



ENERGY STATEMENT – APRIL 2023

OAK LANE

LONDON
N11 2TN

EC  STUDIO XV

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Oak Lane N11 2TL ENERGY STATEMENT

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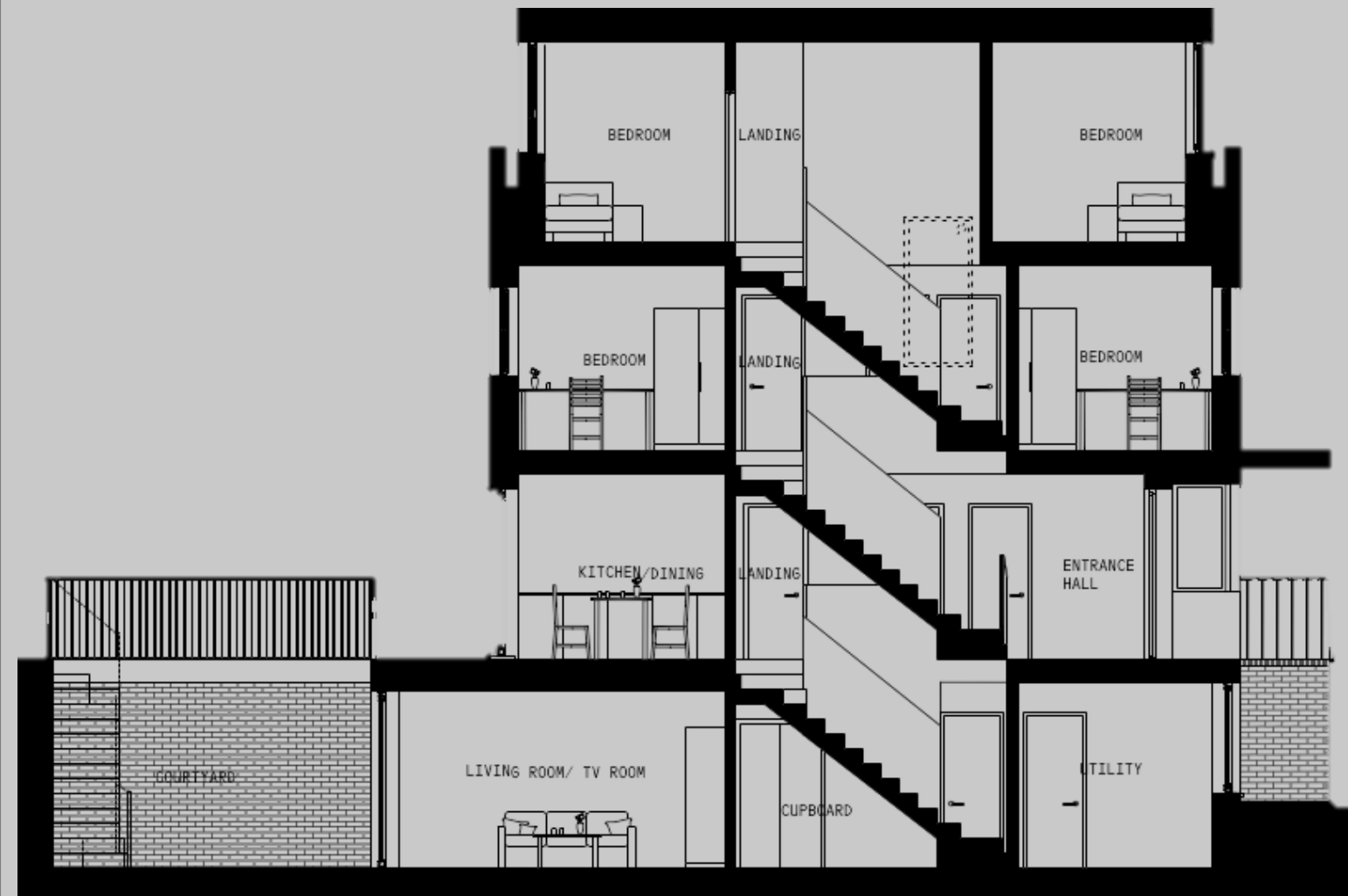
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1.0 EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

The purpose of this document is to demonstrate compliance of the proposed development located at 40 Oak Lane, N11 2TL towards the Energy requirements as listed below in the local, regional and national policies.

ECostudio LTD has been commissioned by vPPR Architects in order to provide an Energy Statement in accordance with:

- London Borough of Haringey.
- Approved Document Part L of Building Regulations, Volume 1: Dwellings v 2021
- Mayor of London Guidance for Energy Statements, April 2020
- The Mayor's London Plan Part L 2021

This report outlines the specifications for maximizing the environmental performance of the proposed development.

The proposed development consists in erection of 3 semi-detached houses, with basement and two stories. Each unit has 4 beds with communal parking and private gardens.

As per the London Borough of Haringey Local Plan, it will expect that all the developments meet the carbon emission reduction requirements set out in the London Plan:

- Residential developments are expected to be able to achieve on-site savings beyond the minimum 35% improvement (be lean, clean and green).

This report provides a summary on how the residential development will achieve this target, with a combined reduction of 74%.

ENERGY HIERARCHY BE LEAN / BE CLEAN

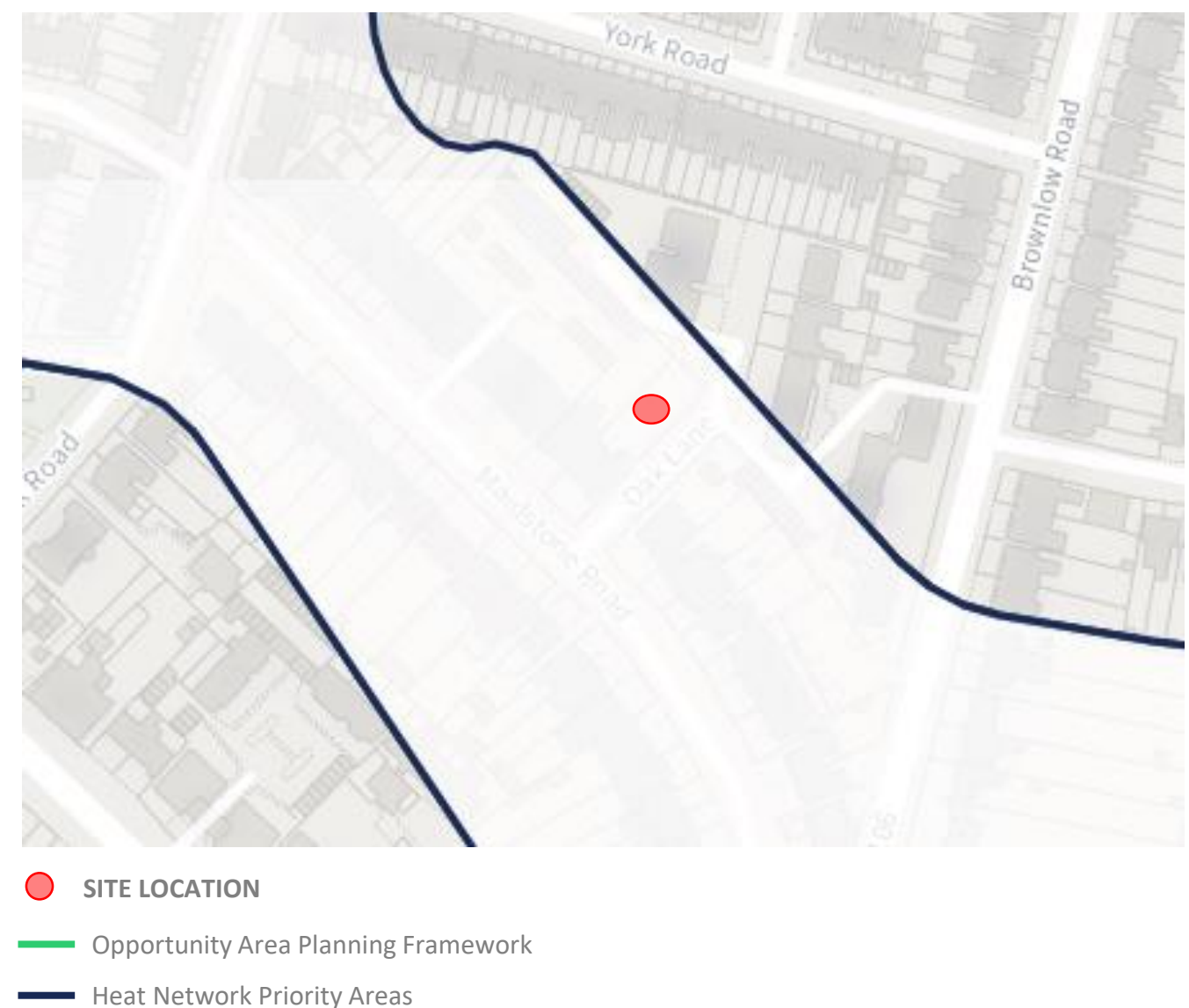
The development will achieve Part L volume 1 for Residential Building Regulations compliance by implementing all possible energy efficiency and energy conservation measures, before any renewable energy system is incorporated to the design.

The residential development will achieve a reduction of 2% in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario. This has been calculated following the London Plan Guidance for Energy Statements applicable to refurbishments and extensions.

The development is far from the decentralized energy network for potential district heating. Therefore, claiming reduction in the carbon emissions, based on the connection to the local district heating is not feasible. Please refer to Figure 1 for further details.

The use of CHP is not viable on a scheme of this size. Instead the target reduction is achieved using the energy efficiency measures and the provision of on-site renewable energy technology.

FIGURE 01 – LONDON HEAT MAP SHOWING THE SITE LOCATION IN THE RED CIRCLE



EXECUTIVE SUMMARY

BE GREEN

The residential development will achieve a 72% CO2 emissions reductions just under the be Green scenario from:

- 1no electric ASHP for space heating per dwelling
- 9no PV panels of 450W each: 0.45 kWp x9 = 4.05 kWp per house

This equates = **12.15 kWp** for the 3no houses in total.

The residential development will have a combined reduction in CO2 emissions when compared with the baseline of 74%. Please refer to figure 04 for further details.

Using the GLA Carbon Emissions reporting for residential developments, the cash in lieu contribution using the recommended price of £95 per tonne of CO2 would be £5,265.00

FIGURE 03 – CASH IN LUE CONTRIBUTION TO ACHIEVE ZERO CARBON

Cumulative savings for off-set payment	55	-
Cash in-lieu contribution (£)	5,265	

*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

FIGURE 02 – THE LONDON PLAN ENERGY HIERARCHY

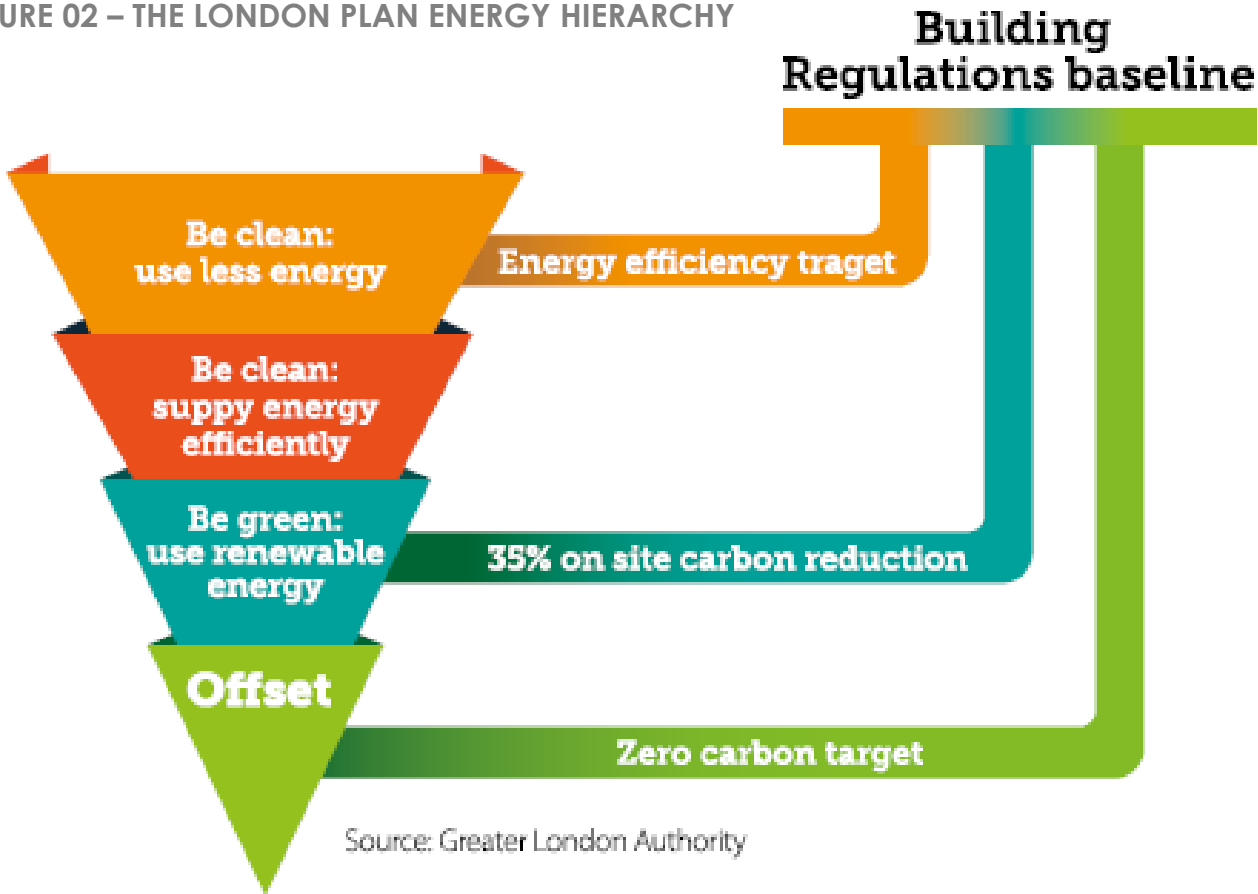
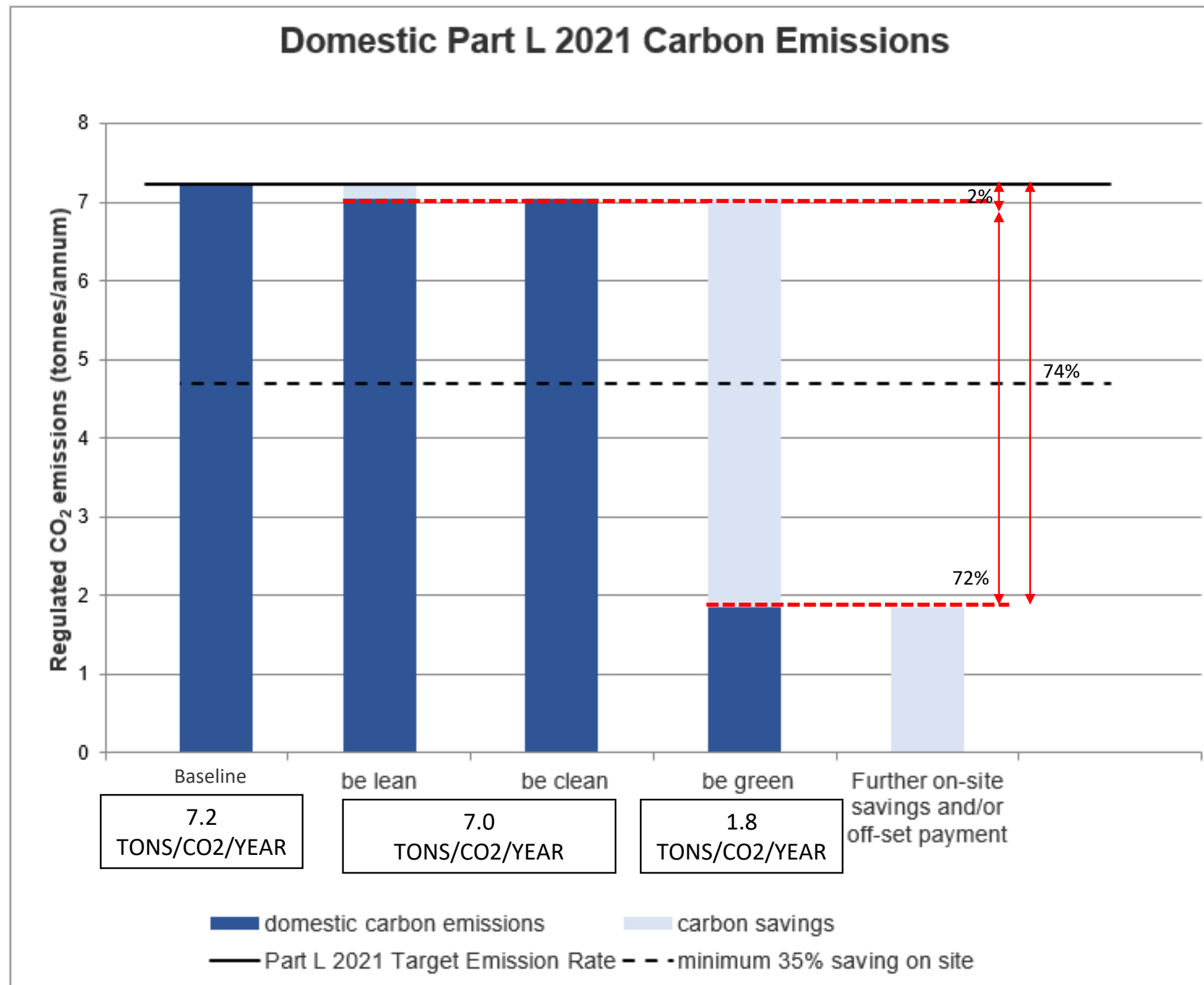


Figure 5.3: Diagram showing Energy Hierarchy

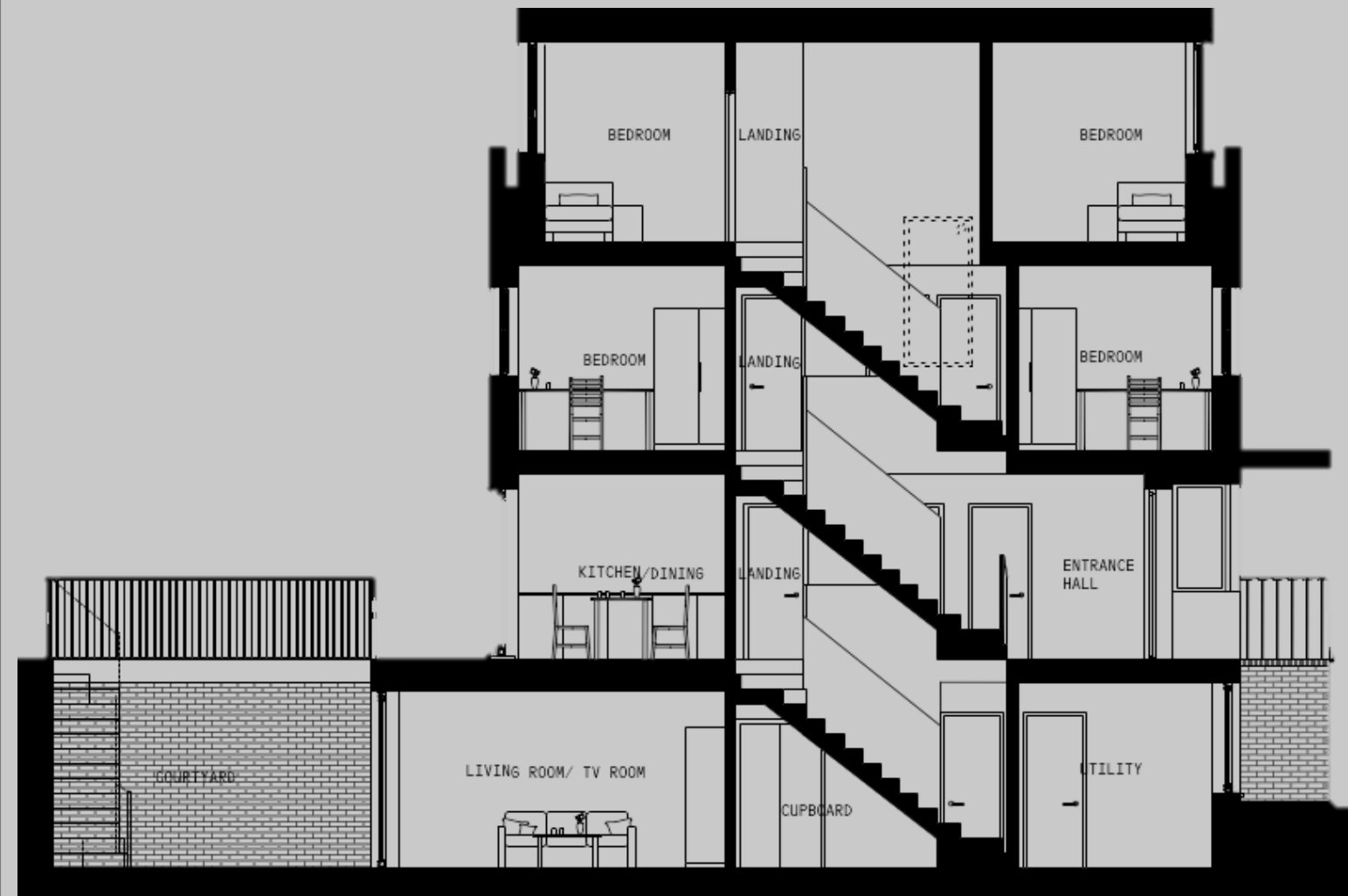


EXECUTIVE SUMMARY

FIGURE 04 – ENERGY HIERARCHY GRAPH

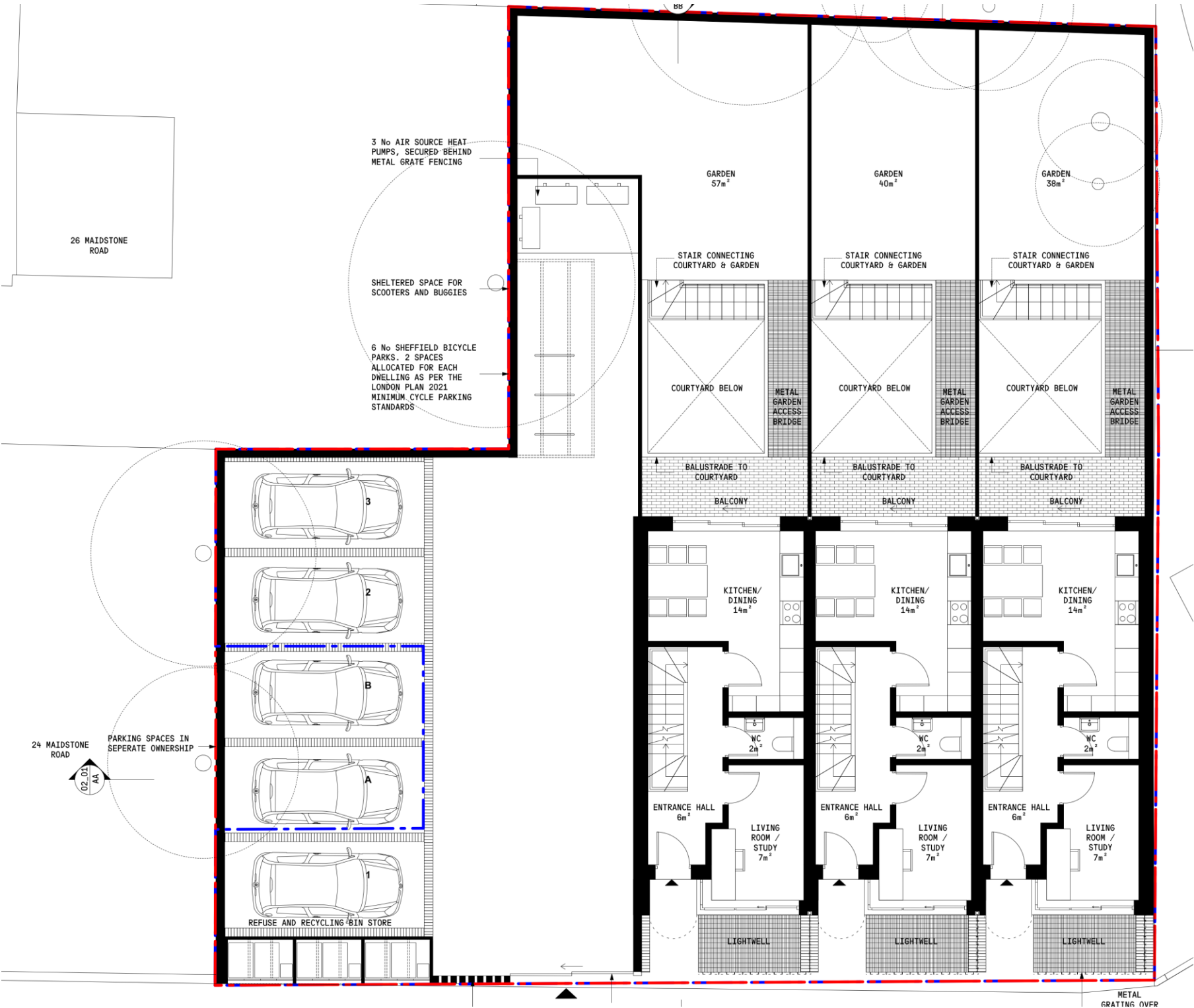


2.0 ENERGY STATEMENT SUMMARY



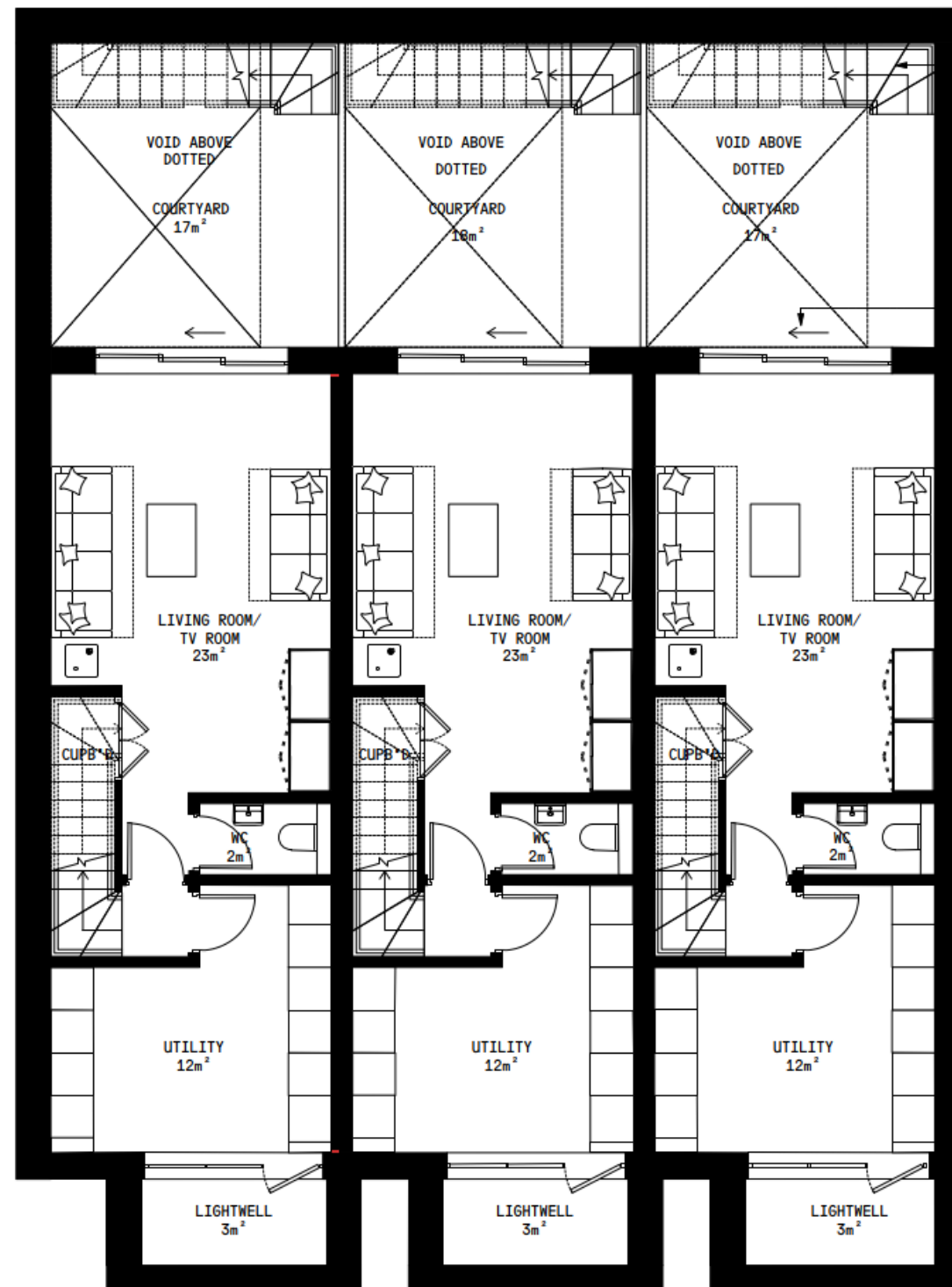
FLOOR PLANS - AS PROPOSED

FIGURE 05 – GROUND FLOOR SITE PLAN

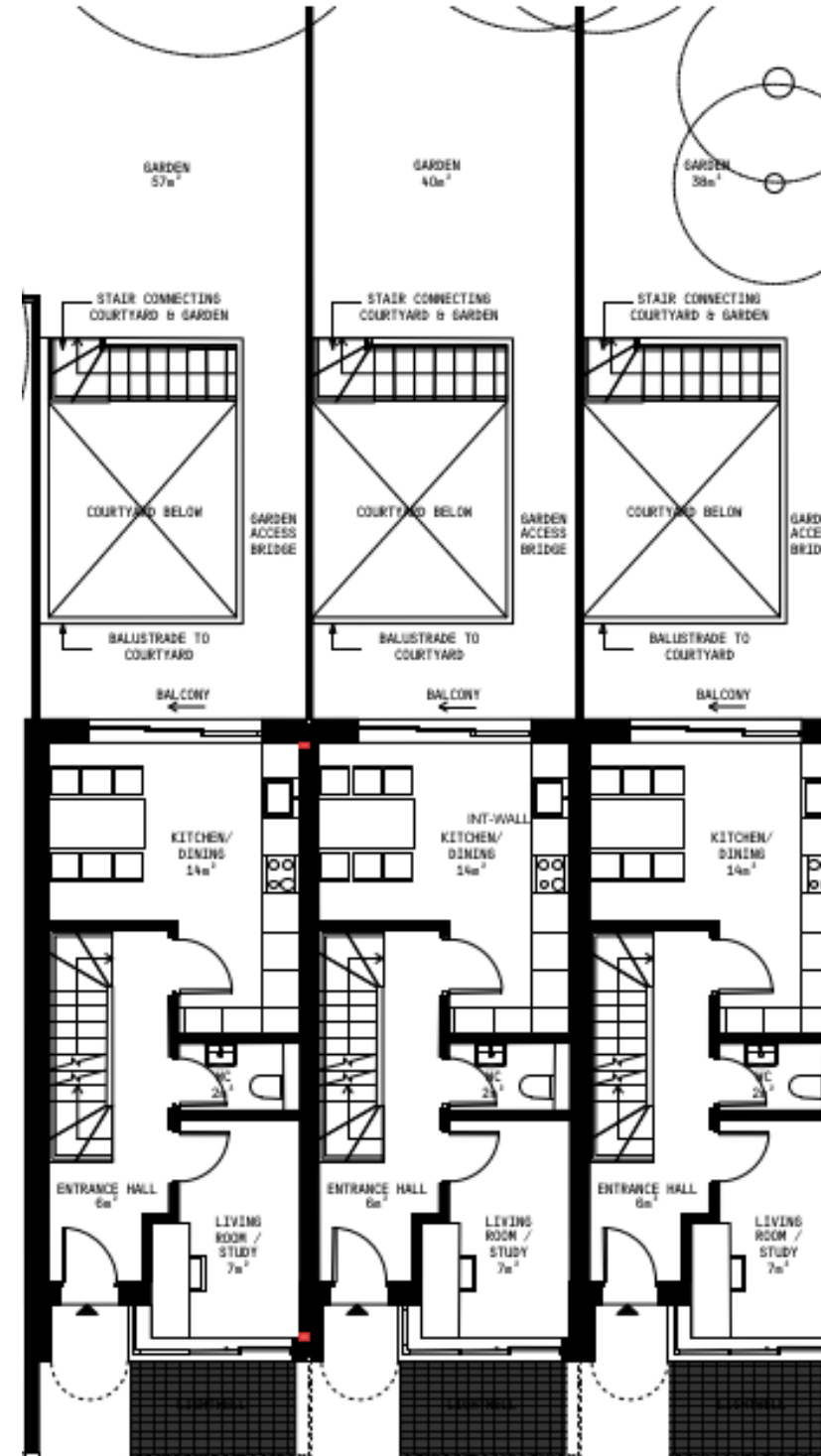


FLOOR PLANS - AS PROPOSED

FIGURE 05 – BASEMENT PLAN



GROUND FLOOR PLAN



FLOOR PLANS - AS PROPOSED

FIGURE 07 – FIRST FLOOR PLAN

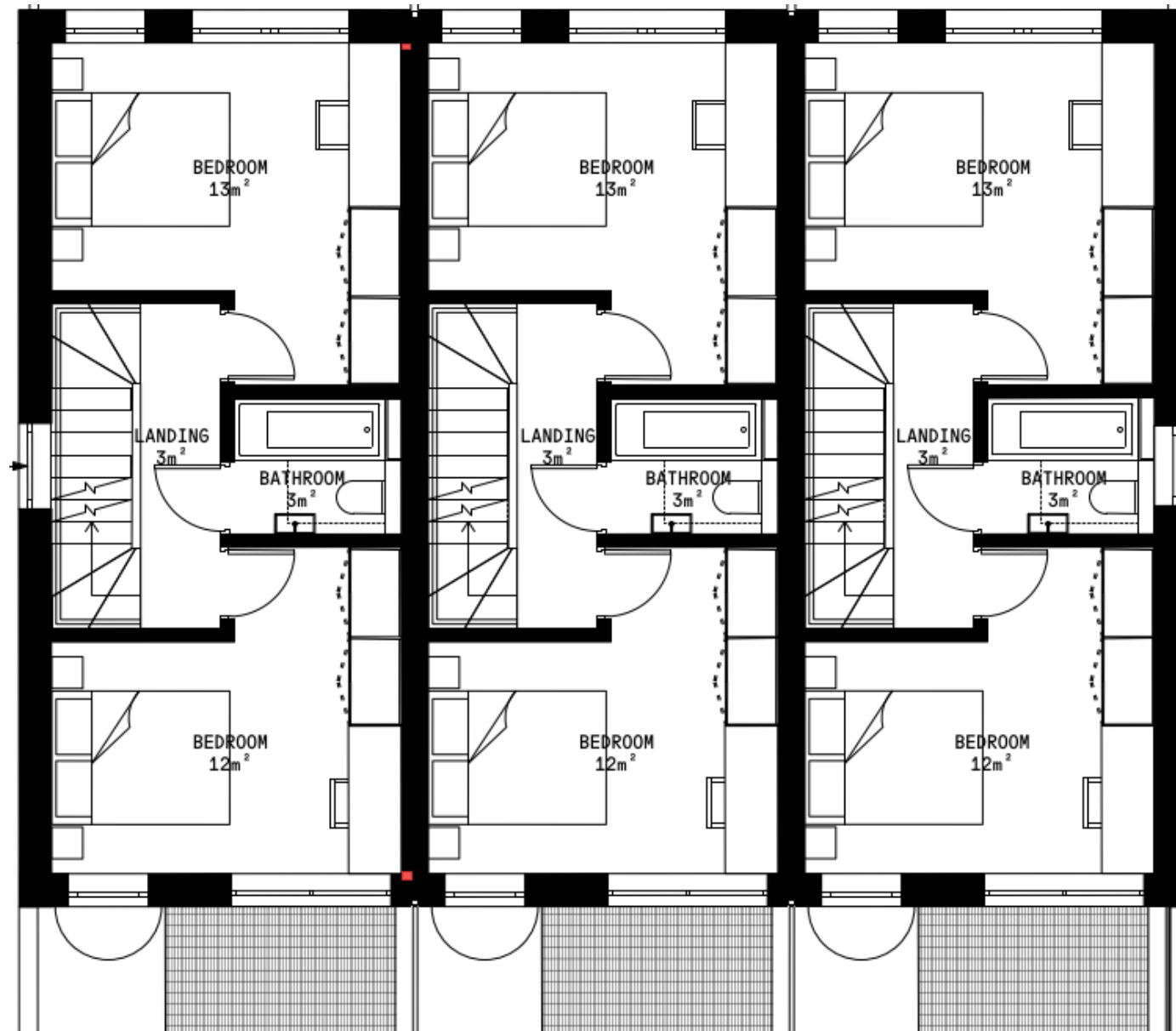
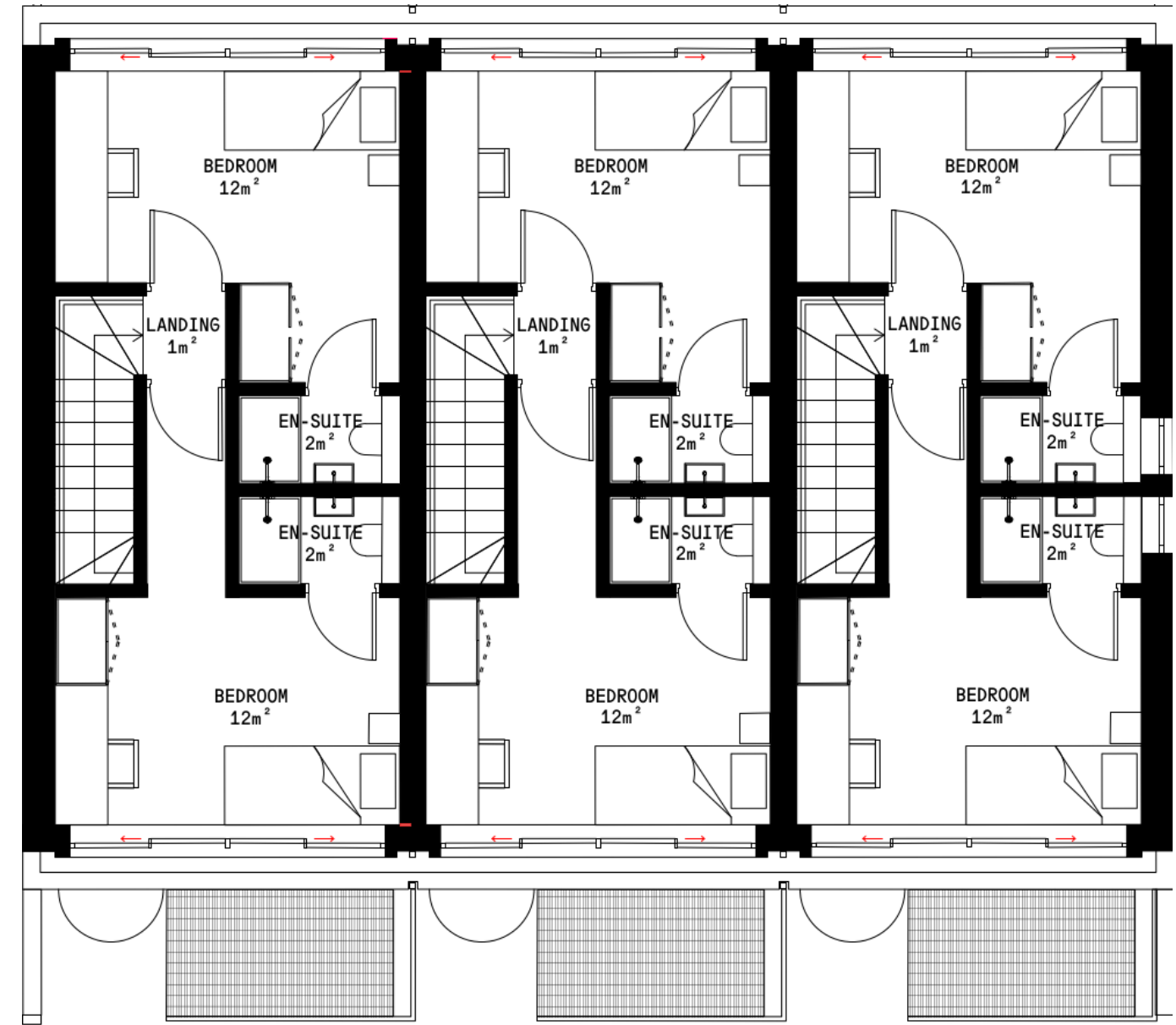
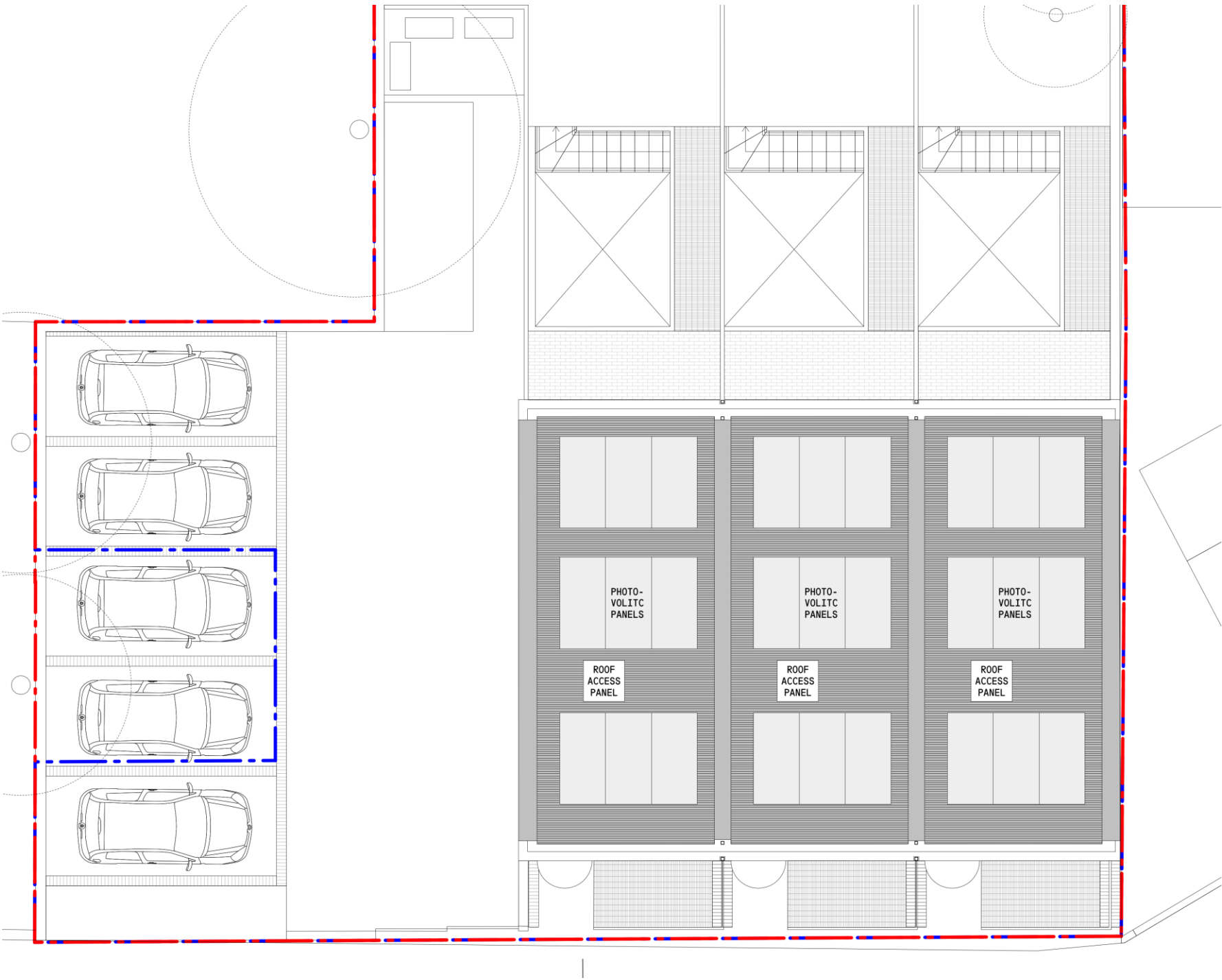


FIGURE 08 –SECOND FLOOR PLAN



FLOOR PLANS - AS PROPOSED

FIGURE 09 – ROOF PLAN



ENERGY STATEMENT

This Energy Statement has been prepared in line with the Energy Hierarchy, Energy Use and Carbon Emissions have been calculated following these standards:

- London Borough of Haringey.
- Approved Document Part L of Building Regulations, Volume 1: Dwellings v 2021
- Major of London Guidance for Energy Statements, April 2020
- The Mayor's London Plan Part L 2021

For this preliminary assessment, the baseline was analysed using SAP 10 version 1.0.52 - JPA.

The Dwelling Emissions Rate (DER) was multiplied by the total m² of the proposed unit.

This study has been made to predict the most accurate Dwelling Emissions Rate (DER) against the Target Emissions Rate (TER).

BASELINE

The baseline energy and CO₂ emissions have been calculated for scheme, as the proposed development would be assessed under Approved Document Part L of Building Regulations. **The baseline has been calculated as per SAP 10.2.**

This has been calculated following the London Plan Guidance for Energy Statements applicable to new build.

BE LEAN / BE CLEAN

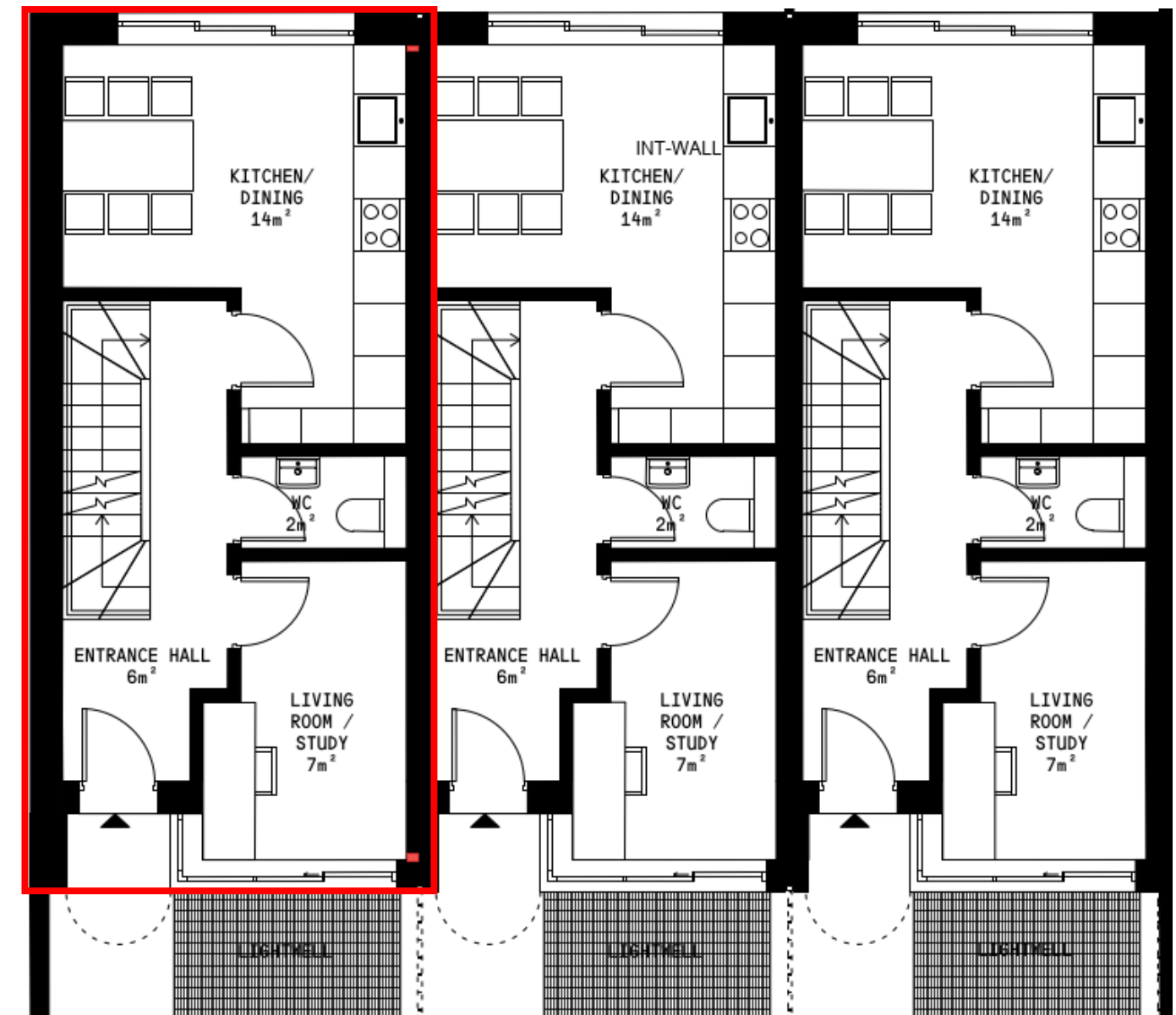
The development will achieve Part L Building Regulations compliance by implementing all possible energy efficiency and energy conservation measures, before any renewable energy system is incorporated to the design.

The proposed development will achieve a reduction in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario of **2%**.

The development is far from the decentralized energy network for potential district heating. Therefore, claiming reduction in the carbon emissions, based on the connection to the local district heating is not feasible. Please refer to Figure 1 for further details.

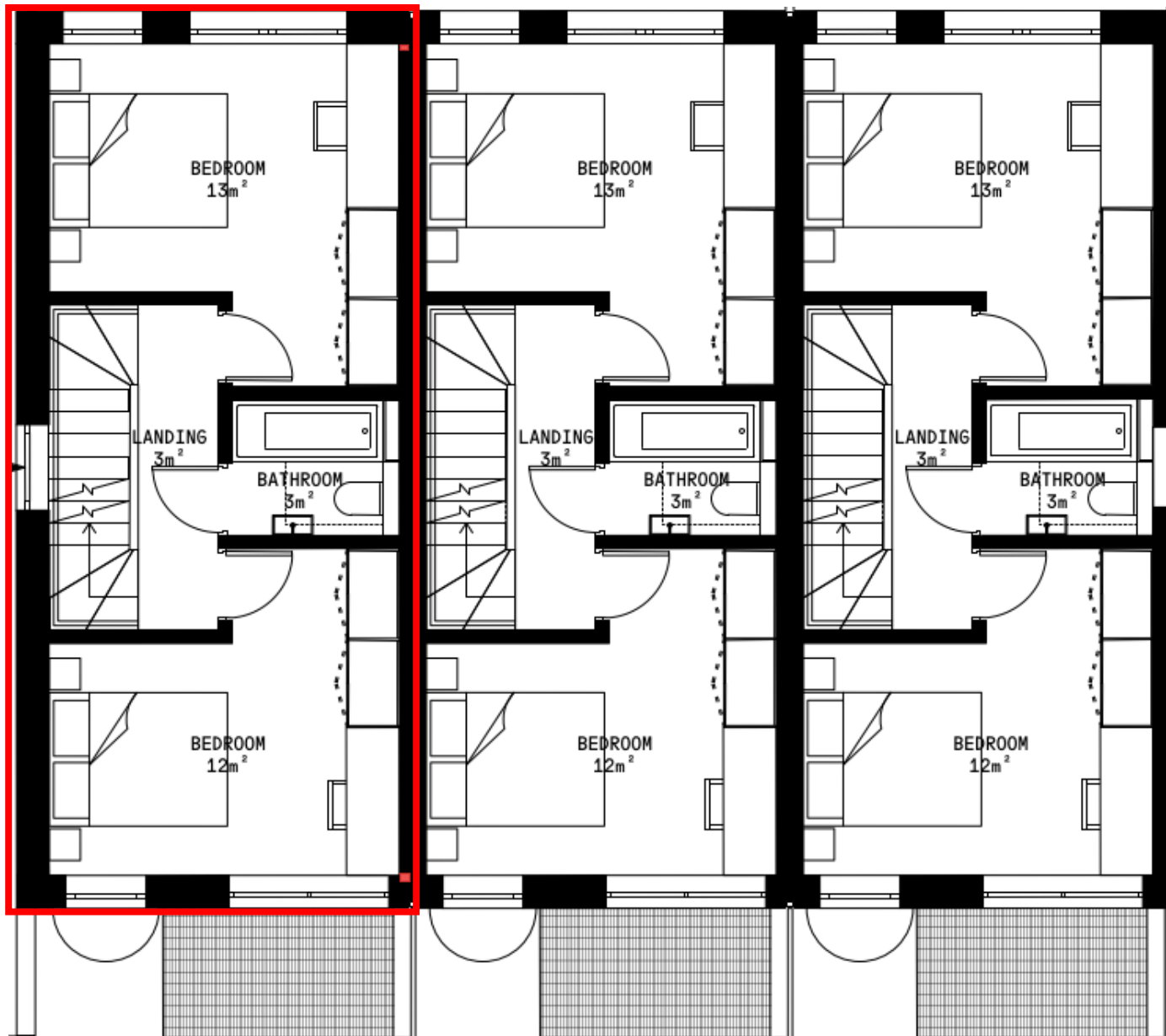
The use of CHP is not viable on a scheme of this size. Instead the target reduction is achieved using the energy efficiency measures and the provision of on-site renewable energy technology.

FIGURE 10- WORST CASE GROUND FLOOR PLAN



ENERGY STATEMENT - METHODOLOGY

FIGURE 11 – WORST CASE: FIRST FLOOR PLAN



BE GREEN

The proposed development will achieve a **72%** CO2 emissions reductions just under the be green scenario, when compared to the Be Lean / Be Clean scenario.

Once all energy efficiency and energy conservation measures have been incorporated to the design, on-site renewable energy technologies have been used to reduce energy and carbon emissions. The required CO2 emissions reductions has been achieved from:

- 1no ASHP from electricity per dwelling.
- 9no PV panels of 450W each: $0.45 \text{ kWp} \times 9 = 4.05 \text{ kWp}$ per house

This equates = 12.15 kWp in total

The residential development will have a combined reduction in CO2 emissions when compared with the baseline of 74%. Please refer to figure 04 for further details.

Using the GLA Carbon Emissions reporting for residential developments, the cash in lieu contribution using the recommended price of £95 per tonne of CO2 would be £5,265.00

To estimate the energy use of the residential development, ECOstudio has used approved SAP 10 version 1.0.2.7 - JPA.

This enables accurate energy and carbon emission figures for both the 'as proposed' situation, and also the 'baseline' conditions.

The specification as proposed is based on a series of simulations to achieve the lowest possible energy use and carbon emissions. See Tables 01no to 08no for the outline specifications. The proposed fabric standards exceed the requirements of Building Regulations.

ENERGY STATEMENT - CONSTRUCTION SPECIFICATIONS

TABLE 01 –SPECIFICATIONS- BUILDING ENVELOPE-MODELLING INPUTS

ELEMENT	U-VALUES (W/m²K)	FURTHER INFORMATION
External Walls	0.11 W/m²K	Improved U-value from Table 1.1 Summary of notional dwelling specification for new dwelling, Part L 1.
Ground Floor	0.10 W/m²K	Improved U-value from Table 1.1 Summary of notional dwelling specification for new dwelling, Part L 1.
Roof	0.10 W/m²K	Improved U-value from Table 1.1 Summary of notional dwelling specification for new dwelling, Part L 1.
Internal Partitions	0.00 W/m²K	Medium dense block partitions finished with plaster, skim and paint.
Upper Floor:	0.00 W/m²K	-
Windows	0.8 W/m²K	Triple glazed windows
Thermal Bridging	0.03	Accredited construction details. Bespoke accredited construction calculations may need to be carried out by ECOstudioXV during detail design stage to achieve the stated HTB value.
Air permeability	2.0 m³/hm²@50Pa	An air pressure test will need to be carried out before completion.

TABLE 02 –SAP SPECIFICATIONS- BUILDING ENVELOPE –GLAZING INPUTS- RESIDENTIAL

ROOM	U-VALUE (W/m²K) Including Frame	G-VALUE	LT VALUE
All Rooms	0.8	<0.60	>0.7

TABLE 03 – PART L VOLUME 1 SAP SPECIFICATIONS- BUILDING ENVELOPE – MODELLING INPUTS

ELEMENT	SYSTEM TYPE/VALUE	FURTHER INFORMATION
Cooling	NONE	
Heating BE LEAN BE CLEAN	Central heating with underfloor heating	- Condensing combi with automatic ignition - Fuel: gas - Seer (90.5%)
Heating BE GREEN	Underfloor via ASHP system	- Fuel: Electricity - Underfloor heating
Heating Controls	YES	Time and Temperature zone control Electricity smart meter present Gas meter present (be lean only)
Secondary heating	-	None
Ventilation	Natural ventilation with intermittent 6no extract fans	- Chimneys :0 - Open flues: 0 - Flue less gas fires: 0
Overheating	-	- Windows fully open - Cross ventilation possible - White roller blinds to all rooms
Lighting		- Low energy fixed lighting outlets: 19 110 lm/W General Lighting
Domestic Hot Water	Combination boiler	Instantaneous from main boiler
	Instantaneous water heating	Electric

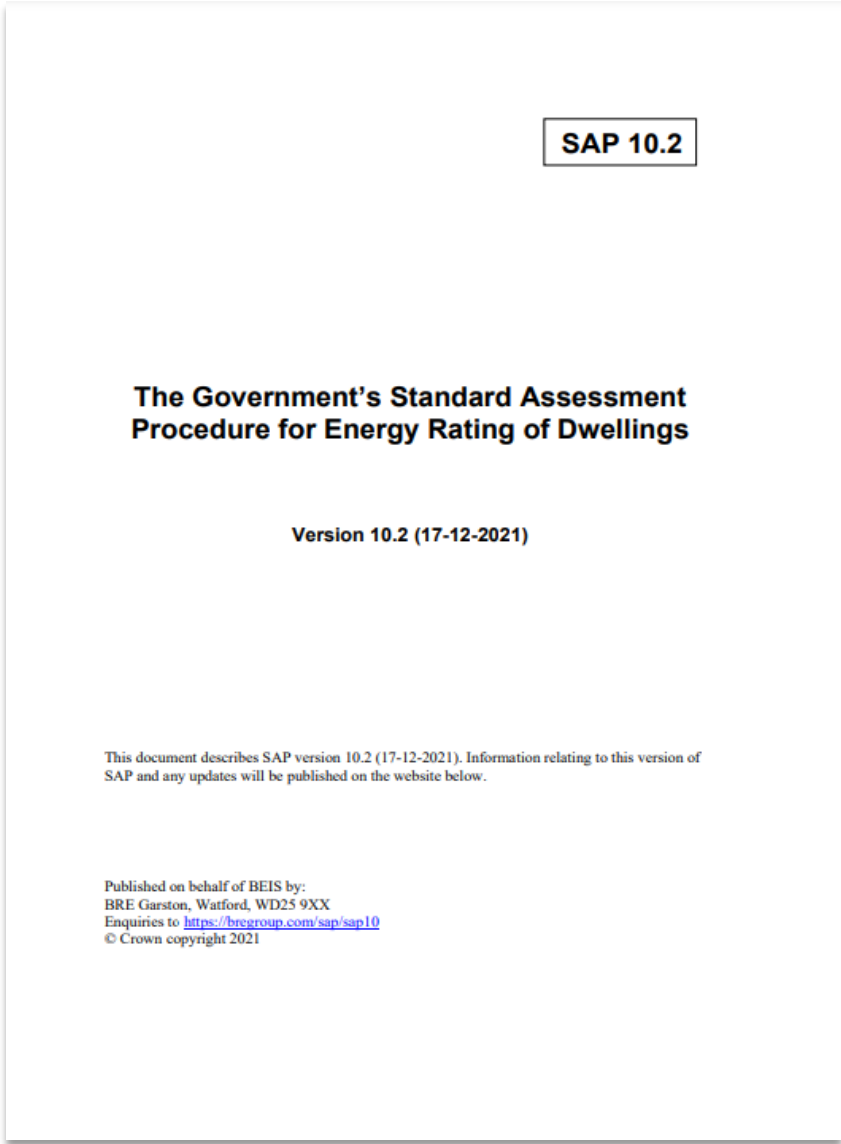


ENERGY STATEMENT - CONSTRUCTION SPECIFICATIONS

TABLE 04 –PART L1 SAP SPECIFICATIONS- BUILDING ENVELOPE – MODELLING INPUTS (CONTINUED)

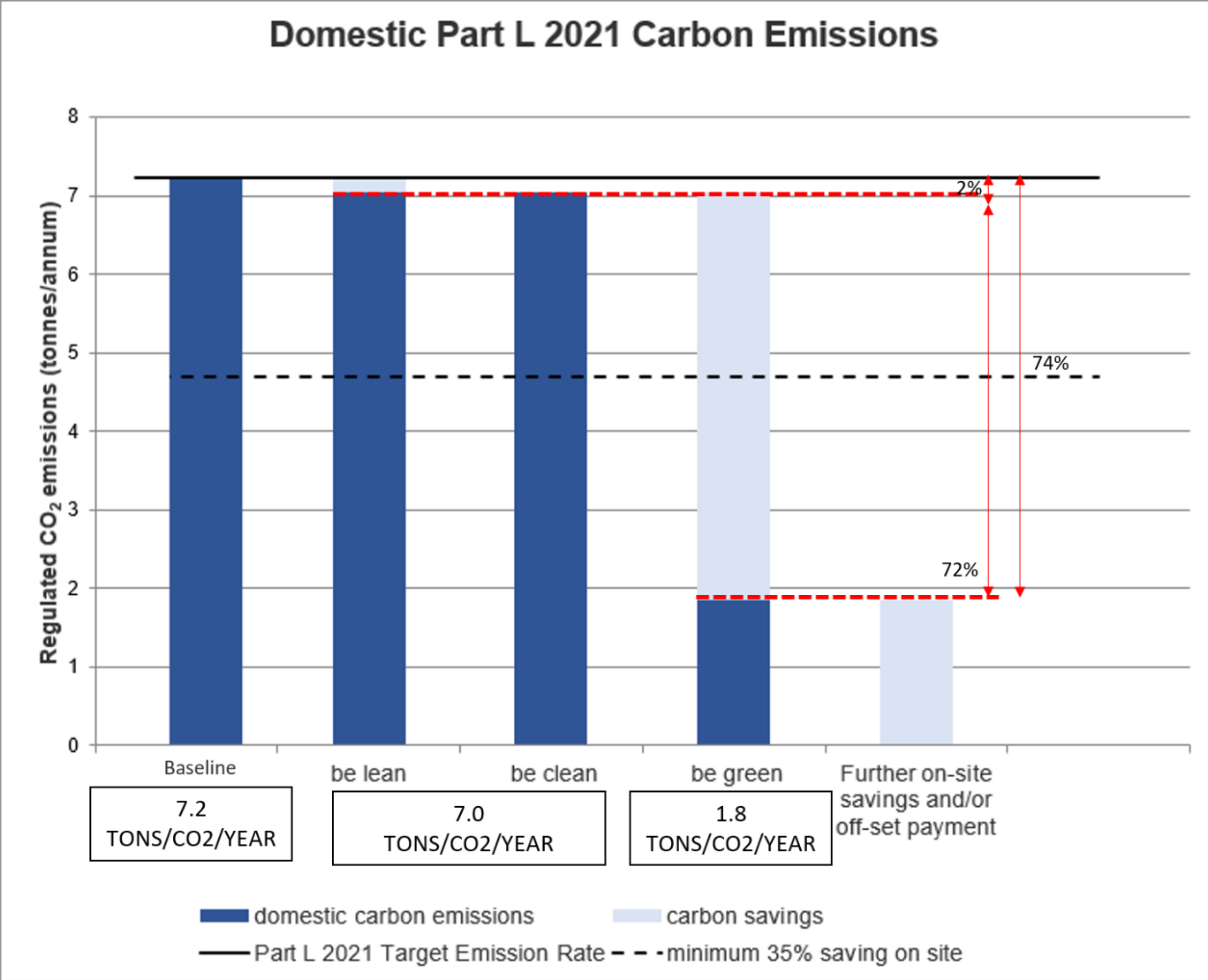
ELEMENT	SYSTEM TYPE/VALUE	FURTHER INFORMATION
Ventilation	Toilets extract and kitchen hood only	Supply Specific Fan Power: 0.30 Wl/S
Renewables	BE LEAN/ BE CLEAN	None
	BE GREEN It is estimated that the most feasible on-site renewable systems would be:	Air Source Heat Pumps (ASHPs), will provide space heating SCoP: 3.5 9no PV panels of 450W each: 0.45 kWp x9 = 4.05 kWp per house This equates = 12.15 kWp in total This would achieve a reduction of 72% in carbon emissions of all regulated emissions.

FIGURE 12 –SAP 10.2 VERSION 10.2 FOR BASELINE AND PROPOSED EMISSIONS



THE BASELINE STANDARD

FIGURE 16 –CO2 EMISSIONS REDUCTIONS FOLLOWING THE GLA ENERGY HIERARCHY



The tables 05 and 06 below show the energy use in kWh/ year and kg/CO₂/year for the Baseline condition and the As Proposed standard for the whole development, which incorporates the Energy Efficiency measures, but not the renewables.

TABLE 05 – CARBON DIOXIDE EMISSIONS AFTER EACH STAGE OF ENERGY HIERARCHY.

ID	ENERGY HIERARCHY	CARBON DIOXIDE EMISSIONS		TOTAL
		(Tones CO2 per annum)		
		REGULATED	UNREGULATED	
A	Baseline: Part L 2013 of Building Regulations Compliant Development	7.2	7.6	14.8
B	After Energy Efficiency (Be Lean)	7	6.1	13.1
C	After Efficient Supply of Energy (Be Clean)	7	6.1	13.1
D	After Renewable Energy Technologies (Be Green)	1.8	6.1	7.9

TABLE 0– REGULATED CARBON DIOXIDE SAVINGS FROM EACH STAGE OF THE ENERGY HIERARCHY.

ID	ENERGY HIERARCHY	REGULATED CARBON DIOXIDE SAVINGS	
		(Tones CO ₂ per annum)	(%)
A-B	Savings from Energy Efficiency (Be Lean)	0.2	2%
B-C	Savings from Efficient Supply of Energy (Be Clean)	0.0	0.0%
C-D	Savings from Renewable Energy Technologies(Be Green)	5.2	72%
A-D	Total Cumulative Savings	5.7	74%



LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 13 –WIND GENERATORS



RENEWABLE OPTIONS

According to the London Housing Design Guide: where feasible, development proposals should incorporate on-site renewable energy generation to reduce carbon dioxide emissions. Renewable energy generation methods include solar thermal systems, biomass-fuelled heating and/or power, ground source heating and cooling, air source heat pumps, photovoltaics, wind power, and renewable energy from waste.

WIND GENERATORS

The economics of wind are driven by two factors: wind flow and rotor diameter, with economies of scale acting strongly in favour of turbines with a capacity of greater than 1MW. Micro-wind is defined as units of less than 4m diameter, having an output of up to 3.5kW.

Another performance factor, particularly relevant to micro wind power is quality of wind flow. Poor wind flow can have a detrimental effect on output levels, efficiency and unit longevity. Poor wind quality is often experienced in urban locations, where neighbouring buildings disrupt turbine operation. The height of the turbine installation relative to neighbouring buildings will help to determine efficiency – ideally, they should be 9m above other obstructions within 100m. It is important to have a detailed survey of the proposed site before proceeding with a wind turbine. Even then small changes in location can have a large effect on the output of the turbine.

A further disadvantage with wind turbines is noise generation.

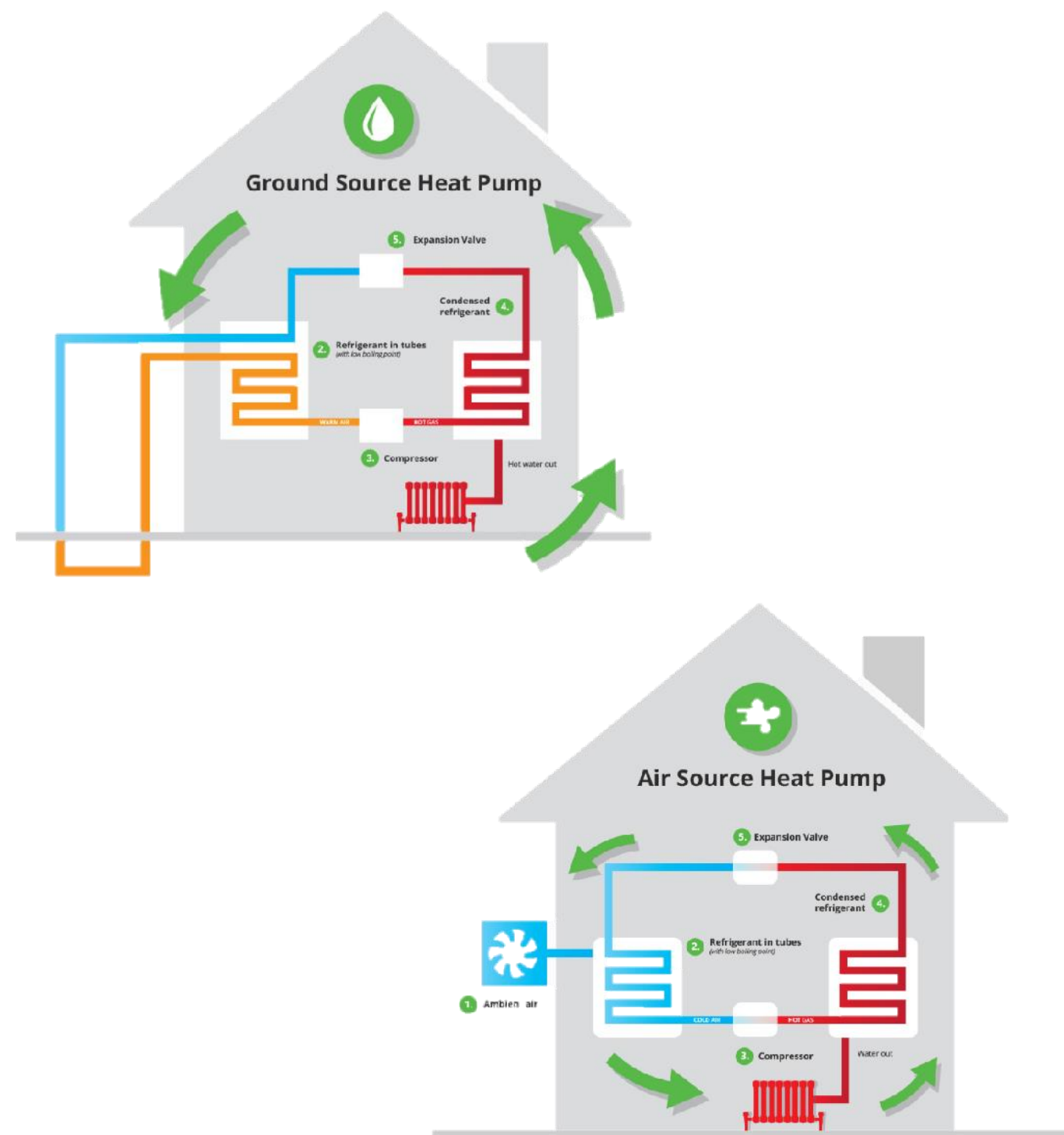
Further issues surrounding turbines consider the visual impact of the units in areas such as this. A turbine would require planning permission, and would probably be not well received by neighbours.

This is an urban site. The average wind speed on this site is low and makes the viable use of a turbine less possible.

Therefore, the energy for the energy statement has excluded wind turbines as a feasible technology.

LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 14 –GROUND AND AIR SOURCE HEAT PUMP SYSTEMS



GROUND SOURCE HEAT PUMP

Ground source heat pumps are used to extract heat from the ground to provide space and water heating. Heat pumps take in heat at a certain temperature and release it at a higher temperature, using the same process as a refrigerator. Fluid is circulated through pipes buried in the ground and pass through a heat exchanger in the heat pump that extracts heat from the fluid. The heat pump raises the temperature of the fluid via the compression cycle to supply hot water to the building as with a normal boiler. The ground pipe system can be horizontal or vertical. The system works most efficiently with underfloor heating.

Key to the effectiveness of GSHP is the pipe system. This can either be a "slinky" style pipe buried in trenches a couple of meters deep, or in much deeper boreholes. Generally, the "slinky" type needs a greater site area which is available on this site.

GSHP are much more efficient than gas boilers, therefore use a lot less energy. However, electricity is more carbon dense than gas, and so some of that benefit is reduced. Nevertheless, overall the use of a GSHP should reduce the amount of CO₂ emitted on the site; similarly with running costs. Although GSHP can be 350+% efficient, that is 3 ½ more efficient than a gas boiler, the cost of electricity is also about 3 ½ the cost of gas, therefore there tends not to be significant running cost saving.

GSHPs are more expensive to install than a traditional gas system. **Therefore, this technology is not suitable for this scheme.**

AIR SOURCE HEAT PUMP

An ASHP works in an identical way to a GSHP. The difference comes in achieving the temperature difference in the system fluids. The GSHP uses the difference in temperature found as you go deeper into the earth. An ASHP uses the difference in air temperatures. Typically, an ASHP is much less efficient than a GSHP. A default efficiency for a GSHP is 350%, whereas for an ASHP it is 300%.

An ASHP is much cheaper to install than a GSHP when there are no ground works, although usually an external condenser unit must be sited on the building.

For the commercial use where there is significant cooling required, and only a minority demand for space heating the use of ASHP becomes viable. There is a saving in the CO₂ emissions, although there is a slight increase in running costs.

This technology is suitable for proposed development.

The noise produced by the external condensing units will be mitigated with ultra quiet systems such as ECODAN R32 ultra quiet PUZ Monobloc Air Source Heat Pumps or equivalent.

LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 15 –AIR SOURCE HEAT PUMP SYSTEMS LOCATION OF EXTERNAL UNITS

Heating Product Information



PUZ-WM60VAA(-BS)
Ecodan R32
Monobloc Air Source Heat Pump

R32

Key Features:

- A+++ high efficiency system
- Ultra quiet noise levels
- Maintains full heating capacity at low temperatures
- Zero carbon solution
- MELCloud enabled

Key Benefits:

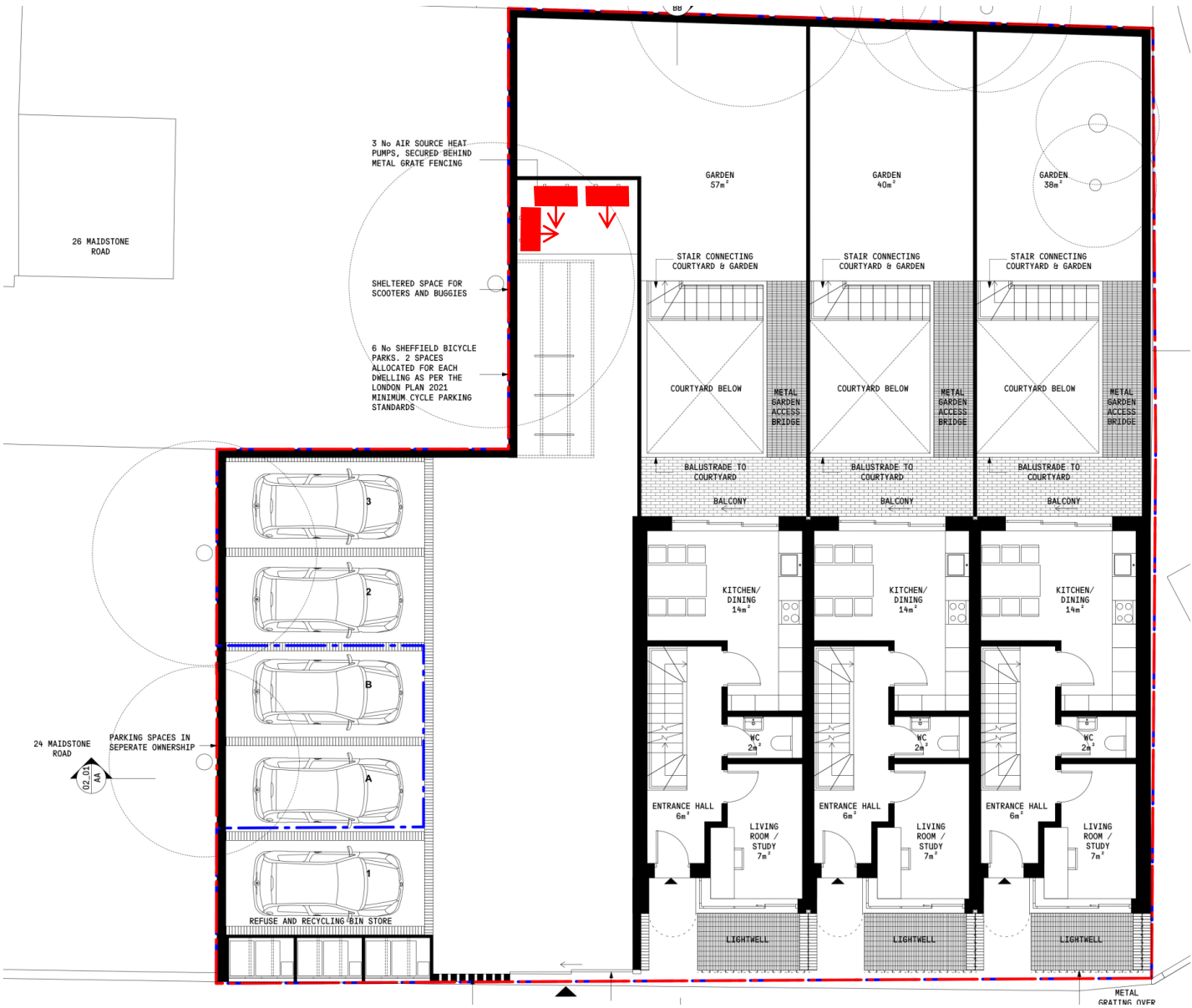
- Ultra low running cost
- Flexible product placement
- Confident and quick product selection
- Help to tackle the climate crisis
- Remote control, monitoring, maintenance and technical support



ecodan.co.uk



AIR SOURCE HEAT PUMP EXTERNAL UNIT



LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 15 –SOLAR WATER HEATING SYSTEM



SOLAR WATER HEATING

Solar water heating systems use the energy from the sun to heat water stored in a hot water cylinder inside the building. The amount of savings from solar thermal is determined by the level of hot water use.

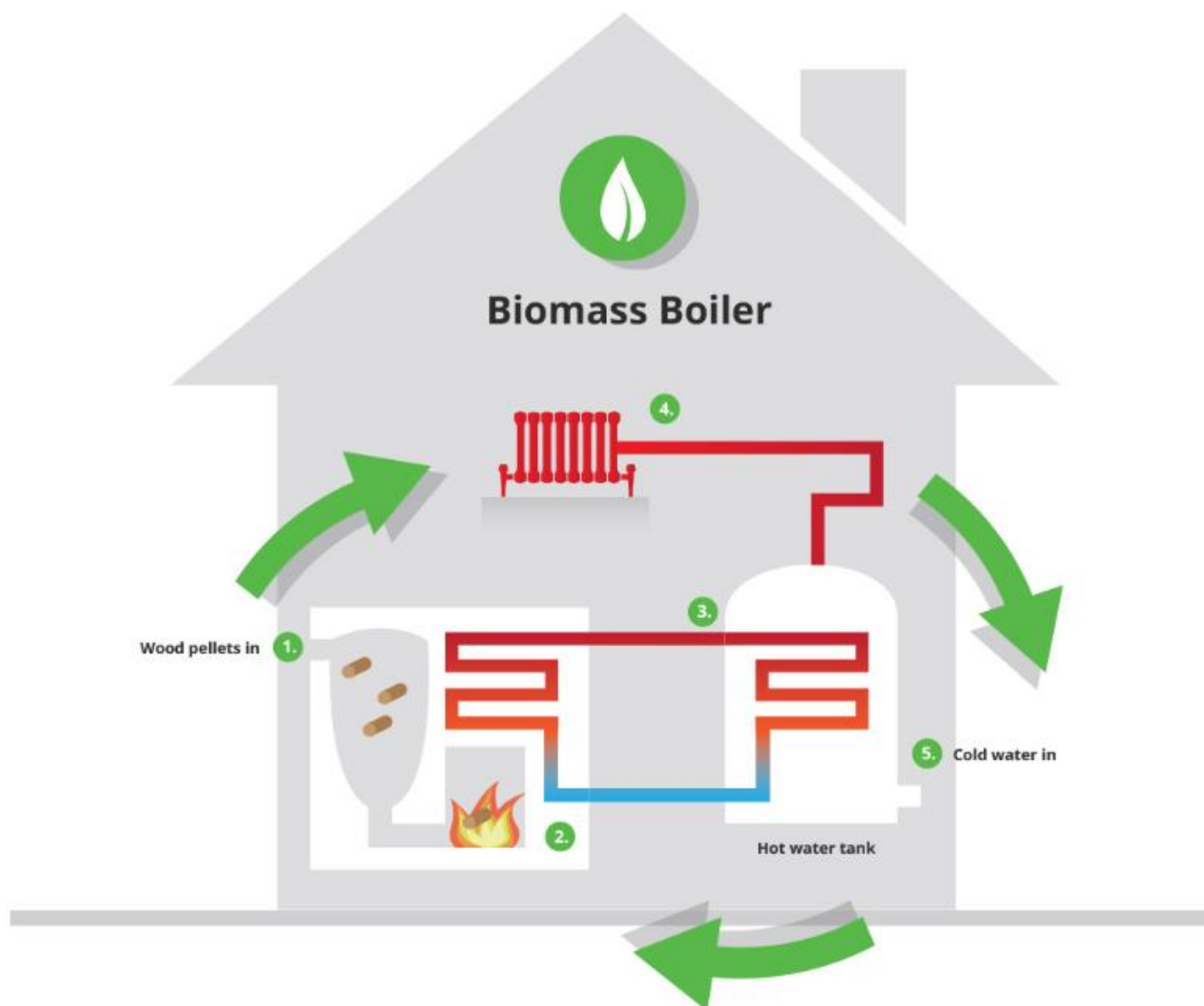
The roof area available for solar panels is the same as for PV. However, the area of panel required is determined by the hot water use. Depending on the type of panel – flat plate glazed, or evacuated tube, there is an optimum area needed for the hot water use. Flat plate glazed panels tend to be less efficient but cheaper than the evacuated tubes. Most installations use the flat plate glazed panels. Such a system would require a cylinder internally which would use up space.

The reductions in carbon emissions over the efficient hot water system proposed will not be great. Similarly, the savings over the proposed system will not be significant. In addition, there is no comparable feed-in tariff for solar thermal systems as there is for PV, therefore the simple payback will be in excess of 80 years, and well beyond the systems expected life of 25 years.

Therefore, this energy strategy has excluded solar water heating as a feasible technology.

LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 16–BIOMASS HEATING SYSTEM.



BIOMASS HEATING

Bio mass is a form of stored solar energy. Plants use the sun's energy to grow and during this process absorb CO₂. When burnt the stored energy and stored CO₂ is released. Biomass fuels are considered virtually carbon neutral because unlike fuels such as gas, oil and coal, if not burnt the CO₂ would be released anyway as the plant material rotted. Therefore, there is no addition to CO₂ in the environment.

Typical biomass fuels include Wood; straw; energy crops; sewage; waste materials. It is a proven technology and has been in use for many years, particularly in northern European countries.

Biomass plants can vary from small manual fed systems, to large fully automatic systems. The most common is wood chips or pellets.

Biomass boilers are much more common in large communal systems, and are often designed to operate alongside back up gas boilers. Typically, the biomass boiler operating on the constant loads, such as hot water, with the back-up gas boilers which have faster reaction times to cope with the variable loads.

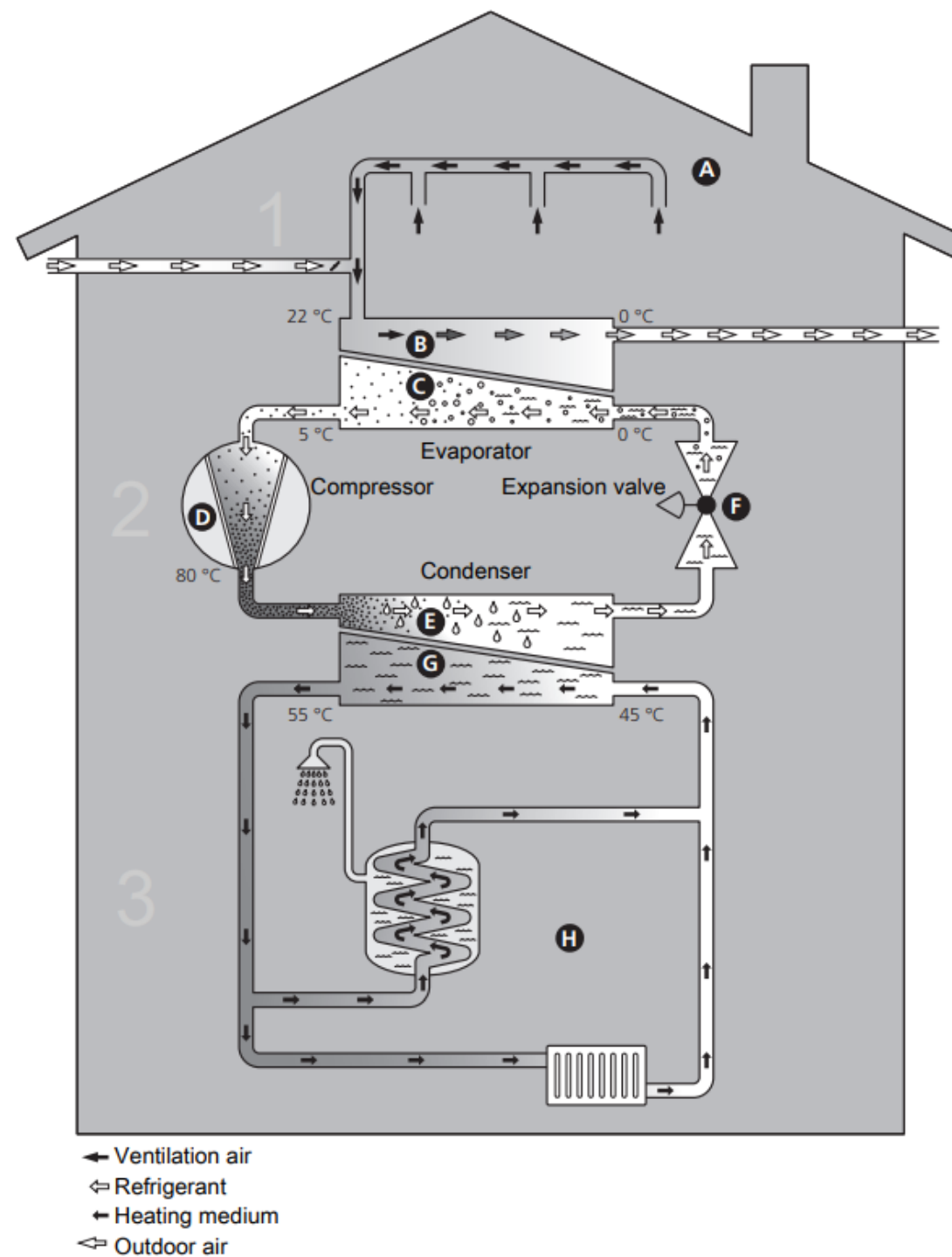
Another key factor of these boilers is that a large fuel store is required. A store is usually sized according to the lorry that is to deliver the fuel, and to minimize the number of deliveries over the year. Therefore, access for large vehicles is required. There is also the need for higher levels of maintenance than there are with gas boilers.

Another important point is the clean air act. Under this Act Local Authorities control the burning of fuels likely to cause smoke. Most urban areas are Smokeless Zones where only authorized smokeless fuels can be burnt. Almost no biomass fuels are authorized as 'smokeless'. However, some biomass fuels can be used provided that an Exempt Appliance is used. Many biomass boilers qualify. However, there will be the need for a chimney, and to work closely with the local authority to ensure any proposed system complies.

Due to the poor economics, limited space for storage, the consequent need for a chimney and related issues on air quality this is not a viable technology for this scheme.

LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 17 –EXHAUST AIR HEAT PUMP SYSTEM



EXHAUST AIR HEAT PUMP

Exhaust air heat pump uses the heat that is in the building's ventilation air to heat up the accommodation. The conversion of the air's energy to heating occurs in three different circuits. Free heating energy is retrieved from the outgoing air (1, in figure 22) from the accommodation and transported to the heat pump. The heat pump increases the retrieved heat's low temperature to a high temperature in the refrigerant circuit, (2, in figure 22). The heat is distributed around the house in the heating medium circuit (3, in figure 22).

An exhaust air heat pump is a profitable solution for new builds of up to 200 m² and sometimes even bigger than that. Using mechanical exhaust air ventilation enables to reduce heating and hot water costs by a third or more compared to a conventional electric boiler. Energy costs can be reduced using renewable energy.

This technology is not suitable for this scheme.

LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 18—PHOTOVOLTAICS



PHOTOVOLTAIC (PV) PANELS

Photovoltaic systems convert energy from the sun into electricity through semi-conductor cells mounted in collector panels. The panels are connected to an inverter to turn the DC output into AC for use in the building to which they are attached and to be fed back into the grid when not required.

Any power generated by the PV panels has a proportionally high saving in terms of CO₂, as the fuel saved is electricity, which is a carbon dense fuel.

In general PV panels will produce more electricity during the day, therefore typically a majority percentage of the generated electricity will be exported. In order to achieve running cost savings, one must find an energy supplier who will purchase this generated electricity. Currently the amount paid for this electricity is quite low sometimes 3p/kWh.

Outputs are usually measured in Kilowatt Peak (kWp). This is the max kW that the panel could produce under perfect conditions.

PV TILES

Traditional PV panels could fail to satisfy aesthetic requirements. Quadratic solar roof tiles with a sub-construction are laid directly onto the sub-roof structure in a scale pattern, replacing conventional roof tiles. Solar roof tiles full all the functions of the roof cladding in terms of strength, durability and weather resistance – with the clear benefit of clean electricity production. The solar roof blends seamlessly into the roofscape, making it the ideal solution for new buildings and energy renovations

- Solar tiles replace conventional tiles
- Can be used from a roof pitch of three degrees (if necessary with a sub-roof)
- Output per square metre: up to 162 watts peak
- Performance guarantee: 25 years

LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 20 –ROOF LAYOUT WITH PVS PANELS



MAXEON 5 COM

POWER RANGE: 430-450 W | EFFICIENCY: Up to 22.2%

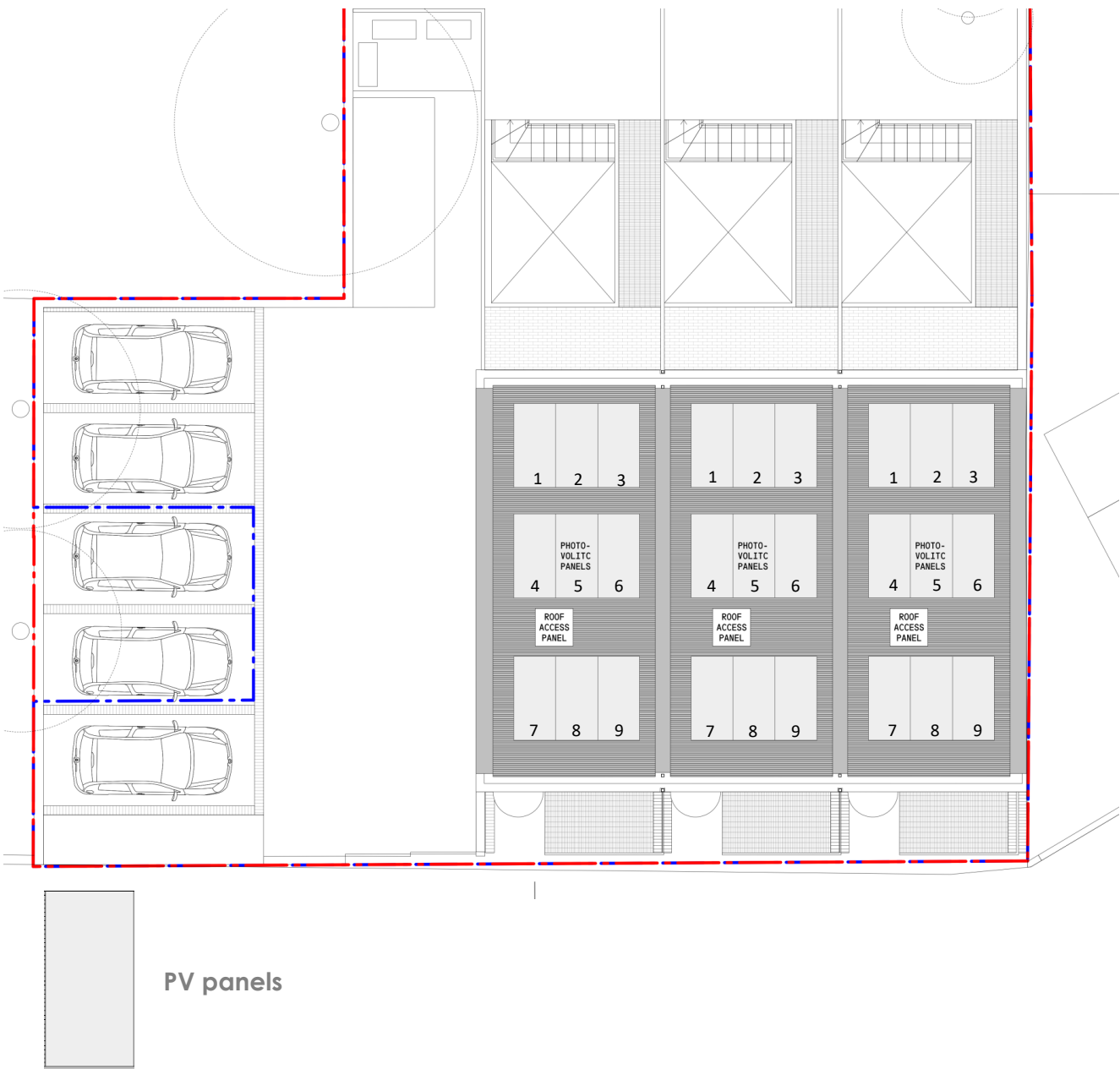
Electrical Data			
	SPR-MAX5-450-COM	SPR-MAX5-440-COM	SPR-MAX5-430-COM
Nominal Power (Pnom) ¹⁰	450 W	440 W	430 W
Power Tolerance	+5/0%	+5/0%	+5/0%
Panel Efficiency	22.2%	21.7%	21.2%
Rated Voltage (Vmpp)	44.0 V	43.4 V	42.7 V
Rated Current (Impp)	10.2 A	10.2 A	10.1 A
Open-Circuit Voltage (Voc) (+/-3%)	51.9 V	51.69 V	51.2 V
Short-Circuit Current (Isc) (+/-3%)	11.0 A	10.9 A	10.9 A
Max. System Voltage	1000 V IEC		
Maximum Series Fuse	20 A		
Power Temp Coef.	-0.29% / ° C		
Voltage Temp Coef.	-136 mV / ° C		
Current Temp Coef.	5.7 mA / ° C		

The residential development will have flat roofs and the PVs would be installed with a 10° angle facing south east.

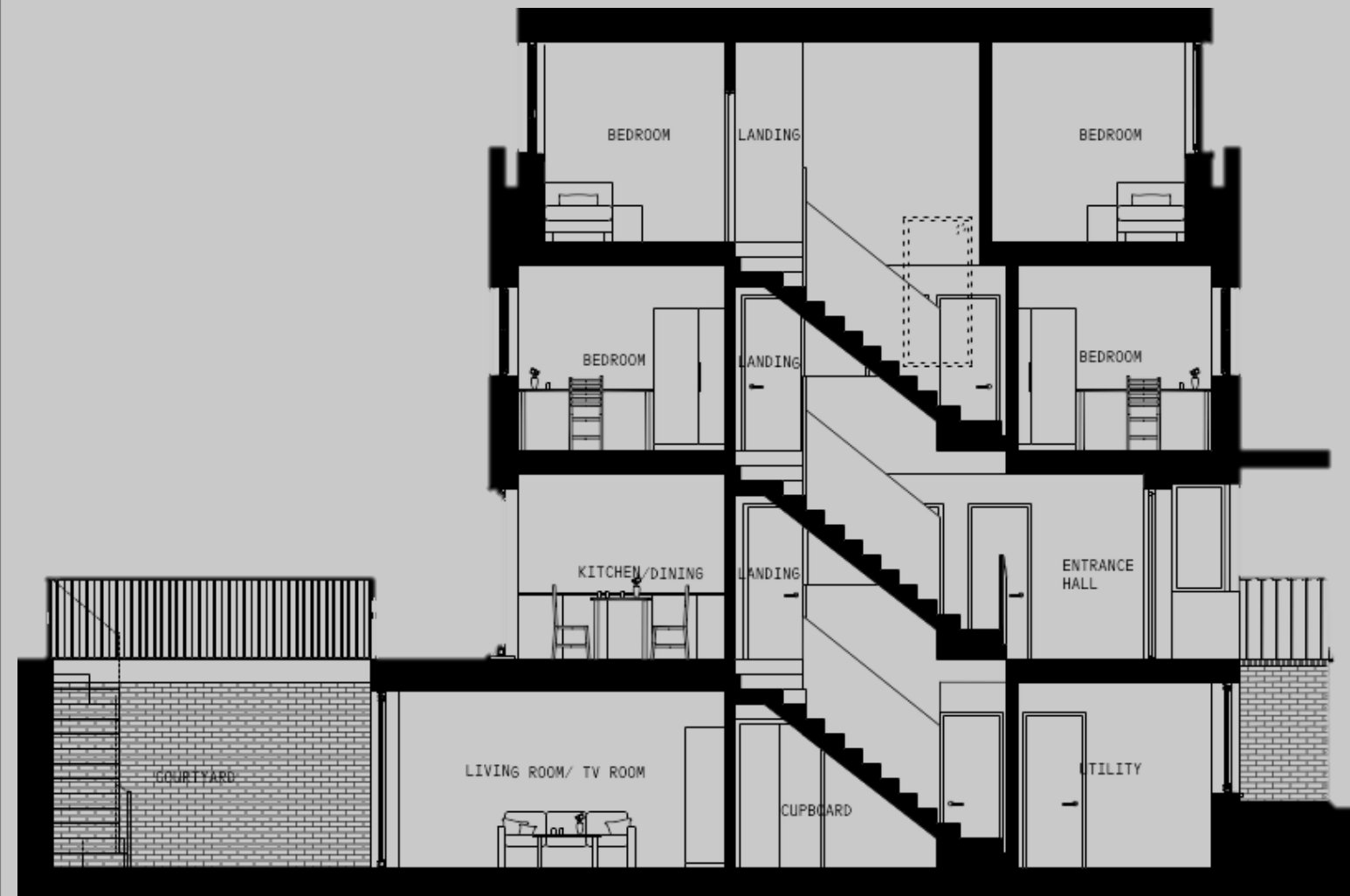
- o 9no PV panels of 450W each: 0.45 kWp x9 = 4.05 kWp per house

This equates = 12.15 kWp in total per 3 houses

This would achieve a combined reduction with other energy efficiency measures of **74%** in carbon emissions of all regulated emissions.



3.0 CONCLUSION



CONCLUSION

The purpose of this document is to demonstrate compliance of the proposed development located at 40 Oak Lane, N11 2TL towards the Energy requirements as listed below in the local, regional and national policies.

ECostudio LTD has been commissioned by vPPR Architects in order to provide an Energy Statement in accordance with:

- London Borough of Haringey.
- Approved Document Part L of Building Regulations, Volume 1: Dwellings v 2021
- Major of London Guidance for Energy Statements, April 2020
- The Mayor's London Plan Part L 2021

This report outlines the specifications for maximizing the environmental performance of the proposed development.

The proposed development consists in erection of 3 semi-detached houses, with basement and two stories. Each unit has 4 beds with communal parking and private gardens.

As per the London Borough of Haringey Local Plan, it will expect that all the developments meet the carbon emission reduction requirements set out in the London Plan:

- Residential developments are expected to be able to achieve on-site savings beyond the minimum 35% improvement (be lean, clean and green).

This report provides a summary on how the residential development will achieve this target, with a combined reduction of 74%.

ENERGY HIERARCHY BE LEAN / BE CLEAN

The development will achieve Part L volume 1 for Residential Building Regulations compliance by implementing all possible energy efficiency and energy conservation measures, before any renewable energy system is incorporated to the design.

The residential development will achieve a reduction of 2% in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario. This has been calculated following the London Plan Guidance for Energy Statements applicable to refurbishments and extensions.

The development is far from the decentralized energy network for potential district heating. Therefore, claiming reduction in the carbon emissions, based on the connection to the local district heating is not feasible. Please refer to Figure 1 for further details.

The use of CHP is not viable on a scheme of this size. Instead the target reduction is achieved using the energy efficiency measures and the provision of on-site renewable energy technology.

BE GREEN

The proposed development will achieve a **72%** CO2 emissions reductions just under the be Green scenario from:

- o **1no ASHP per dwelling**
- o **9no PV panels of 450W each: 0.45 kWp x 9 = 4.05 kWp per house**

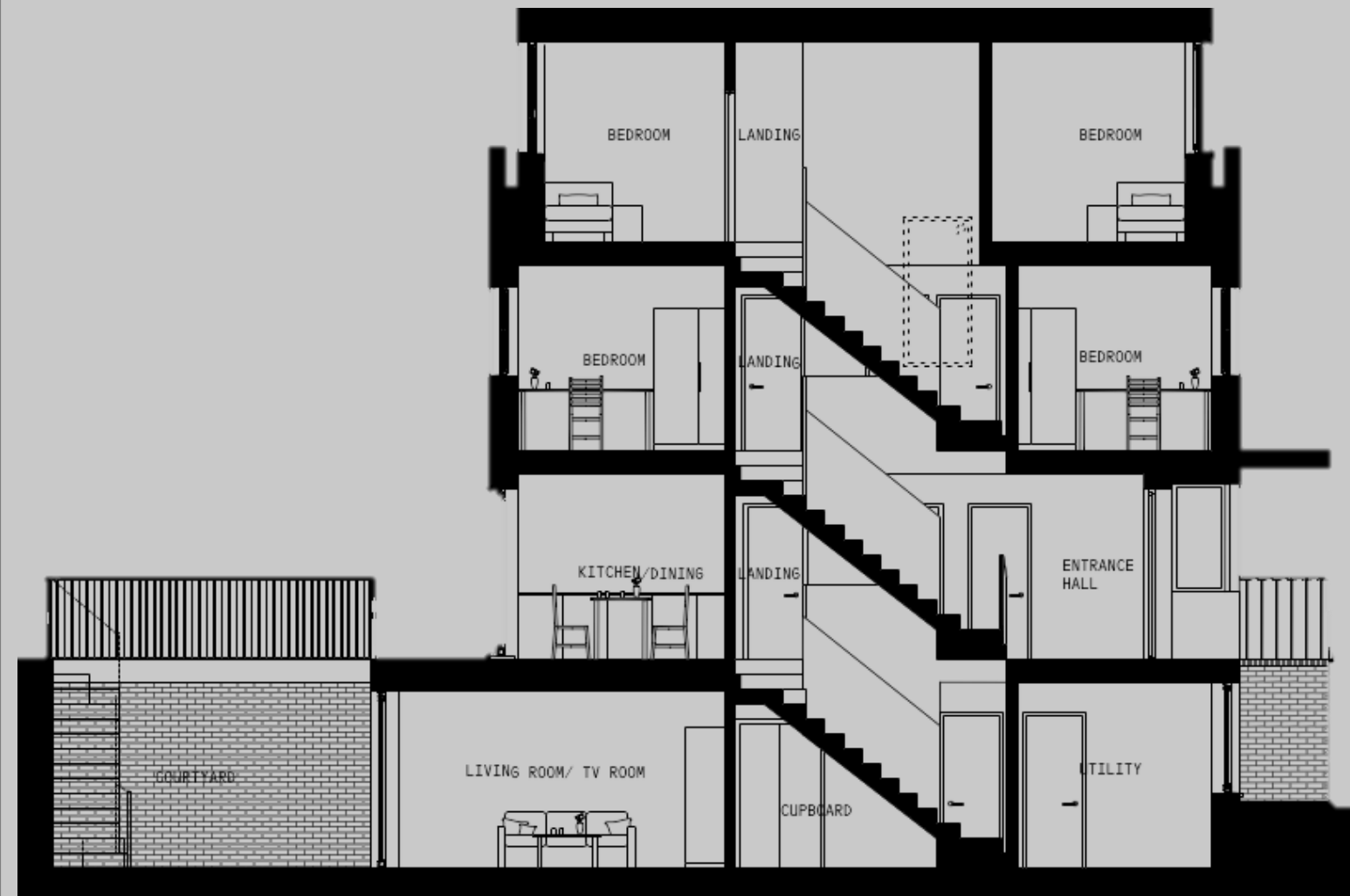
This equates = 12.15 kWp in total per 3 houses

The proposed development will have a combined reduction in CO2 emissions when compared with the baseline of 74%. Please refer to figure 04 and figure 05 for further details.

Using the GLA Carbon Emissions reporting for residential developments, the cash in lieu contribution using the recommended price of £95 per tonne of CO2 would be £5,265.00



4.0 APPENDIX A- PV DETAILS



PV PANELS

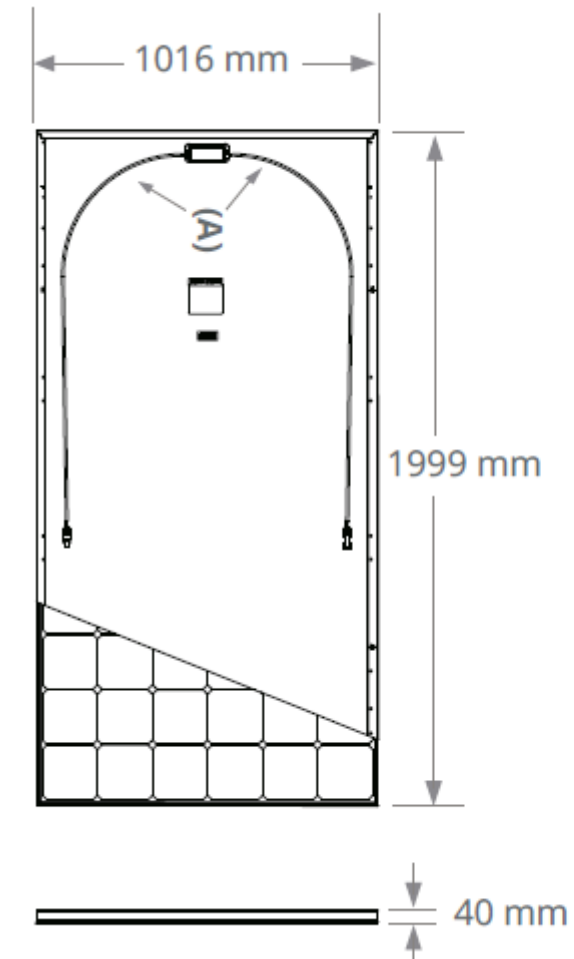
MAXEON 5 COM

POWER RANGE: 430-450 W | EFFICIENCY: Up to 22.2%

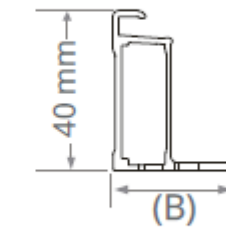


Electrical Data

	SPR-MAX5-450-COM	SPR-MAX5-440-COM	SPR-MAX5-430-COM
Nominal Power (P _{nom}) ¹⁰	450 W	440 W	430 W
Power Tolerance	+5/0%	+5/0%	+5/0%
Panel Efficiency	22.2%	21.7%	21.2%
Rated Voltage (V _{mpp})	44.0 V	43.4 V	42.7 V
Rated Current (I _{mpp})	10.2 A	10.2 A	10.1 A
Open-Circuit Voltage (V _{oc}) (+/-3%)	51.9 V	51.69 V	51.2 V
Short-Circuit Current (I _{sc}) (+/-3%)	11.0 A	10.9 A	10.9 A
Max. System Voltage		1000 V IEC	
Maximum Series Fuse		20 A	
Power Temp Coef.		-0.29% / °C	
Voltage Temp Coef.		-136 mV / °C	
Current Temp Coef.		5.7 mA / °C	



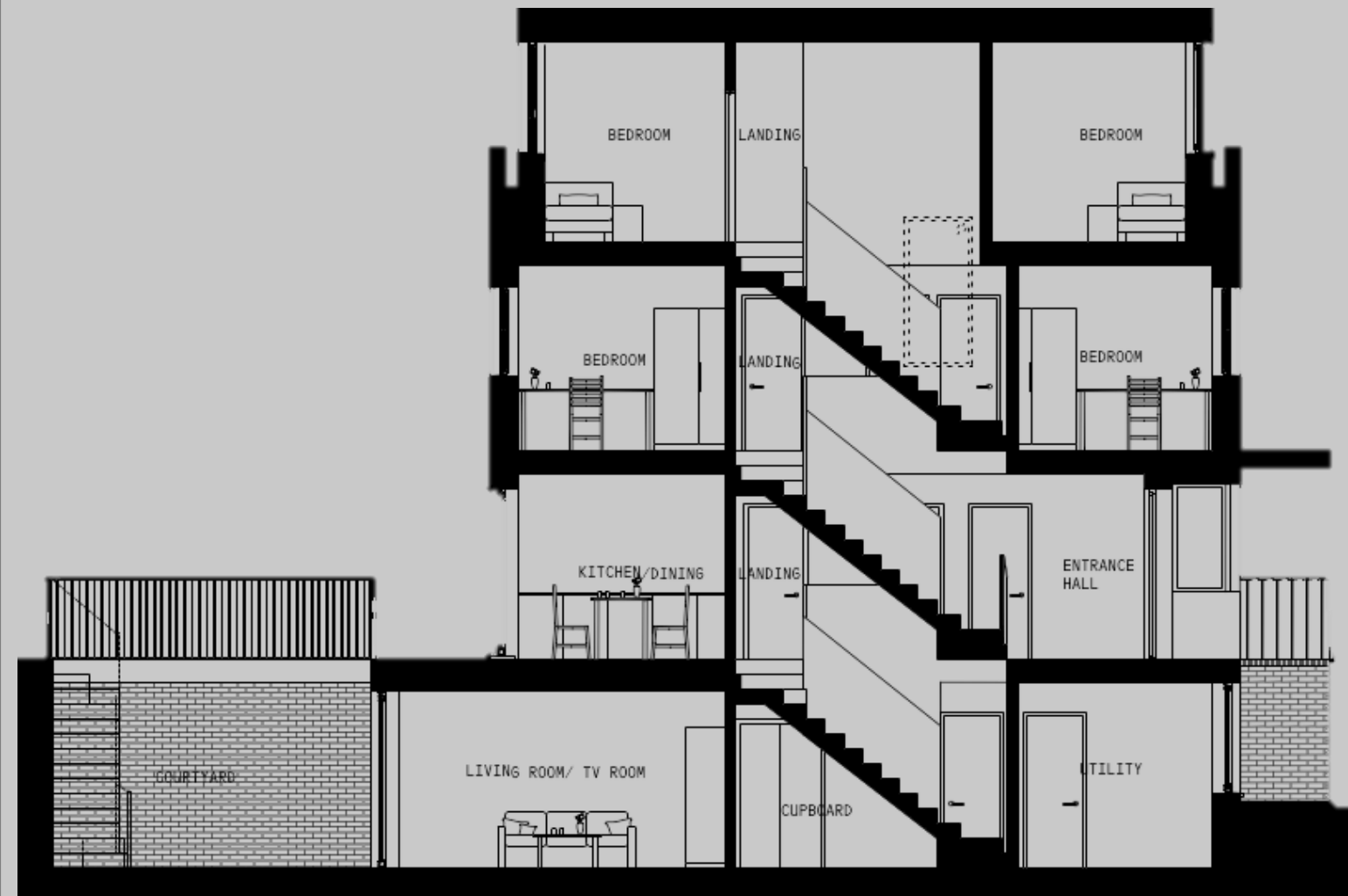
FRAME PROFILE



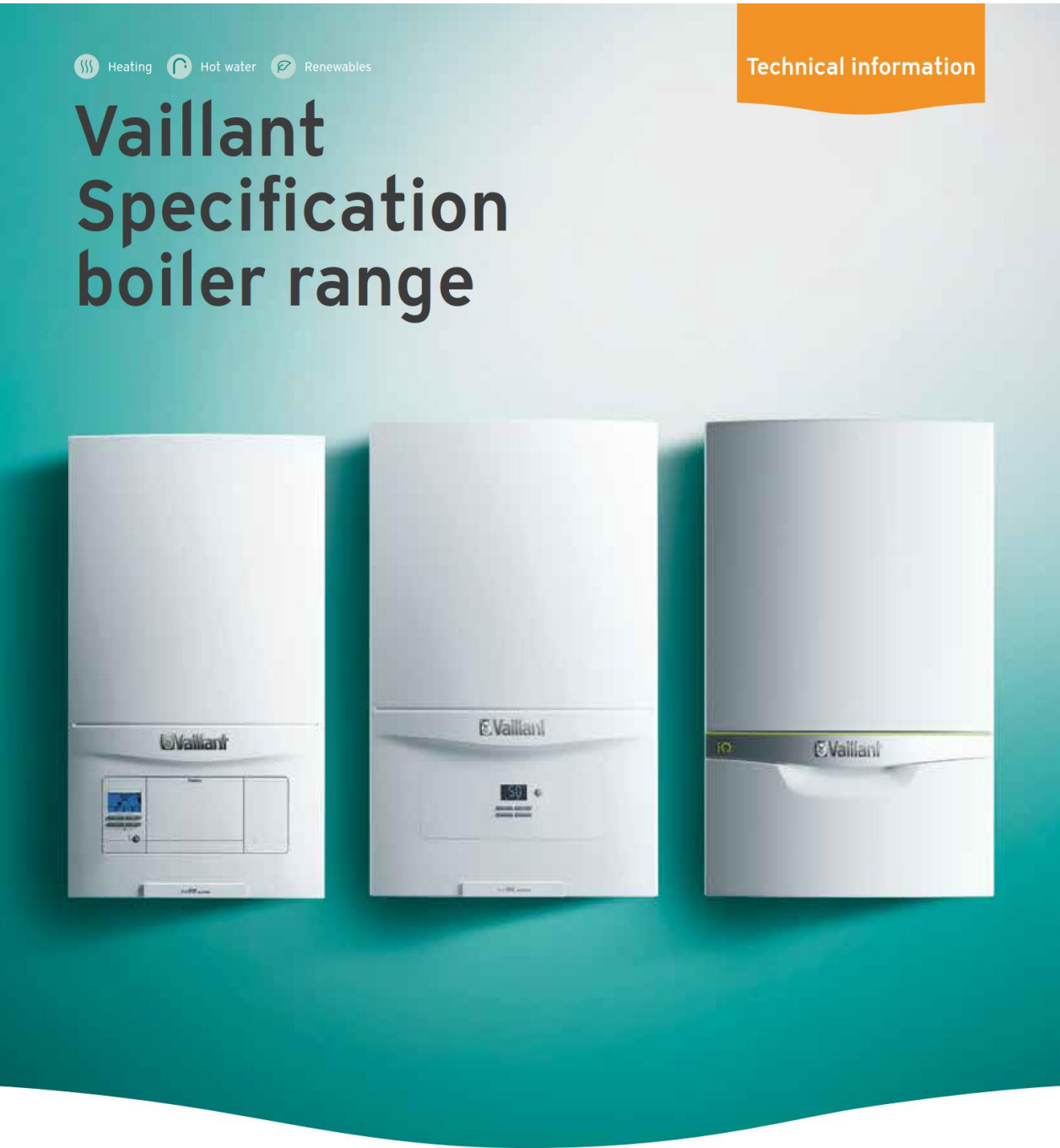
(A) Cable Length:
1320 mm +/-10 mm

(B) Long Side: 32 mm
Short Side: 24 mm

5.0 APPENDIX B- BOILER SPECIFICATION BE LEAN SCENARIO (ONLY)



POSSIBLE BOILER SPECIFICATION



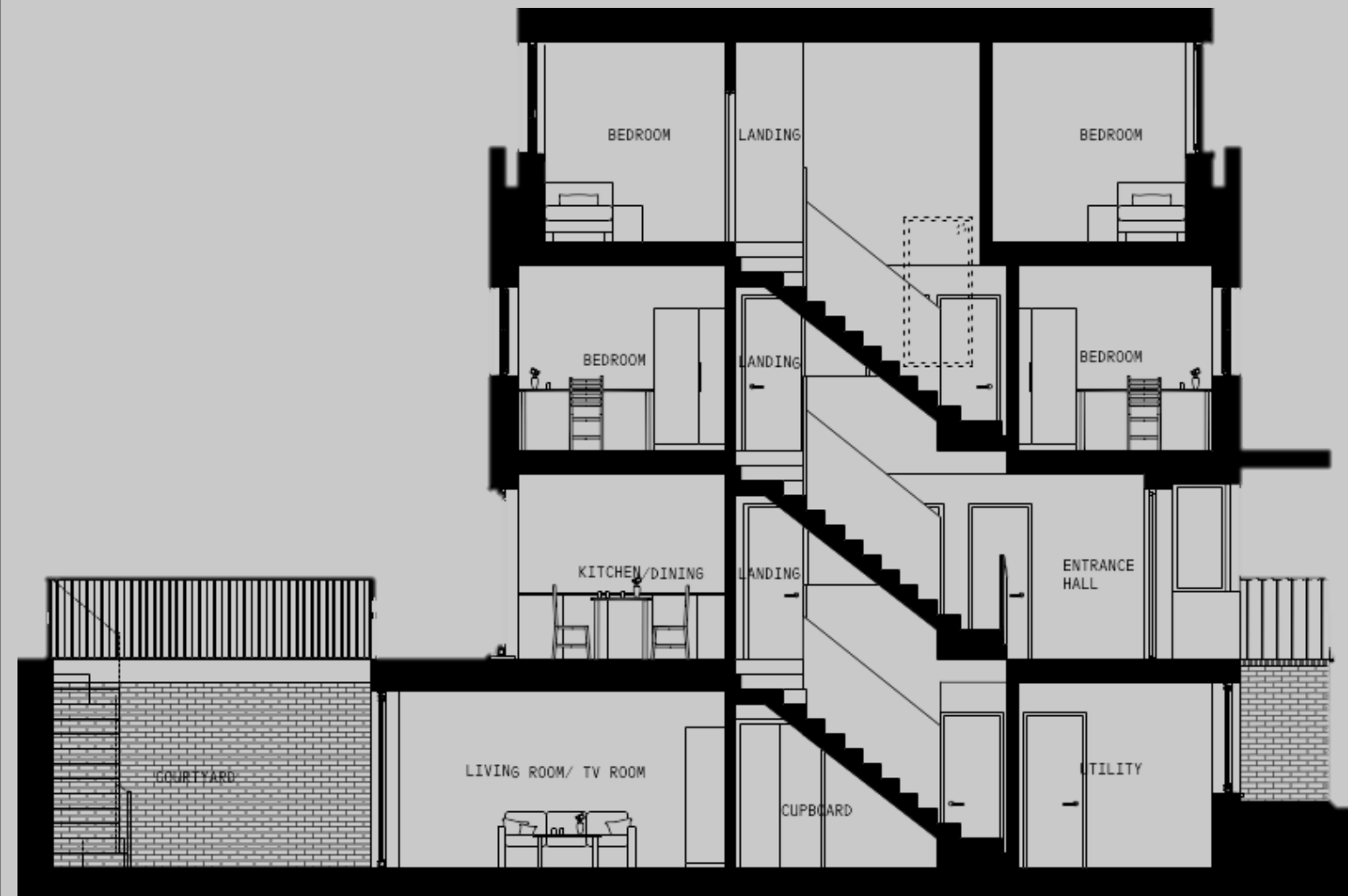
 Comfort for your home

Technical data	Unit of measure	25kW combi	30kW combi	35kW combi
Article number		0010020392	0010020393	0010020394
PCDB number		017958	017959	017960
Boiler dimensions (HxWxD)	mm	702 x 390 x 295	702 x 390 x 295	702 x 390 x 295
Flue options		Top / rear	Top / rear	Top / rear
Maximum flue length (60/100) horizontal/vertical	m	10 / 10	10 / 10	10 / 10
Maximum flue length (80/125) horizontal/vertical	m	25 / 25	25 / 25	25 / 25
Boiler lift weight - dry boiler	kg	32	33	33
Nominal heat output range at 50/30°C (condensing mode)	kW	5.3 - 19.1	6.3 - 19.1	7.5 - 19.1
Nominal heat output range at 80/60°C (condensing mode)	kW	5.1 - 18.3	6.1 - 18.3	7.2 - 18.3
Maximum flow temperature	°C	80	80	80
Flow temperature range	°C	10 - 80	10 - 80	10 - 80
Domestic hot water flow rate (at ΔT = 35K)	l/min	10.4	12.2	14.1
Flow temperature factory setting	°C	75	75	75
PCDB seasonal efficiency (SAP 2012)	%	89.3	89.3	89.3
ErP efficiency	%	93	93	93
ErP rating (heating/hot water)	A+++ - D/A+ - F	A/A	A/A	A/A
Sound power/ErP decibel rating	dB(A)	49	44	45
NOx (En 15502-2-1)	mg/kWh	39	38	37
		15kW system	18kW system	30kW system
Article number		0010025271	0010025272	0010025273
PCDB number		18403	18404	18405
Boiler dimensions (HxWxD)	mm	702 x 390 x 295	702 x 390 x 295	702 x 390 x 295
Flue options		Top / rear	Top / rear	Top / rear
Maximum flue length (60/100) horizontal/vertical	m	10 / 10	10 / 10	10 / 10
Maximum flue length (80/125) horizontal/vertical	m	25 / 25	25 / 25	25 / 25
Boiler lift weight - dry boiler	kg	31	31	32
Nominal heat output range at 50/30°C (condensing mode)	kW	4.7 - 15.9	5.2 - 19.1	7.5 - 31.8
Nominal heat output range at 80/60°C (condensing mode)	kW	4.5 - 15.2	5.0 - 18.3	7.2 - 30.5
Maximum flow temperature	°C	80	80	80
Flow temperature range	°C	10 - 80	10 - 80	10 - 80
Flow temperature factory setting	°C	75	75	75
PCDB seasonal efficiency (SAP 2012)	%	89.8	89.7	89.8
ErP efficiency	%	94	94	94
ErP rating (heating)	A+++ - D/A+ - F	A	A	A
Sound power/ErP decibel rating	dB(A)	48	49	54
NOx (En 15502-2-1)	mg/kWh	33	39	40
		15kW open vent	18kW open vent	30kW open vent
Article number		0010025274	0010025275	0010025276
PCDB number		18400	18401	18402
Boiler dimensions (HxWxD)	mm	602 x 375 x 295	602 x 375 x 295	602 x 375 x 295
Flue options		Top / rear	Top / rear	Top / rear
Maximum flue length (60/100) horizontal/vertical	m	10 / 10	10 / 10	10 / 10
Maximum flue length (80/125) horizontal/vertical	m	25 / 25	25 / 25	25 / 25
Boiler lift weight - dry boiler	kg	22	22	22
Nominal heat output range at 50/30°C (condensing mode)	kW	4.7 - 15.9	5.2 - 19.1	7.4 - 31.8
Nominal heat output range at 80/60°C (condensing mode)	kW	4.5 - 15.2	5.0 - 18.3	7.1 - 30.5
Maximum flow temperature	°C	80	80	80
Flow temperature range	°C	10 - 80	10 - 80	10 - 80
Flow temperature factory setting	°C	75	75	75
PCDB seasonal efficiency (SAP 2012)	%	89.8	89.7	89.8
ErP efficiency	%	94	94	94
ErP rating (heating)	A+++ - D/A+ - F	A	A	A
Sound power/ErP decibel rating	dB(A)	48	51	55
NOx (En 15502-2-1)	mg/kWh	33	39	40

* Vaillant combi boilers are fitted with a flow regulator set to achieve a temperature rise of 42°C. This maintains comfortable bathing and showering during the colder months of the year.



6.0 APPENDIX C - SAP CALCULATIONS



APPENDIX B: SAP CALCULATIONS

FIGURE 26 – SAP CALCULATIONS, BE LEAN

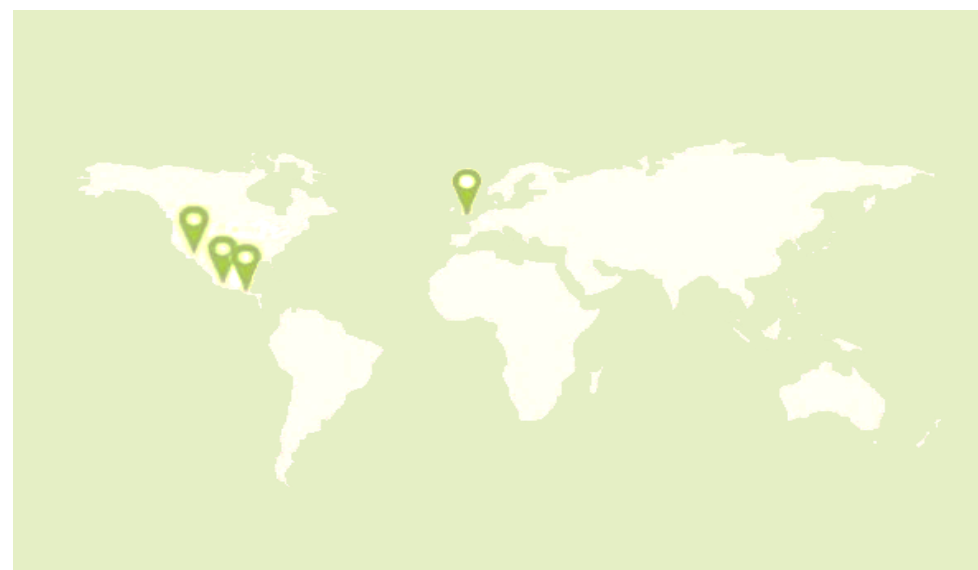
Conservation of Fuel & Power in Dwellings - SAP 10						
786_230315_BeLean SAP 10.2 v 1-0-2-7_EC						
TER	DER	TPER	DPER	TFEE	DFEE	
16.15	15.76	85.04	88.06	54.5	38.2	Energy Rating B (84)

England Thames Valley			Permitted Max	Achieved U-value (W/m ² K) (worst/area weighted)
Opaque elements				
Pitched roofs insulated between joists			0.16	...
Pitched roofs insulated between rafters			0.16	0.11 / 0.110
Pitched roofs with integrated insulation			0.16	..
Flat roofs			0.16	...
Sloping walls, skillings, cambceils			0.26	0.00 / 0.110
Walls			0.26	0.11 / 0.110
Party walls			0.20	0.05 / 0.050
Floors			0.18	..
Ground floors			0.18	0.10 / 0.100
Windows, doors, rooflights				
Average U-value				1.00 / 0.809

FIGURE 27 – SAP CALCULATIONS, BE GREEN

Conservation of Fuel & Power in Dwellings - SAP 10						
786_230315_BeGreen SAP 10.2 v 1-0-2-7_EC-XV-0						
TER	DER	TPER	DPER	TFEE	DFEE	
15.59	4.13	82.02	41.42	54.5	38.2	Energy Rating B (85)

England Thames Valley			Permitted Max	Achieved U-value (W/m ² K) (worst/area weighted)
Opaque elements				
Pitched roofs insulated between joists			0.16	...
Pitched roofs insulated between rafters			0.16	0.11 / 0.110
Pitched roofs with integrated insulation			0.16	..
Flat roofs			0.16	...
Sloping walls, skillings, cambceils			0.26	0.00 / 0.110
Walls			0.26	0.11 / 0.110
Party walls			0.20	0.05 / 0.050
Floors			0.18	..
Ground floors			0.18	0.10 / 0.100
Windows, doors, rooflights				
Average U-value				1.00 / 0.809



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