Energy and Sustainability Statement

Flitcroft House, London Borough of Camden
Issue: August 2022
Rev: 2

Executive Summary

Savills Earth has been appointed by Damion Burrows Architects to prepare an Energy and Sustainability Statement to support the planning application for the proposed development at 114 – 116 Charing Cross Road, Soho, WC2H 0JR in the London Borough of Camden. This statement details the sustainable design features of the development and demonstrates how they relate to applicable planning policy guidance as listed below:

- National Planning Policy Framework (NPPF) (2021).
- The London Plan (March 2021)
- Camden's Local Plan (adopted March 2017)
- Camden Planning Guidance (CPG)
- Camden Climate Action Plan (2020 – 2050)

The development proposals comprises of a comprehensive refurbishment and two storey extension of the existing building. The existing building is a five storey commercial building with a restaurant occupying the ground floor and offices occupying the upper floors.

By designing to rigorous energy standards, following the Energy Hierarchy (Be Lean, Be Clean, Be Green, Be Seen), designing an energy efficient fabric, omitting the use of fossil fuels for heating and hot water, and implementing a significant rooftop array of solar photovoltaic panels, the application will respond directly to the national, regional and local policy requirements.

The passive design and energy efficiency measures demonstrate a 29% carbon emissions reduction against Part L Building Regulations. Renewable energy technologies are responsible for an additional 21% carbon reduction against Part L Building Regulations from passive design and energy efficiency. These measures combined provide a carbon dioxide emissions saving of 49% compared to the Part L:2013 Building Regulations which exceeds the minimum requirement as set by the London Borough of Camden's planning policy.

In summary, the proposed development:

- Will minimise energy demand through the use of low u-values, low air permeability and low thermal bridging to reduce heat loss.
- Will improve building fabric.
- Will be fossil fuel free, using air source heat pumps to provide space heating and hot water.
- Will utilise rooftop photovoltaic panels to provide renewable electricity.
- Will have a minimal impact on the risk of surface water flooding onsite and will increase permeable surface area
- Will minimise water consumption.
- Will improve the longevity by creating more flexible and adaptable spaces in line with future needs.

In addition to sustainability measures, the following health and wellbeing measures have been implemented onsite:

- The public space will be landscaped, providing amenity benefits to residents.
- All units will receive a good level of daylighting through large openable windows. The provision of good internal daylighting has been balanced with reducing the overheating risk.
- The provision of external space in the form of a communal garden area will ensure that all residents have access to outside space.
- Dedicated fresh air provision will ensure that air quality within the building is of high quality.
- The use of high VOC content paints, sealants and all ozone depleting materials including insulation will be avoided where possible.

Overall, the proposals constitute sustainable development in accordance with national, regional and local policy requirements and will provide a development that seeks to promote these principles in operation. The total CO_2 emissions using the SAP 10.0 carbon factors can be seen in the table below.

	Regulated (tonnes CO_2/yr)	**CO_2 Savings (tonnes CO_2/yr)**
Baseline: Part L 2013 of the Building Regulations Compliant Development	39.1	-
After energy demand reduction (Be Lean)	27.9	11.2
After renewable energy (Be Green)	19.7	8.1
Improvement over Baseline	19.3	Tonnes CO_2 per annum
	49	%

CONTENTS

Savills Earth	
Written by:	I. Brown
Checked by:	G. Askounis
Report Version	
Issue Date:	01 August 2022
Revision:	02
File reference:	-

1. Introduction

Savills Earth has been appointed by Damion Marcus Burrows Architects on behalf of the London Borough of Camden to prepare an Energy & Sustainability Statement to support the planning application for the proposed refurbishment and extension of Flitcroft House located in the Holborn and Covent Garden Ward in the London Brough of Camden.

1.1 Site location and proposed development

The client is seeking to refurbish and extend the existing building at 114 – 116 Charing Cross Road, Soho, WC2H 0JR. The aim is to enhance the existing Flitcroft House to meet floor space demand for commercial uses and improve the buildings architectural value. The building currently comprises of five storeys and is mixed use with a restaurant on the ground floor and offices on the upper floors.

The proposal comprises two new storeys providing office space and an outdoor terrace. The design is a contemporary reflection of the existing 19th century façade, tying the building to the surrounding context.

Figure 1.1 – Location plan of the proposed development site

In line with the GLA and London Borough of Camden's requirements, the proposed development is looking to deliver the following benefits:

- Improved energy performance;
- Reduce carbon dioxide emissions;
- Improved local architecture and an enhanced landscape setting;
- Improve arrival experience for staff and visitors;
- Promote sustainable methods of transport; and
- Optimise resource efficiency.

1.2 Report objectives

The objectives of this report are to:

- Demonstrate how the proposed development will meet the sustainability standards set by the London Borough of Camden, GLA and the National Planning Policy Framework outlined in Chapter 2; and
- Identify how to incorporate of the principles of sustainable design and construction into the proposed development from an early stage.

2. Planning Context

2.1 National Planning Policy Framework (2021)

The National Planning Policy Framework sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. At the heart of the NPPF is a presumption in favour of sustainable development. Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives).

An economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure.

A social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being.

An environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating adapting to climate change, including moving to a low carbon economy.

This sustainability statement has been developed in line with the NPPF and alongside the suite of documents submitted as part of this application fulfils the requirements.

2.2 Building Regulations Approved Document Part L

Part L of the Building Regulations is the mechanism by which the Government is driving reductions in the regulated CO_2 emissions from new buildings.

The energy efficiency requirements of the Building Regulations in England were updated in June 2021, with Part L 2021 into effect from June 2022. However, initial energy and carbon modelling for the proposed development was conducted before the 2021 version was released so for reasons of continuity and compliance with current policy, the 2013 version has been retained in this report.

Part L2A and L2B 2013 (with 2016 amendments) and has five key criteria which must be satisfied as follows:

- Criterion 1 - Achieving the Target Emission Rate (TER)
- Criterion 2 - Limits on design flexibility
- Criterion 3 - Limiting the effects of solar gains in summer
- Criterion 4 - Building performance consistent with the Building Emission Rate (BER)
- Criterion 5 - Provision for energy-efficient operation of the building

Criterion 1 requires that a building does not generate CO_2 emissions in excess of the TER as calculated in accordance with the approved the approved methodologies for new buildings

Criterion 2 places upper limits on the efficiency of controlled fittings and services

Criterion 3 requires that occupied spaces are not subject to excessive solar gains.

2.3 London Plan (March 2021)

The London Plan 2021 is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies of relevance to this project in the context of sustainability and energy are as follows:

Policy SI2- Minimising Greenhouse Gas emissions

This policy states that major development proposals should be net zero-carbon, by reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

- Be lean: use less energy
- Be clean: supply energy efficiently
- Be green: use renewable energy
- Be seen: monitor, verify and report energy performance

Non-residential developments should achieve a 15% reduction of GHG emissions through energy efficiency measures. Developments with more than 500m^2 of floor space should also achieve a 20% reduction in CO_2 emissions from on-site renewable technology in line with stage three of the energy hierarchy, 'Be Green'.

Policy SI3- Energy Infrastructure

This policy recognises that combined heat and power installations can have negative effects on London's air quality and shifts the focus of decentralised energy networks to the use of waste or secondary heat sources, where available. The policy also recognises that, compared to increasingly decarbonised electricity generation, gas-fired heat will become comparatively more carbon intensive as the electricity grid is further decarbonised.

Policy SI4- Managing Heat Risk

This policy states that development proposals should minimise adverse impacts on the urban heat island effect through design, layout, orientation, materials and the incorporation of green infrastructure. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

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

Policy SI5- Water Infrastructure

This policy states that major development proposals should minimise the use of mains water

Policy SI7- Reducing Waste and Supporting the Circular Economy

This states that resource conservation, waste reduction, increases in material re-use and recycling, and reductions in waste going for disposal will be achieved, in part, through designing developments with adequate, flexible and easily accessible storage space and collection systems.

2.4 Greater London Authority (GLA) guidance on preparing energy assessments as part of planning applications (June 2022)

The April 2022 draft revision to the GLA guidance on preparing energy statements confirms the calculation methodology for new developments and refurbishments, and sets an expectation for all referable applications to use SAP 10 fuel carbon emission factors.

It also further clarifies the carbon emission targets required for all types of developments.

The Draft 2022 guidance confirms the New London Plan energy efficiency targets which require new referable developments to achieve:

2.5 Be Seen' Energy Monitoring Guidance Consultation (September 2021)

Major developments are required to monitor and report on energy performance to the Mayor for at least five years via an online portal to enable the GLA to identify good practice and report on the operational performance of new development in London.

The document is aimed at those involved in the planning, design, construction, delivery and operation of development. It includes a reporting template which applicants will be expected to use. It applies to major developments and sets out what each responsible party needs to do to comply with the policy from the inception stage of a development to full occupancy. The 'Be Seen' policy is designed help verify the London Plan policies and to ensure compliance with London's net zero-carbon standard is achieved.

2.6 Camden Local Plan (adopted July 2017)

The Camden Local Plan document sets out the Council's planning policies which include policies to manage the city and deliver Camden's future development. Policies of relevance to this project in the context of sustainability and energy are as follows:

Policy A3 – Biodiversity

- Expect developments to incorporate additional trees and vegetation wherever possible.

Policy D1 – Design

- Respect local context and character;
- Is sustainable in design and construction, incorporating best practice in resource management and climate change mitigation and adaptation;
- Is of sustainable and durable construction and adaptable to different activities and land uses;
- Comprises details and materials that are of high quality and complement the local character;
- Integrates well with the surrounding streets and open spaces, improving movement through the site and wider area with direct, accessible and easily recognisable routes and contributes positively to the street frontage;
- Is inclusive and accessible for all;
- Promotes health;
- Is secure and designed to minimise crime and antisocial behaviour;
- Responds to natural features and preserves gardens and other open space;
- Incorporates high quality landscape design (including public art, where appropriate) and maximises opportunities for greening for example through planting of trees and other soft landscaping;
- Incorporates outdoor amenity space; and
- Carefully integrates building services equipment.

Policy CC1 – Climate Change and Mitigation

- Promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
- Require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
- Ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
- Support and encourage sensitive energy efficiency improvements to existing buildings;
- Require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building;
- Expect all developments to optimise resource efficiency;
- Non-residential development to achieve 15% reduction (beyond part L Building regulations), in accordance with the new London Plan, through on-site energy efficient measures (Be lean stage); and
- All major developments to assess the feasibility of connecting to an existing decentralised energy network, and where this is not possible establishing a new network (see paragraph 8.25 Local Plan).

Policy CC2 – Adapting to climate change

- The protection of existing green spaces and promoting new appropriate green infrastructure;
- Not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;
- Incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and
- Measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

Policy CC3 – Water and Flooding

- Incorporate water efficiency measures;
- Avoid harm to the water environment and improve water quality;
- Consider the impact of development in areas at risk of flooding (including drainage);
- Incorporate flood resilient measures in areas prone to flooding; and
- Not locate vulnerable development in flood-prone areas.

Policy CC4 – Air Quality

- Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution; and
- Development should take into consideration the location of amenity space and opportunities for appropriate planting 'greening'.

Policy CC5 – Waste

- Deal with North London's waste by working with our partner boroughs in North London to produce a Waste Plan, which will ensure that sufficient land is allocated to manage the amount of waste apportioned to the area in the London Plan;
- Safeguard Camden's existing waste site at Regis Road unless a suitable compensatory waste site is provided that replaces the maximum throughput achievable at the existing site; and

- Make sure that developments include facilities for the storage and collection of waste and recycling.

Policy T1 – Prioritising walking, cycling and public transport

- Provides for accessible, secure cycle parking facilities exceeding minimum standards outlined within the London Plan (Table 6.3) and design requirements outlined within our supplementary planning document Camden Planning Guidance on transport. Higher levels of provision may also be required in areas well served by cycle route infrastructure, taking into account the size and location of the development; and
- Makes provision for high quality facilities that promote cycle usage including changing rooms, showers, dryers and lockers.

Policy T3 – Transport infrastructure

- Protect existing and proposed transport infrastructure, particularly routes and facilities for walking, cycling and public transport, from removal or severance.

Other Considerations

2.7 Camden Planning Guidance (CPG)

Water and Flooding (2021)

- Refurbishments and other non-domestic development will be expected to meet BREEAM water efficiency credits; and
- Major developments and high or intense water use developments should include grey water recycling;

Energy Efficiency and adaptation (2021)

- Natural 'passive' measures should be prioritised over active measures to reduce energy;
- PV Panels: flush to roof or wall (reduce visibility and improve efficiency), confirm the number and size of the panels, confirm panels won't impact potential presence of bats and birds nesting/ roosting in historic buildings, meter installed to monitor the system;
- Deep refurbishments (i.e. refurbishments assessed under Building Regulations Part L1A/L2A) should also meet the London Plan carbon reduction targets for new buildings;
- Non-residential development to achieve 15% reduction (beyond part L Building regulations), in accordance with the new London Plan, through on-site energy efficient measures outlined by table 2b, Energy Reduction Targets Non-domestic;
- Developments are to target a 20% reduction in carbon dioxide emissions from on-site renewable energy technologies outlined by table 2b, Energy Reduction Targets Non-domestic; and
- Where cooling is required in non-residential development, the cooling demand of the actual and notional buildings should be compared, with the aim of reducing the cooling demand below that of the notional building. If this is not possible, the applicant should provide a clear explanation of why it is not possible, and outline the implications for building design.

2.8 Camden Climate Action Plan (2020 - 2050)

In 2019, Camden declared a Climate and Ecological Emergency, committing Camden to be net zero carbon by 2030. The New Climate Action Plan for Camden (2020) was informed by the 17 outputs from Camden Citizens' Assembly which delivers impact at a multi-scalar level to reduce carbon and pursue climate action measures through relevant strategies and plans focused around four themes. These include People, Buildings, Places and Organisations.

2.9 Carbon Factors

In June 2022, the GLA released draft guidance on preparing Energy Assessments as part of planning applications. Within this guidance, it is stated that all applications should report on carbon emissions using the SAP 2012 carbon factors (current Part L) and the emerging SAP10.0 carbon factors. This will ensure that the assessment of new developments better reflects the actual carbon emissions associated with their expected operation.

Hence, within this report the carbon emissions of the proposed development are reported using both SAP 2012 and SAP 10.0 factors.

	SAP 2012 carbon factor ($kgCO_2e/kWh$)	SAP 10.0 carbon factor ($kgCO_2e/kWh$)
Gas	0.216	0.210
Electricity	0.519	0.233

Table 2.1 – SAP2012 and SAP10.0 carbon factors

3. Energy

In line with Policy CC1 of the Camden Local Plan (2017) and New London Plan (2021), the following principles have been considered for the design approach of the proposed development:

- The energy hierarchy of 'Be Lean', 'Be Clean' 'Be Green' and 'Be Seen'
- Non-residential development to achieve 15% reduction (beyond part L Building regulations), in accordance with the new London Plan, through on-site energy efficient measures;
- Developments are to target a 20% reduction in carbon dioxide emissions from on-site renewable energy technologies.

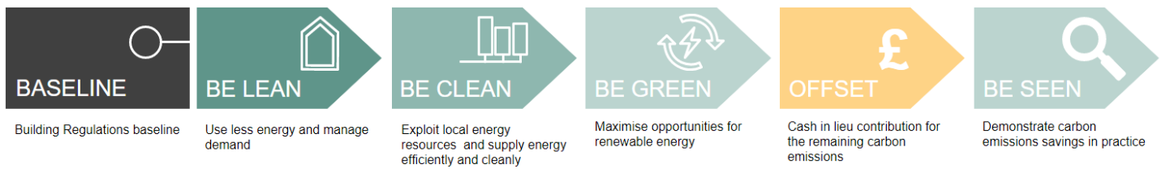

Figure 3.1 – Energy Hierarchy

The building was assessed using energy modelling software EDSL TAS 9.5 which uses the National Calculation Methodology (NCM) and SBEM platform to demonstrate building compliance for non-residential buildings with Part L2A of the Building Regulations 2013. The results are summarised in this section, and full results are presented in the form of a BRUKL document in Appendix 1.

3.1 Demand Reduction (Be Lean)

The first step of the energy hierarchy demands measures that help reduce energy demand during building operation. This section outlines the proposed architectural, mechanical and electrical building performance standards that reduce energy demand. Where applicable, performance standards are compared to minimum Part L 2013 requirements to demonstrate improved building performance.

The energy strategy for the proposed development focuses on delivering spaces that are thermally comfortable throughout the year with minimum energy input and carbon dioxide emissions, prioritising the optimisation of building fabric to reduce the need for heating, cooling and artificial lighting.

3.1.1 Passive design measures

The following passive design features are proposed:

- Optimised fabric performance with high levels of envelope insulation, airtight construction and thermal bridges between building elements minimised to prevent heat loss.
- Good airtightness of the building which will conserve heat.
- Highly efficient double glazing throughout with low-emissivity coatings to balance winter and summer solar gains for optimum performance.

The proposed and target fabric performance for the proposed development is presented in the following table:

	GLA Energy Assessment Guidance (April 2020)	Part L2A Limiting Fabric Parameters (2013)	Refurbishment	Proposed Extension
External wall	0.55 W/m².K	0.35 W/m².K	0.3 W/m².K	0.25 W/m².K
Exposed & ground floors	0.55 W/m².K	0.25 W/m².K	0.25 W/m².K	0.25 W/m².K
Exposed roof	0.18 W/m².K	0.25 W/m².K	0.18 W/m².K	0.18 W/m².K
Windows	1.80 W/m².K g-value: 0.63 Light transmittance: 80%	2.20 W/m².K	1.80 W/m².K g-value: 0.5 Light transmittance: 78%	1.80 W/m².K g-value: 0.4 Light transmittance: 70%
Air permeability rate	25 m³/m².hr @50Pa	10 m³/m².hr @50Pa	5 m³/m².hr @50Pa	5 m³/m².hr @50Pa

Table 3.1 – Fabric performance of the proposed development.

Dynamic simulation has been used to calculate the carbon performance of the non-residential parts of the proposed development. The software used to carry out the dynamic simulation includes the thermal bridging percentages prescribed in the NCM guide.

3.1.2 Energy efficiency measures

The objective is to deliver a building as energy-efficient as possible without relying on complex systems to deliver low carbon performance. Where energy is required to operate systems, efficient plant has been selected and designed to minimise delivered energy. The following energy-efficient systems are proposed:

- Low energy LED lighting throughout with occupant detection and daylight control in applicable office spaces.

Carbon Dioxide Emissions	Total regulated emissions (tonnes CO_2/yr)	CO_2 Savings (tonnes CO_2/yr)	Percentage saving (%)
BR compliant case (TER) 'Base case'	61.1	-	-
Energy efficiency improvements 'Lean case'	46.9	14.1	23%

Table 3.2 – Sitewide carbon emissions for the Be Lean case using SAP 2012 carbon factor

Carbon Dioxide Emissions	Total regulated emissions (tonnes CO_2/yr)	CO_2 Savings (tonnes CO_2/yr)	Percentage saving (%)
BR compliant case (TER) 'Base case'	39.1	-	-
Energy efficiency improvements 'Lean case'	27.9	11.2	29%

Table 3.3 –Sitewide carbon emissions for the Be Lean case using SAP 10.0 carbon factor

The regulated CO_2 emissions of the scheme before the use of any low and zero carbon systems has been estimated as approximately 11.2 tonnes of CO_2 per year, demonstrating a 29% reduction from passive design and energy efficiency measures against Part L Building Regulations(using SAP 10.0 carbon factors. Please refer to Table 3.10 for a summary of the SAP 10.0 emissions and Appendix 1 for detailed SAP calculations.

3.2 Heating Infrastructure (Be Clean)

London Plan policy SI3 requires development proposals to explore the opportunities to link into an existing or planned decentralised energy network. Where an existing decentralised energy network is not present, an assessment of the feasibility of establishing a decentralised energy system for the proposed development should be undertaken. Where it is not feasible to implement an energy network, opportunities to maximise renewable electricity generation and incorporate demand-side response measures should be investigated.

As can be seen in Figure 3.3, there are no known available district heat networks in the vicinity of the site for connection. Furthermore, it is considered that the establishment of a new heat network would not be economically feasible for the proposed development considering the nature, scale and density of the scheme. It is therefore recommended that air heat pump systems are employed to service the proposed scheme. The incorporation of heat pump technology is discussed in greater detail in the 'Be Green' section.

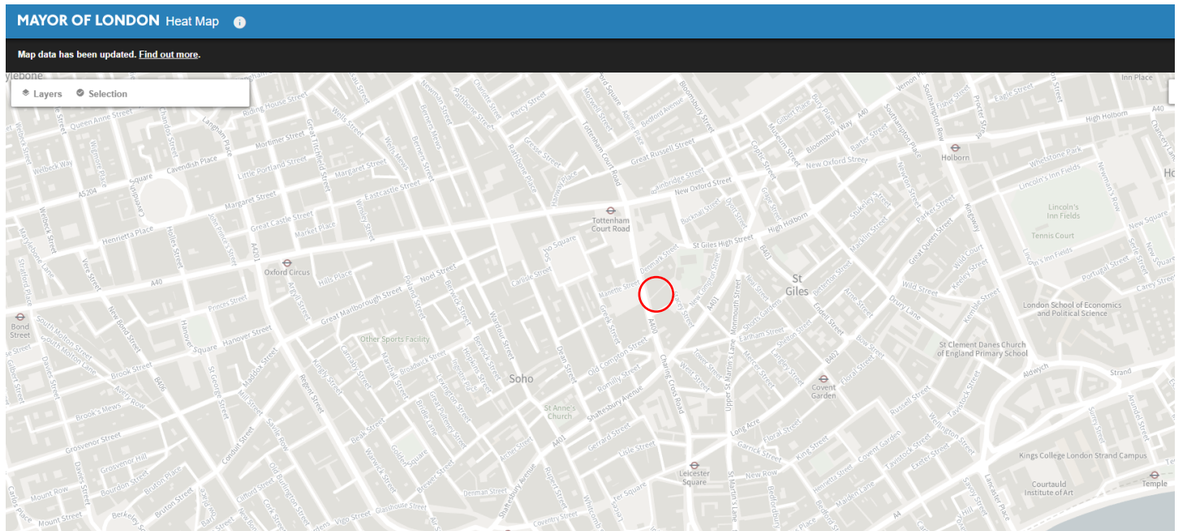

Figure 3.4 – Extract from the London heat map (proposed development in red)

3.3 Renewable Energy (Be Green)

This step in the energy hierarchy requires the generation of energy by renewable energy technologies to be examined in line with London Borough of Camden's requirements. The following sections present the feasibility of Low and Zero Carbon (LZC) technologies that have been considered suitable for the proposed scheme.

3.3.1 Air Source Heat Pumps (ASHPs)

An ASHP is considered a low carbon technology of high efficiency, as electrically powered heat pumps and exchangers extract and utilise heat from outside air in order to provide space heating and hot water. ASHPs work by having an external evaporator unit with a fan linked to an internal condenser unit to release the heat. ASHPs come in a range of sizes, performances and designs and are sub-categorised into two different types:

- Air-to-water systems transfer heat to a wet heating system.
- Air-to-air systems produce warm air which is circulated by fans to heat the space.

Both ASHPs and Ground Source Heat Pumps (GSHP) achieve great efficiencies, ranging from 250% to more than 350%. An ASHP will have a lower Coefficient of Performance (COP) than a (GSHP) due to the lower average outside air temperature of outside than the average ground temperature, and due to greater variance of the former across the year. The cost of an ASHP is however much lower as there is no need for expensive ground works. Key considerations for ASHPs are as follows:

- There must be a suitable location to mount the external unit to the building and planning permission may be required.
- The noise generated by the external unit must be considered as part of the design.
- ASHPs are easier and cheaper to install than GSHPs, however GHSPs can be more efficient.

An ASHP system combined with low-temperature wet system via radiators and VRF system via fan coil units is envisaged to be used for the proposed development.

3.3.2 Photovoltaic panels (PVs)

PV panels convert sunlight into usable electricity, at relatively low efficiency of conversion at around 6-24% (depending on the technology). Despite this low efficiency, their advantage is low maintenance and zero-carbon electricity that offsets grid electricity, reduces the burden on the electricity grid, and provides considerable carbon emission savings. PVs operate optimally when installed in a southerly orientation with an inclination of 15°- 45°. Electricity generated from PV will be directly connected to the building. It is proposed that 10 south east facing PV panels totalling approximately 22m^2 at a 10^o inclination are to be installed across all the available roof space to maximise the development's renewable energy generation capability.

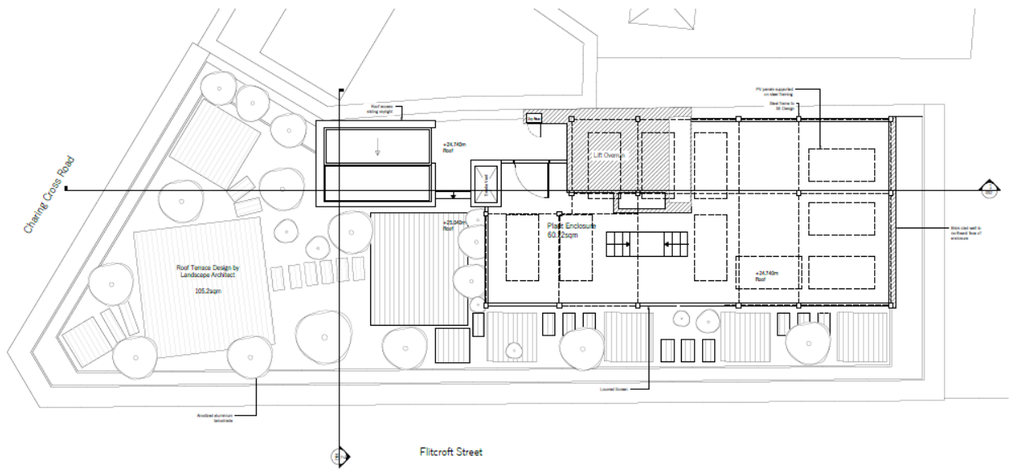

Figure 3.5 – Roof Plan highlighting layout of PVs

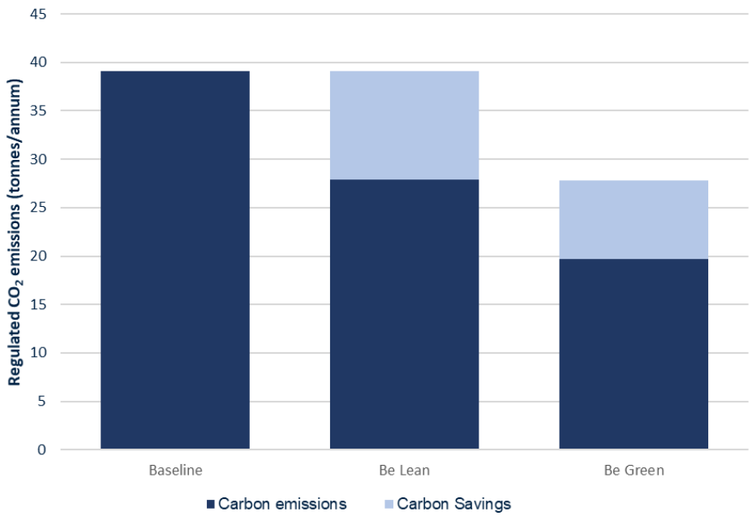

Figure 3.6 – Energy hierarchy SAP10 calculations graphical illustration

3.4 Delivering the savings in practice (Be Seen)

The Mayor of London has declared a climate emergency and has set an ambition for London to be net zero-carbon. To truly achieve net zero-carbon buildings, a better understanding of their actual operational energy performance is required. Although Part L calculations give an indication of the theoretical performance of buildings, it is well established that there is a 'performance gap' between design theory and measured reality. The London Plan has introduced the 'Be Seen' framework as an attempt to bridge this gap.

For the purposes of complying with the 'Be Seen' policy, a development is split into a number of 'reportable units' (RUs) which applicants will need to report against individually.

Note that a de minimis threshold applies, where the gross internal floor area of a RU is less than 250 m^2 and/or the expected emissions for the unit are less than 5% of the development's total emissions. De minimis buildings are only required to report energy generation from renewable energy technologies.

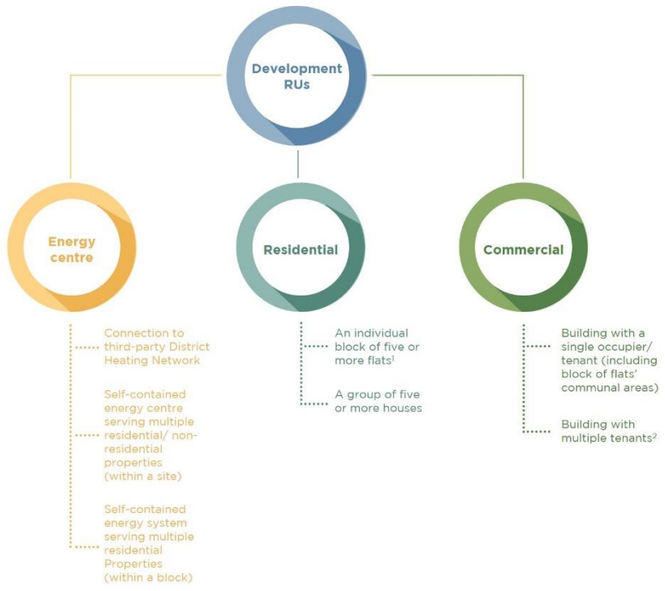

Figure 3.7 –Diagram of Developments reportable Units (Rus)

3.4.1 Planning Stage

The evidence being requested at the planning stage should be generated via the analysis conducted as part of the energy assessment submission.

For non-residential uses, energy consumption (kWh/m^2) and carbon emissions (tonnes CO_2/m^2) estimates should be informed and reported using Part L calculations and CIBSE TM54 calculations. The Part L calculations are already reported in this document, and TM54 calculations will be provided in due course.

Once planning approval has been granted, the applicant will endeavour to provide estimates of each of the performance indicators listed in the table below using the 'be seen' spreadsheet.

Performance indicator group	Description
Contextual data	• Location Unique Property Reference Number (UPRN) or Address (if no UPRN available) • Site plan • Typology / Planning Use Class (all included) • GIA (m^2) for each Typology / Use Class • Anticipated target dates for each 'Be Seen' reporting stage
Building energy use	• Grid electricity consumption (kWh) • Gas consumption (kWh) • Other fuels consumption (kWh) • Energy generation (kWh) • District heating/cooling consumption (kWh) (if applicable) • Confirm that metering plans that will enable the in-use energy performance reporting are in place
Carbon emissions	• Carbon emissions estimates (tonnes CO_2/m^2) for residential and non-residential uses separately as well as the whole development • Carbon shortfall for the entire development (tonnes CO_2) • Estimated carbon offset amount (£)

Table 3.8 – Planning Stage performance indicators

3.5 Results

The total CO_2 emissions reduction over the GLA Base Case scenario using the SAP 2012 and SAP 10.0 carbon factors can be seen in the graphs and tables below.

Carbon Dioxide Emissions	Total regulated emissions (tonnes CO_2/yr)	CO2 Savings (tonnes CO_2/yr)	Percentage saving (%)
BR compliant case (TER) 'Base case'	61.0	-	-
Energy efficiency improvements 'Lean case'	46.9	14.1	23%
Energy efficiency improvements 'Green case'	44.0	2.9	5%
TOTAL SAVINGS		17.0	28%

Table 3.9 – Carbon emissions for the proposed development using SAP 2012 carbon factors

Carbon Dioxide Emissions	Total regulated emissions (tonnes CO_2/yr)	CO2 Savings (tonnes CO_2/yr)	Percentage saving (%)
BR compliant case (TER) 'Base case'	39.1	-	-
Energy efficiency improvements 'Lean case'	27.9	11.2	29%
Energy efficiency improvements 'Green case'	19.7	8.1	21%
TOTAL SAVINGS		19.3	49%

Table 3.10 – Carbon emissions for the proposed development using SAP 10.0 carbon factors

The above analysis shows that the proposed development achieves a carbon dioxide emissions saving of 49% against Part L Building Regulations 2013, under the SAP 10.0 carbon factors, through energy efficiency measures and renewable technologies, under the 'Be Green' scenario. The renewable energy technologies alone are responsible for 21% of this reduction. This meets the Mayor of London's definition of a zero carbon building through onsite means alone, and will not require any cash in-lieu payments to offset residual emissions.

4. Materials & Waste

In line with Policy CC5 Waste of the Camden's Local Plan (2017) and circular economy approach, the project team has recognised that reducing waste is achieved through early strategic design decisions. In contrast to a linear economy, circular economy promotes the extension of materials' lifetime.

Due to the nature of the demolition and extension works, the amount of material required and waste produced in the construction will be significantly reduced compared to a demolition and new build scenario. Through retaining, renovating and reusing the existing building, the value of the existing materials is kept, in line with circular economy principles, with the demand for new materials and the waste arisings being reduced.

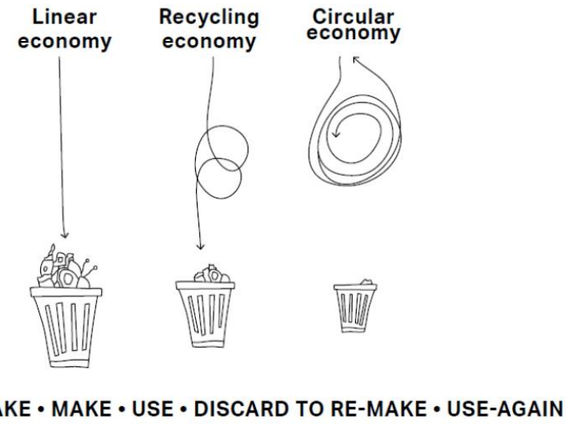

Figure 4.1 - London Plan Guidance for Circular Economy Statements

4.1 Construction materials

The proposed development will give preference to the selection of sustainable materials and the minimisation of waste. The following measures will be considered to demonstrate that the materials specified are sourced, managed and used in a sustainable manner.

- Specific consideration will be given to selection of materials of low embodied carbon, that are durable and strong;
- The use of locally sourced materials will be prioritised, where feasible to reduce transport related emissions and to support local supply chains;
- Responsible sourcing of materials from suppliers that operate an Environmental Management System (EMS) and hold robust certifications such as BES 6001 or ISO 14001will be prioritised;
- All timber included in the construction of floors, roofs, walls and staircase will be legally harvested and traded with;
- The use of recycled materials, such as aggregate will be considered;
- The use of insulation materials with low Global Warming Potential (GWP) will be prioritised; and
- The use of high volatile organic compound (VOC) content paints, sealants and all ozone depleting materials including insulation will be avoided where possible.

4.2 Sustainable construction

Sustainable construction practices include good site management to encourage resource efficiency, increased material recovery and the avoidance of the disposal of waste to landfill.

As part of achieving a sustainable approach to construction, the main contractor will be encouraged to commit to reducing the impact of the construction processes on the environment. The contractor will be required to monitor and mitigate construction site impacts throughout the construction period (in particular: energy, water, transport of materials to the site and waste from the site). Best practice pollution prevention policies will be adopted in respect of air (dust) and water pollution arising from site activities. To minimise air (dust) pollution, skips will be covered, dust-generating site activities will be dampened down and wet cutters will be used. Low emission and efficient equipment will be used on site.

A construction management plan will be in place prior to commencement of activities on site. The construction management plan will appropriately demonstrate how the impacts of air/water pollution, noise and vibration will be mitigated during the construction of the development. Where feasible, timber used on site will be reclaimed, reused or responsibly sourced.

The contractors will be also required to minimise the ecological impact of construction activities. Section 9 covers the proposed measures in more detail.

A Construction Waste Management Plan will be developed prior to commencing works on site. The plan will comprise of:

- Development of waste related targets and KPIs;
- Measures for effective planning and management of the construction site to maximise material segregation, maximise material reuse and recycling and minimise waste diverted to landfill; Measures to ensure processing of materials as close as possible the scheme site, where possible; and
- Monitoring and reporting strategy for use of resources such as water, diesel and timber.

4.3 Operational waste

Dedicated space will be provided for the segregation and storage of operational recyclable waste volumes generated by the proposed development, its occupants and activities. This space should be:

- Clearly labelled, to assist with segregation, storage and collection of the recyclable waste streams;
- Accessible to building occupants or facilities operators for the deposit of materials and collections by waste management contractors; and
- Of a capacity appropriate to the building type and size, and predicted volumes of waste that will arise from daily/weekly operational activities and occupancy rates.

5. Whole Life Carbon

Whole life carbon comprises operational carbon and embodied carbon. While the previous sections present the efforts to reduce operational and embodied carbon separately, this section provides a description of the holistic thinking, and the sustainable and circular economy practices and design options implemented to reduce the whole life carbon of the development.

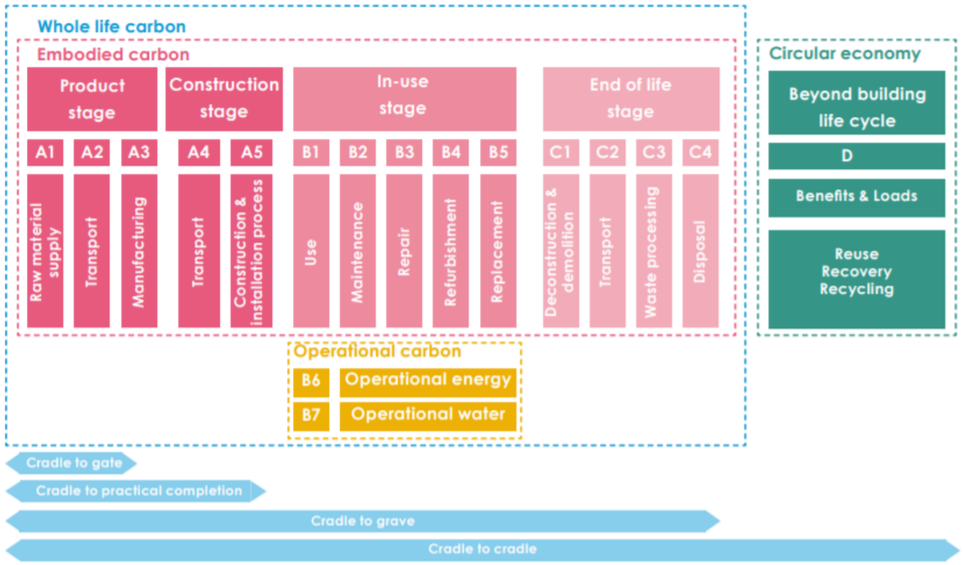

Figure 5.1: The different stages of the building assessment (LETI Embodied Carbon Primer)

Low carbon projects and design measures:

- The retrofit and extension nature of the project has significantly lower Whole Life Carbon compared to a new build development of this size;
- An improved operational energy and carbon performance will be achieved in the existing building with a fairly limited amount of materials and, thereby, embodied carbon, compared to new build projects;
- The improvements to the building fabric and layout will improve the longevity of the building by creating more flexible and adaptable spaces in line with future needs;
- By refurbishing the existing building, the embodied carbon and emissions associated with concrete has been considerably reduced because the existing foundations and frame are being reused;
- The new-build extension adds new floor space of high energy efficiency and low operational carbon;
- Operational energy consumption has been reduced through the use of passive design and the high-performing building fabric; and
- An all-electric energy strategy has been proposed for the development with AHPs supplying heating and hot water. The National Grid is rapidly decarbonising and the proposed heat pumps can take advantage of this which, over the life of the building, will reduce the emissions associated with life cycle stage B6.

Additional whole life carbon reduction measures that will be considered in the next design and construction phases will include and not be limited to:

- Reduction of the quantities of materials required, for example through the implementation of Design for off-site Manufacturing and Assembly (DfMA) techniques;
- Provision of suitable municipal waste facilities for future residents of the proposed development;
- The average embodied carbon impact of concrete is around 100kgCO_2e per tonne. Utilising cement replacement products such as fly ash or GGBS will reduce the amount of cement within concrete therefore reducing the embodied carbon. Admixtures can also be used to reduce the increased concrete setting time associated with using higher proportion of cement replacement in the mix. The design team will ensure cement replacement is incorporated into the technical specifications where possible;
- Specification of materials that are responsibly and sustainably sourced, for example through the implementation of the principles of the BRE Green Guide to Specification, use of materials with EPDs, use of locally sourced materials; and
- Use of materials that are circular, and may be easily recovered, reused and recycled at the end of the proposed development's life.

6. Climate Change

Climate change brought about by man-made emissions of greenhouse gases and its effects are complex and include:

- Increased average temperatures;
- Rising sea levels;
- Increased precipitation during winter months; and
- More frequent extreme weather.

Action to address climate change falls into two categories: mitigation and adaptation. Mitigation measures are designed to reduce greenhouse gas emissions to slow down or stop climate change, whilst adaptation measures are designed to adjust society and buildings to cope with climate change. The proposed development incorporates the following climate change mitigation and adaptation features in line with Policy CC2, working towards a Low Carbon Camden of the Camden Local Plan (2017).

6.1 Climate change mitigation

The energy strategy of the scheme has considered multiple measures in line with the energy hierarchy to mitigate the effects of climate change through the specification of passive design, improved building fabric, energy-efficient systems and LZC technologies. The measures mitigate energy use in the first instance whilst also providing a significant proportion of the estimated resultant energy use via renewable energy sources.

These measures represent a 49% saving in regulated carbon emissions when compared to the Building Regulations Part L2013 baseline using the SAP 10.0 carbon factors. This is a significant step toward enabling the development to minimise regulated carbon emissions and contribute to the national net-zero carbon target in the future.

A summary of the strategy and the resultant energy and carbon emission savings can be found in Section 3 of this report.

6.2 Climate change adaptation: Overheating assessment

Policy SI4 of the London Plan 'Managing Heat Risk' seeks to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces to avoid overheating and excessive heat generation, and to reduce overheating due to the impacts of climate change and the urban heat island effect on an area wide basis.

In order to reduce overheating and reliance on air conditioning, the design of the proposed scheme at Flitcroft House has followed the Cooling Hierarchy detailed in Policy CC2 of Camden's Local Plan (2017):

1. Minimise internal heat generation through energy efficient design;
2. Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls;
3. Manage the heat within the building through exposed internal thermal mass and high ceilings;
4. Passive ventilation;
5. Mechanical ventilation; and
6. Active cooling.

Cooling Hierarchy

New development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. Therefore, all new extensions should also be designed to avoid the need for energy intensive air conditioning systems as much as possible. Taking this into account the following measures have been implemented into design:

Reduction of the amount of heat entering the building in summer

- The use of shading in the form of overhangs will provide solar shading on floors 5 and 6.

Minimisation of internal heat generation through energy efficient design

- Heat gain from lighting is kept to a minimum as a result of energy-efficient lighting specifications ;
- The availability of natural light is maximised by generous glazing areas combined with optimised light transmittance of the glass elements of the façade;
- The scheme will use heat pumps for heating and hot water. This is a low temperature distribution system, leading to lower internal heat gains from distribution pipework; and
- Electrical services equipment shall be located in separate areas.

Management of the heat within the building through exposed thermal mass and high ceilings

- The proposed green roof will have a high degree of in-built thermal mass to help mitigate thermal discomfort and will help regulate temperature.

Mechanical ventilation

- Year-round fresh air will be provided through the specification of mechanical ventilation units with heat recovery (full details provided in Section 3). The systems will be specified with a summer bypass on the heat recovery element to ensure that unwanted heat is purged where possible.

Active Cooling

- Cooling demand for the office and restaurant areas to ensure the risk of overheating is minimised to an acceptable level and cooling demand for the proposed building is less than for the notional building.

Methodology

TM52: The limits of Thermal Comfort: Avoiding Overheating in European Buildings 2013 methodology published by CIBSE provides a baseline and guidance for a non-domestic overheating risk assessment. This section provides the results of the overheating risk assessment for the proposed redevelopment of Flitcroft House.

Dynamic simulation software, EDSL TAS, has been used to create the model of the proposed design, and simulate the internal conditions in each of the occupied spaces. The geometry was modelled based on planning submission issue drawings from Damion Marcus Burrows Architects. The assessment analyses the performance of the proposed building against the following set of criteria that the TM52 methodology has defined to measure unacceptable levels of overheating.

- Criterion 1: Hours of exceedance

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

- Criterion 2: Daily Weighted Exceedance

  The weighted exceedance shall be less than or equal to 6 in any one day and is a function of both magnitude and duration

- Criterion 3:

  The value of ΔT shall not exceed 4K. The criteria set an absolute limit for the indoor operative temperature.

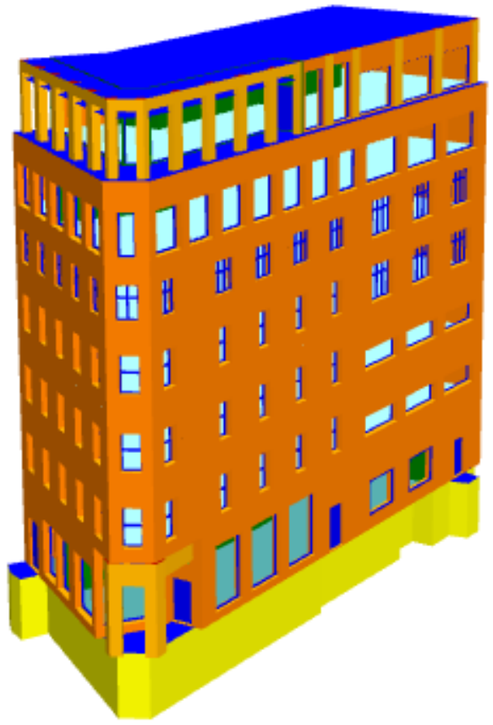

Figure 5.1- TAS 3D model geometry

In accordance with the GLA and TM52 guidance, the following weather files were used in the modelling simulations:

- DSY 1 - 1989: 2020 High 50
- DSY 2 - 2003: 2020 High 50
- DSY 3 - 1976: 2020 High 50

In line with the TM52 methodology, the following internal gains and time periods have been employed for this analysis.

Room	Sensible heat gain (W/m²)	Latent heat gain (W/m²)	Occupancy period
Office	9	5.55	Full gains from 9am-6pm
Restaurant	13.42	8.58	Full gains from 12am-10pm

Table 5.1- Occupancy heat gains

Room	Heat gain (W/m²)	Occupancy period
Office	25	Full gains form 9am-6pm
Restaurant	18.88	Full gains from 12am-10pm

Table 5.2- Equipment heat gains

A lighting gain of 6 W/m² has been applied from 9am to 6pm for the offices and 12am to 10pm for the restaurant. Passive ventilation was modelled based on information provided by Damion Marcus Burrows Architects as part of the planning submission documentation.

All the windows have been assumed to be closed for security during the night and noise reasons during the day because the building is situated on Charring Cross Road, a busy A road and Flitcroft Street, a noisy side street. The proposed extension has shading integrated in the design with a an overhang of 1.2 metres on the sixth floor on the west and partially on the south east facade. The addition of this external shading lessens the effect of overheating because solar gains are reduced leading to a reduction in heat build-up in the thermal mass of the building.

The proposed overheating mitigation strategy includes the use of air conditioning with mechanical ventilation to mitigate overheating for the baseline results displayed below. It should be noted that the new g-value for the windows in the existing building will be 0.5 and that the g-value of the new windows in the proposed extension with be 0.4, reducing solar gains and overheating.

An infiltration rate of 0.35ACH has been used for the building, and has been derived from CIBSE Guide A (2015) with an air permeability of 5 m³/m².hr @50Pa. Mechanical ventilation with cooling will be provided by MVHR units as required by Part F of the Building Regulations. The ventilation rate included in the model is 1.42ACH for all rooms.

Results

The tables below show the baseline results of the simulation incorporating the inputs described above, without air conditioning and without air conditioning. In total there are 23 zones, 21 office zones and 2 restaurant zones.

	DSY1 2020	DSY2 2020	DSY3 2020
No. Office Zones passing	0	0	0
No. Restaurant Zones passing	0	0	0

Table 5.3- Baseline overheating summary (CIBSE TM54) – no air conditioning

The neither the office or restaurant areas pass the overheating criteria for DSY 1, DSY 2 and DSY 3 weather files 2020s time frame. This highlights that passive measures of ventilation do not prevent overheating and the building requires mechanical ventilation to be usable and not overheat. This is because none of the windows are openable, providing no natural ventilation or ability to purge excess heat. The building is also a refurbishment project resulting in a fixed southernly orientation and high glazing to façade ratios, increasing the solar gains and contributed to the overheating. Active cooling was deemed to be the most suitable solution to mitigate overheating risk for the offices, given the difficulty of having openable windows because of noise and security issues.

	DSY1 2020	DSY2 2020	DSY3 2020
No. Office Zones passing	21	20	20
No. Restaurant Zones passing	3	3	3

Table 5.4- Overheating summary frequency run – with air conditioning

These results demonstrate that with cooling, all zones pass the TM52 overheating assessment with DSY 1 2020 scenario which is crucial to prevent overheating. All the zones apart from the office zone 01 on the sixth floor pass DSY2 and DSY3 weather scenarios. This demonstrates that the building is compliant with the relevant CIBSE guidance for non-domestic buildings. The data produced for the overheating assessment can be found in appendix 3.

Conclusion

This study has shown how the proposed development at Flitcroft House has been designed to minimise the risk of overheating. The strategy has followed the cooling hierarchy in Policy SI4 of the London Plan.

TM52:2017 has been adopted for this overheating study because it is the recommended methodology for the assessment of overheating risk in non-domestic buildings. The methodology aims to produce a test that encourages good design that is comfortable within sensible limits, without being so stringent that it over-promotes the use of mechanical cooling.

A dynamic thermal model was created in EDSL TAS to simulate the internal conditions for the whole building. The modelling incorporated inputs provided within the TM52 methodology guidance and information provided by Damion Marcus Burrows Architects. The building design and building services design incorporated available measures to minimise heat generation within the building to reduce the amount of heat entering the building, and to passively and mechanically ventilate the existing building in line with the cooling hierarchy in Policy SI4 of the London Plan.

The buildings results were then compared to the CIBSE TM52 overheating criteria for the 3 weather files specified in CIBSE TM52. It can be concluded that the building passes the TM52 overheating criteria for the DSY1 2020s weather file with cooling implemented.

In order to completely mitigate overheating risk for all scenarios and timeframes, it would be necessary to install air conditioning throughout the building to reduce internal air temperatures to acceptable limits. Due to having maximised the potential of passive measures first, the cooling demand of the proposed building is lower than the cooling demand of the notional building.

7. Flood Risk, Drainage & Water

In line with Policy CC3- Water and Flooding of the Camden Local Plan (2017) and Water and Flooding Policy of the Camden Planning Guidance (2019), consideration has been made with regards to the conservation of water resources through water efficiency measures, in addition to the risk posed by flooding.

7.1 Flood risk

Flooding risk has become increasingly prevalent across the UK. It is both linked with climate change and rapid urbanisation because of the increased pressures on the sewers and water courses. The Environment Agency's national Risk of Flooding from Surface Water (RoFSW) model indicates that the site is not in a flooding area. Therefore the site is considered to be at low risk of flooding, and requires no flooding measures.

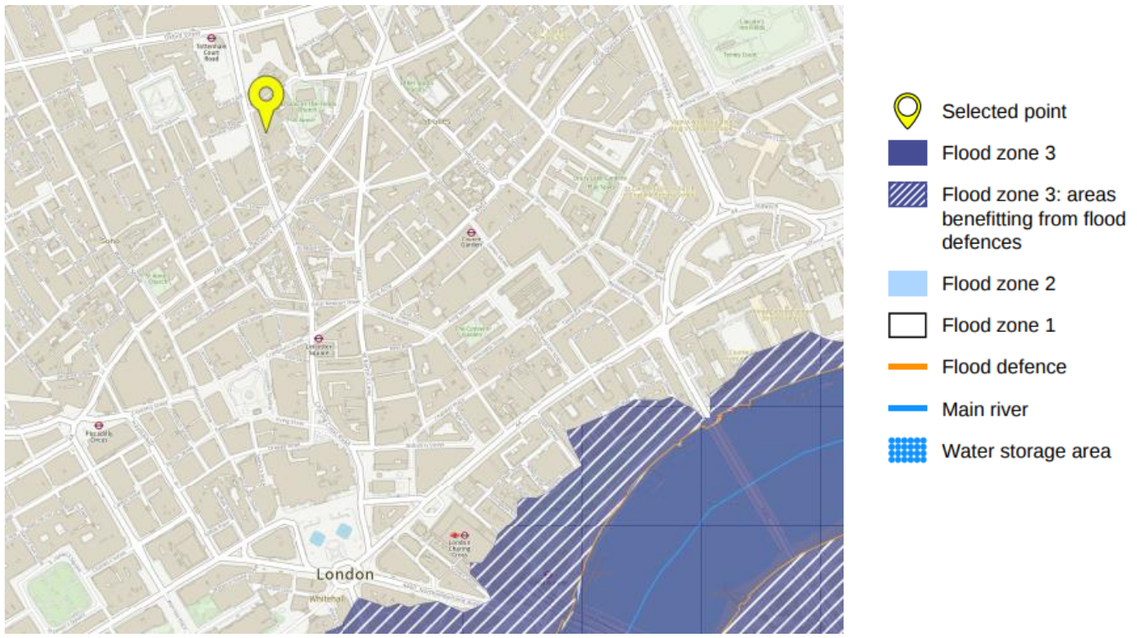

Figure 6.1 – Environment Agency Flood Risk Map

7.2 Drainage

The refurbishment and extension will connect into the existing drainage network. There will be an increase in permeable surface area through new planting at ground floor level and at roof level. This will consist of planting borders at ground level, green roofs, planting at roof level and roof terrace. These measures will create a net reduction in surface run off and reduce the pressure on the drainage system, reducing the risk of flooding. .

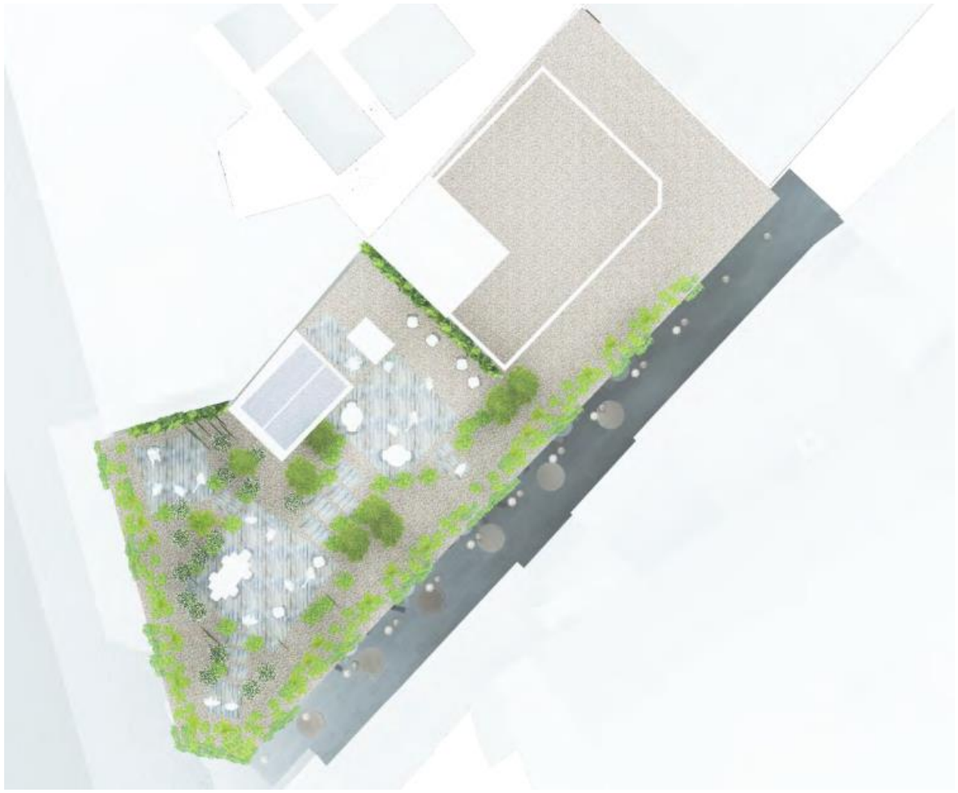

Figure 6.2 – Proposed Planting at Roof Level

7.3 Water efficiency

Water consumption in the UK has risen by more than 50% over the last 25 years. This represents a huge strain on natural water resources such as reservoirs and rivers and has a knock-on effect on wetland habitats and ecosystems.

Where possible, water saving fittings and appliances shall be installed to reduce water consumption:

- Dual flush WCs - cisterns with both a half flush and full flush. The half flush delivers 3 litres for the removal of liquids, whilst the full flush delivers 6 litres for a long flush. These cisterns save over 33% of water when compared to a 6 litre cistern;
- Flow restrictors & aerators - restrictors fit within the existing plumbing structure of the shower head or connection pipe to taps to restrict water flow and reduce the outlet flow and pressure. Aerators restrict the flow of water but maintain the pressure by adding air to the water giving a perception of a power shower/taps without the water and energy use;
- Appliances - where dishwashers and washing machines are specified, consideration will be given to low water consuming appliances; and
- Drought resistant planting with low irrigation requirements will reduce water demand for irrigation.

8. Pollution

The development will minimise its impact on noise, air and light pollution in line with Policy CC4 of the Camden Local Plan (2017). As the proposed redevelopment and extension does not require demolition or earthworks, dust and emission impact will be minimal and have low impact on the air quality.

8.1 Operational air pollution

An Air Quality Assessment (AQA) was undertaken for the proposed development by Air Quality Consultants Ltd.

The proposed development lies within the London Borough of Camden's Air Quality Management Area (AQMA), for exceedance of both the NO_2 annual mean and PM_{10} 24-hour mean objectives. The site also located near the Focus Areas identified by the GLA for exceedances of the EU annual mean limit value for nitrogen dioxide coinciding with high levels of human exposure.

External air quality

- Traditional means of providing heat and hot water to a development during operation have required gas-fired boilers and CHP units. These often have an impact on local air quality. The proposed development seeks to minimise the generation of pollutants by pursuing an air source heat pump (ASHP) led heating system. Operated using grid electricity, the system not only provides an efficient source of heat energy but will not contribute to local air pollution whilst in operation. Emergency backup maybe provided by a diesel generator. The development does not include any car parking, resulting in no changes to vehicle flow. This will not create any further traffic, having no impact on the air quality.

Internal air quality

- Air pollution to internal spaces will be minimised by adequate natural ventilation.

The findings from the AQA outline that the proposed development complies with the Policy SI 1 of the London Plan which outlined that all new deployments in London should be at least air quality neutral. The assessment stated that 'no mitigation measures are required'. The emissions associated with the bi-annual testing of the emergency diesel generator are unlikely to exceed the 1-hour mean objective.

8.2 Operational noise pollution

A Noise Impact Assessment was undertaken by Venta Acoustics to determine the potential noise impact of the proposal. The new plant room with the mitigation measures set out in the survey has been found to meet the requirements of Camden Council noise emissions limits.

The mitigation measures included:

- Multiple silencers fitted to achieve insertion loss as outlined in Venta Acoustics report. The silencers should be separated by a minimum distance of 3-4 x D;
- Anti-vibration mounts to be fitted to all plant and ductwork in line with manufactures guidelines; and
- Attenuators should be fitted as close to the fan as possible and attached to the ductwork using flexible connection.

The noise survey concluded that the scheme is not expected to have any significant adverse noise impacts.

9. Landscape & Biodiversity

The proposed development will endeavour to improve the landscape inline with Policy A3 in the Camden Local Plan (2017). The scheme aims to provide additional planting at ground and roof level.

9.1 Landscape strategy

A landscape strategy has been developed by Phil Allen Design. The proposal rethinks a previously unused space to provide a new roof garden and green space which will improve the health and wellbeing of the occupants through interaction with the natural environment year-round.

The roof garden will provide additional insulation to the building. The green roof can also cool the local micro climate and provide visual amenity.

Biodiversity will be maximised through the provision of soft landscaping, tree planting and green roofs. Currently the site has negligible ecological value. The proposed landscaping and ground level and extensive green roof design will result in a net biodiversity gain. Approprite planting will be considered including drought resistant plants to ensure the planting can adapt with changes in the climate with minimal maintenace.

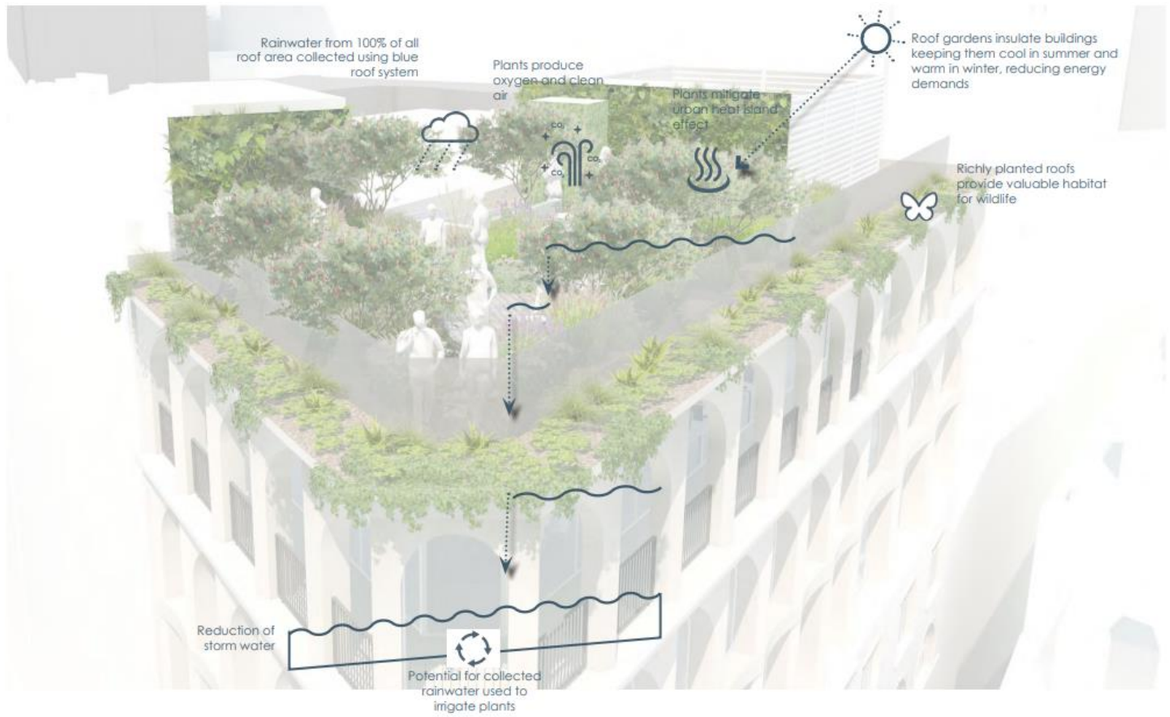

Figure 9.2 – Benefits of the roof garden

10. Transport

The proposed development has been designed to promote sustainable transport measures in line with policy T1, T2 and T3 of the Camden Local Plan (2017).

In order to integrate sustainable travel within the proposed development, the NPPF encourages local authorities to support "a pattern of development which, where reasonable to do so, facilitates the use of sustainable modes of transport'" and "gives priority to pedestrian and cycle movements with access to high quality public transport facilities".

A Transport Assessment was undertaken for the development by Transport Planning Practice.

10.1 Sustainable Transport

The site has a Public Transport Accessibility Level (PTAL) rating of 6b which represents 'Best' rating. This is because of the close proximity of multiple bus stops and train stations. Tottenham Court Road, Leister Square and Covent Garden are all within a 5 minute walk. These stations provide access to the Central, Piccadilly and the Northern Lines. Charring Cross station is a 12 minute walk, providing access to the Northern and Bakerloo lines and National Rail routes out to Kent. There are also 24 regular bus services which can be accessed within a short walk of the site including routes 14, 19, 24, 38, 55, 73, 98, 176 and 390.

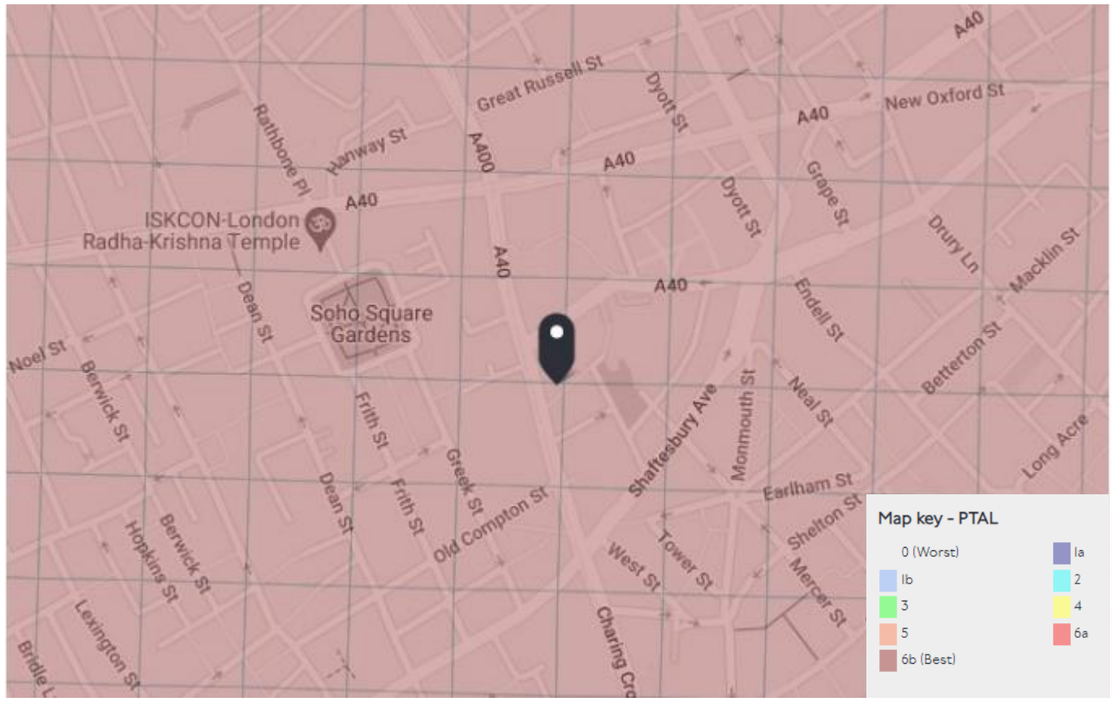

Figure 10.1- PTAL map of the site

Figure 10.2 – Local Transport Links

The Transport Assessment highlighted three key areas:

Pedestrian access

- Stepped and step-free pedestrian access to the restaurant from Charring Cross Road; and
- Pathways with dropped kerbs along key pedestrian lines which link to underground stations and bus stops.

Cycle access and parking

- Six Barclays Cycle Hire docking stations within 500m walking distance of the site;
- Secure parking for 20 bikes on-site to encourage active travel options which will serve the offices and restaurant;
- Short-stay cycle parking off site via a S106 payment to LBC; and
- Shower changing facilities including accessible toilet and shower facilities.

Car Parking

- Car-free development;
- Three club car vehicles within 500m walking distance of the site including Zipcar and Enterprise Car Club; and
- Blue badge holders are able to park within residents bays, paid for parking bays and loading bays.

The report concluded that because of the highly accessibility location of the site, the majority of trips are likely to be by sustainable or active modes of travel. The increased number of trips generated by the proposed development will also have minimum impact on existing users, the transport infrastructure and service compared to the current impact of the existing building.

11. Summary

This Energy and Sustainability Statement provides an overview as to how the proposed refurbishment and extension at Flitcroft House contributes to sustainable development in the context of the strategic, design and construction considerations. By refurbishing the building, associated embodied carbon emissions from a traditional demolition and rebuild have been prevented, while fabric and building services upgrades will reduce the building's operational carbon emissions. The efficiency and longevity of the building have been improved by updating building fabric and remodelling the interior.

Consideration has been given to the National Planning Policy Framework (2021), London Plan (2021), Camden's Local Plan (2017) and Camden Planning Guidance (CPG) in the formulation of this statement. This statement demonstrates that the proposed refurbishment and extension supports relevant policy relating to sustainable development and highlights that the proposed development:

- makes efficient use of land;
- will improve efficiency of the building;
- will utilise existing sustainable transport infrastructure;
- will seek to maximise the incorporation of low-impact and sustainable materials, where possible;
- will minimise water consumption;
- will minimise waste production during construction and maximise the proportion of waste to be diverted from landfill;
- will enhance biodiversity in the proposed terrace and green roof;
- will adopt a 'fabric first' approach to minimise energy demand through the efficient building fabric and low thermal bridging to reduce heat loss;
- will employ highly efficient air source heat pumps;
- will utilise rooftop photovoltaic panels to provide renewable electricity;
- will achieve a minimum 49% reduction in CO_2 emissions by following the Energy Hierarchy methodology; and
- will reduce the whole life carbon of the proposed development through efficient design decisions and material choices.

Overall, the proposals for the scheme will holistically incorporate principles of sustainable development as well as the policy requirements of the NPPF and London Borough of Camden, and will seek to provide a development that promotes these principles in operation.

In addition to sustainability measures, the following health and wellbeing measures have been implemented onsite:

- The building's roof top and ground floor will be landscaped, providing communal gardens and amenity benefits to occupiers;
- The risk of overheating has minimised on site through window recesses and balconies providing solar shading, dual aspect spaces to allow for cross ventilation;
- Dedicated fresh air provision will ensure that air quality within the building is of high quality; and
- The use of high VOC content paints, sealants and all ozone depleting materials including insulation will be avoided where possible.

Appendix 1 BRUKLs and GLA Energy Spreadsheet summary

SAP 2012 Performance

Domestic

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Cumulative on site savings	**0.0**	**0%**
Annual savings from off-set payment	0.0	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**0**	-
Cash in-lieu contribution (£)	**0**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

Non-domestic

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

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	61.0	
After energy demand reduction (be lean)	46.9	
After heat network connection (be clean)	46.9	
After renewable energy (be green)	44.0	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	14.1	23%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	2.9	5%
Total Cumulative Savings	**17.0**	**28%**
Annual savings from off-set payment	44.0	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**1,320**	-
Cash in-lieu contribution (£)	**125,353**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SITE-WIDE

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2013 baseline	61.0		
Be lean	46.9	14.1	23%
Be clean	46.9	0.0	0%
Be green	44.0	2.9	5%
Total Savings	-	17.0	28%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**1,319.5**	-

SAP 10.0 Performance

Domestic

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: Savings from energy demand reduction	0.0	0%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	0.0	0%
Cumulative on site savings	**0.0**	**0%**
Annual savings from off-set payment	0.0	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**0**	-
Cash in-lieu contribution (£)	**0**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

Non-domestic

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

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	39.1	
After energy demand reduction (be lean)	27.9	
After heat network connection (be clean)	27.9	
After renewable energy (be green)	19.7	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	11.2	29%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	8.1	21%
Total Cumulative Savings	**19.3**	**49%**
Annual savings from off-set payment	19.7	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**592**	-
Cash in-lieu contribution (£)*	**56,276**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SITE-WIDE

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2013 baseline	39.1		
Be lean	27.9	11.2	29%
Be clean	27.9	0.0	0%
Be green	19.7	8.1	21%
Total Savings	-	19.3	49%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**592.4**	-

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Flitcroft House - Extention - Be Lean As designed

Date: Tue Jul 26 17:10:42 2022

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.2"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.2

BRUKL compliance check version: v5.6.b.0

Certifier details

Name:

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	19.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	19.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	16.9
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.25	0.25	External Wall (new)
Floor	0.25	-	-	No floors in project
Roof	0.25	0.18	0.19	Exposed Floor/C_F5
Windows***, roof windows, and rooflights	2.2	1.8	2.55	GL_05_02
Personnel doors	2.2	1.8	1.8	Dr_03
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

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

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- VRF with Mechanical Ventilation - Offices (7 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.6	-	2	0.8
Standard value	0.91*	2.6	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- Nat Vent - Store

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

3- Extract Only - WC (6 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- Nat Vent - Circulation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- Point of Use

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0
Standard value	0.9*	N/A

* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

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	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
05-WC 1	-	1	-	-	-	-	-	-	-	-	N/A
05-WC 2	-	1	-	-	-	-	-	-	-	-	N/A
05-WC 3	-	1	-	-	-	-	-	-	-	-	N/A
06-WC 1	-	1	-	-	-	-	-	-	-	-	N/A
06-WC 2	-	1	-	-	-	-	-	-	-	-	N/A
06-WC 3	-	1	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
05-ST 1	-	-	-	7
06-ST 1	-	-	-	10
05-OF 1	-	-	-	135
05-OF 2	-	-	-	143
05-OF 3	-	-	-	754
06-OF 1	-	-	-	147
05-WC 1	-	-	-	37
05-WC 2	-	-	-	15
05-WC 3	-	-	-	14
06-WC 1	-	-	-	38
06-WC 2	-	-	-	15
06-WC 3	-	-	-	14
05-CL 1	-	-	-	73
05-CL 2	-	-	-	54
06-CL 1	-	-	-	72
06-CL 2	-	-	-	59
05-OF 4	-	-	-	106
06-OF 2	-	-	-	106
06-OF 3	-	-	-	636

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
05-OF 1	NO (-68%)	NO
05-OF 2	NO (-48%)	NO
05-OF 3	NO (-42%)	NO
06-OF 1	NO (-44%)	NO
05-OF 4	NO (-93%)	NO
06-OF 2	NO (-87%)	NO
06-OF 3	NO (-15%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	406	406
External area [m^2]	621	621
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	371	326
Average U-value [W/m^2K]	0.6	0.52
Alpha value* [%]	31.54	31.54

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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	14.68	11.12
Cooling	6.15	10.28
Auxiliary	6.47	3.04
Lighting	13.47	19.23
Hot water	2.4	2.64
Equipment*	36.39	36.39
TOTAL**	**43.16**	**46.31**

* 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	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	127.73	174.82
Primary energy* [kWh/m^2]	98.91	114.23
Total emissions [kg/m^2]	16.9	19.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	43.2	95.7	13.9	7.8	7.9	0.86	3.42	0.91	3.6
	Notional	26.3	168.6	8.9	13	3.7	0.82	3.6	----	----
[ST] No Heating or Cooling										
	Actual	32.8	0	10.5	0	0	0.86	0	0.91	0
	Notional	14.6	0	5	0	0	0.82	0	----	----
[ST] Other local room heater - unfanned, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	66.4	0	21.3	0	4.8	0.86	0	0.91	0
	Notional	61.4	0	20.8	0	2.9	0.82	0	----	----
[ST] No Heating or Cooling										
	Actual	78.2	0	25.1	0	0	0.86	0	0.91	0
	Notional	85.3	0	28.9	0	0	0.82	0	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.25	External Wall (new)
Floor	0.2	-	No floors in project
Roof	0.15	0.18	C_F6 (roof)
Windows, roof windows, and rooflights	1.5	1.54	GL_06_1
Personnel doors	1.5	1.8	Dr_03
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project
$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)]			$U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Flitcroft House- Extention - Be Green As designed

Date: Tue Jul 26 17:20:20 2022

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.2"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.2

BRUKL compliance check version: v5.6.b.0

Certifier details

Name:

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	18.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	18.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	15.7
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.25	0.25	External Wall (new)
Floor	0.25	-	-	No floors in project
Roof	0.25	0.18	0.18	C_F6 (roof)
Windows***, roof windows, and rooflights	2.2	1.8	2.55	GL_05_02
Personnel doors	2.2	1.8	1.8	Dr_03
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

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

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- VRF with Mechanical Ventilation - Offices (7 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.69	5.1	-	2	0.8
Standard value	2.5*	2.6	N/A	1.6^	0.65
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- Nat Vent - Store

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

3- Extract Only - WC (6 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- Nat Vent - Circulation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- Point of Use

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

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	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
05-WC 1	-	1	-	-	-	-	-	-	-	-	N/A
05-WC 2	-	1	-	-	-	-	-	-	-	-	N/A
05-WC 3	-	1	-	-	-	-	-	-	-	-	N/A
06-WC 1	-	1	-	-	-	-	-	-	-	-	N/A
06-WC 2	-	1	-	-	-	-	-	-	-	-	N/A
06-WC 3	-	1	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
05-ST 1	-	-	-	7
06-ST 1	-	-	-	10
05-OF 1	-	-	-	135
05-OF 2	-	-	-	143
05-OF 3	-	-	-	754
06-OF 1	-	-	-	147
05-WC 1	-	-	-	37
05-WC 2	-	-	-	15
05-WC 3	-	-	-	14
06-WC 1	-	-	-	38
06-WC 2	-	-	-	15
06-WC 3	-	-	-	14
05-CL 1	-	-	-	73
05-CL 2	-	-	-	54
06-CL 1	-	-	-	72
06-CL 2	-	-	-	59
05-OF 4	-	-	-	106
06-OF 2	-	-	-	106
06-OF 3	-	-	-	635

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
05-OF 1	NO (-67%)	NO
05-OF 2	NO (-48%)	NO
05-OF 3	NO (-43%)	NO
06-OF 1	NO (-31%)	NO
05-OF 4	NO (-93%)	NO
06-OF 2	NO (-87%)	NO
06-OF 3	NO (-12%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	406	406
External area [m²]	655	655
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	425	335
Average U-value [W/m²K]	0.65	0.51
Alpha value* [%]	30.98	30.98

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m²]

	Actual	Notional
Heating	6.82	6.12
Cooling	4.24	8.84
Auxiliary	6.47	3.04
Lighting	13.4	19.25
Hot water	2.4	2.64
Equipment*	36.39	36.39
TOTAL**	**33.32**	**39.89**

* 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/m²]

	Actual	Notional
Photovoltaic systems	2.32	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	135.4	151.16
Primary energy* [kWh/m²]	99.75	106.39
Total emissions [kg/m²]	15.7	18.9

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	54.2	93.5	4.3	5.4	7.9	3.51	4.84	3.69	5.1
	Notional	20.8	145	2.4	11.2	3.7	2.43	3.6	----	----
[ST] No Heating or Cooling										
	Actual	37.2	0	10.9	0	0	0.95	0	1	0
	Notional	15.2	0	5.2	0	0	0.82	0	----	----
[ST] Other local room heater - unfanned, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	68	0	18.9	0	4.8	1	0	1	0
	Notional	64.5	0	21.9	0	2.9	0.82	0	----	----
[ST] No Heating or Cooling										
	Actual	80.2	0	23.5	0	0	0.95	0	1	0
	Notional	89.5	0	30.4	0	0	0.82	0	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.25	External Wall (new)
Floor	0.2	-	No floors in project
Roof	0.15	0.18	C_F6 (roof)
Windows, roof windows, and rooflights	1.5	1.54	GL_06_1
Personnel doors	1.5	1.8	Dr_03
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project
$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)]			$U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Flitcroft House - Refurbishment - Baseline

As designed

Date: Tue Jun 28 16:15:34 2022

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.2"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.2

BRUKL compliance check version: v5.6.b.0

Certifier details

Name:

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	30.8
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	30.8
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	41
Are emissions from the building less than or equal to the target?	BER > TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.55	0.55	External Wall (existing)-basement
Floor	0.25	0.55	0.58	Ground Floor/C_F-1
Roof	0.25	0.18	0.18	C_F-1
Windows***, roof windows, and rooflights	2.2	1.81	2.17	A Fourth Floor (top)
Personnel doors	2.2	1.8	2.02	DR_00_01
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

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

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	25

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- VRF with Mechanical Ventilation - Offices (B-OF 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	-	-	2.2	0.7
Standard value	0.91*	N/A	N/A	1.6^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- VRF with Mechanical Ventilation - Offices (13 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	2.6	-	2.2	0.7
Standard value	0.91*	2.6	N/A	1.6^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

3- Nat Vent - Store

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- VRF with Mechanical Ventilation - Rest Kitchen (GF-KI 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	2.6	-	2.2	0.7
Standard value	N/A	2.6	N/A	1.1^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

5- Extract Only - WC (16 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

6- VFR with Mechanical Ventilation - Rest (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	-	-	2.2	0.7
Standard value	0.91*	N/A	N/A	1.6^	0.6
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

7- VFR with Mechanical Ventilation - Rest (B-REST 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	2.6	-	2.2	0.7
Standard value	0.91*	2.6	N/A	1.6^	0.6
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

8- Nat Vent - Circulation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- Point of Use

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.84	0
Standard value	0.9*	N/A

* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

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	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
B-WC 1	0.4	-	-	-	-	-	-	-	-	-	N/A
B-WC 2	0.4	-	-	-	-	-	-	-	-	-	N/A
B-WC 3	0.4	-	-	-	-	-	-	-	-	-	N/A
B-WC 4	0.4	-	-	-	-	-	-	-	-	-	N/A
01-WC 1	0.4	-	-	-	-	-	-	-	-	-	N/A
01-WC 2	0.4	-	-	-	-	-	-	-	-	-	N/A
01-WC 3	0.4	-	-	-	-	-	-	-	-	-	N/A
02-WC 1	0.4	-	-	-	-	-	-	-	-	-	N/A
02-WC 2	0.4	-	-	-	-	-	-	-	-	-	N/A
02-WC 3	0.4	-	-	-	-	-	-	-	-	-	N/A
03-WC 1	0.4	-	-	-	-	-	-	-	-	-	N/A
03-WC 2	0.4	-	-	-	-	-	-	-	-	-	N/A

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	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
03-WC 3	0.4	-	-	-	-	-	-	-	-	-	N/A
04-WC 1	0.4	-	-	-	-	-	-	-	-	-	N/A
04-WC 2	0.4	-	-	-	-	-	-	-	-	-	N/A
04-WC 3	0.4	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
B-OF 1	51	-	-	69
B-ST 1	51	-	-	46
B-ST 2	51	-	-	9
B-ST 3	51	-	-	17
B-ST 4	51	-	-	15
B-WC 1	-	51	-	40
B-WC 2	-	51	-	25
B-WC 3	-	51	-	39
B-CL 1	-	51	-	66
B-REST 1	-	51	22	152
B-ST 5	51	-	-	9
B-WC 4	-	51	-	24
B-CL 2	-	51	-	162
B-CL 3	-	51	-	60
GF-ST 1	-	51	22	213
01-ST 1	51	-	-	8
02-ST 1	51	-	-	5
03-ST 1	51	-	-	7
04-ST 1	51	-	-	22
GF-KI 1	-	51	-	897
01-OF 1	51	-	-	563
01-OF 2	51	-	-	1438
01-OF 3	51	-	-	222
02-OF 1	51	-	-	571
02-OF 2	51	-	-	1473
02-OF 3	51	-	-	222
03-OF 1	51	-	-	225
03-OF 2	51	-	-	1473
03-OF 3	51	-	-	571
04-OF 1	51	-	-	289
04-OF 2	51	-	-	295
04-OF 3	51	-	-	1487
01-WC 1	-	51	-	87
01-WC 2	-	51	-	37
01-WC 3	-	51	-	36

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
02-WC 1	-	51	-	86
02-WC 2	-	51	-	37
02-WC 3	-	51	-	36
03-WC 1	-	51	-	89
03-WC 2	-	51	-	36
03-WC 3	-	51	-	36
04-WC 1	-	51	-	86
04-WC 2	-	51	-	36
04-WC 3	-	51	-	36
GF-CL 1	-	51	-	128
GF-CL 2	-	51	-	82
GF-CL 3	-	51	-	113
01-CL 1	-	51	-	61
01-CL 2	-	51	-	49
02-CL 1	-	51	-	54
02-CL 2	-	51	-	48
03-CL 1	-	51	-	54
03-CL 2	-	51	-	49
04-CL 1	-	51	-	57
04-CL 2	-	51	-	25
GF-REST 1	-	51	22	113
GF-REST 2	-	51	22	255
04-OF 4	51	-	-	222

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B-REST 1	N/A	N/A
GF-ST 1	N/A	N/A
GF-KI 1	NO (-60%)	NO
01-OF 1	NO (-78%)	NO
01-OF 2	NO (-80%)	NO
01-OF 3	NO (-96%)	NO
02-OF 1	NO (-79%)	NO
02-OF 2	NO (-79%)	NO
02-OF 3	NO (-97%)	NO
03-OF 1	NO (-97%)	NO
03-OF 2	NO (-77%)	NO
03-OF 3	NO (-79%)	NO
04-OF 1	NO (-85%)	NO
04-OF 2	NO (-74%)	NO
04-OF 3	NO (-72%)	NO
GF-REST 1	NO (-16%)	NO
GF-REST 2	NO (-42%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04-OF 4	NO (-97%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	1301	1301
External area [m²]	1632	1632
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	1087	978
Average U-value [W/m²K]	0.67	0.6
Alpha value* [%]	34.35	34.35

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
12	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
88	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m²]

	Actual	Notional
Heating	53.43	21.1
Cooling	19.79	21.06
Auxiliary	8.64	3.73
Lighting	28.73	21.82
Hot water	14.24	12.45
Equipment*	42.89	42.89
TOTAL**	**124.83**	**80.16**

* 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/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	328.61	352.8
Primary energy* [kWh/m²]	238.33	180.46
Total emissions [kg/m²]	41	30.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	72.2	48.4	26.5	5.7	8.3	0.76	2.34	0.84	2.6
	Notional	16.3	136.7	5.5	10.5	3.5	0.82	3.6	----	----
[ST] No Heating or Cooling										
	Actual	237.1	0	87.1	0	0	0.76	0	0.84	0
	Notional	75.8	0	25.7	0	0	0.82	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	3778.5	0	448.5	48.5	0	2.34	0	2.6
	Notional	0	5211.8	0	402.1	20.9	0	3.6	----	----
[ST] No Heating or Cooling										
	Actual	142.9	0	52.5	0	1.9	0.76	0	0.84	0
	Notional	62.5	0	21.2	0	2.9	0.82	0	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	731.2	15	268.7	1.8	28.9	0.76	2.34	0.84	2.6
	Notional	439.1	52.4	148.9	4.1	12.2	0.82	3.6	----	----
[ST] No Heating or Cooling										
	Actual	194.3	0	71.4	0	0	0.76	0	0.84	0
	Notional	83	0	28.2	0	0	0.82	0	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.54	External Wall (existing)
Floor	0.2	0.18	Ground Floor
Roof	0.15	0.18	C_F-1
Windows, roof windows, and rooflights	1.5	1.63	GL_00_04
Personnel doors	1.5	1.65	DR_00_02
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project
$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)]			$U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	25

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Flitcroft House - Refurbishement - Be Lean

As designed

Date: Tue Jul 26 15:09:00 2022

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.2"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.2

BRUKL compliance check version: v5.6.b.0

Certifier details

Name:

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	30.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	30.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	30.7
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.3	0.3	External Wall (existing)
Floor	0.25	0.25	0.25	Ground Floor/C_F-1
Roof	0.25	-	-	No roofs in project
Windows***, roof windows, and rooflights	2.2	1.8	2.14	A Fourth Floor (top)
Personnel doors	2.2	1.8	2.01	DR_00_01
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

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

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- VRF with Mechanical Ventilation - Offices (B-OF 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	2	0.8
Standard value	0.91*	N/A	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- VRF with Mechanical Ventilation - Offices (13 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.6	-	2	0.8
Standard value	0.91*	2.6	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

3- Nat Vent - Store

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- VRF with Mechanical Ventilation - Rest Kitchen (GF-KI 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	3.6	-	1.5	-
Standard value	N/A	2.6	N/A	1.6^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

5- Extract Only - WC (16 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

6- VFR with Mechanical Ventilation - Rest (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	0.8	0.7
Standard value	0.91*	N/A	N/A	1.6^	0.6
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.