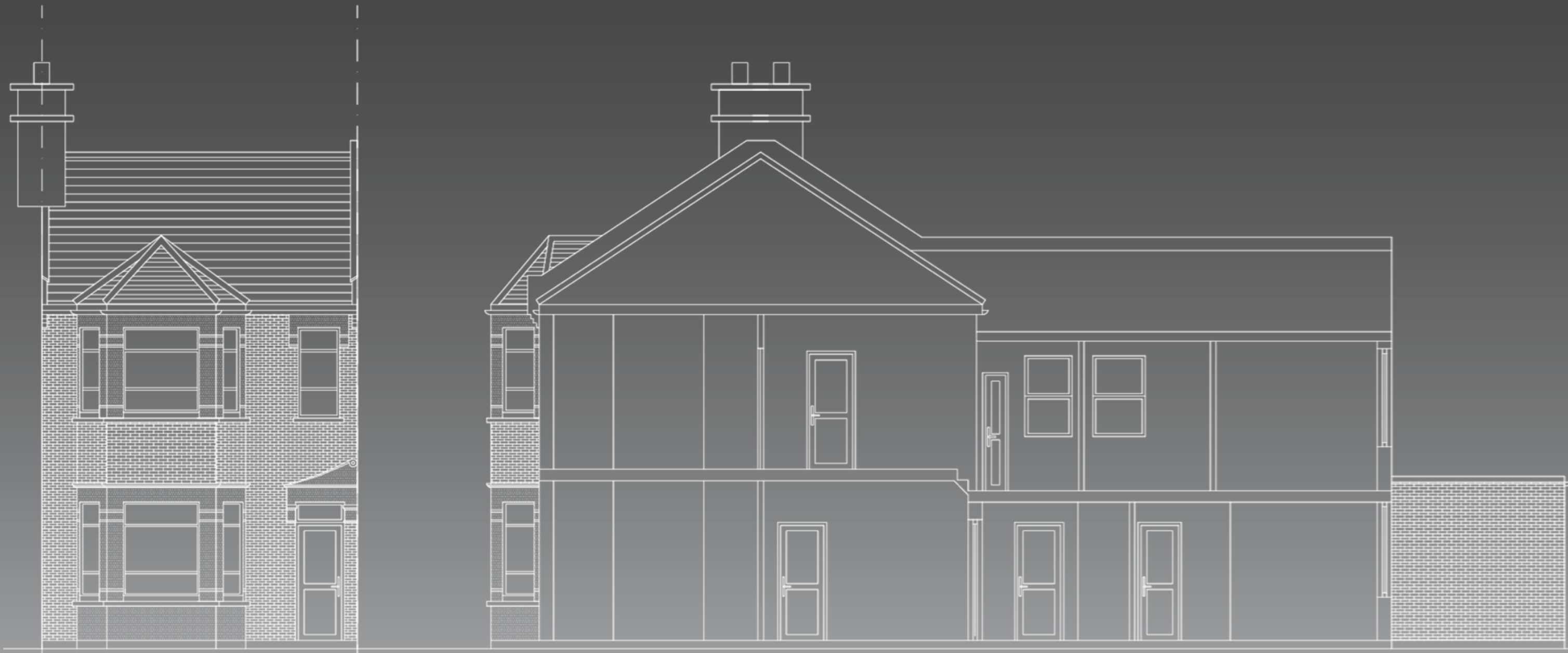




ENERGY STATEMENT – OCTOBER 2023

89 WILLINGDON ROAD

LONDON
N22 6SE

EC  STUDIO 

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DISCLAIMER NOTE

This Report has been produced to support a Planning Application and is not to be used 'For Construction', for Building Control compliance or for a Planning Condition on an approved scheme.

The information contained within this Report is based on Drawings and Specifications provided by the Design Team along with preliminary assumptions by ECostudio XV Ltd for the purposes of compliance where no other information was available.

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ECostudio XV LTD current scope is for planning stage only. However, a complete scope to follow through the proposed development from detail design, construction documents and construction is available upon request.

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1.0 EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

The purpose of this document is to summarize the energy statement for the proposed development located at 89 Willingdon Road, London, N22 6SE.

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

- Haringey Local Plan.
- Approved Document Part L1 of Building Regulations, 2021 Edition
- Major of London Guidance for Energy Statements, June 2022
- RdSAP 2012 version 9.92 (Applicable from June 2014) Appendix S

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

The proposed development consist in the refurbishment and extension of the existing building at 89 Willingdon Road. Proposed works consist of a ground floor rear extension, refurbishment and division of the existing house into 1no x 3no bedroom flat (ground floor) and 1no x 2no bedroom flat (first floor). The occupancy type is a residential building.

As per Haringey Local Plan, it will be expected that minor new residential schemes, like this one, meet the following criteria:

- All new minor residential schemes must achieve a 35% reduction in CO2 emissions against a Haringey Local Plan.

This report provides a summary on how the refurbished house and new build extension development will achieve this target, with a combined reduction of **80%** for refurbished house development and **75%** for new build extension. Please see figure 03 and 04 for further information.

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 refurbished house will achieve a reduction of **17%** in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario.

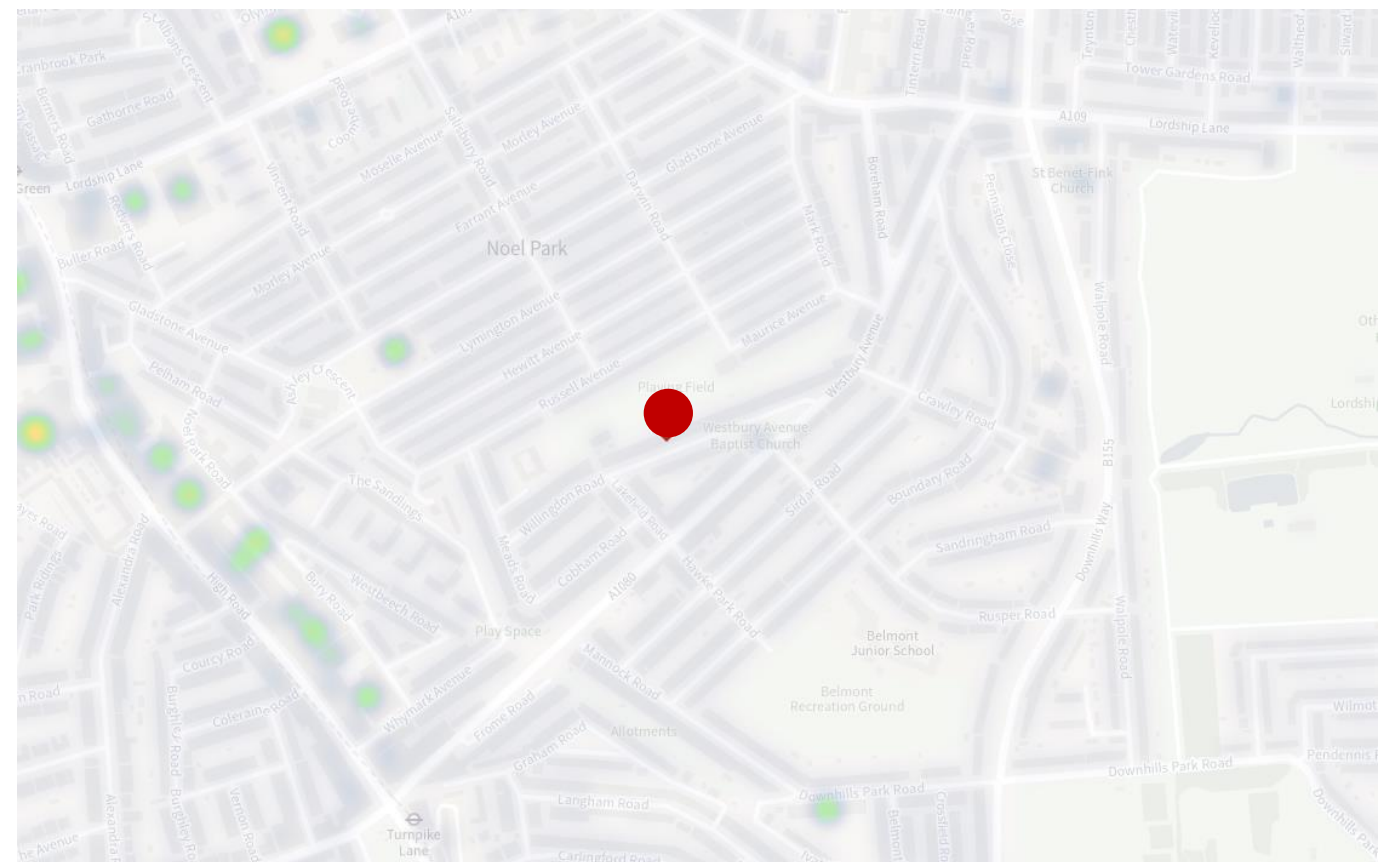
The new build extension will achieve a reduction of **6%** in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario.

For developments consisting of a refurbishment with a new build extension, the CO2 savings for the new and refurbished elements are presented separately within the energy strategy. The new build elements are assessed in line with the methodology for new build development and comply with London Plan policy.

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 refurbished house development will achieve a **63%** CO2 emissions reductions and the new build extension development **69%** just under the be Green scenario from:

- 9no PV panels of 450W each: 0.45 kWh x9 = 4.05 kWh
- 1no Air Source Heat Pump (ASHP) per unit for space and water heating.

This equates = **4.05 kWp** in total.

In addition to the energy coming from the PV panels the other renewable low carbon system to be used, will be a ASHP for space heating. **Please refer to tables 01 to 04 and Appendix A and C for further details.**

The refurbished house development will have a combined reduction in CO2 emissions when compared with the baseline of 80%. Please refer to figures 03 for further details.

The new build extension development will have a combined reduction in CO2 emissions when compared with the baseline of 75%. Please refer to figures 04 for further details.

FIGURE 02 – THE LONDON PLAN ENERGY HIERARCHY

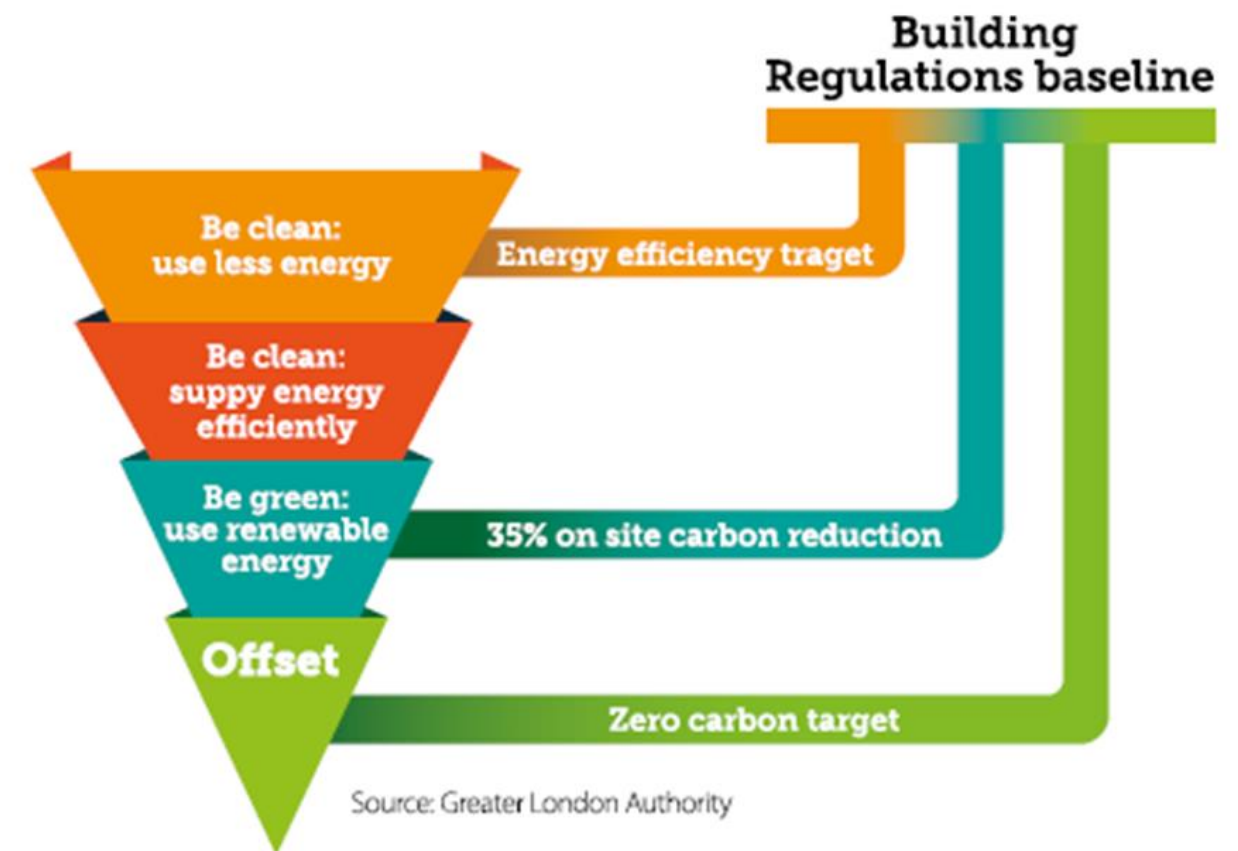


FIGURE 03 – ENERGY HIERARCHY GRAPH – **REFURBISHED HOUSE** - DOMESTIC PART L

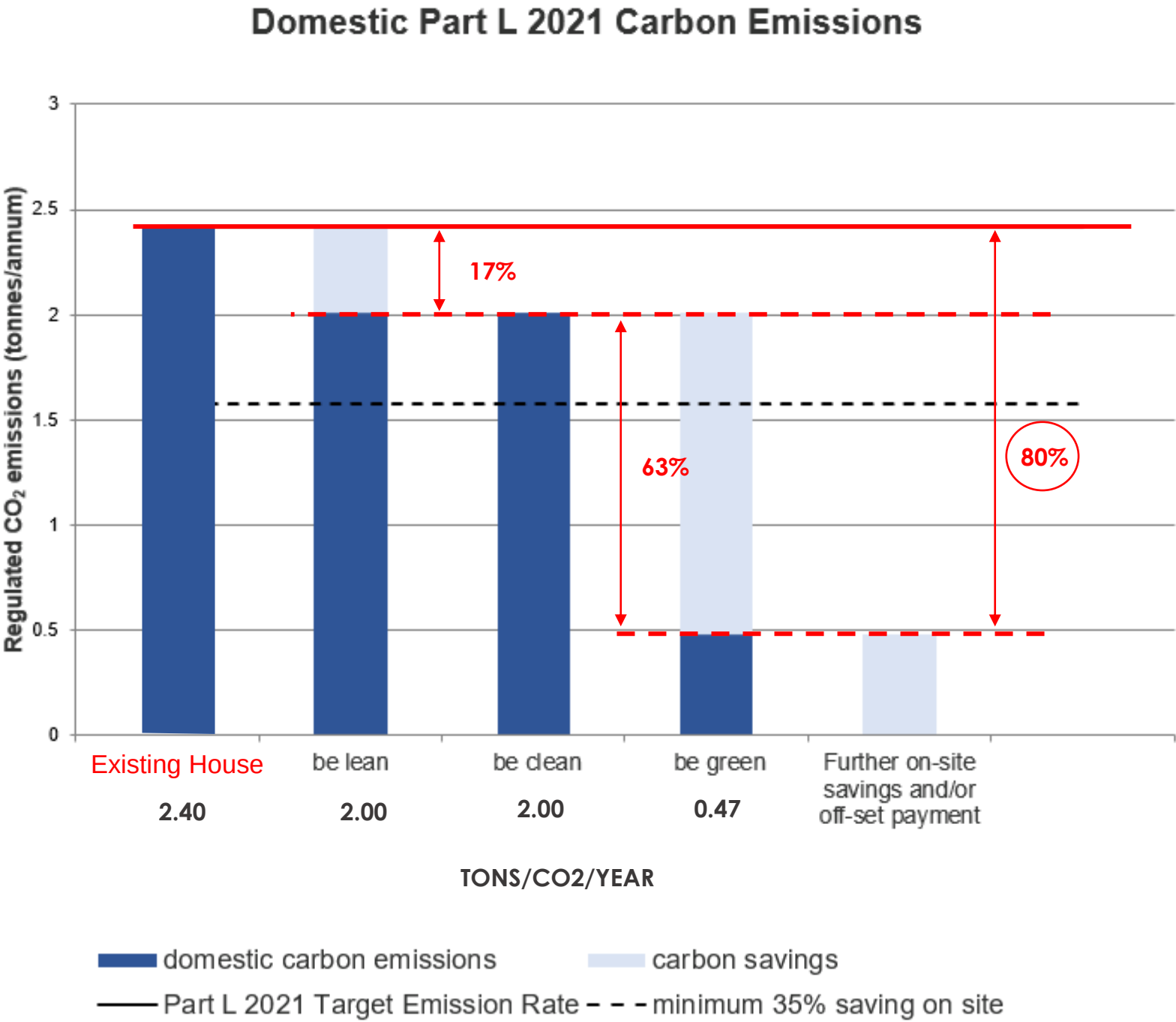
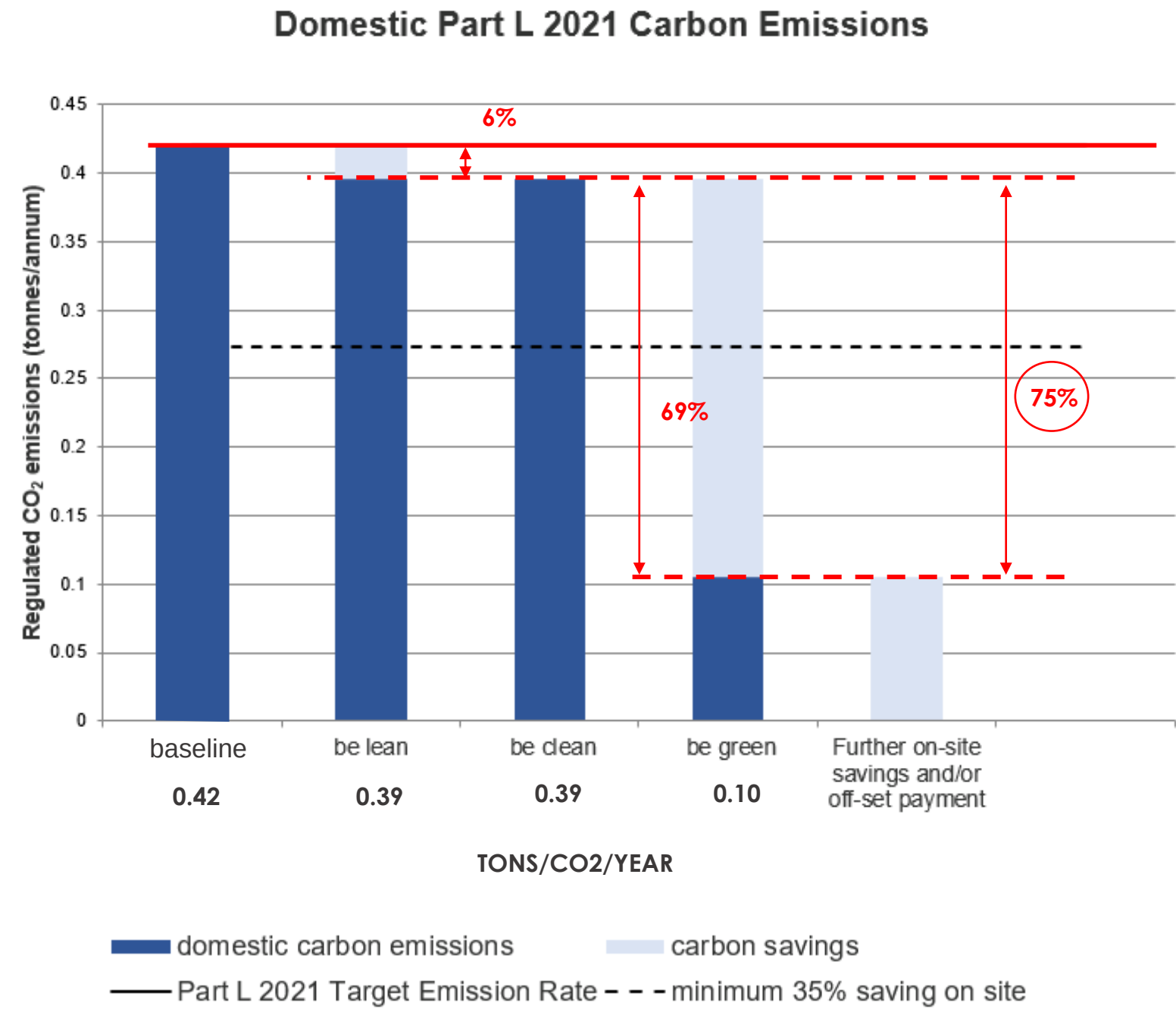


FIGURE 04 – ENERGY HIERARCHY GRAPH – **NEW BUILD EXTENSION** - DOMESTIC PART L



2.0 ENERGY STATEMENT SUMMARY



FLOOR PLANS - AS PROPOSED

FIGURE 05 – EXISTING AND PROPOSED GROUND FLOOR PLAN.

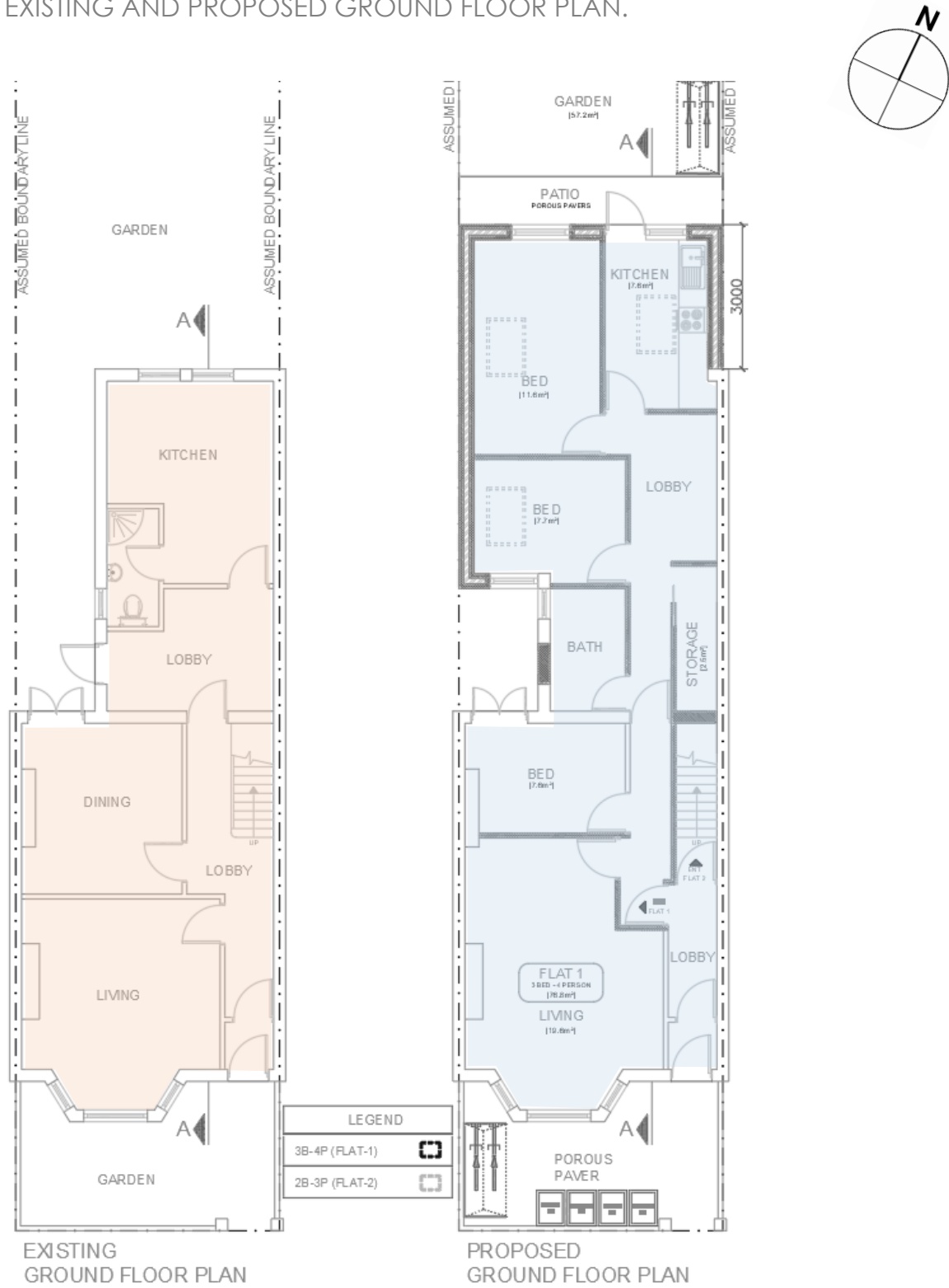


FIGURE 06 – EXISTING AND PROPOSED FIRST FLOOR PLAN



FLOOR PLANS - AS PROPOSED

FIGURE 07 – EXISTING AND PROPOSED 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:

- Haringey Local Plan.
- Approved Document Part L1 of Building Regulations, 2021 Edition
- Major of London Guidance for Energy Statements, June 2022
- RdSAP 2012 version 9.92 (Applicable from June 2014) Appendix S

For this preliminary assessment, the baseline was analysed using SAP 10.2 The Dwelling Emissions Rate (DER) of both worst cases was multiplied by the total m2 of the proposed units.

The building geometry and layout information has been taken from the Architect's drawings and several assumptions were made in order to achieve compliance. **Please refer to Table 01 to Table 04 below for further details.**

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 L1 of Building Regulations. The baseline has been calculated as per SAP 10.2.

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.

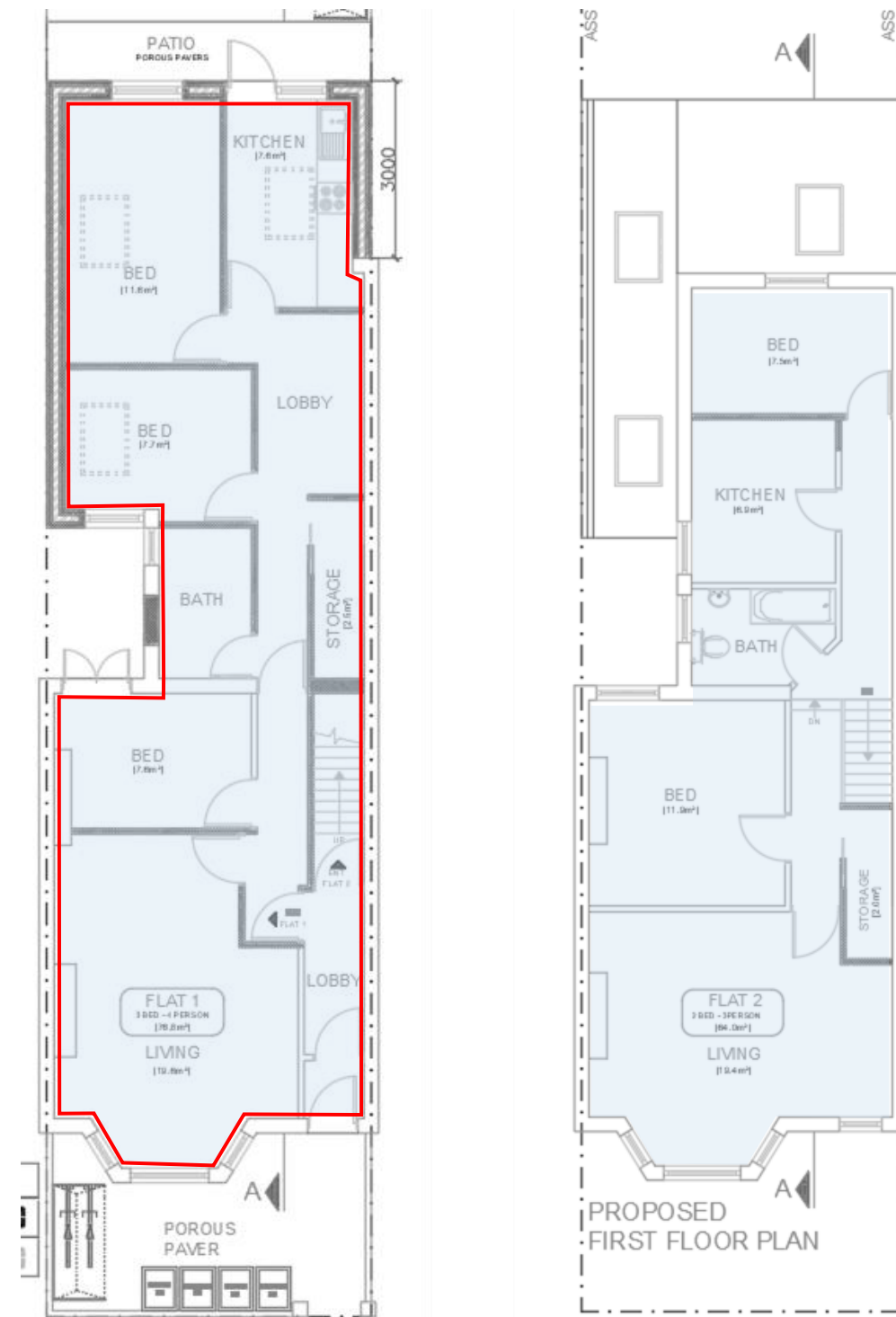
The refurbished house will achieve a reduction of **17%** in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario.

The new build extension will achieve a reduction of **6%** in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario.

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.

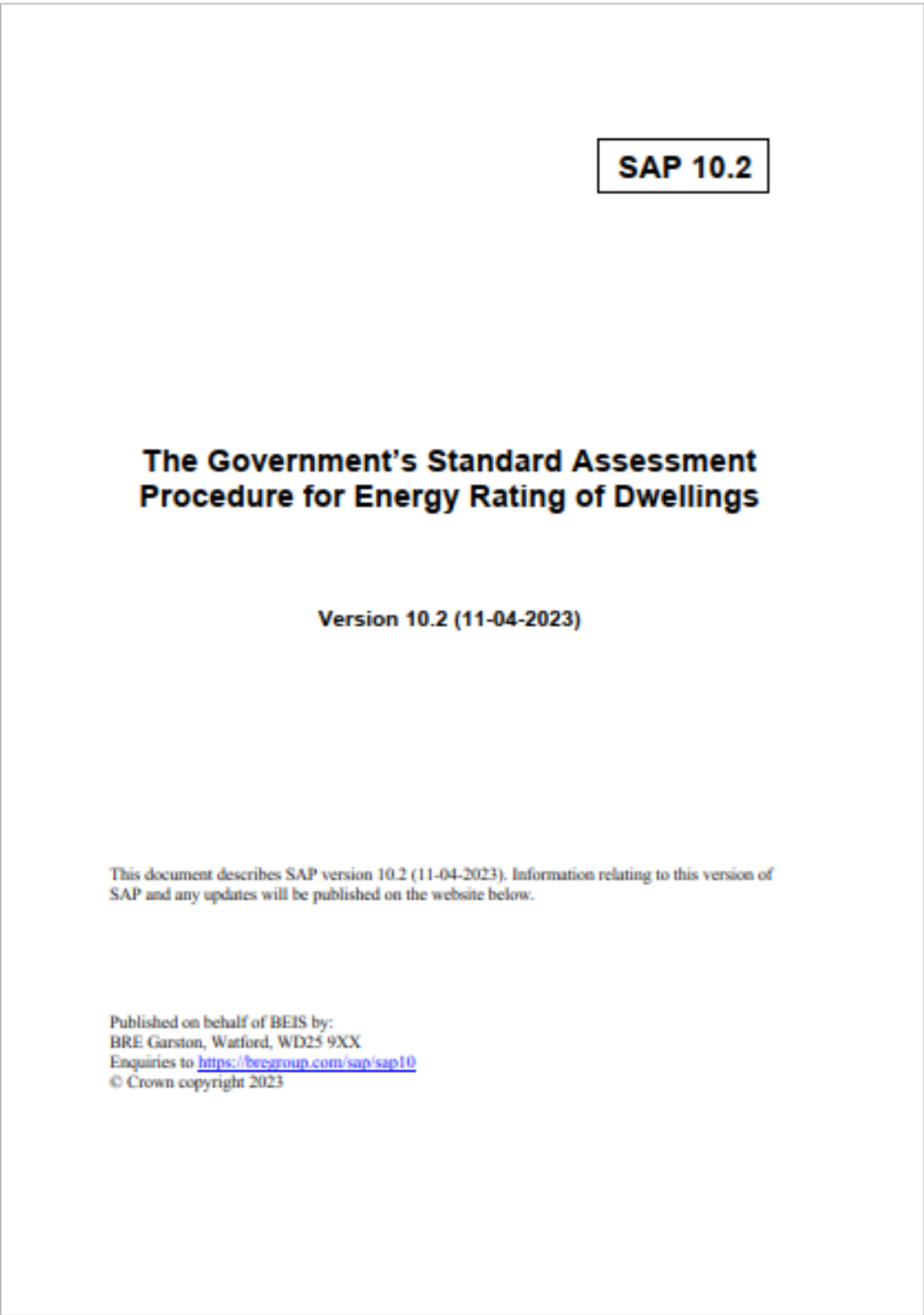
The use of CHP is not viable on a scheme of this size. Instead the target reduction is achieved using the energy efficiency measures and the provision of on-site renewable energy technology.

FIGURE 08 – PROPOSED GROUND FLOOR PLAN. WORST CASE: FLAT 01



ENERGY STATEMENT - METHODOLOGY

FIGURE 09 – SAP 10.2 FOR BASELINE AND PROPOSED EMISSIONS



BE GREEN

The refurbished house development will achieve a **63%** CO2 emissions reductions and the new build extension development **69%** 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:

- o **9no PV panels of 450W each: 0.45 kWh x9 = 4.05 kWh**
- o **1no Air Source Heat Pump (ASHP) per unit for space and water heating.**

This equates = **4.05 kWp** in total.

To estimate the energy use of the residential development, ECOstudio has used approved SAP 10.2. 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 11no for the outline specifications.** The proposed fabric standards exceed the requirements of Building Regulations.



SAP CALCULATIONS

TABLE 01 – SAP SPECIFICATIONS EXISTING HOUSE - BUILDING ENVELOPE.

ELEMENT	U-VALUES (W/m²K)	FURTHER INFORMATION
EXTERNAL WALLS	0.30 W/m²K	Based on Appendix 3, Major of London Guidance for Energy Statements, June 2022
GROUND FLOOR	0.25 w/m2K	Based on Appendix 3, Major of London Guidance for Energy Statements, June 2022
ROOF	0.16 W/m2K	Based on Appendix 3, Major of London Guidance for Energy Statements, June 2022
WINDOWS	1.60 W/m²K	- Asdumed doble-glazed, air filled windows. - Frame: PVC - Solar transmittance: 0.76
THERMAL BRIDGING	21.43 Htb	Non-accredited construction details. See Tables 05 - 07 for further information
AIR PERMEABILITY	15 m³/hm²@50Pa	Default value used. No air pressure test has been carried out.

ROOM	U-VALUE (W/m²K) Including Frame	G-VALUE	LT VALUE
ALL ROOMS	1.60	0.76	>0.63

TABLE 02 – SAP SPECIFICATIONS EXISTING HOUSE - BUILDING SERVICES.

ELEMENT	SYSTEM TYPE	DETAILS	STATUS
VENTILATION	NATURAL VENTILATION	Natural ventilation with intermittent extract fans.	Assumed 2 intermittent extract fans.
COOLING	COMFORT COOLING	None	Assumed
HEATING	CENTRAL HEATING SYSTEMS	Vailant eco TEC exclusive 835 VUW 356 – 89.10% Efficiency	Based on Appendix S, SAP data for existing buildings Age Band B 1900-1929
	EMITTER	Radiators in existing house / Underfloor heating in new extension.	Based on Appendix S, SAP data for existing buildings Age Band B 1900-1929
	CONTROLS	Delayed start thermostat + programmer + TRVs	
	SECONDARY HEATING	None.	Assumed.
SERVICE WATER HEATING	HOT WATER STORAGE TANK	Instantaneous water heating at point of use main gas	Based on Appendix S, SAP data for existing buildings Age Band B 1900-1929
LIGHTING	INTERNAL LIGHTING	Efficacy of all lighting = 80 lm/W Controlled by single switches.	Assumed.
RENEWABLES	SOLAR PHOTOVOLTAIC PANELS	None	Assumed.



SAP CALCULATIONS

TABLE 03 – SAP SPECIFICATIONS REFURBISHED HOUSE & NEW BUILD EXTENSION - BUILDING ENVELOPE.

ELEMENT	U-VALUES (W/m²K)	FURTHER INFORMATION
EXTERNAL WALLS	0.11 W/m²K	WALL FOR NEW EXTENSION Improved U-Value from table 1.1 Summary of notional dwelling specification for new dwelling, Part L volume 1
	0.18 W/m²K	REFURBISHED WALL U-Value as per maximum allowed in Approved Document Part L1 of Building Regulations, Table 4.2
GROUND FLOOR	0.18 w/m²K	U-Value as per maximum allowed in Approved Document Part L1 of Building Regulations, Table 4.2
ROOF	0.10 W/m²K	ROOF FOR NEW EXTENSION Improved U-Value from table 1.1 Summary of notional dwelling specification for new dwelling, Part L volume 1
	0.15 W/m²K	REFURBISHED PITCHED ROOF U-Value as per maximum allowed in Approved Document Part L1 of Building Regulations, Table 4.2
WINDOWS	0.70 W/m²K	WINDOWS FOR NEW EXTENSION Triple glazed, argon filled windows. Frame: Aluminium Solar transmittance: 0.71
	0.70 W/m²K	ROOFLIGHTS FOR NEW EXTENSION Triple glazed, argon filled windows. Frame: Aluminium. Solar transmittance: 0.71 Obscured glazed
	1.20 W/m²K	REFURBISHED WINDOWS Triple glazed, argon filled windows. Frame: Aluminium Solar transmittance: 0.71
AIR PERMEABILITY	10 m³/hm²@50Pa	An air pressure test will need to be carried out before completion.

TABLE 04 – SAP SPECIFICATIONS REFURBISHED HOUSE - BUILDING SERVICES.

ELEMENT	SYSTEM TYPE	DETAILS	STATUS
VENTILATION	NATURAL VENTILATION	Natural ventilation with intermittent extract fans.	Assumed 2 intermittent extract fans.
COOLING	COMFORT COOLING	None	Assumed
HEATING (Be Lean scenario only)	RADIATORS VIA BOILER GAS	- Condensing combi with automatic ignition - Fuel: Gas - SEER: (90%) - Low NOx emissions boiler - See appendix B for boiler specification	Based on Appendix S, SAP data for existing buildings Age Band B 1900-1929
SERVICE WATER HEATING	HOT WATER STORAGE TANK	Instantaneous water heating at point of use main gas	Based on Appendix S, SAP data for existing buildings Age Band B 1900-1929
LIGHTING	INTERNAL LIGHTING	Efficacy of all lighting = 110 lm/W Controlled by single switches.	Assumed.
HEATING (Be Green)	RADIATORS VIA ASHP	- Fuel: Electricity - SCoP: 4.81 - CoP: 3.20 - A++ high efficiency system 58 dBA power level	See appendix C for AHSP
BE GREEN (Renewable energy Sources)	PV PANELS	9no PV panels of 450W each: 0.45 kWh x9 = 4.05 kWh This equates = 4.05 kWp in total and 2.03 kWp per flat. This would achieve a reduction of a 67% in carbon emissions under be green scenario. The total CO2 emissions reductions	See appendix A for PV panels



ENERGY STATEMENT - CONSTRUCTION SPECIFICATIONS

TABLE 05 – THERMAL BRIDGES CALCULATION SAP 10.2– MODELLING INPUTS FOR NEW BUILD EXTENSION

K1 REF	JUNCTION	JUNCTION PRESENT	USE	JUNCTION REF.	ACD	DEFAULT	EACD REF. NO.	EACD	CD REF. MO.	CD BLOCK K=
E1	STEEL, LINTEL BASEPLATE PERFORATED				0.50	1.00				
E2	OTHER LINTELS (INCLUDING STEEL)	Y	ACD		0.30	1.00				
E3	SILL	Y	ACD		0.04	0.08				
E4	JAMB	Y	ACD		0.05	0.10				
E5	GROUND FLOOR (NORMAL)	Y	ACD		0.16	0.32				
E19	GROUND FLOOR (INVERTED)				0.07					
E20	EXPOSED FLOOR (NORMAL)				0.32					
E21	EXPOSED FLOOR (INVERTED)				0.32					
E22	BASEMENT FLOOR				0.07					
E6	INTERNAL FLOOR BETWEEN DWELLINGS				0.07	0.14				
E7	PARTY FLOOR BETWEEN DWELLINGS				0.07	0.14				
E8	BALCONY WITHIN DWELLINGS (CONTINUOUS INSULATION)				0.00	0.00				
E9	BALCONY BETWEEN DWELLINGS (CONTINUOUS INSULATION)				0.02	0.04				
E23	BALCONY (SUPPORT PENETRATES INSULATION)				none	1.00				
E10	EAVES (INSULATION AT CEILING LEVEL)				0.06	0.12				
E24	EAVES (INSULATION AT CEILING LEVEL INVERTED)				none	0.24				
E11	EAVES (INSULATION AT RAFTER LEVEL)	Y	ACD		0.04	0.08				
E12	GABLE (INSULATION AT CEILING LEVEL)				0.24	0.48				
E13	GABLE (INSULATION AT RAFTER LEVEL)	Y	ACD		0.04	0.08				
E14	FLAT ROOF	Y	ACD		0.04	0.08				
E15	FLAT ROOF WITH PARAPET				0.28	0.56				
E16	CORNER NORMAL	Y	ACD		0.09	0.18				
E17	CORNER INVERT	Y	ACD		-0.09	0.00				
E18	PARTY WALL BETWEEN DWELLINGS	Y	ACD		0.06	0.12				
E25	STAGGERED PARTY WALL BETWEEN DWELLINGS				none	0.12				

These are tables of all the junctions in the ACD list. The table shows which junctions are present in this building with a “Y” in the 1st column. Extra columns are available for Enhanced ACDs (EACD) and Constructive Details values (CD) should they wish to be used.

Only the Accredited Construction Detail column values where used for the proposed development analysis and should be followed through detail design, construction documents and construction

NOTE:
For the existing house, thermal bridges calculation has been used as default inputs. Based on Appendix S, SAP data for existing buildings Age Band B 1900-1929



ENERGY STATEMENT - CONSTRUCTION SPECIFICATIONS

TABLE 06 – THERMAL BRIDGES CALCULATION SAP 10.2 – MODELLING INPUTS FOR NEW EXTENSION (CONTINUED)

K1 REF	JUNTION WITH PARTY WALL	JUNCTION PRESENT	USE	JUNCTION REF.	ACD	DEFAULT	EACD REF. NO.	EACD	CD REF. MO.	CD BLOCK K=
P1	GROUND FLOOR	Y	ACD		0.08	0.16				
P6	GROUND FLOOR INVERTED				none	0.07				
P2	INTERNAL FLOOR WITHIN DWELLING				0.00	0.04				
P3	INTERNAL FLOOR BETWEEN DWELLINGS				0.00	0.04				
P7	EXPOSED FLOOR (NORMAL)				none	0.16				
P8	EXPOSED FLOOR (INVERTED)				none	0.24				
P4	ROOF (INSULATION AT CEILING LEVEL)				0.12	0.24				
P5	ROOF (INSULATION AT RAFTER LEVEL)				0.02	0.04				

These are tables of all the junctions in the ACD list. The table shows which junctions are present in this building with a “Y” in the 1st column. Extra columns are available for Enhanced ACDs (EACD) and Constructive Details values (CD) should they wish to be used.

Only the Accredited Construction Detail column values where used for the proposed development analysis and should be followed through detail design, construction documents and construction

TABLE 07 – THERMAL BRIDGES CALCULATION SAP 10.2 – MODELLING INPUTS FOR NEW EXTENSION (CONTINUED)

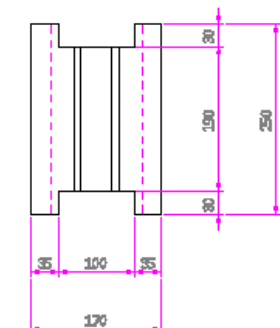
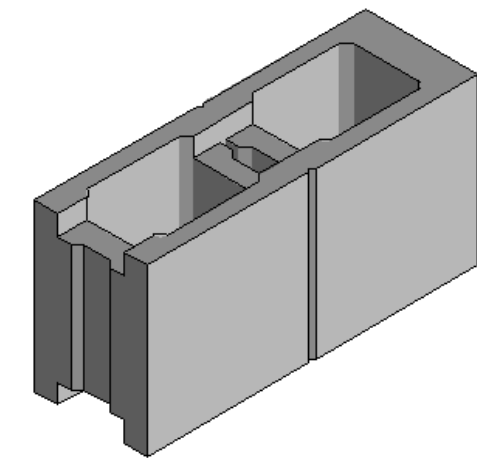
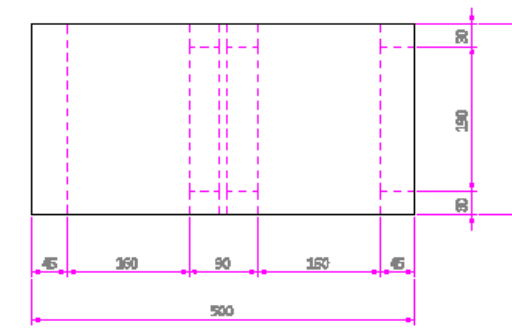
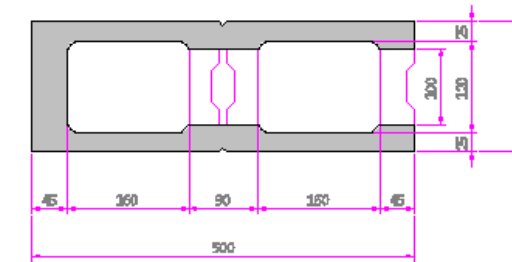
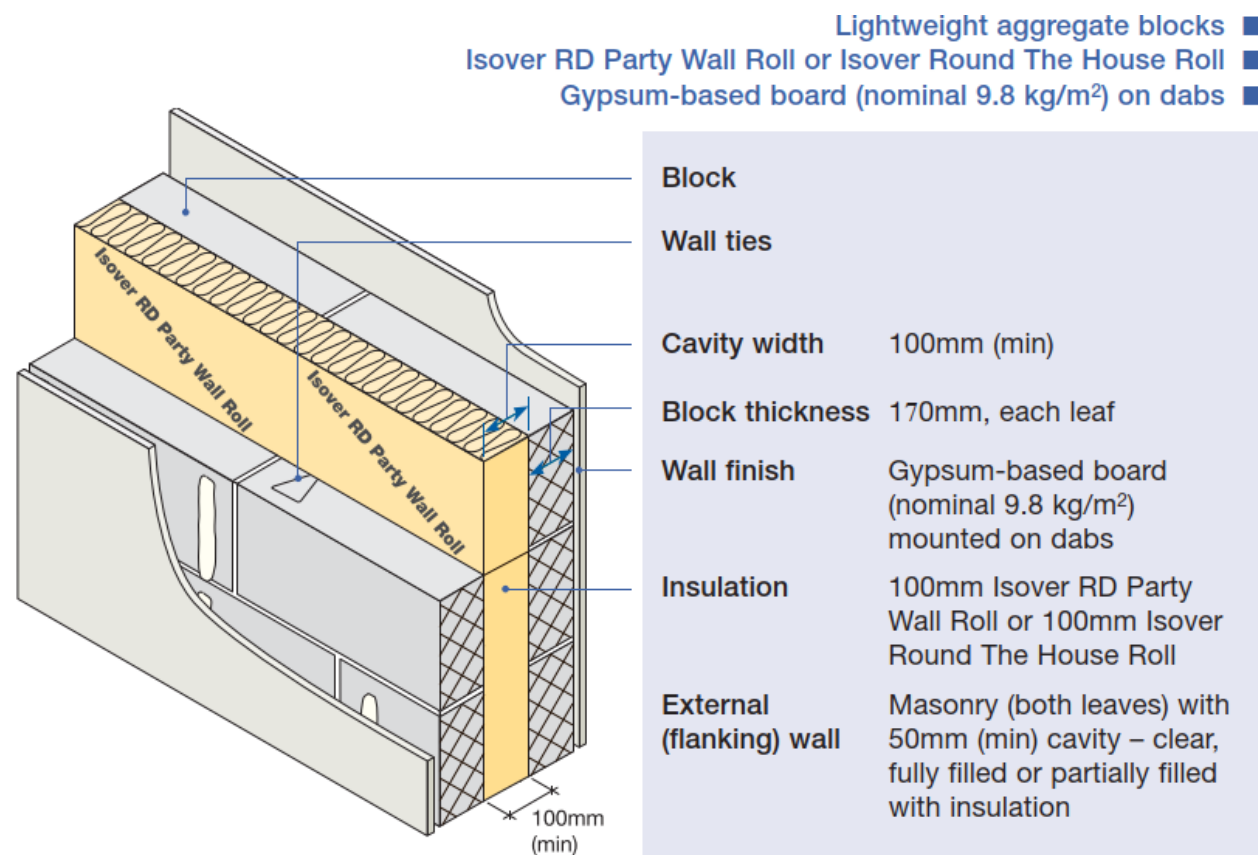
K1 REF	JUNTION WITH ROOF OR A ROOM IN A ROOF	JUNCTION PRESENT	USE	JUNCTION REF.	ACD	DEFAULT	EACD REF. NO.	EACD	CD REF. MO.	CD BLOCK K=
R1	HEAD				none	0.08				
R2	SILL				none	0.06				
R3	JAMB				none	0.08				
R4	RIDGE (VAULTED CEILING)				none	0.08				
R5	RIDGE INVERTED				none	0.04				
R6	FLAT CEILING				none	0.06				
R7	FLAT CEILING (INVERTED)				none	0.04				
R8	ROOF WALL (RAFTER)				none	0.06				
R9	ROOF WALL (FLAT CEILING)				none	0.04				

NOTE:
For the existing house, thermal bridges calculation has been used as default inputs. Based on Appendix S, SAP data for existing buildings Age Band B 1900-1929



ENERGY STATEMENT - CONSTRUCTION SPECIFICATIONS

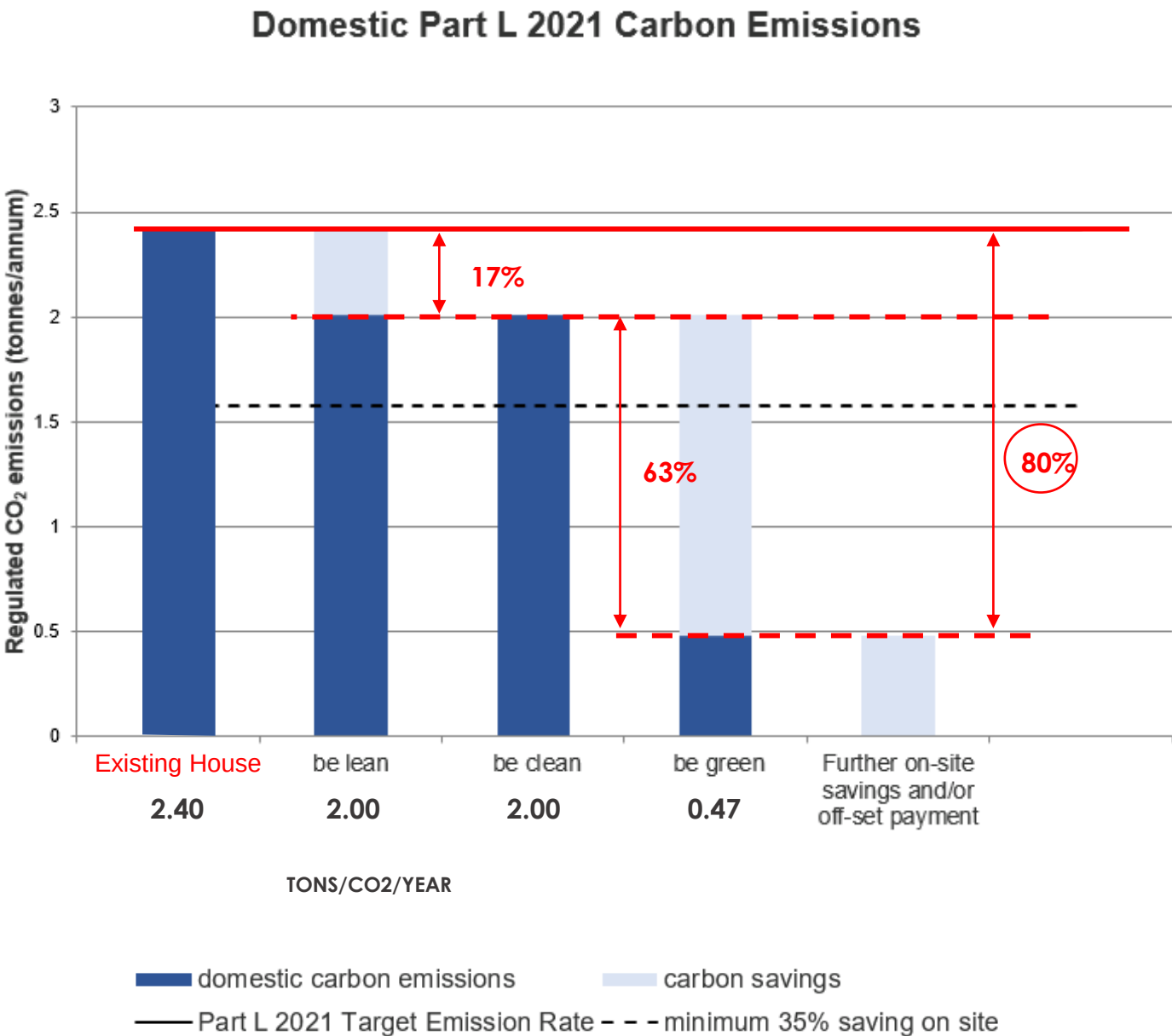
FIGURE 10 - OUTLINE CONSTRUCTION SPECIFICATIONS AS PROPOSED



THE BASELINE STANDARD

FIGURE 11 – CO2 EMISSIONS REDUCTIONS FOLLOWING THE GLA ENERGY HIERARCHY

REFURBISHED HOUSE



The tables 08 and 09 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 08 – 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	2.4	1.6	4.0
B	After Energy Efficiency (Be Lean)	2.0	1.5	3.5
C	After Efficient Supply of Energy (Be Clean)	2.0	1.5	3.5
D	After Renewable Energy Technologies (Be Green)	0.5	1.5	2.0

TABLE 09 – REGULATED CARBON DIOXIDE SAVINGS FROM EACH STAGE OF THE ENERGY HIERARCHY.

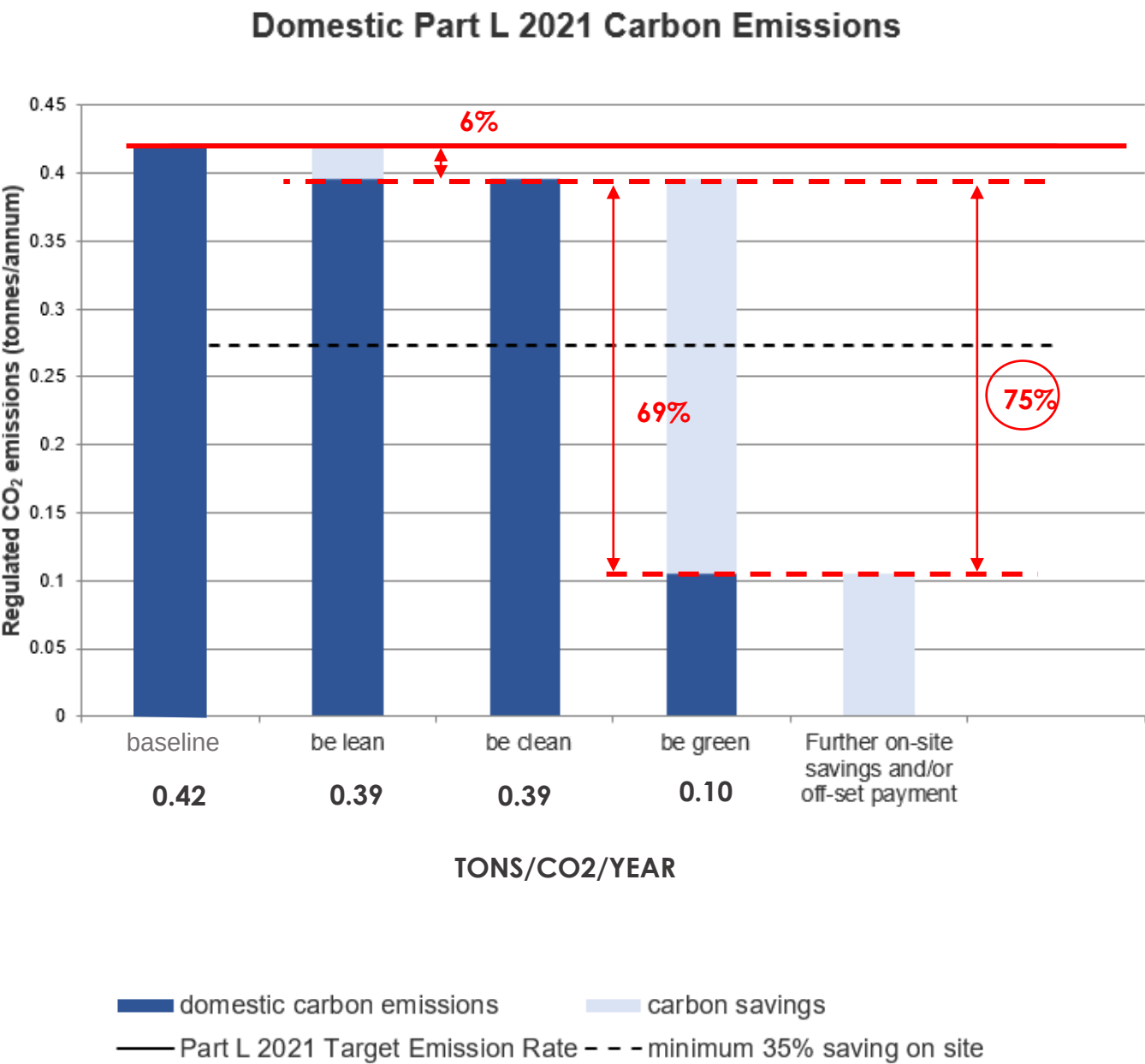
ID	ENERGY HIERARCHY	REGULATED CARBON DIOXIDE SAVINGS	
		(Tones CO ₂ per annum)	(%)
A-B	Savings from Energy Efficiency (Be Lean)	0.4	17%
B-C	Savings from Efficient Supply of Energy (Be Clean)	0.0	00%
C-D	Savings from Renewable Energy Technologies (Be Green)	1.5	63%
A-D	Total Cumulative Savings	1.9	80%



THE BASELINE STANDARD

FIGURE 12 – CO2 EMISSIONS REDUCTIONS FOLLOWING THE GLA ENERGY HIERARCHY

NEW BUILD EXTENSION



The tables 10 and 11 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 10 – 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	0.4	0.3	0.7
B	After Energy Efficiency (Be Lean)	0.4	0.2	0.6
C	After Efficient Supply of Energy (Be Clean)	0.4	0.2	0.6
D	After Renewable Energy Technologies (Be Green)	0.1	0.2	0.3

TABLE 11– REGULATED CARBON DIOXIDE SAVINGS FROM EACH STAGE OF THE ENERGY HIERARCHY.

ID	ENERGY HIERARCHY	REGULATED CARBON DIOXIDE SAVINGS	
		(Tones CO2 per annum)	(%)
A-B	Savings from Energy Efficiency (Be Lean)	0.0	06%
B-C	Savings from Efficient Supply of Energy (Be Clean)	0.0	00%
C-D	Savings from Renewable Energy Technologies(Be Green)	0.3	69%
A-D	Total Cumulative Savings	0.3	75%



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.

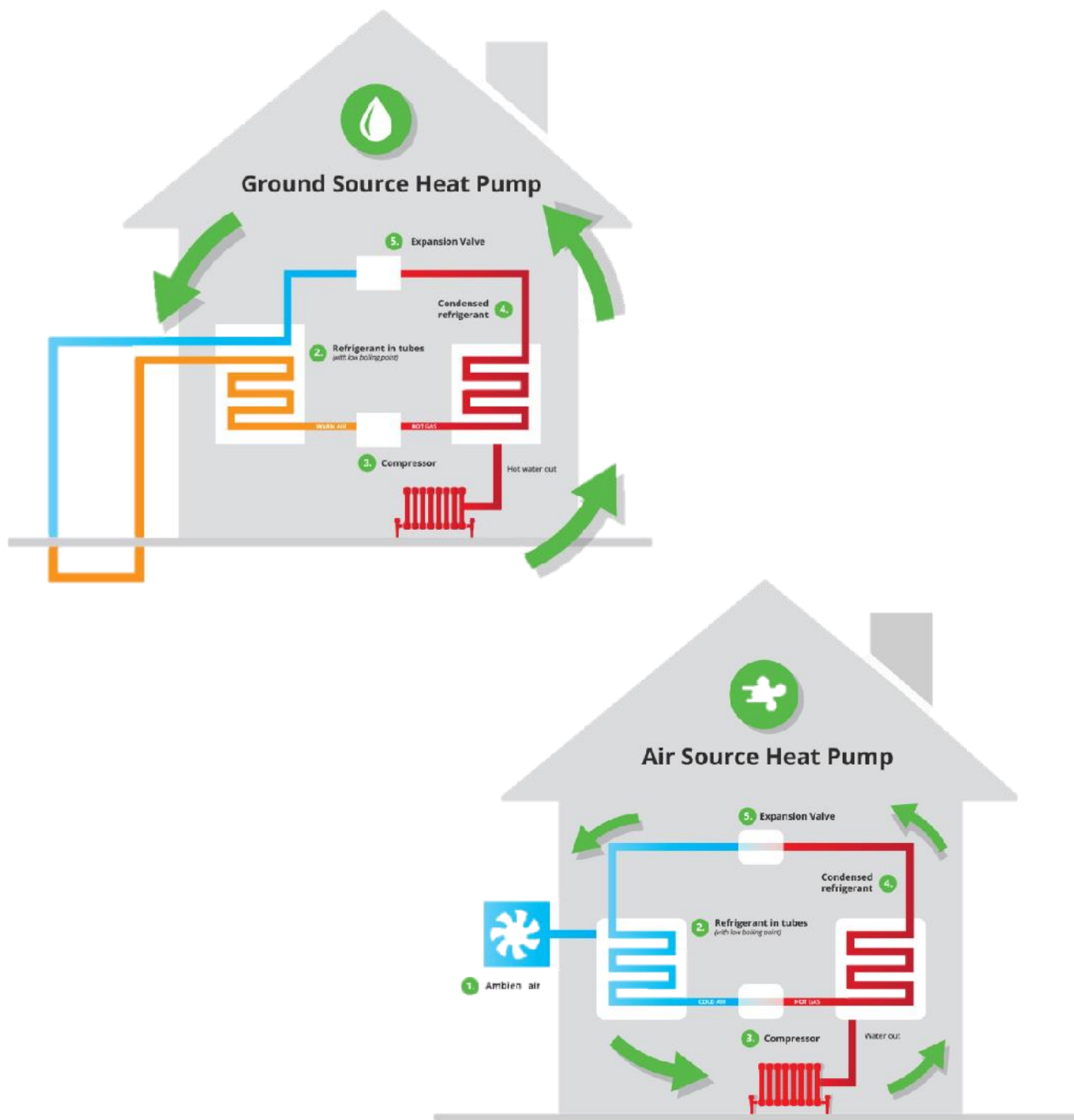
Further issues surrounding turbines consider the visual impact of the units in areas such as this. A turbine would require planning permission, and would probably be not well received by neighbours.

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.

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.

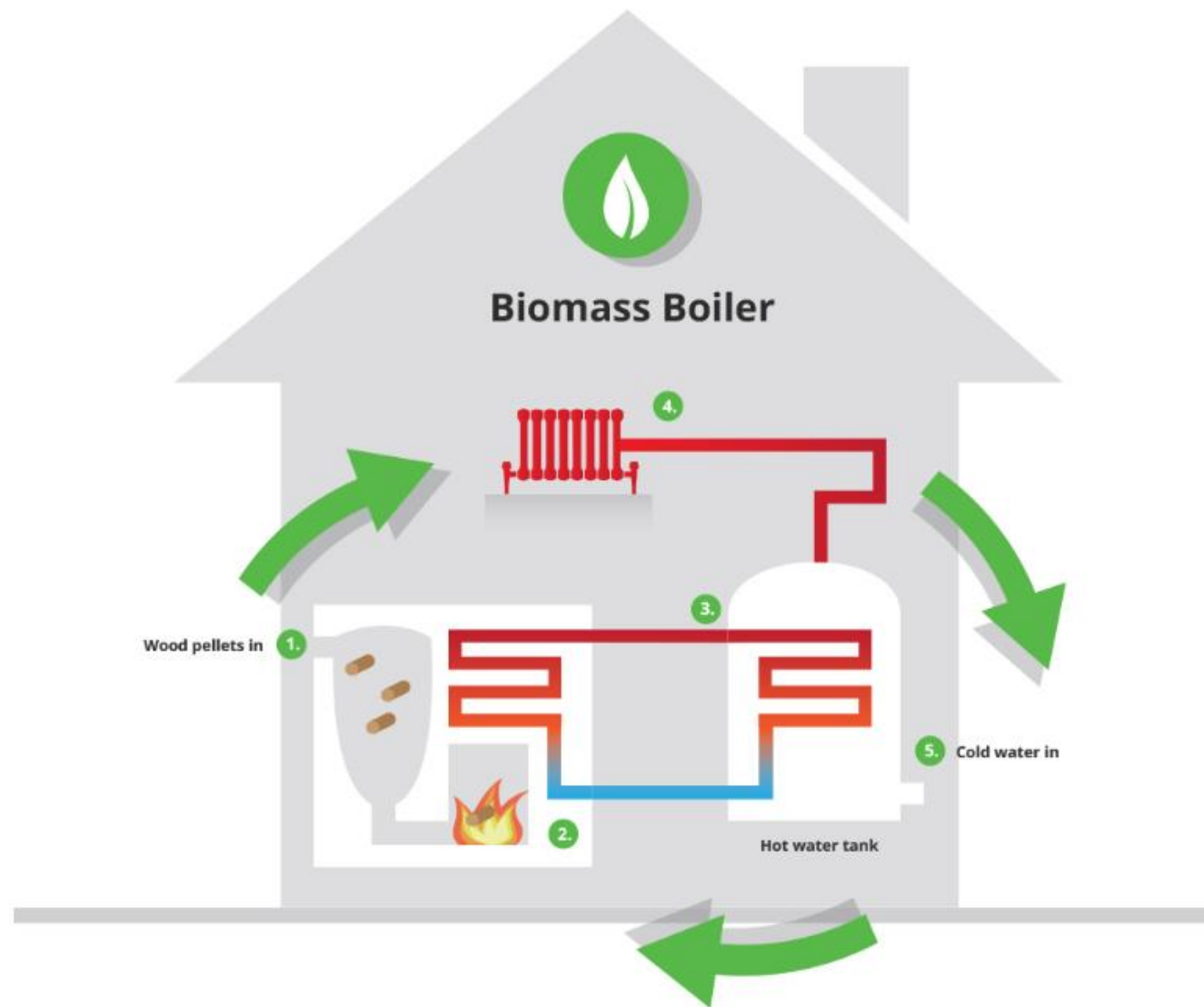
The roof area available for solar panels is the same as for PV. However, the area of panel required is determined by the hot water use. Depending on the type of panel – flat plate glazed, or evacuated tube, there is an optimum area needed for the hot water use. Flat plate glazed panels tend to be less 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.

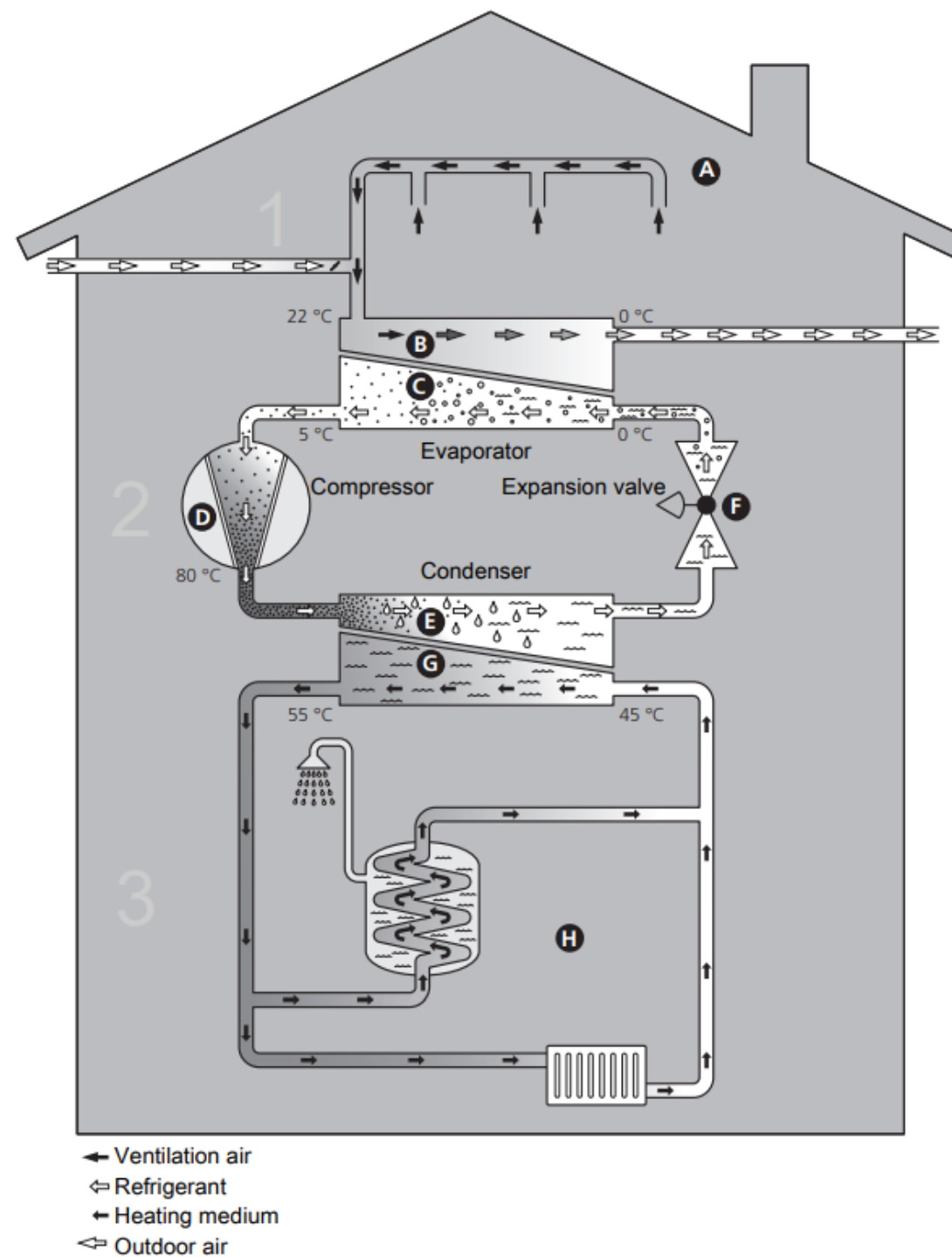
Another key factor of these boilers is that a large fuel store is required. A store is usually sized according to the lorry that is to deliver the fuel, and to minimize the number of deliveries over the year. Therefore, access for large vehicles is required. There is also the need for higher levels of 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 24) 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 24). The heat is distributed around the house in the heating medium circuit (3 , in figure 24).

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.

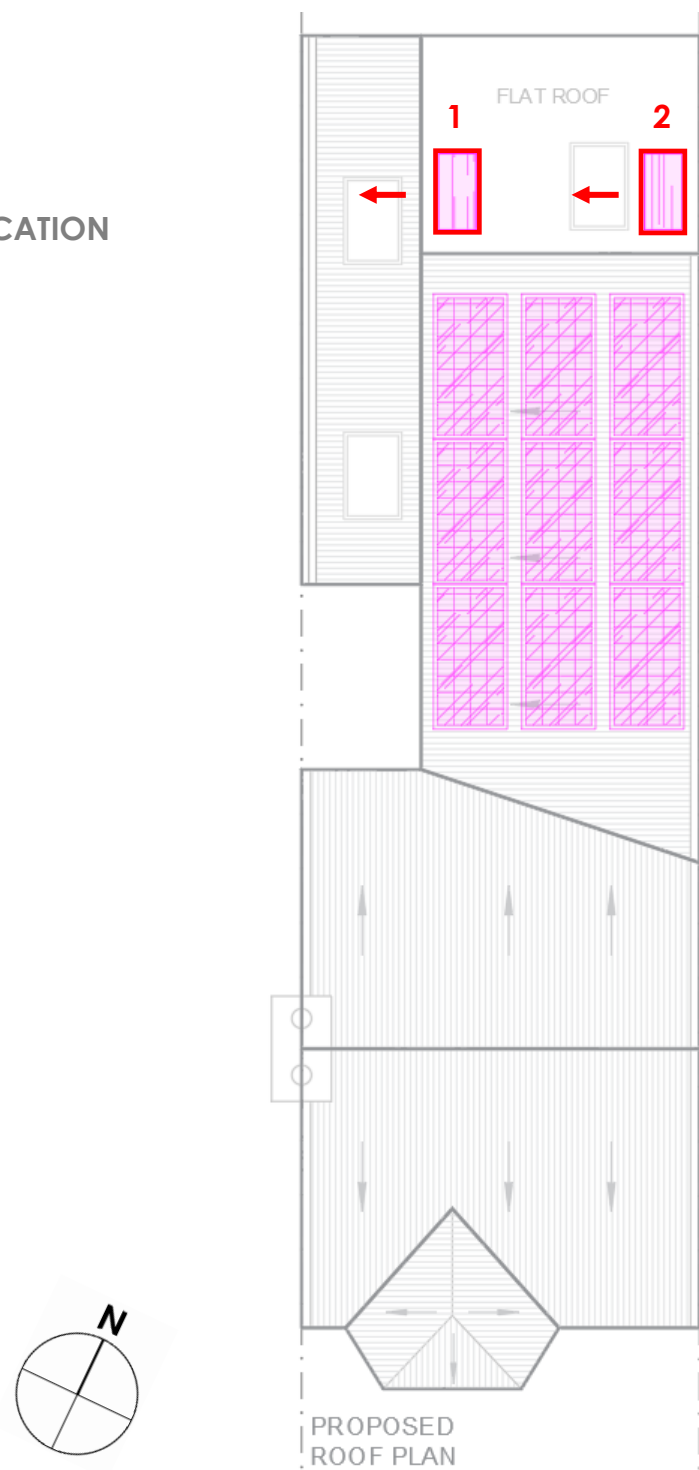
In general PV panels will produce more electricity during the day, therefore typically a majority percentage of the generated electricity will be exported. In order to achieve running cost savings, one must find an energy supplier who will purchase this generated electricity. Currently the amount paid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

LOW CARBON AND LOW EMISSION ENERGY SOURCES

FIGURE 19 – SITE PLAN WITH PROPOSED LOCATION OF EXTERNAL CONDENSING UNITS FOR AIR SOURCE HEAT PUMP

EXTERNAL CONDENSING UNITS LOCATION



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

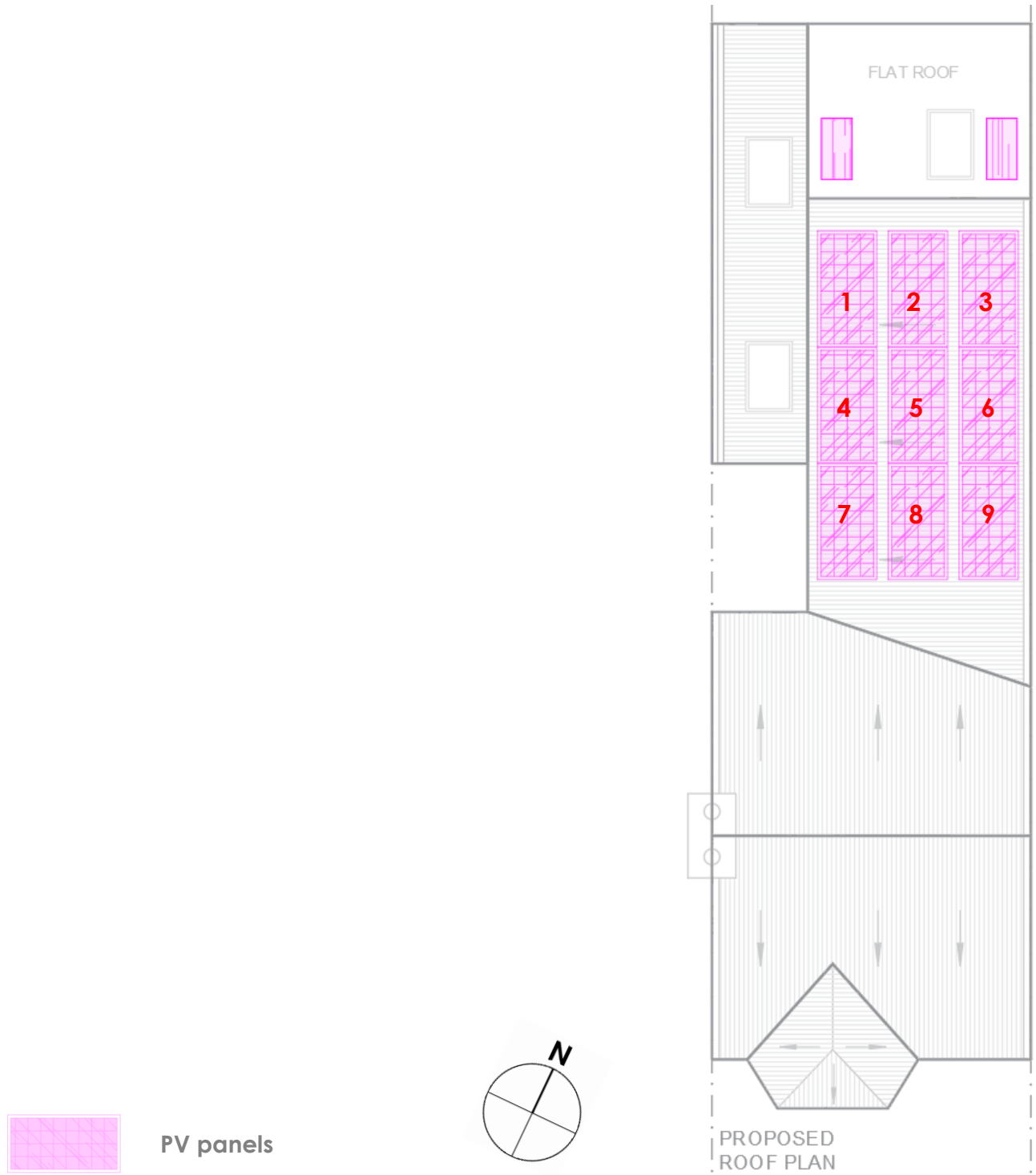


ecodan.co.uk



RENEWABLE ENERGY SOURCES

FIGURE 20 – ROOF LAYOUT WITH PVS PANELS



The residential development will have a flat roof and the PV tiles would be installed with a 20° angle facing southeast.

- 9no PV panels of 450W each: $0.45 \text{ kWh} \times 9 = 4.05 \text{ kWh}$
- 1no Air Source Heat Pump (ASHP) per unit for space and water heating.

This equates = 4.05 kWp in total and 2.03 per Flat.

The refurbished house development will achieve a reduction with other energy efficiency measures of **63%** and the new build extension development **69%** in carbon emissions of all regulated emissions.

3.0 CONCLUSION



CONCLUSION

The purpose of this document is to summarize the energy statement for the proposed development located at 89 Willingdon Road, London, N22 6SE.

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

- Haringey Local Plan.
- Approved Document Part L1 of Building Regulations, 2021 Edition
- Major of London Guidance for Energy Statements, June 2022
- RdSAP 2012 version 9.92 (Applicable from June 2014) Appendix S

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

The proposed development consist in the refurbishment and extension of the existing building at 89 Willingdon Road. Proposed works consist of a ground floor rear extension, refurbishment and division of the existing house into 1no x 3no bedroom flat (ground floor) and 1no x 2no bedroom flat (first floor). The occupancy type is a residential building.

As per Haringey Local Plan, it will be expected that minor new residential schemes, like this one, meet the following criteria:

- All new minor residential schemes must achieve a 35% reduction in CO2 emissions against a Haringey Local Plan.

This report provides a summary on how the refurbished house and new build extension development will achieve this target, with a combined reduction of **80%** for refurbished house development and **75%** for new build extension. Please see figure 03 and 04 for further information.

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 refurbished house will achieve a reduction of **17%** in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario.

The new build extension will achieve a reduction of **6%** in carbon dioxide emissions for all regulated emissions under the Be Lean / Be Clean scenario.

For developments consisting of a refurbishment with a new build extension, the CO2 savings for the new and refurbished elements are presented separately within the energy strategy. The new build elements are assessed in line with the methodology for new build development and comply with London Plan policy.

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 refurbished house development will achieve a **63%** CO2 emissions reductions and the new build extension development **69%** just under the be Green scenario from:

- o **9no PV panels of 450W each: 0.45 kWh x9 = 4.05 kWh**
- o **1no Air Source Heat Pump (ASHP) per unit for space and water heating.**

This equates = **4.05 kWp** in total.

In addition to the energy coming from the PV panels the other renewable low carbon system to be used, will be a ASHP for space heating. **Please refer to tables 01 to 04 and Appendix A and C for further details.**

The refurbished house development will have a combined reduction in CO2 emissions when compared with the baseline of 80%. Please refer to figures 03 for further details.

The new build extension development will have a combined reduction in CO2 emissions when compared with the baseline of 75%. Please refer to figures 04 for further details.



4.0 APPENDIX A- PV DETAILS



PV PANELS

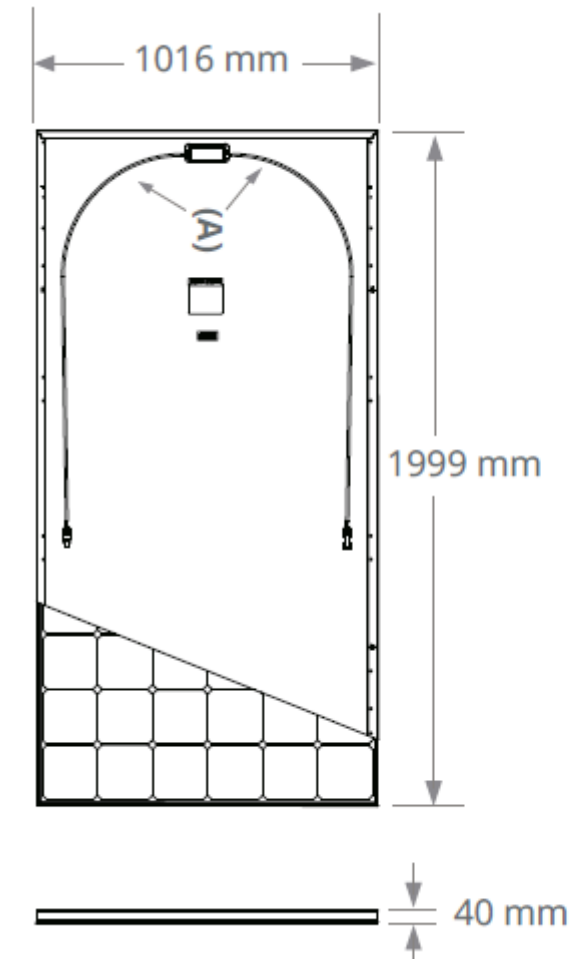
MAXEON 5 COM

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

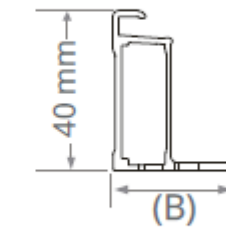


Electrical Data

	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

USED ONLY FOR LONDON PLAN ENERGY
HIERARCHY - BE LEAN SCENARIO

NOT FOR PROJECT SPECIFICATION



POSSIBLE BOILER SPECIFICATION

 Heating

 Hot water

 Renewables

Vaillant Specification boiler range







Technical information

 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- AIR SOURCE HEAT PUMP SPECIFICATION



AIR SOURCE HEAT PUMP SPECIFICATION

Heating Product Information



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



Key Features:

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

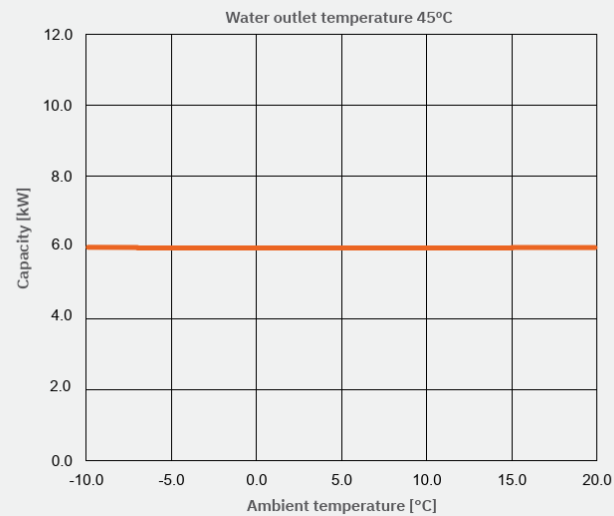
Key Benefits:

- 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



OUTDOOR UNIT		PUZ-WM60VAA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_{hp}	142%
	SCOP (MCS)	3.57
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_{hp}	190%
	SCOP (MCS)	4.81
HEAT PUMP COMBINATION	ErP Rating	A+
HEATER - Large Profile ¹	η_{wh}	145%
HEATING ² (A-7/W35)	Capacity (kW)	6.0
	Power Input (kW)	1.88
	COP	3.20
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35
SOUND DATA ³	Pressure Level at 1m (dBA)	45
	Power Level (dBA) ⁴	58
WATER DATA	Pipework Size (mm)	22
	Flow Rate (l/min)	17
	Water Pressure Drop (kPa)	8.0
DIMENSIONS (mm)	Width	1050
	Depth	480
	Height	1020
WEIGHT (kg)		98
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A) ⁵	5.68 [13]
	Fuse Rating - MCB Sizes (A) ⁶	16
REFRIGERANT CHARGE (kg) / CO ₂ EQUIVALENT (t)		R32 (GWP 675) 2.2 / 1.49

NOMINAL HEATING CAPACITY



7.0 APPENDIX D - SAP CALCULATIONS



APPENDIX A: SAP CALCULATIONS

SAP CALCULATIONS EXISTING HOUSE - BUILDING ENVELOPE.

SAP v10.2

12. Carbon dioxide emissions				
Space heating - main system	8759.6637	0.2100	1839.5294	(261)
Water heating	2503.0625	0.2100	525.6431	(264)
Space and water heating			2365.1725	(265)
Pumps and fans	86.0000	0.1388	11.9293	(267)
Energy for lighting	0.0000	0.1360	41.5749	(268)
Electricity generated - PVs	-0.0000	1.6660	-0.0000	(269)
Electricity generated - wind	-0.0000	1.6660	-0.0000	(269)
Electricity generated - hydro	-0.0000	1.6660	-0.0000	(269)
Electricity generated - mCHP	-0.0000	1.6660	-0.0000	(269)
Total kg/Year			2418.6767	(272)

13. Primary energy				
Space heating - main system	8759.6637	13.5600	9898.4199	(275)
Water heating	2503.0625	13.5600	2828.4606	(278)
Space and water heating			12726.8805	(279)
Pumps and fans	86.0000	1.5133	130.1008	(281)
Energy for lighting	288.0526	1.5133	441.8247	(282)
Electricity generated - PVs	-0.0000	18.1590	-0.0000	(283)
Electricity generated - wind	-0.0000	18.1590	-0.0000	(283)
Electricity generated - hydro	-0.0000	18.1590	-0.0000	(283)
Electricity generated - mCHP	-0.0000	18.1590	-0.0000	(283)
Total kg/Year			13298.8060	(286)
EI value			81.2657	
Dwelling Carbon Dioxide Emission Rate (DER)		18.90	(273) \ / (384)	
Dwelling Primary Energy Rate (DPER)		103.90	(287) \ / (484)	

SAP CALCULATIONS REFURBISHED HOUSE - BUILDING ENVELOPE.

SAP v10.2

12. Carbon dioxide emissions				
Space heating - main system	6971.7888	0.2100	1464.0757	(261)
Water heating	2362.2292	0.2100	496.0681	(264)
Space and water heating			1960.1438	(265)
Pumps and fans	86.0000	0.1388	11.9293	(267)
Energy for lighting	0.0000	0.1360	34.5599	(268)
Electricity generated - PVs	-0.0000	1.6660	-0.0000	(269)
Electricity generated - wind	-0.0000	1.6660	-0.0000	(269)
Electricity generated - hydro	-0.0000	1.6660	-0.0000	(269)
Electricity generated - mCHP	-0.0000	1.6660	-0.0000	(269)
Total kg/Year			2006.6329	(272)

13. Primary energy				
Space heating - main system	6971.7888	13.5600	7878.1214	(275)
Water heating	2362.2292	13.5600	2669.3190	(278)
Space and water heating			10547.4403	(279)
Pumps and fans	86.0000	1.5133	130.1008	(281)
Energy for lighting	239.4489	1.5133	367.2747	(282)
Electricity generated - PVs	-0.0000	18.1590	-0.0000	(283)
Electricity generated - wind	-0.0000	18.1590	-0.0000	(283)
Electricity generated - hydro	-0.0000	18.1590	-0.0000	(283)
Electricity generated - mCHP	-0.0000	18.1590	-0.0000	(283)
Total kg/Year			11044.8158	(286)
EI value			84.4573	
Dwelling Carbon Dioxide Emission Rate (DER)		15.68	(273) \ / (384)	
Dwelling Primary Energy Rate (DPER)		86.29	(287) \ / (484)	

APPENDIX A: SAP CALCULATIONS

SAP CALCULATIONS - EXISTING HOUSE

Conservation of Fuel & Power in Dwellings - SAP 10

Existing House

TER	DER	TPER	DPER	TFEE	DFEE	
8.89	18.9	46.29	103.9	33.1	64.2	Energy Rating B (81)

Calculate

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	..
Pitched roofs with integrated insulation	0.16	0.16 / 0.160
Flat roofs	0.16	...
Sloping walls, skillings, cambceils	0.26	0.00 / 0.160
Walls	0.26	0.30 / 0.300
Party walls	0.20	..
Floors	0.18	..
Ground floors	0.18	0.25 / 0.250
Windows, doors, rooflights		
Average U-value		1.40 / 1.400

SAP CALCULATIONS – REFURBISHED HOUSE

Conservation of Fuel & Power in Dwellings - SAP 10

Proposed House

TER	DER	TPER	DPER	TFEE	DFEE	
5.69	15.68	31.59	86.29	33.1	52.7	Energy Rating B (84)

Calculate

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	..
Pitched roofs with integrated insulation	0.16	0.16 / 0.160
Flat roofs	0.16	...
Sloping walls, skillings, cambceils	0.26	0.00 / 0.160
Walls	0.26	0.30 / 0.300
Party walls	0.20	..
Floors	0.18	..
Ground floors	0.18	0.25 / 0.250
Windows, doors, rooflights		
Average U-value		1.20 / 1.200

APPENDIX A: SAP CALCULATIONS

SAP CALCULATIONS, NEW BUILD EXTENSION – BE LEAN / BE CLEAN

Conservation of Fuel & Power in Dwellings - SAP 10

New build Extension

TER	DER	TPER	DPER	TFEE	DFEE	
20.46	19.28	108.96	109.14	41.6	33.5	Energy Rating B (84)

Calculate

England
Thames Valley

	Permitted Max	Achieved U-value (W/m²K) (worst/area weighted)
Opaque elements		
Pitched roofs insulated between joists	0.16	...
Pitched roofs insulated between rafters	0.16	..
Pitched roofs with integrated insulation	0.16	0.10 / 0.100
Flat roofs	0.16	0.10 / 0.100
Sloping walls, skillings, cambceils	0.26	0.00 / 0.100
Walls	0.26	0.11 / 0.110
Party walls	0.20	..
Floors	0.18	..
Ground floors	0.18	0.11 / 0.110
Windows, doors, rooflights		
Average U-value		0.70 / 0.700

SAP CALCULATIONS, NEW BUILD EXTENSION – BE GREEN

Conservation of Fuel & Power in Dwellings - SAP 10

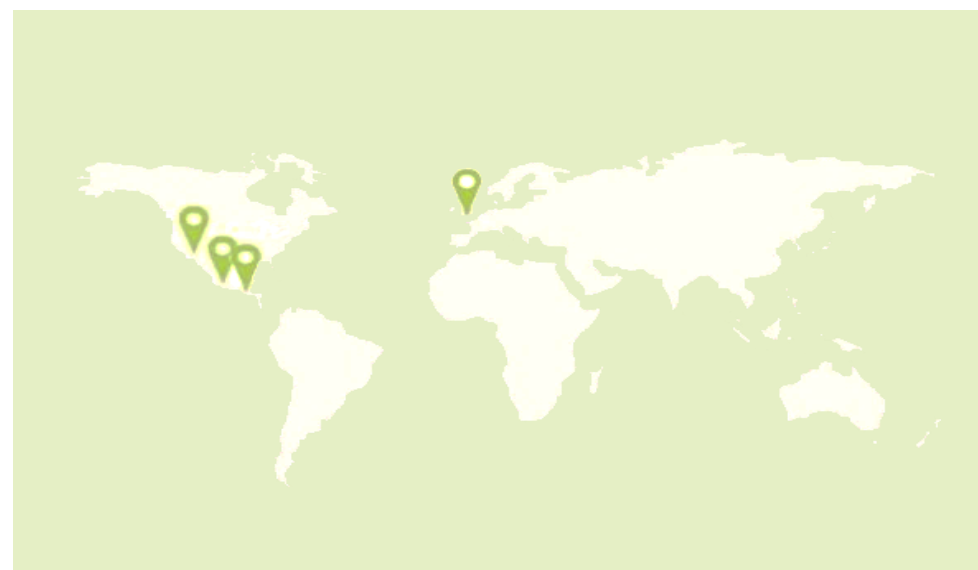
New build Extension Be Green

TER	DER	TPER	DPER	TFEE	DFEE	
21.25	5.13	113.17	53.62	41.6	33.5	Energy Rating B (90)

Calculate

England
Thames Valley

	Permitted Max	Achieved U-value (W/m²K) (worst/area weighted)
Opaque elements		
Pitched roofs insulated between joists	0.16	...
Pitched roofs insulated between rafters	0.16	..
Pitched roofs with integrated insulation	0.16	0.10 / 0.100
Flat roofs	0.16	0.10 / 0.100
Sloping walls, skillings, cambceils	0.26	0.00 / 0.100
Walls	0.26	0.11 / 0.110
Party walls	0.20	..
Floors	0.18	..
Ground floors	0.18	0.11 / 0.110
Windows, doors, rooflights		
Average U-value		0.70 / 0.700



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