0	2396.4	-599.0
Sep 01-30	128.8	403.2	175.5	1122.0	369.7	106.3	2305.5	-465.0
Oct 01-31	133.4	404.8	261.6	1131.6	382.4	34.4	2348.2	-264.0
Nov 01-30	128.8	403.2	915.4	1122.0	369.7	0.0	2939.1	-165.0
Dec 01-31	133.2	413.9	1206.8	1131.6	382.1	0.0	3267.6	-97.0
Summed total	1,569.5	4,855.7	6,764.8	13,512.2	4,499.7	993.4	32,195.2	-4,913.0
EUI (kWh/m ²)							36.6	-5.6
Space Heating Demand (kWh/m ²)							7.7	-