Energy Statement

Issue 1 - Issued for Planning
21/12/2022

Braemar Avenue Baptist Church
Wood Green, London, N22 7BY

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Executive Summary

This Energy Statement was prepared by Energylab Consulting ltd in support of the full planning application for a new build development of 15 flats and a new Baptist Church located at Braemar Avenue, London N22 7BY to comply with the London Borough of Haringey's Council requirements on Sustainable Design and Construction.

The report confirms that the energy and carbon reduction strategy under the climate change mitigation measures proposed for this development are in line and in compliance with the relevant and applicable targets and requirement listed within the following planning policies of Haringey Council and the London Plan:

1. Haringey Council's Sustainable Design and Construction Supplementary Planning Document (SPD)
2. The London Plan relevant planning policies within section 9, i.e. Energy Hierarchy and carbon reduction targets

The Energy Statement for the new development has been developed in line with the London Plan Energy Hierarchy principles (displayed in Figure 1) to reduce the energy and associated CO_2 emissions using the "Be Lean, Be Clean, Be Green and Be Seen" approach:

1. "Be Lean": Improvements to the building fabric and energy efficient services to minimise energy demand, including efficient building services and 100% low energy LED lightings.
2. "Be Clean": The site is not suitable for a local CHP system or connection to an existing district network. Therefore, no carbon savings are possible using this measure.
3. "Be Green": Renewable and low carbon technologies have been proposed such as PV panels.
4. "Be Seen": Monitoring and reporting carbon emissions post-construction.

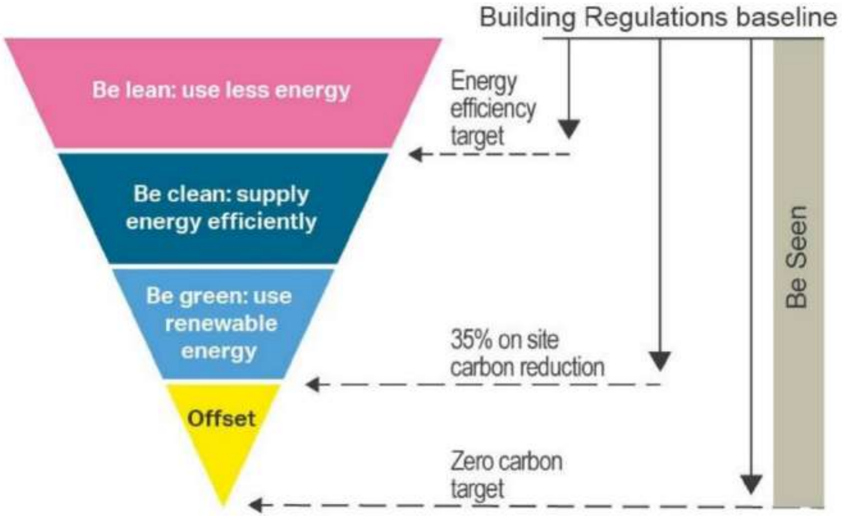


Figure 1: GLA Energy Hierarchy

According to the GLA Guidance, the target reduction in CO_2 emissions is a minimum 35% on site through the proposed design against the Part L 2021 target. This is to be achieved with a minimum reduction of 10% achieved via passive energy demand reduction measures and 25% due to incorporating on site renewable technologies and mechanical systems. The remaining CO_2 emissions to reach the target zero carbon will be offset by a one-off payment made to the local authority to invest into suitable sustainable projects within the borough. The current GLA carbon offset price is £95 per tonne of carbon dioxide over 30 years (building services life span) - only applicable to the domestic development.

Haringey Council states major developments should seek to reduce carbon emissions by 20% via the utilisation of renewable technologies where technically feasible.

Table 1 displays the percentage reductions in CO_2 emissions and the improvements against the notional building CO_2 emissions as per the Approved Document Part L 2021.

Table 1: Carbon (CO_2) Emission Reductions

	(Tonnes CO_2 per annum)	(%)
Baseline Part L 2021 Target Emission	12.33	-
Energy Demand Reduction Savings (Be Lean)	1.18	10
Heat Network/Active Savings (Be Clean)	5.01	41
Renewable Technologies Savings (Be Green)	1.67	13
Total Potential On Site Savings	**7.86**	**64**

As displayed in Table 1, there is potential in achieving **10%** reduction in CO2 emissions as a result of reducing the demand for energy approach, **41%** reduction due to 'Clean' energy supply through utilising efficient electrical boilers, and a potential further **13%** reduction as a result of incorporating renewable technologies, which in this case is a PV panels system. Furthermore, as displayed by Table 1, the Haringey Council target of reduction in carbon emissions by 20% via renewable technologies is not achieved. That being said, the utilisation of all available roof space has been proposed to maximise the potential for on-site renewable technologies.

Additionally, Table 2 displays the carbon offset payments towards a net zero target required due to shortfall to a zero carbon development.

Table 2: Carbon Offset Payments

Shortfall per Annum	4.47 tonnes
Total Shortfall over 30 Years*	134.18 tonnes
Carbon Offset Payment (£95 per tonne)	**£12,746.93**

*It is assumed lifetime of the development's services to be 30 years

Figure 2 displays predicted domestic CO_2 reductions across each phase of the London Plan Energy Hierarchy, surpassing the minimum requirements for CO_2 reductions as displayed by the green dotted lines.

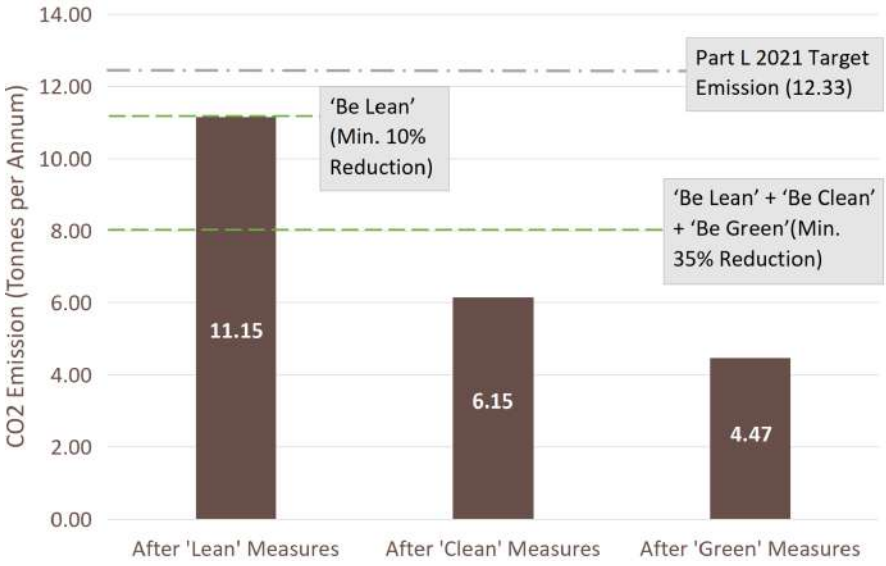


Figure 2: Predicted Domestic CO_2 reductions against Part L 2021 Baseline

The energy and the associated CO_2 emission calculations for the new church were assessed using Integrated Environmental Solution Virtual Environment (IESVE). Compliance with Part L2 2021 has been demonstrated for the new church, however, the church has not been included in the zero carbon target as it does not fall under a major non domestic development, i.e., greater than 1000 sqm. Please refer to section 2.2 for more information.

Furthermore, the proposed development will adopt a number of sustainable design and construction measures to further promote reduced carbon emissions and sustainability. Please refer to the 'Sustainable Design and Construction Statement' prepared by Energylab_ on the 21/11/2022.

The new development has the potential to comply with the Building Regulations Parts L1 and L2 2021, and targets set out in Haringey Council's Sustainable Design and Construction SPD.

1. Introduction

1.1 Existing Site

The site is located on Braemar Avenue, within the London Borough of Haringey. The existing site currently comprises a church building and derelict church hall.

1.2 The Proposal

The proposal is for a mixed-use development comprising a 4 storey new-build block of flats as well as an additional baptist church on the ground and lower ground floors.

The total number of residential units will be 15, comprising 7 No. One Bed Flats, 5 No. Two Bed Flat and 3 No. Three Bed Flats. The residential development will include private outdoor amenity space in the form of a terrace or balcony for each dwelling, waste and recycle storage space, bicycle storage, and amendments to the existing church building.

The non-domestic church building proposal consists of a basement church hall, tea point and WC, with a reception area and WC on the ground floor.

Please see Figure 3 for a 3D image of the proposed development.

Figure 3: 3D image of the proposed scheme.

The area schedule for the proposed domestic development is displayed below in Table 3.

Table 3: Domestic Area Schedule

Building	Approximate Gross Internal Area (sqm)
Lower Ground Floor	213.2
Ground Floor	141.2
1st Floor	220.1
2nd Floor	220.1
3rd Floor	124.0

The area schedule for the proposed non-domestic development is displayed below in Table 4.

Table 4: Non-Domestic Area Schedule (Church)

Building	Approximate Gross Internal Area (sqm)
Lower Ground Floor	141
Ground Floor	65

1.3 Compliance

This assessment demonstrates how the proposed domestic development has the potential to achieve a minimum of 35% reduction in regulated Carbon Dioxide (CO2) emissions over the Part L1 2021 baseline, and that the proposed climate change mitigation measures would comply with London Plan energy policies, including the energy hierarchy. Additionally, this assessment demonstrates how the non-domestic development has the potential to achieve reduced carbon emissions over the Part L2 2021 'notional' building.

This assessment would also ensure that energy remains an integral part of the development's design and evolution. The domestic building must achieve zero carbon for regulated emissions through additional on-site measures or payment into an offset fund. The Carbon offset payment is presented in Table 2.

The energy and carbon reduction strategy under the climate change mitigation measures proposed for this development are in line and in compliance with the relevant and applicable targets and requirement listed within the following:

1. Haringey Council's Sustainable Design and Construction Supplementary Planning Document (SPD)
2. The London Plan 2021 relevant planning policies within Chapter 9
3. The GLA Draft Energy Assessment Guidance April 2020

The project team is committed to achieving the reduced carbon target by following the London Plan Energy Hierarchy principles.

1.4 Carbon Emission Factors

Fuel carbon emission factors are displayed below in Table 5. The proposed development energy performance has been assessed using the Standard Assessment Procedure 10 (SAP10). The development has been designed as a gas free development.

Table 5: Carbon (CO_2) Emission Factors

Fuel Type	Fuel Carbon Factor ($kgCO_2/kWh$)
Natural Gas	0.210 (The development is a gas free development)
Grid Electricity	0.233

2. Establishing CO_2 Emissions

2.1 Domestic Units

The energy and the associated CO_2 emissions calculations for the residential units were carried out using an approved software - Elmhurst Design SAP10.

SAP is the UK Government National Calculation Methodology for assessing the energy performance of new dwellings under the European Directive on the Energy Performance of Buildings (EPBD).

The baseline CO_2 emissions were calculated from the 'notional' building using the Part L software tools. i.e. FSAP and/or SBEM. The 'notional' building consists of a standard set of fabric and services parameters which deliver the Target Emissions Rate (TER). All fabric and service improvements provide reduced carbon emissions against the TER as presented by the 'notional' building at the 'Be Lean' stage.

The results tables shall be completed and presented separately for domestic uses and non-domestic uses (where applicable), to demonstrate compliance with the energy hierarchy and the carbon targets.

Savings shall be expressed in tonnes of CO2 per annum. Please refer to Appendix 2 for the final SAP 10 results.

Figure 4: Design SAP 10 - Elmhurst Energy

2.2 Non-Domestic (Church)

The non-domestic blocks energy demand benchmarks were used based on a General Assembly and Leisure (theatre) building modelled in IES. The church CO2 emissions base line shall be calculated using SBEM software in line with the CO2 emission calculations guideline.

The energy and the associated CO_2 emission calculations for the new church were calculated using Integrated Environmental Solution Virtual Environment (IESVE). Compliance with Part L2 2021 has been demonstrated for the new church, however, the church has not been included in the zero carbon target as it does not fall under a major non domestic development, i.e., greater than 1000 sqm. Instead, the building has been displayed to comply with current building regulations.

The Part L2 2021 baseline CO_2 emissions was calculated from the 'notional' building using the Part L approved software tool, SBEM. The 'notional' building consists of a standard set of fabric and services parameters which deliver the Target Emission Rate (TER) as well as the Target Primary Energy Rate (TPER). Please see sections 3.1 and 3.2 for additional information regarding the TER and TPER.

An image of the 3D model developed in IES is displayed in Figure 5. The basement level of the building, i.e., the proposed church, can be observed by the grey, concrete colouring. Table 6 displays the compliant results for the Building Emission Rate (BER) and the Building Primary Energy Rate (BPER) for the church against the Part L 2021 regulations.

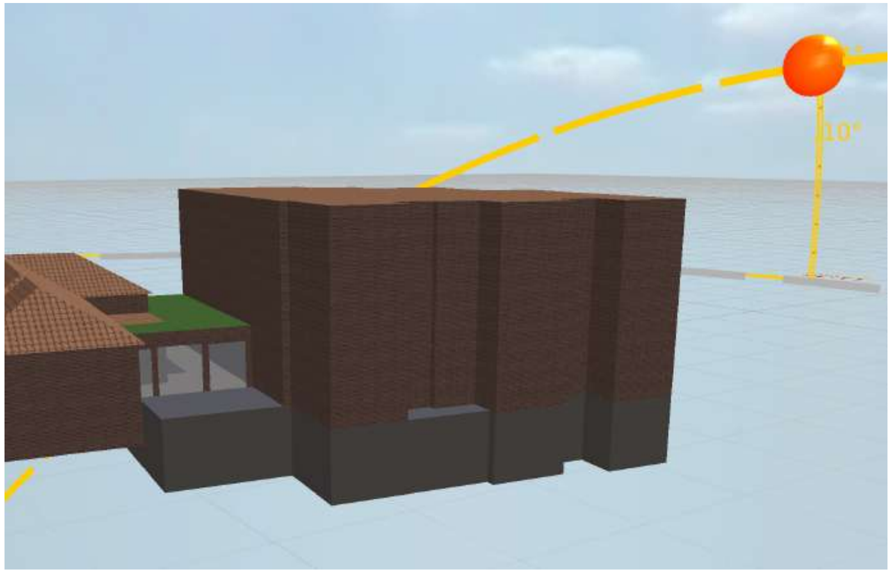


Figure 5: IES VE 3D Model

Table 6: Carbon (CO_2) Emission Reductions (Non-Domestic)*

	(Tonnes CO_2 per annum)
Part L 2021 Target Emission Rate (TER)	6.95
Church Building Emission Rate (BER)	**6.28**
Part L 2021 Target Primary Energy Rate	56.44
Church Building Primary Energy Rate	**53.58**

**Please see Appendix 5 for the supporting BRUKL document.*

3. Building Regulation Targets

Newly constructed dwellings/buildings must be shown, by calculation, to meet the following building regulation targets.

3.1 Emission Rate

A key component of building regulation Part L 2021 is the target CO2 emission rate (TER). This sets a minimum allowable standard for the energy performance of a building and is defined by the annual CO2 emissions of a notional building of same type, size and shape to the proposed building. The maximum CO2 emission rate for the dwelling, expressed as kgCO2/(m2 ·year) and determined using the Standard Assessment Procedure.

Tables 7 and 8 display the overall results for TER against the DER for the proposed domestic and non-domestic developments, respectively.

Table 7: Domestic CO_2 Emission Rates

	TER (kWh/m^2)	DER (kWh/m^2)	Improvement (%)
Development Total	12.33	4.36	65

Table 8: Non-Domestic CO_2 Emission Rates

	TER (kWh/m^2)	BER (kWh/m^2)	Improvement (%)
Development Total	7.17	6.31	11.99

3.2 Fabric Energy Efficiency Rate

Another key component of building regulation Part L 2021 is the Target Fabric Energy Efficiency rate (TFEE). This defines the minimum fabric energy efficiency rate in kWh/m^2 for a development, determined using the SAP 10 calculation.

Fabric Energy Efficiency (FEE) is assessed using Dwelling Fabric Energy Efficiency rates (DFEE) and TFEE figures. For instance, overall DFEE must be equal to or less than TFEE to gauge compliance (DFEE≤TFEE). This encourages designers to take a fabric-first approach to reduce carbon emissions prior to installing low or zero-carbon technologies.

Table 9 displays the overall results for DFEE against the TFEE for the proposed domestic development.

Table 9: Domestic Fabric Properties and Fabric Energy Efficiency Standard

	TFEE (kWh/m^2)	DFEE (kWh/m^2)	Improvement (%)
Development Total	28.11	30.54	8

3.3 Primary Energy Rate

Target Primary Energy Rate (TPER) is a new introduction to the English building regulations. TPER considers how much energy (kWh) is required to provide heating and hot water to a newly built dwelling. It will also include energy used by lighting, ventilation, cooling systems and showers.

Instead of just looking at energy used within the building itself, TPER also considers the amount of energy required to produce the fuel source in the first place.

Any additional energy will be added to every kilowatt of the fuel source used by the dwelling to calculate the DPER. Electricity and biomass have the highest primary energy factors as these are perceived to be the fuels which require the most energy to produce and transport. This means houses must introduce low energy or renewable systems to meet (TPER).

Tables 10 and 11 display the overall results for TPER against the DPER for the proposed domestic and non-domestic developments, respectively.

Table 10: Primary Properties and Primary Energy Efficiency Standard (Domestic)

	TPER (kWh/m^2)	DPER (kWh/m^2)	Improvement (%)
Development Total	71.95	52.33	27

Table 11: Primary Properties and Primary Energy Efficiency Standard (Non-Domestic)

	TPER (kWh/m^2)	BPER (kWh/m^2)	Improvement (%)
Development Total	56.44	53.58	5

4. The Energy Hierarchy

As previously stated, the London Plan energy hierarchy (“Be Lean, Be Clean, Be Green”) approach has been utilised for the CO_2 emission reduction strategy for the proposed development.

The ‘Be Lean’ approach addresses reduction in energy demand through the adoption of passive and active design measures. The aim is to use less energy and manage demand during operation through fabric and servicing improvements, and the incorporation of flexibility measures.

The ‘Be Clean’ approach aims to utilise existing, local heating distribution networks or combined heat and power (CHP) engines.

The ‘Be Green’ approach incorporates on-site renewable technologies to supply energy to the dwellings.

4.1 Demand Reductions (Be Lean)

Potential reduction due to ‘Be Lean’ measures, in CO2 emission compared to Part L1A 2021, is 10% for the domestic development. All methods within this section are proposed for both domestic and non-domestic developments.

4.1.1 Passive Measures

The aim is to use less energy and manage demand during operation through fabric and servicing improvements, and the incorporation of flexibility measures. Before any mechanical systems are considered, the development should be made as energy efficient as possible by having low U-values and using daylight.

Passive design measures would include optimising orientation and site layout, thermal mass and site microclimate to provide natural lighting, heating and cooling of buildings. Green roofs, walls, high ceilings and window heights (for natural light and ventilation) are preferred (where possible), as well as high thermal mass and the incorporation of solar shading.

4.1.1.1 Building Facade and Air Permeability

The building facade has a great impact on a building's energy efficiency. Specifying materials with low U-values and ensuring low air permeability* minimise energy demand through reduced heat loss.

**Air permeability describes the amount of air that passes, perpendicularly through a facade. This can be reduced through material selection and best practice construction methods.*

4.1.1.2 Thermal Bridging

Thermal bridges occur when an area of a building has significantly higher heat transfer than the surrounding parts. Breaks in insulation, reduced insulation or more conductive materials can contribute to thermal bridge effects. The building fabric should be constructed so that thermal bridging, including at the party wall, is reasonably limited.

Building Regulation Part L1B 2021 places increased importance on addressing thermal bridging, that could be minimised by careful detailing, or the use of standard details (such as Accredited Construction Details i.e. ACDs) where appropriate.

Building Regulation Part L2 2021 places increased importance on addressing thermal bridging, that could be minimised by careful detailing, or the use of standard details (such as Accredited Construction Details i.e. ACDs) where appropriate.

The role of thermal bridges in building heat loss can be significant for well insulated buildings.

We recommend that as the design is progressed, building junctions are considered carefully to minimise thermal bridging. Standard ‘accredited construction details’ are available, for which the impact of thermal bridging is known. In many cases the impact of thermal bridging can be ignored if good thermal continuity is achieved through the junction. For more complex or less intuitive scenarios, thermal bridging calculations can be carried out to calculate the additional heat loss.

4.1.1.3 Passive Ventilation

Passive ventilation utilises natural forces, such as wind or thermal buoyancy to extract stale air and supply fresh air to a space.

Natural ventilation has been proposed as the secondary strategy for providing fresh air and dissipating heat across communal spaces and stairwells throughout the building. The passive ventilation strategy includes single-sided ventilation, cross ventilation and night purge ventilation through openable windows and doors, operated by the occupants.

4.1.1.4 Passive Summary

Table 12 exhibits the targeted thermal performances of the proposed facade, as well the thermal performance requirements as stated in the Part L 2021 guidance.

Table 12: Proposed Fabric Properties and Part L 2021 Fabric Standards for Domestic and Non-Domestic Developments

	Proposed Design	Part L Limiting Values
Walls U-Value Target	0.14 W/m^2.k	0.26 W/m^2.k
Floors U-Value Target	0.1 W/m^2.k	0.18 W/m^2.k
Roofs U-Value Target	0.11 W/m^2.k	0.16 W/m^2.k
Doors U-Value Target	1 W/m^2.k	1.6 W/m^2.k
Windows U-Value Target	1 W/m^2.k	1.6 W/m^2.k
Windows G Value Target	0.35	-
Air Permeability Target	3 m^3/h.m^2@50pa	8 m^3/h.m^2@50p
Thermal Bridging Target	0.04 (y-value)	0.2 (y-value)
Heating system pipework	Insulated pipework and fittings within the plant room to reduce heat loss (All primary pipework insulated to reduce heat loss - domestic hot water and heating).	
Thermal Mass	Medium	-
Green Roof	100% of the roof total area for domestic and non domestic buildings (equating to approx. 202 sqm)	

4.1.2 Active Measures

Active design measures would include mechanical heating, cooling and ventilation required in the building, also any mechanical systems that are considered, for example, efficient mechanical ventilation with heat recovery (MVHR) or waste water heat recovery (WWHR) (where appropriate).

4.1.2.1 Heating

To fully understand the effect of improved building fabric and 'Lean' measures proposed, a gas boiler was specified in the SAP calculations as per the 'notional' building defined in the Approved Document Part L1 2021 and provided in the GLA Energy Assessment Guidance. Active heating solutions are proposed within section 4.3 in this document, i.e., 'Renewable Energy - (Be Green)'.

4.1.2.2 Lighting

Traditional fluorescent lighting dissipates a large amount of energy to heat. Alternatively, specifying high efficiency LED lighting can significantly reduce the energy demand for a building, and therefore the carbon emissions.

4.1.2.3 Active Ventilation

Balanced whole-house MVHR with a minimum efficiency of 90% is proposed for each of the units. These systems supply fresh air and extract stale air from a dwelling, whilst minimising heat loss.

To ensure high efficiency in MVHR systems, a low air permeability must be maintained. In this case, a value of 3 $m^3/h.m^2$@50pa has been proposed as displayed in Table 8. This will maximise the heat recovery aspect of the MVHR system.

In addition to this, MVHR reduces overheating risk during the summer months. For dwellings at significant risk of overheating, the *Zehnder ComfoClime 36 with ComfoAir Q600* was utilised within the model. This is an MVHR unit with a 2.6kW comfort cooling capacity. Please refer to the TM59 Overheating Assessment prepared by Energylab Consulting Ltd.

4.1.2.4 Controls

Smart control systems can massively reduce energy consumption within a dwelling through targeted heating, ventilation and lighting.

Temperature/CO_2 sensors have been proposed for all ventilation systems. Once temperatures/CO_2 levels rise above a certain threshold, a 'boost' function will be activated to ensure adequate indoor air quality is restored.

Additionally, occupant controlled heating by zones within each dwelling is proposed to further minimise wasted energy.

Automatic lighting has been proposed for the non-domestic church building. This will minimise the possibility of lights being left on when not in use.

4.1.2.5 Active Summary

Table 13 displays a summary of the active design measures proposed for this development.

Table 13: Active Measures (Energy Saving)	
Space and Domestic Hot Water Heating System	Efficient electrical boilers with underfloor/radiators heating system
Domestic hot water system	• Selection of low-flow showers and basin taps • Time control of circulation pump to reduce heat losses • High levels of cylinder insulation to achieve a maximum 1.2 kWh/day heating losses • Water heating to be timed
Space Heating system controls	Individually timed control of heating in each room, enabling heating to be turned off in unoccupied rooms (e.g., bedrooms during the day)
Smart Controls	Yes, potential smart controls equipment and appliances
Water Waste Heat Recovery (WWHR)	• Not applicable for this proposal
LED Lighting	High efficiency LED lighting proposed for all fittings

4.1.3 Energy Use Intensity (EUI)

The EUI and space heating demand has been presented in Table 14 as per the GLA Energy Assessment Guidance. This figure presents the energy

4.1.3 Cooling and Overheating

The airtight envelope is critical in reducing energy demand for space heating and domestic hot water, however, this imposes some real challenges related to the risks of overheating. A key aspect of the Haringey Council's Sustainable Design and Construction SPD and the Approved Document Part O 2021 is to ensure developments are prepared against rising temperatures.

Table 14 displays several passive and active mitigation methods to counter overheating risk. Please refer to Appendix 3 for the Good Homes Alliance Early Stage Overheating Risk Tool utilised to assess the potential risk of overheating.

Table 14: Overheating Mitigation Methods	
Balance daylight and overheating	Windows areas, g value, window overhangs and orientation
Reduce solar gain	Introduce external shading and balconies
Improve ventilation	• Openable windows • Trickle vents • Cross ventilation • Thermal mass and night purge
Potential ceiling mount fans (future retrofit)	Subject to final apartment floor to ceiling height

CIBSE Overheating assessment TM59	Please refer to the TM59 Assessment prepared by Energylab Consulting Ltd.

4.1.3.1 Cooling Hierarchy

Overheating risk should be mitigated utilising the cooling hierarchy as stated within Policy SI 4 of the London Plan. This strategy is stated as follows:

1. Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.
2. Minimise internal heat generation through energy efficient design.
3. Manage the heat within the building through exposed internal thermal mass and high ceilings.
4. Provide passive ventilation.
5. Provide mechanical ventilation.
6. Provide active cooling systems.

This strategy has been utilised to ensure adequate thermal comfort within the proposed dwellings. An official overheating assessment has been performed to assess the level of risk for the proposed development, along with any mitigation methods required. Please refer to the TM59 Overheating Assessment prepared by Energylab Consulting Ltd. for the detailed assessment.

Additionally, an initial assessment of overheating risk has been carried out utilising the Good Homes Alliance Early Stage Overheating Risk Tool. This can be found in Appendix 3. High risk of overheating was identified, hence the requirement for a detailed TM59 Overheating Assessment.

4.1.4 Carbon Emission Reduction after 'Be Lean'

Potential reduction, due to Lean measures, in CO2 emission compared to Part L 2021 is 10% for domestic developments. Please see Tables 15a and 15b, summarising findings for 'Be Lean' measures.

Table 15a: Carbon (CO$_2$) Emissions (Domestic)

	Regulated (Tonnes CO$_2$ per annum)
Baseline Part L 2021 Target Emission	12.33
After 'Be Lean' Measures	11.15

Table 15b: Regulated CO$_2$ Savings (Domestic)

	Tonnes CO$_2$ per annum	(%)
Savings from 'Be Lean' Measures	1.18	10

4.2 Energy Supply (Be Clean)

Potential reduction due to 'Be Clean' measures, in CO2 emission compared to Part L1A 2021, is 41% for domestic and non-domestic developments.

4.2.1 Connection to Existing Heating Distribution Network

There are no available communal plants that are within a reasonable distance to connect to the site. This is displayed in Figure 6, where the nearest plant is around 2.1km from the site. For the above reason connection to a district heating network has been ruled out as an option.

It is not anticipated to achieve any further CO2 reduction than what has been achieved via incorporating the Lean measures from this method.

Figure 6: London heat map displaying local heat sources to development

4.2.2 Local Site CHP

Combined Heat and Power only becomes economically viable for larger schemes with constant and steady demand for heat and electricity throughout the year. This is not suited for our scheme, which has insufficient steady thermal and electrical loads throughout the year. Therefore, this has been ruled out for the site. Since there is no viable district heat network in the area, and since CHP is not suited to our development, there are no carbon savings achieved by this stage of the energy hierarchy.

4.2.3 High Efficiency Electric Boilers

High efficiency electric boilers with a minimum efficiency of 90% have been proposed for all dwellings. Utilising electric boilers eliminates any requirement for gas on site, making the development free of NOx.

4.2.4 Carbon Emission Reduction after ‘Be Clean’

Potential reduction, due to Clean measures for the domestic development, is displayed below in Tables 18a and 18b.

Since a district heating connection or on-site CHP is unviable, no carbon emissions reductions are available using these measures. That being said, specification of efficient electrical boilers resulted in major CO2 reductions for the domestic development. This is displayed in Tables 16a and 16b.

Table 16a: Carbon (CO_2) Emissions (Domestic)

	(Tonnes CO_2 per annum)
Baseline Part L 2021 Target Emission	12.28
After ‘Be Lean’ Measures	11.15
After ‘Be Clean’ Measures	6.15

Table 16b: Regulated CO_2 Savings (Domestic)

	Tonnes CO_2 per Annum	%
Savings from ‘Be Lean’ Measures	1.18	10
Savings from ‘Be Clean’ Measures	5.01	41

4.3 Renewable Energy (Be Green)

Potential reduction, due to Green measures (Be Green) in CO2 emission compared to Part L 2021 is 14% for the domestic development.

4.3.1 Technology Options

There are several renewable options that could be utilised for the generation of electricity required for lighting, machinery, controls etc on site. Financial and technical feasibility of the following renewable systems was assessed to determine the most suitable technologies for the proposed development:

- Photo-voltaic (PV) panels
- Air-source heat pumps (ASHPs)
- Ground-source heat pumps (GSHPs)
- Variable refrigerant flow (VRF) systems
- Wind turbines

Selection is made based on a variety of factors, including efficiency, constraints of the development, location or cost.

4.3.2 Domestic

4.3.2.1 PV Panels

A PV panels system installed on the roof of the new residential blocks is proposed. As there are no moving parts in the PV cell, the units tend to be low maintenance but they must be kept clean as efficiency can drop. This is reduced if the panels are installed at a 5° angle, therefore allowing for potential cleaning through rainfall. Additionally, locating the panels away from trees can mitigate fouling caused by leaves and debris. An inclination of 5° allows the panels to be out of view from street level, ensuring the aesthetic of the building is not damaged.

Maximum energy yield will occur when the panels are orientated between south-east and south-west. Once installed, the panels have no running costs apart from occasional maintenance.

PV panels are proposed to be installed at a 5° angle, south facing on a green roof. (Please see Figure 7) A total of 38 PV panels is proposed to serve this development, based on a 20% efficient PV panel, providing approximately 12.7 kWp. The initial PV electricity production assessment was based on the parameters defined in Table 17. *Please see Appendix 4 PV panels calculation*

Table 17: PV Requirements (Tonnes per annum)	
Roof Space	As per drawings
Panel Efficiency	At least 20%
Orientation	South
Inclination of Panel	5 degree closest to the flat
Number of Panels	40
Panel Area	1.62 m^2
Total Panel Area	65.2 m^2
Electrical Output	13.3 kWp

Figure 7: Example of angled PV system on a Green Roof

Additionally, Figure 8 displays the planned location of the PV panels on the roof of the domestic development.

4.3.2.2 PV Panels Reduction

Haringey Council's Sustainable Design and Construction SPD states '*All major development proposals should seek to reduce carbon dioxide emissions by at least 20 per cent through the use of on-site renewable energy generation wherever feasible.*'

Although this value has not been achieved, the utilisation of all available roof space has been proposed to maximise the potential for on-site renewable technologies. Furthermore, the target 35% reduction has been exceeded significantly through the 'Lean' and 'Clean' measures, allowing potential for the development to become a benchmark project.

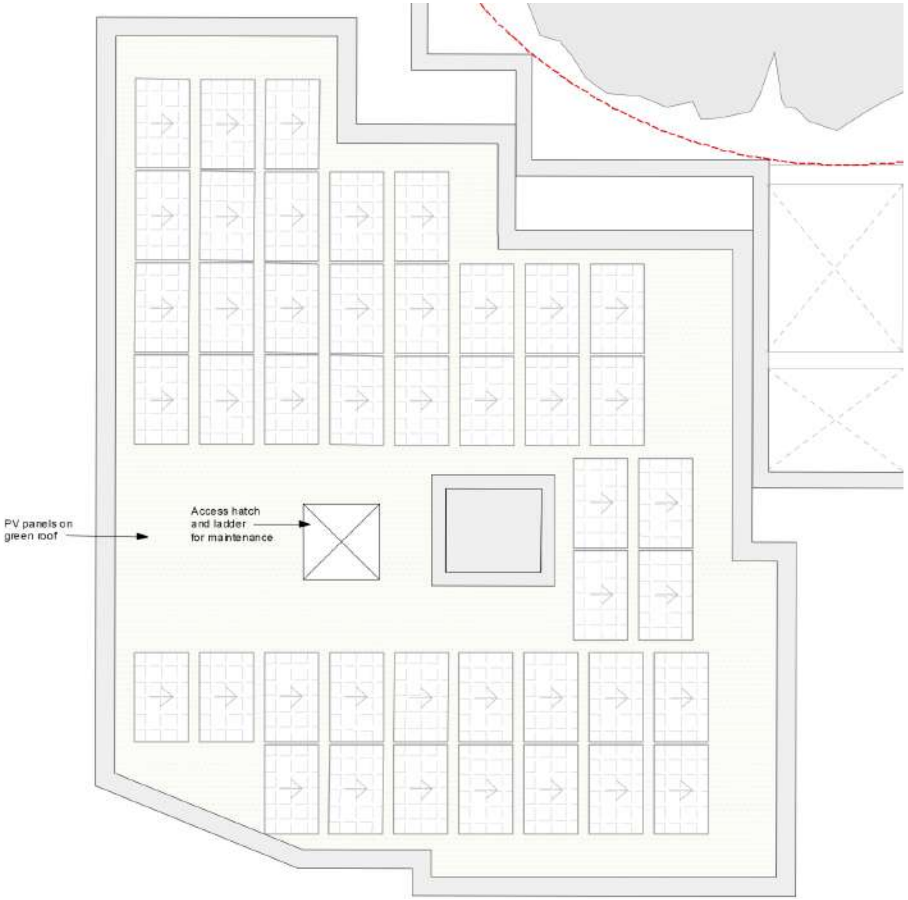


Figure 8: PV Panel Location on Domestic Development

4.3.3 Non-Domestic (Church)

A Variable Refrigerant Flow (VRF) system has been proposed for the non-domestic church building. The proposal is to install the units outside of the building with an acoustic enclosure to mitigate noise levels. VRF systems are highly efficient, consistent and quiet, therefore, disturbance to occupants in the proposed dwellings is minimised.

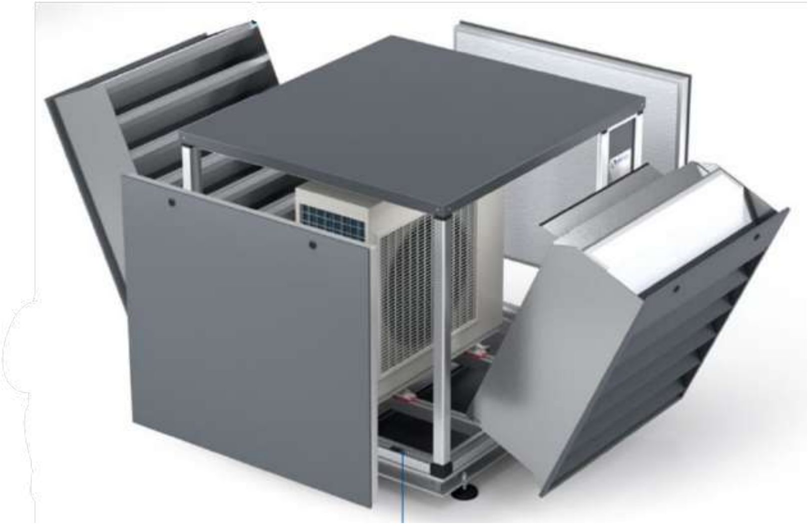


Figure 9: VRF Unit in Acoustic Enclosure

The outdoor unit will be sized depending on space and domestic water heating load calculations for the development, conducted by a specialist MEP Engineer.

4.3.4 Carbon Emission Reduction after Be Green

Potential reduction, due to Green measures for the domestic development, is displayed below in Tables 18a and 18b.

Table 18a: Carbon (CO_2) Emissions (Domestic)

	(Tonnes CO_2 per annum)
Baseline Part L 2021 Target Emission	12.33
After 'Be Lean' Measures	11.15
After 'Be Clean' Measures	6.15
After 'Be Green' Measures	4.47

Table 18b: Regulated CO_2 Savings (Domestic)

	Tonnes CO_2 per annum	(%)
Savings from 'Be Lean' Measures	1.18	10
Savings from 'Be Clean' Measures	5.01	41
Savings from 'Be Green' Measures	1.67	13

5. Conclusion

This Energy Statement was prepared by Energylab Consulting ltd in support of the full planning application for a new build development of 15 flats and a new Baptist Church located at Braemar Avenue, London N22 7BY to comply with the London Borough of Haringey's Council requirements on Sustainable Design and Construction.

The report confirms that the energy and carbon reduction strategy under the climate change mitigation measures proposed for this development are in line and in compliance with the relevant and applicable targets and requirement listed within the following planning policies of Haringey Council and the London Plan:

1. Haringey Council's Sustainable Design and Construction Supplementary Planning Document (SPD)
2. The London Plan relevant planning policies within section 9, i.e. Energy Hierarchy and carbon reduction targets

The Energy Statement for the new development has been developed in line with the London Plan Energy Hierarchy principles (displayed in Figure 1) to reduce the energy and associated CO_2 emissions using the "Be Lean, Be Clean, Be Green and Be Seen" approach:

1. "Be Lean": Improvements to the building fabric and energy efficient services to minimise energy demand, including efficient building services and 100% low energy LED lightings.
2. "Be Clean": The site is not suitable for a local CHP system or connection to an existing district network. Therefore, no carbon savings are possible using this measure.
3. "Be Green": Renewable and low carbon technologies have been proposed such as PV panels.
4. "Be Seen": Monitoring and reporting carbon emissions post-construction.

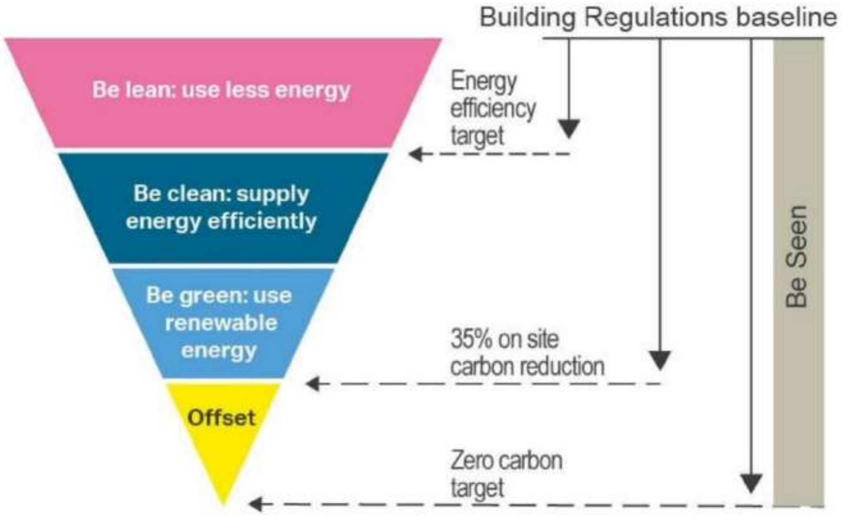


Figure 1: GLA Energy Hierarchy

According to the GLA Guidance, the target reduction in CO_2 emissions is a minimum 35% on site through the proposed design against the Part L 2021 target. This is to be achieved with a minimum reduction of 10% achieved via passive energy demand reduction measures and 25% due to incorporating on site renewable technologies and mechanical systems. The remaining CO_2 emissions to reach the target zero carbon will be offset by a one-off payment made to the local authority to invest into suitable sustainable projects within the borough. The current GLA carbon offset price is £95 per tonne of carbon dioxide over 30 years (building services life span) - only applicable to the domestic development.

Haringey Council states major developments should seek to reduce carbon emissions by 20% via the utilisation of renewable technologies where technically feasible.

Table 1 displays the percentage reductions in CO_2 emissions and the improvements against the notional building CO_2 emissions as per the Approved Document Part L 2021.

Table 1: Carbon (CO_2) Emission Reductions

	(Tonnes CO_2 per annum)	(%)
Baseline Part L 2021 Target Emission	12.33	-
Energy Demand Reduction Savings (Be Lean)	1.18	10
Heat Network/Active Savings (Be Clean)	5.01	41
Renewable Technologies Savings (Be Green)	1.67	13
Total Potential On Site Savings	**7.86**	**64**

As displayed in Table 1, there is potential in achieving **10%** reduction in CO2 emissions as a result of reducing the demand for energy approach, **41%** reduction due to 'Clean' energy supply through utilising efficient electrical boilers, and a potential further **13%** reduction as a result of incorporating renewable technologies, which in this case is a PV panels system. Furthermore, as displayed by Table 1, the Haringey Council target of reduction in carbon emissions by 20% via renewable technologies is not achieved. That being said, the utilisation of all available roof space has been proposed to maximise the potential for on-site renewable technologies.

Additionally, Table 2 displays the carbon offset payments towards a net zero target required due to shortfall to a zero carbon development.

Table 2: Carbon Offset Payments

Shortfall per Annum	4.47 tonnes
Total Shortfall over 30 Years*	134.18 tonnes
Carbon Offset Payment (£95 per tonne)	**£12,746.93**

*It is assumed lifetime of the development's services to be 30 years

Figure 2 displays predicted domestic CO_2 reductions across each phase of the London Plan Energy Hierarchy, surpassing the minimum requirements for CO_2 reductions as displayed by the green dotted lines.

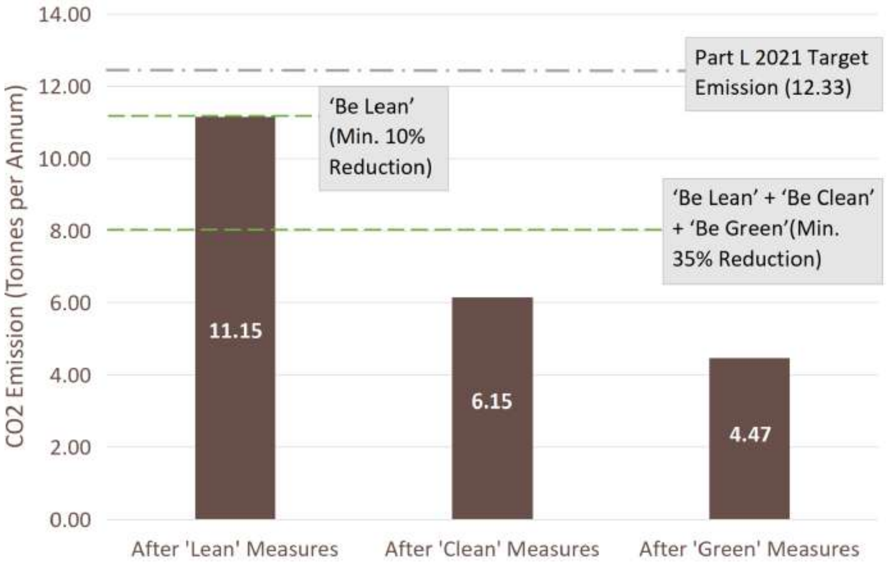


Figure 2: Predicted Domestic CO_2 reductions against Part L 2021 Baseline

The energy and the associated CO_2 emission calculations for the new church were assessed using Integrated Environmental Solution Virtual Environment (IESVE). Compliance with Part L2 2021 has been demonstrated for the new church, however, the church has not been included in the zero carbon target as it does not fall under a major non domestic development, i.e., greater than 1000 sqm.

Furthermore, the proposed development will adopt a number of sustainable design and construction measures to further promote reduced carbon emissions and sustainability. Please refer to the 'Sustainable Design and Construction Statement' prepared by Energylab_ on the 21/11/2022.

The new development has the potential to comply with the Building Regulations Parts L1 and L2 2021, and targets set out in Haringey Council's Sustainable Design and Construction SPD.

Appendices

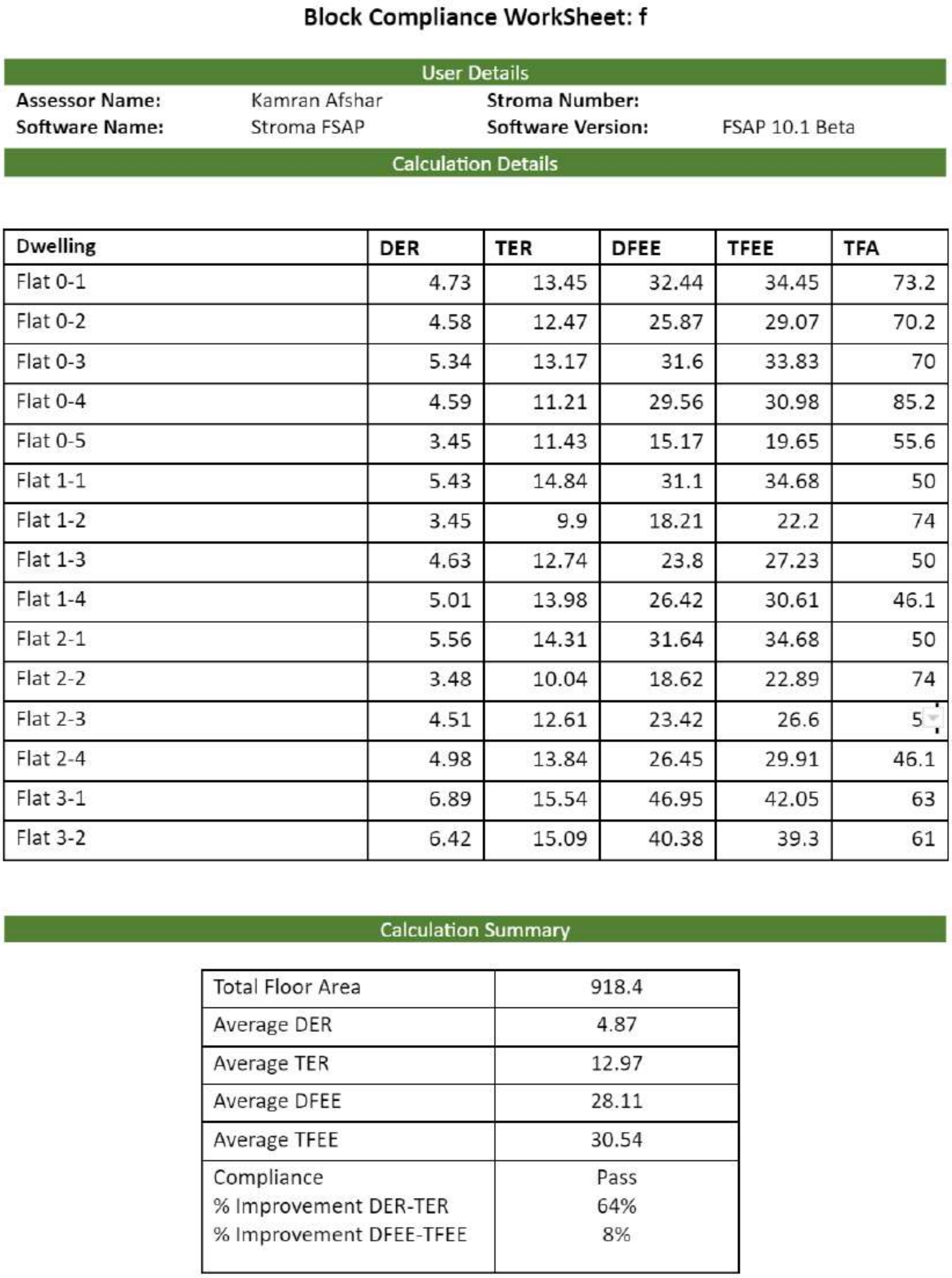
Appendix 1: Preliminary Appraisal of Renewable Energy Options

This appendix summarises the preliminary analysis of renewable energy options, and identifies which should be assessed in further detail, and which should be discounted because of clear technical reasons or other obstacles.

LZC Technology	Basic Technical Information	Technical, Environmental & Economic implications / Considerations	Suited Application	Site Specific Comment	Detailed Analysis ?
Solar thermal	Solar collectors (flat plate or tube) transfer energy into transfer liquid to a closed loop twin coil hot water cylinder	+ Government grants available (RHIs) +/- Can meet a significant proportion of the DHW demand - Efficiency effected by site factors – shading, orientation and roof/ground space -Requires considerable hot water demand all year round to be finically beneficial	Domestic and commercial applications with high annual hot water load; leisure centres, canteens, washrooms	This technology has not been specified as the PV panels proved to be the most viable and sufficient technology to achieve the targeted reduction in CO2 emissions. Hence this has not been specified for this development.	No
Wind turbine	Turbine/generator converts wind energy to electrical power.	+ Government grants available (FITs) + Allows on site generation of renewable electricity - Can create structural, vibrations and noise implications - Not suited for urban environments - Costs can be high in relation to the actual amount of electricity generated - Potential for additional planning issues	Large sized turbines in non-urban or offshore locations will be more effective	The site is located in a dense urban area and further planning approvals would be required.	No
Solar Photo-voltaic	Converts sunlight to DC electrical power which then uses an inverter to convert to AC.	+ Government grants available (FITs) + Allows on site generation of renewable electricity + Generally payback between 7-12 years + Low maintenance requirements - Efficiency affected by site factors – shading, orientation and roof/ground space	Wide range of building types particularly buildings with limited solar shading and south facing roof	There is sufficient roof space with minor over shading from surroundings.	YES

LZC Technology	Basic Technical Information	Technical, Environmental & Economic implications / Considerations	Suited Application	Site Specific Comment	Detailed Analysis ?
Air heat pump	Air Source Heat Pumps (ASHP) capture heat from the outside air and transfer the heat directly to the air inside the building or transferring the heat to a liquid medium that can be pumped around the building	+Lower installation cost that ground source heat pump + Can provide heating and cooling + Government grants available (RHIs) -COP is not as good during the heating season when the outside air temperature is often less than the ground temperature -Can restrict distribution strategies -Carbon saving are less clear cut -Noise and visual impact	Wide range of building types particularly buildings designed to have low temperature heat emitters.	Planning, noise and space limitations.	No
Ground Source Heat Pump	Ground Source Heat Pumps (GSHP) capture heat from the ground and transfer the heat to a liquid medium that can be pumped around the building	+ COP is much better than air source heat pumps + Government grants available (RHIs) -Requires area for ground collector or borehole -High initial capital cost - Can restrict distribution strategies -Carbon saving are less clear cut	Suits building designed to have low temperature heat emitters with sufficient space for necessary ground works	Limited external ground space to allow for the installation. The high capital cost relevant to the size of the development has also been considered when discounting this technology.	No
Biomass	Uses biomass as a fuel source for space heating and hot water	+ Government grants available (RHIs) + Renewable source of heating - Requires large fuel storage capacity - Generally a large capital cost	Building/site with sufficient access and storage facilities and a capable maintenance team	There is insufficient storage space and very limited access for regular deliveries to warrant further investigation.	No

Appendix 2: Supporting SAP Document



Block Compliance WorkSheet: f

User Details

Assessor Name:	Kamran Afshar	**Stroma Number:**	
Software Name:	Stroma FSAP	**Software Version:**	FSAP 10.1 Beta

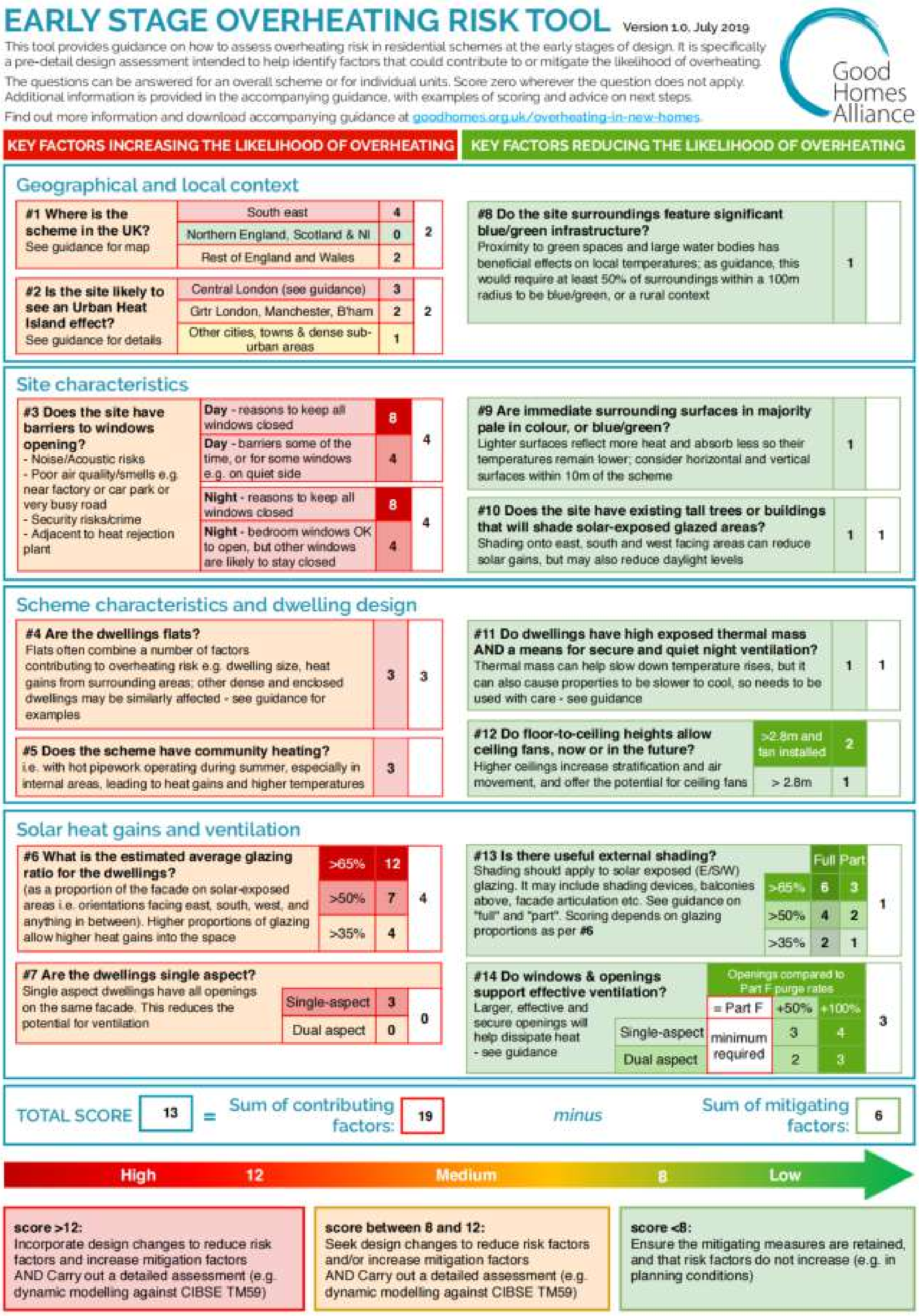
Calculation Details

Dwelling	**DER**	**TER**	**DFEE**	**TFEE**	**TFA**
Flat 0-1	4.73	13.45	32.44	34.45	73.2
Flat 0-2	4.58	12.47	25.87	29.07	70.2
Flat 0-3	5.34	13.17	31.6	33.83	70
Flat 0-4	4.59	11.21	29.56	30.98	85.2
Flat 0-5	3.45	11.43	15.17	19.65	55.6
Flat 1-1	5.43	14.84	31.1	34.68	50
Flat 1-2	3.45	9.9	18.21	22.2	74
Flat 1-3	4.63	12.74	23.8	27.23	50
Flat 1-4	5.01	13.98	26.42	30.61	46.1
Flat 2-1	5.56	14.31	31.64	34.68	50
Flat 2-2	3.48	10.04	18.62	22.89	74
Flat 2-3	4.51	12.61	23.42	26.6	5
Flat 2-4	4.98	13.84	26.45	29.91	46.1
Flat 3-1	6.89	15.54	46.95	42.05	63
Flat 3-2	6.42	15.09	40.38	39.3	61

Calculation Summary

Total Floor Area	918.4
Average DER	4.87
Average TER	12.97
Average DFEE	28.11
Average TFEE	30.54
Compliance % Improvement DER-TER % Improvement DFEE-TFEE	Pass 64% 8%

Appendix 3: Early Stage Overheating Risk Tool



EARLY STAGE OVERHEATING RISK TOOL

Version 1.0, July 2019

This tool provides guidance on how to assess overheating risk in residential schemes at the early stages of design. It is specifically a pre-detail design assessment intended to help identify factors that could contribute to or mitigate the likelihood of overheating.

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply. Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

Find out more information and download accompanying guidance at goodhomes.org.uk/overheating-in-new-homes

KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING | **KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING**

Geographical and local context

#1 Where is the scheme in the UK? See guidance for map	South east	4	2
	Northern England, Scotland & NI	0	
	Rest of England and Wales	2	
#2 Is the site likely to see an Urban Heat Island effect? See guidance for details	Central London (see guidance)	3	2
	Grtr London, Manchester, B'ham	2	
	Other cities, towns & dense sub-urban areas	1	

#8 Do the site surroundings feature significant blue/green infrastructure? Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context	1	

Site characteristics

#3 Does the site have barriers to windows opening? - Noise/Acoustic risks - Poor air quality/smells e.g. near factory or car park or very busy road - Security risks/crime - Adjacent to heat rejection plant	**Day** - reasons to keep all windows closed	8	4
	Day - barriers some of the time, or for some windows e.g. on quiet side	4	
	Night - reasons to keep all windows closed	8	4
	Night - bedroom windows OK to open, but other windows are likely to stay closed	4	

#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green? Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme	1	
#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas? Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels	1	1

Scheme characteristics and dwelling design

#4 Are the dwellings flats? Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples	3	3
#5 Does the scheme have community heating? i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures	3	

#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation? Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance		1	1
#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future? Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans	>2.8m and fan installed	2	
	> 2.8m	1	

Solar heat gains and ventilation

#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65%	12	4
	>50%	7	
	>35%	4	
#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation	Single-aspect	3	0
	Dual aspect	0	

#13 Is there useful external shading? Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per **#6**		Full	Part	1
	>65%	6	3	
	>50%	4	2	
	>35%	2	1	

#14 Do windows & openings support effective ventilation? Larger, effective and secure openings will help dissipate heat - see guidance		Openings compared to Part F purge rates			3
		= Part F	+50%	+100%	
	Single-aspect	minimum required	3	4	
	Dual aspect		2	3	

TOTAL SCORE **13** = Sum of contributing factors: **19** *minus* Sum of mitigating factors: **6**

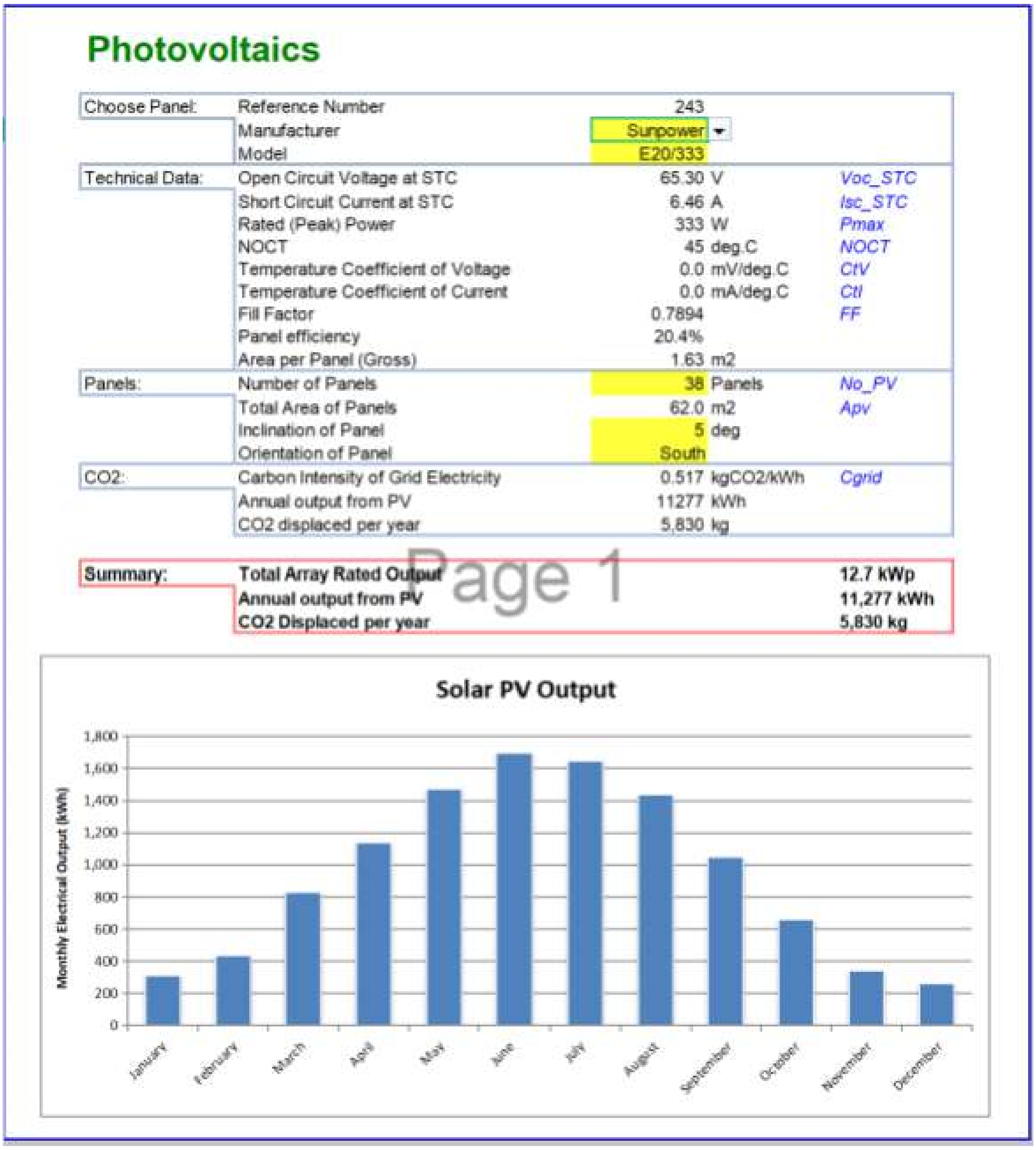
score >12:
Incorporate design changes to reduce risk factors and increase mitigation factors
AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score between 8 and 12:
Seek design changes to reduce risk factors and/or increase mitigation factors
AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score <8:
Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)

**Thermal simulation modelling has been carried out. Please refer to the TM59 Overheating Assessment conducted by Energylab Consulting Ltd.*

Appendix 4: PV Calculation

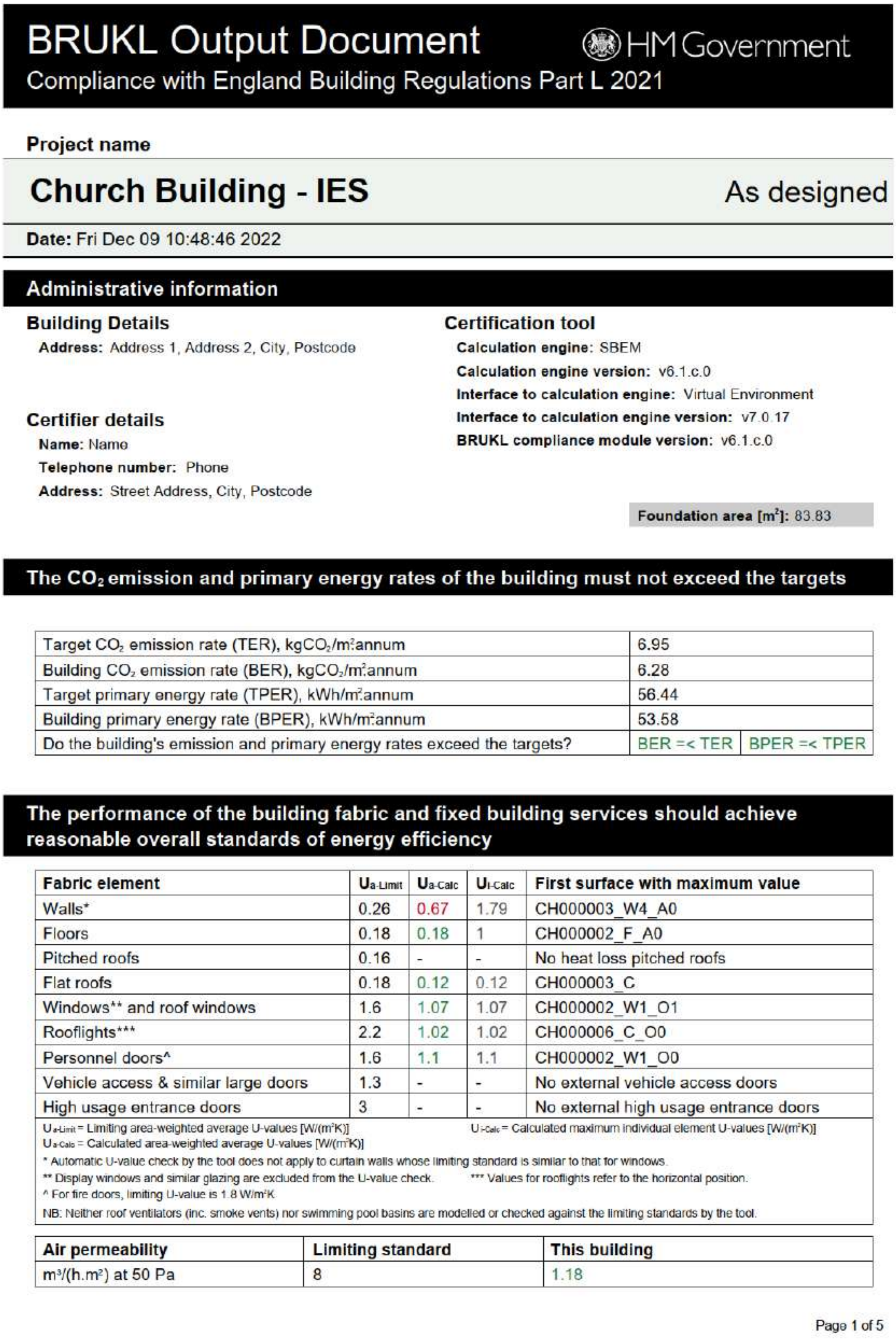


Photovoltaics

Choose Panel:	Reference Number	243		
	Manufacturer	Sunpower		
	Model	E20/333		
Technical Data:	Open Circuit Voltage at STC	65.30	V	*Voc_STC*
	Short Circuit Current at STC	6.46	A	*Isc_STC*
	Rated (Peak) Power	333	W	*Pmax*
	NOCT	45	deg.C	*NOCT*
	Temperature Coefficient of Voltage	0.0	mV/deg.C	*CtV*
	Temperature Coefficient of Current	0.0	mA/deg.C	*CtI*
	Fill Factor	0.7894		*FF*
	Panel efficiency	20.4%		
	Area per Panel (Gross)	1.63	m2	
Panels:	Number of Panels	38	Panels	*No_PV*
	Total Area of Panels	62.0	m2	*Apv*
	Inclination of Panel	5	deg	
	Orientation of Panel	South		
CO2:	Carbon Intensity of Grid Electricity	0.517	kgCO2/kWh	*Cgrid*
	Annual output from PV	11277	kWh	
	CO2 displaced per year	5,830	kg	

Summary:	**Total Array Rated Output**	**12.7 kWp**
	Annual output from PV	**11,277 kWh**
	CO2 Displaced per year	**5,830 kg**

Appendix 5: BRUKL Document Church Building



BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Church Building - IES

As designed

Date: Fri Dec 09 10:48:46 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.c.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.17

BRUKL compliance module version: v6.1.c.0

Foundation area [m^2]: 83.83

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO$_2$ emission rate (TER), kgCO$_2$/m^{2}annum	6.95	
Building CO$_2$ emission rate (BER), kgCO$_2$/m^{2}annum	6.28	
Target primary energy rate (TPER), kWh/m^{2}annum	56.44	
Building primary energy rate (BPER), kWh/m^{2}annum	53.58	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	**U$_{a\text{-Limit}}$**	**U$_{a\text{-Calc}}$**	**U$_{i\text{-Calc}}$**	**First surface with maximum value**
Walls*	0.26	0.67	1.79	CH000003_W4_A0
Floors	0.18	0.18	1	CH000002_F_A0
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	CH000003_C
Windows** and roof windows	1.6	1.07	1.07	CH000002_W1_O1
Rooflights***	2.2	1.02	1.02	CH000006_C_O0
Personnel doors^	1.6	1.1	1.1	CH000002_W1_O0
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

U$_{a\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m^{2}K)]
U$_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m^{2}K)]
U$_{a\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m^{2}K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^{2}K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	**Limiting standard**	**This building**
m^3/(h.m^2) at 50 Pa	8	1.18

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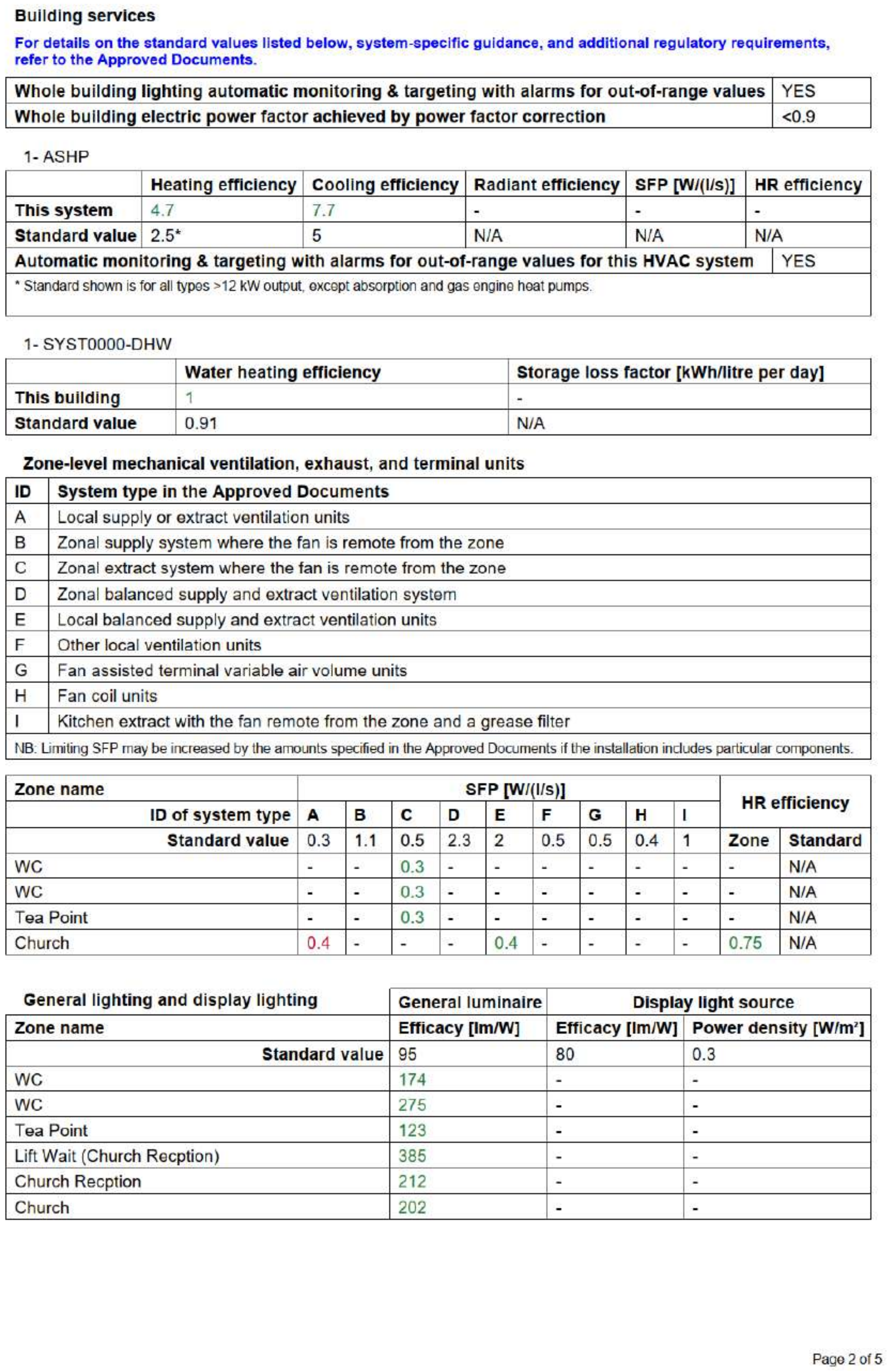


Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- ASHP

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4.7	7.7	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system	YES				
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- SYST0000-DHW

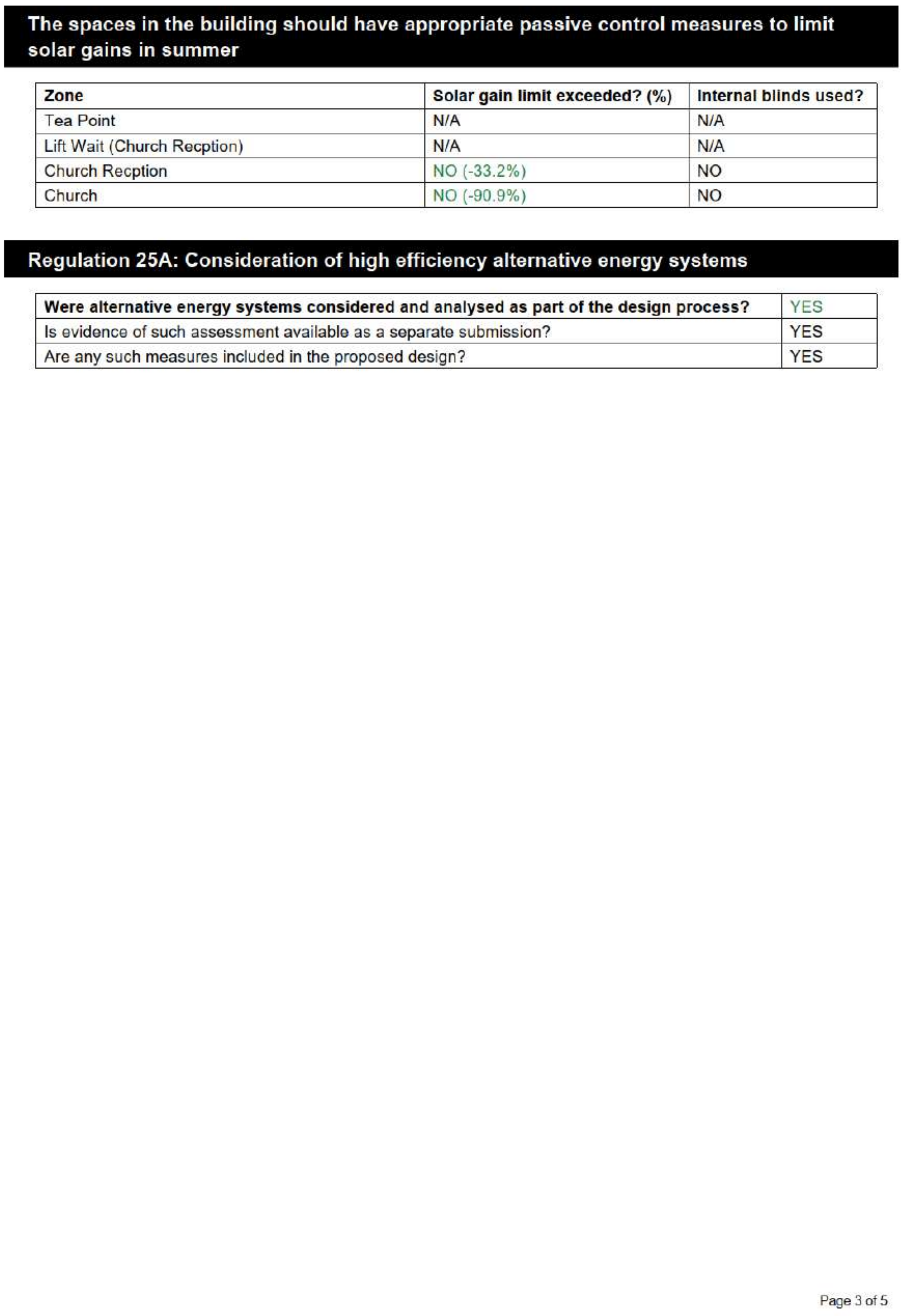
	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	1	-
Standard value	0.91	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	**System type in the Approved Documents**
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	**Zone**	**Standard**
WC	-	-	0.3	-	-	-	-	-	-	-	N/A
WC	-	-	0.3	-	-	-	-	-	-	-	N/A
Tea Point	-	-	0.3	-	-	-	-	-	-	-	N/A
Church	0.4	-	-	-	0.4	-	-	-	-	0.75	N/A

General lighting and display lighting	**General luminaire**	**Display light source**	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
WC	174	-	-
WC	275	-	-
Tea Point	123	-	-
Lift Wait (Church Recption)	385	-	-
Church Recption	212	-	-
Church	202	-	-



The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Tea Point	N/A	N/A
Lift Wait (Church Recption)	N/A	N/A
Church Recption	NO (-33.2%)	NO
Church	NO (-90.9%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

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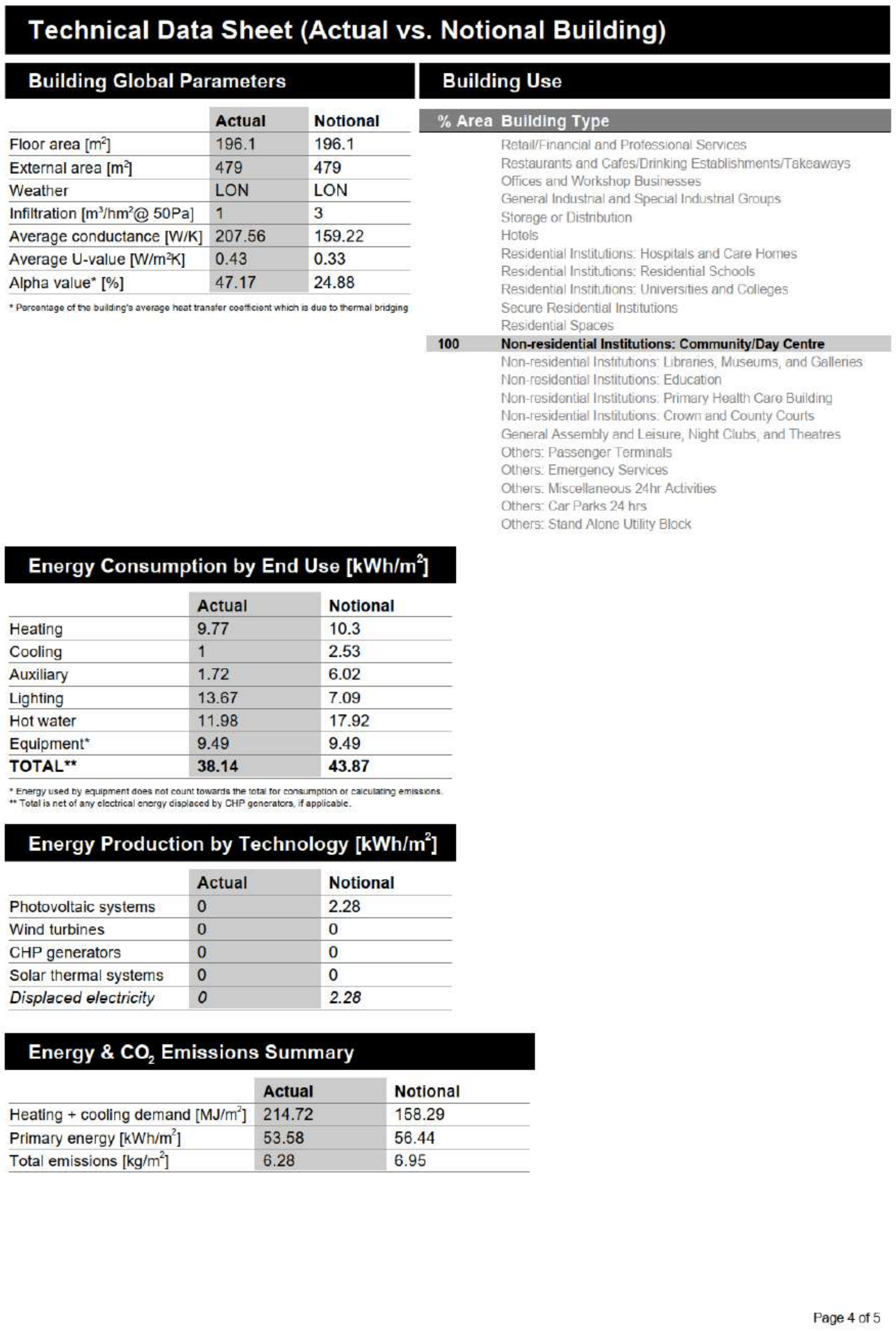

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	196.1	196.1
External area [m^2]	479	479
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	1	3
Average conductance [W/K]	207.56	159.22
Average U-value [W/m^2K]	0.43	0.33
Alpha value* [%]	47.17	24.88

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
100	**Non-residential Institutions: Community/Day Centre**
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	9.77	10.3
Cooling	1	2.53
Auxiliary	1.72	6.02
Lighting	13.67	7.09
Hot water	11.98	17.92
Equipment*	9.49	9.49
TOTAL**	**38.14**	**43.87**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	2.28
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*2.28*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	214.72	158.29
Primary energy [kWh/m^2]	53.58	56.44
Total emissions [kg/m^2]	6.28	6.95

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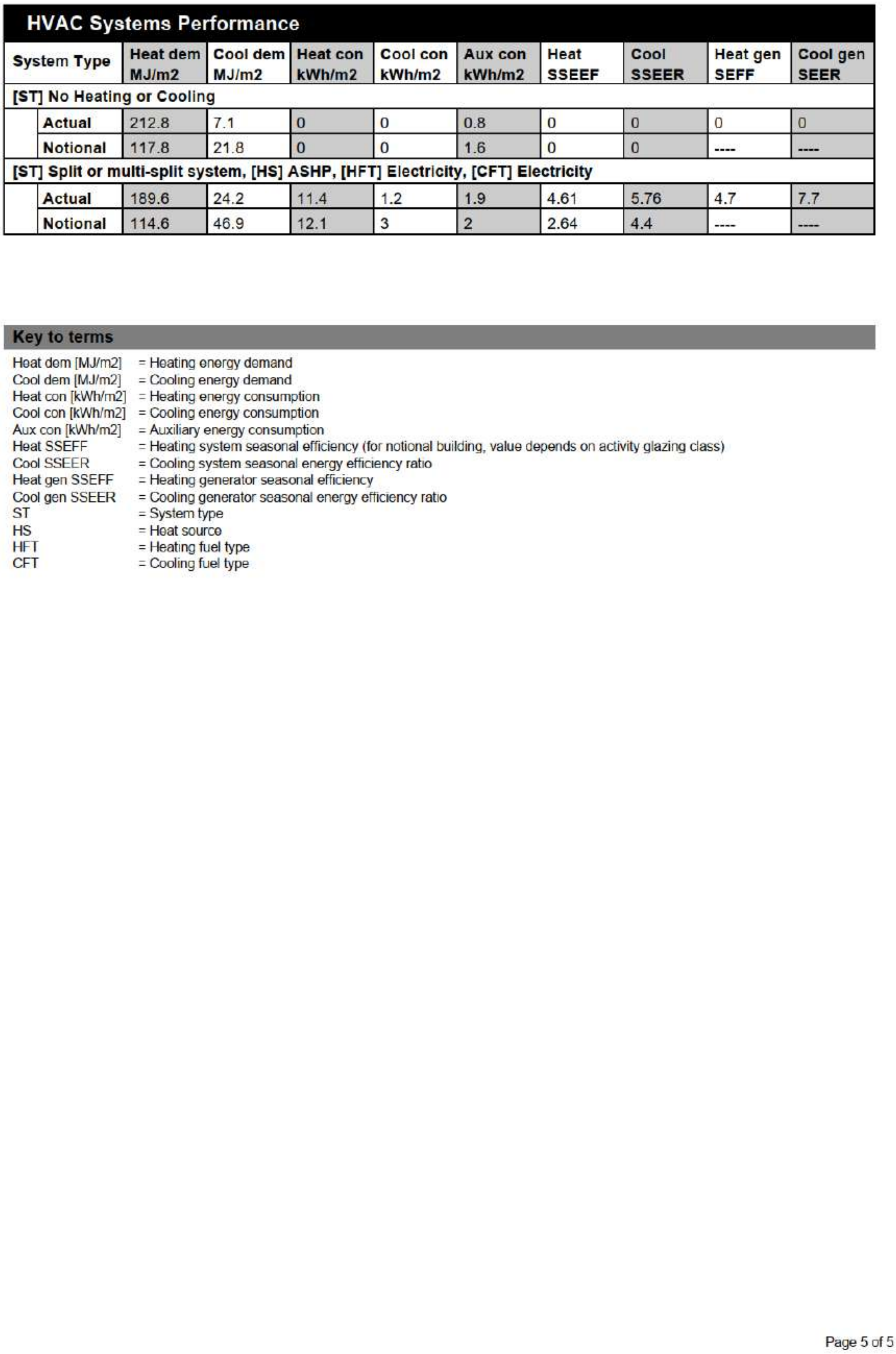

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	212.8	7.1	0	0	0.8	0	0	0	0
	Notional	117.8	21.8	0	0	1.6	0	0	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	189.6	24.2	11.4	1.2	1.9	4.61	5.76	4.7	7.7
	Notional	114.6	46.9	12.1	3	2	2.64	4.4	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

energylab_
Building Services and Sustainability Designers

energylab_ is a dynamic consultancy specialising in sustainability and sustainable design. We have extensive experience in both design and management across a broad range of sectors where we aim to embrace circular economy principles and low energy design practices.

Our vision is to deliver efficient and flexible environments which are engineered to help people work in an sustainable, effective and collaborative way.

We have a proactive approach to spatial design and how building services integrate within the space. We offer our clients a high quality service by working closely with them and their team to achieve a successful end product which meets the ESG agenda.

energylab_ wants to change that way of working by providing a more strategic and integrated approach to workplace design.

We do things differently……..

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