JS LEWIS LTD

Energy and Sustainability Statement

212-214 High Holborn

Revision A

November 2024

ZH London Properties Ltd

Applicant:	ZH London Properties Ltd
Report:	Energy and Sustainability Statement – 212-214 High Holborn
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EXECUTIVE SUMMARY

The applicant is seeking planning permission for alterations and an extension of 212-214 High Holborn.

The scheme has to address national, regional and local planning policy on energy and sustainability. It also has to address the regulatory framework at the post-planning detailed design stage. This document sets out the energy strategy and the sustainability strategy as required by both the local and the regional planning policy. The strategy put in place makes key commitments to the headline standards.

It should be recognised that as schemes are developed post-planning, some of the details may change as the detailed design considerations are resolved in more depth. Accordingly, any related planning conditions should be worded to allow flexibility in how the details are resolved.

The first section of this report sets out the purpose and scope of the Energy and Sustainability Strategy, the context within which it sits, and the description of development.

The second section sets out the planning policy and regulatory framework against which the development will be assessed. This covers national policy, local policy, emerging local policy, national building regulation and emerging national guidance that relates to property developments and policy-making. It identifies the London Plan CO2 reductions as the key headline policy for the development to address.

Section 3 considers the energy hierarchy, the heating hierarchy, the cooling hierarchy, the energy demand assessment and the CO2 strategy. The CO2 emissions estimates are as follows:

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	5.2	47%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	4.3	40%
Total Cumulative Savings	**9.5**	**87%**
Annual savings from off-set payment	1.5	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**44**	-
Cash in-lieu contribution (£)	**4,176**	

Figure 1 - CO2 Emissions Summary

The scheme has been modelled at the planning stage and demonstrates high CO2 savings over the baseline modelled through a strategy that incorporates energy efficiency measures for both the extant building and for the new element, some rooftop solar PV, and efficient servicing. The exact specification and performance of the energy systems will evolve as the detailed servicing specification is determined at the building control stage.

The proposed system is based upon heating and cooling being provided by a heat pump system, likely to be VRF. There are many available permutations regarding heating and ventilation and the exact specification will depend on the final occupancy. Other permutations that are also policy compliant may be suited to the site. Detailed Stage E engineering will review the options again for suitability. Any selected option will remain policy compliant on CO2 emissions.

The fourth section considers the sustainability strategy for the development. Flood, water conservation, sustainable transport, materials and resource efficiency, waste and ecology are all considered.

The final section sets out the conclusions and recommended standards for the scheme. The client is aiming to deliver a sustainable development that addresses the environmental, social and economic issues in the round. National and local policy have been reviewed and analysed.

Through the provision of this strategy, the proposed development is considered to address the planning policy framework.

1 INTRODUCTION

1.1 Context

The applicant is seeking planning permission for the extension and alteration of 212-214 High Holborn. This document, a combined energy and sustainability strategy, addresses the Council's request for an updated energy statement. The request was as follows:

"The proposal needs to be assessed against Part L 2021 and the London Plan 2021, considering the GLA Energy Assessment Guidance June 2022. It should be noted that new developments over 1000 sqm are required to be net zero carbon. An updated Energy and Sustainability Strategy is therefore required to show how the development proposes to meet the requirements in the Camden Local Plan and the London Plan 2021."

The scheme has to address national, regional and the Council's policy on energy and sustainability. It also has to address the regulatory framework at the post-planning detailed design stage. This document sets out the energy strategy and the sustainability strategy as required by both the local and the regional planning policy. The strategy put in place makes key commitments to the headline standards. However, it should be recognised that as schemes are developed post-planning, some of the details may change as the detailed design considerations are resolved in more depth. Accordingly, any related planning conditions should be worded to allow flexibility in how the details are resolved.

1.2 Location and Scheme Description

The description of development is as follows:

'Alterations and extensions to existing building including: demolition at mezzanine and fourth floor levels; removal of modern additions at basement, ground, first, second, and third floor levels; construction of six storey rear extension above ground floor level; and an uplift in office (Class E) floorspace at upper levels including loss of 1 ancillary residential unit.'

The actual building is North facing, and is surrounded by substantially taller buildings, notably to the East, but also to the South and West. This provides substantial natural shading for the proposed building.

2 POLICY AND REGULATORY CONTEXT

2.1 National Policy

National Planning Policy Framework (December 2023)

The National Planning Policy Framework sets out a framework for positive growth, making progress in environmental, social, and economic areas, and enhancing existing areas. It is a material consideration in planning decisions and reinforces the need for decisions to be determined in accordance with the local plan unless material considerations indicate otherwise.

The policies throughout the NPPF constitute the government's view of what sustainable development is, and requires the planning process to perform a number of roles:

1. An economic role – building a strong economy, supporting growth and innovation;
2. A social role – supporting communities through providing housing supply, a high-quality built environment, and accessible local services;
3. An environmental role – contributing to natural and built environments, improving biodiversity, using resources prudently, minimizing waste and addressing climate change, including moving to a low carbon economy.

The 2023 National Planning Policy Framework retains a presumption in favour of sustainable development. Section 14 concerns itself with climate change:

158. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

159. *New development should be planned for in ways that:*
a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation, and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

162. In determining planning applications, local planning authorities should expect new development to:

a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b) take account of landform, layout, building orientation, massing, and landscaping to minimise energy consumption.

The NPPF sets out the importance of dealing with climate change, and the use renewable energy. Development should be in sustainable locations to reduce CO2 emissions. It notes the need to align local policies with the national timeline for low carbon buildings.

2.2 London Policy

The London Plan (2021)

Policy SI2 reflects the current adopted position on energy and CO2 savings:

A. *Major development should be net zero-carbon. This means reducing carbon dioxide emissions from construction and operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy:*

   1. *Be lean: use less energy and manage demand during construction and operation.*

   2. *Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly. Development in Heat Network Priority Areas should follow the heating hierarchy in Policy SI3 Energy infrastructure.*

   3. *Be green: generate, store and use renewable energy on-site.*

B. *Major development should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy and will be expected to monitor and report on energy performance.*

C. *In meeting the zero-carbon target a minimum on-site reduction of at least 35 per cent beyond Building Regulations is expected. Residential development should aim to achieve 10 per cent, and non-residential development should aim to achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided:*

   1. *through a cash in lieu contribution to the relevant borough's carbon offset fund, and/or*

   2. *off-site provided that an alternative proposal is identified, and delivery is certain.*

D. *Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver greenhouse gas reductions. The operation of offset funds should be monitored and reported on annually.*

Guidance on Preparation of Energy Strategies (2022)

This version of the Strategy has used the latest GLA Emissions Reporting Spreadsheet for use from January 2023. In addition, the guidance clarifies the targets to be sought by all new major developments, summarized below:

- Commit to achieving compliance with Part L through efficiency measures only;
- Demonstrate how residential developments will achieve 35% saving onsite, with 10% from efficiency (noted as not always viable);
- Demonstrate how non-residential developments will achieve 35% saving onsite, with 15% from efficiency (noted as not always viable);
- For free-running buildings, include information regarding how overheating risk has been addressed;
- Demonstrate that connection to existing or planned networks have been prioritized;
- Commit to a single energy centre to serve the site;
- Investigate low carbon and renewable heating plant;
- Investigate low carbon and renewable technology onsite;
- Include information on post-occupancy energy performance monitoring;
- Align documents with the rest of the submission.

Be Seen Energy Monitoring Guidance (September 2021)

This document notes that static energy assessments based upon building regulations alone are not particularly accurate reflections of energy consumption of a building when in use. As a result, it recommends that actual energy use is monitored to help understand and bridge the gap between modelled energy use and actual. Applications are required to provide monitoring data for 'Reportable Units', which include individual buildings, heating and cooling systems and energy centres. At the planning stage, much of the energy demand and carbon emissions information is covered by the information in the GLA reporting spreadsheet. However, non-regulated energy uses should also be estimated applying the principles of CIBSE TM54 where applicable.

2.3 Local Policy

Policy CC2 of the Camden Local Plan sets out the following expectations:

Policy CC2 Adapting to climate change
The Council will require development to be resilient to climate change.
All development should adopt appropriate climate change adaptation measures such as:

- *b. the protection of existing green spaces and promoting new appropriate green infrastructure;*
- *c. not increasing, and wherever possible reducing, surface water run- off through increasing permeable surfaces and use of Sustainable Drainage Systems;*
- *d. incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and*
- *e. measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.*

Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement.

Sustainable design and construction measures
The Council will promote and measure sustainable design and construction by:

- *a. ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation;*
- *b. encourage new build residential development to use the Home Quality Mark and Passivhaus design standards;*
- *c. encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and*
- *d. expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.*

The Camden Planning Guidance note summarizes the expectations for new developments with regard to overheating:

Efficient ventilation and cooling
3.14 Local Plan Policy CC2 discourages active cooling (air conditioning). Air conditioning will only be permitted where thermal modelling demonstrates a clear need for it after all preferred measures are incorporated in line with the London Plan cooling hierarchy (please see Chapter 10 for further information on overheating and the cooling hierarchy). The following passive measures should be considered first. If active cooling is unavoidable, applicants need to identify the cooling requirement and provide details of the efficiency of the system.

- *Water based cooling systems reduce the need for air conditioning by running cold water through pipes in the floor and/or ceiling to cool the air.*
- *Evaporation cooling could also be investigated, this cools air through the simple evaporation of water.*
- *Ground source cooling. Ground source cooling is provided by a 'ground source heat pump' in the summer the ground stays cooler than the air and the difference in temperature can be harnessed for cooling.*
- *Exposed concrete slabs can provide natural cooling. This leaves internal thermal mass (concrete slabs, stone or masonry which form part of the construction) inside a building exposed so that it can absorb excess heat in the day and slowly release it at night.*
- *Developments could adopt a natural 'stack effect' which draws cool air from lower levels whilst releasing hot air.*

Other energy efficient technology

- *High efficiency lighting with controlled sensors, e.g. timers, movement sensors and photo sensors, which adjust the brightness of the light depending on the natural light level.*
- *Zoned lighting, heating and cooling with individual control.*
- *Specifying appliances which are A+ rated.*
- *Efficient mechanical services system or a building management system – computer systems which control and monitor a building's mechanical and electrical equipment. Their main aim is to control the internal environment, but in doing so can also reduce the energy consumption of a building.*
- *Using heat recovery systems. Mechanical Ventilation with Heat Recovery (MVHR) conserves energy by recovering heat from stale warm air leaving a building and transferring the heat to the cooler incoming air.*
- *Energy monitoring, metering and controls should be used to inform and facilitate changes in user behaviour.*

Cooling hierarchy

All developments should follow the cooling hierarchy outlined below, to reduce the risk of overheating and subsequent reliance on active cooling:

1. Minimise internal heat generation through energy efficient design, considering the following:

- *Layout and uses: locate any spaces that need to be kept cool or that generate heat on cooler sides of developments.*
- *Reducing heat gains e.g. including low energy lighting.*
- *Seal/insulate heat generating processes.*
- *Reduce the distance heat needs to travel and insulate pipework.*
- *Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.*
- *Consider evaporation cooling which cools air through the evaporation of water.*
- *Consider 'free cooling' or 'night cooling', which uses the cooling capacity of ambient air to directly cool the space.*

2. Reduce the amount of heat entering a building in summer:

- *Consider the angle of the sun and optimum daylight and solar gain balance.*
- *Orientate and recess windows and openings to avoid excessive solar gain.*
- *Consider low g-values and the proportion, size and location of windows.*
- *Make use of shadowing from other buildings.*
- *Include adequate insulation.*
- *Design in shading: e.g. include internal courtyards, large shade-providing trees and vegetation, balconies, louvers, internal or external blinds, and shutters.*
- *Make use of the albedo effect (use light coloured or reflective materials to reflect the sun's rays).*
- *Include green infrastructure e.g. green wall, green/blue roofs and landscaping, to regulate temperatures.*

• Reduce the amount of heat entering a building in summer.
3. Manage the heat within the building through exposed internal thermal mass and high ceilings, (see 'Thermal performance' Chapter 3 of this CPG).
4. Passive ventilation:
• Natural ventilation, openable windows, the 'stack effect' system (see Chapter 3 of this guidance).
• Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.
• Consider evaporation cooling which cools air through the evaporation of water.
• Consider 'free cooling' or 'night cooling' which uses the cooling capacity of ambient air to directly cool the space
5. Mechanical ventilation:
• Ensuring the most efficient system possible.
• Consider mechanical ventilation with heat recovery
6. Active cooling:
• Ensuring they are the lowest carbon options.
• Ground Source Heat Pumps and Air Source Heat Pumps can be used in reverse to provide cooling to buildings.
• Water based cooling systems also reduce the need for air conditioning by running cold water through pipes in the floor and/or ceiling to cool the air.

The Guidance note also covers the following points:

- The reuse of existing buildings is the most sustainable form of development;
- Opportunities to improve the carbon performance of the existing stock should be taken;
- The implications of conservation areas should be taken into account where applicable.

2.4 Analysis and Interpretation

The key policy standards can be summarized as follows:

1. Retain and upgrade buildings where possible;
2. Zero carbon development overall;
3. Connect to extant networks where available;
4. Application of the energy/cooling/heating hierarchies;
5. Sustainable resource management;
6. Pollution and overheating management.

With extant buildings there is a methodology proposed within the GLA's guidance for assessing the improvements achieved by the proposed development. There are constraints that are associated with existing buildings.

3 ENERGY ASSESSMENT

3.1 Methodology

This chapter explains the methodology for assessing energy demand and CO2 emissions profile and for undertaking options appraisal for low carbon and renewable energy solutions. It provides details of the process of identifying and assessing the likely significant environmental effects of the proposed development. The building was evaluated using both a dynamic thermal model, and following guidance from the Local Authority, the old and the new elements were evaluated separately.

The recommended methodology is set out in the GLA Energy Guidance document. For extant buildings the approach is as follows:

- Determine the baseline using values from Appendix 4 and the relevant tables in Part L2b;
- Evaluate the impact of energy efficiency opportunities;
- Evaluate the impact of low and zero carbon technology;
- Utilise the GLA Energy sheet for reporting.

3.2 Establishing CO2 Emissions (Business as Usual)

The building has an EPC that suggests a building that does not perform particularly well:

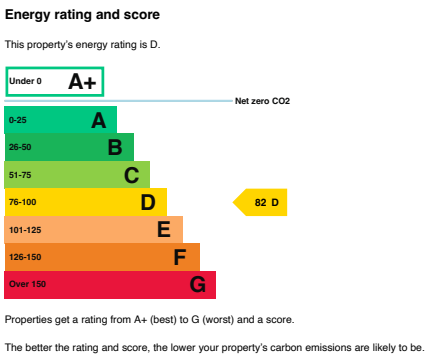

Figure 2 - Extract from Most Recent EPC

In order to assess the scheme, an EDSL TAS model was developed for the building to provide a means of analyzing the baseline and the potential performance. The baseline specification was as follows:

- Extant building:
  - Walls – 0.30W/m2K (Part L target of 0.3W/m2K)
  - Floors – 0.25W/m2K (Part L target of 0.25W/m2K)
  - Roofs – 0.18W/m2K (Part L target of 0.16W/m2K)
  - Doors – 1.4W/m2K (Part L target of 1.4W/m2K)
  - Glazing – 1.4W/m2K (Part L target of 1.4W/m2K)
  - Air permeability – 25m3/m2/hr
  - 60 lumens per circuit Watt
  - Heat recovery 70%
- New building:
  - Use the TER value in the Proposed Building.

3.3 Passive and Low Carbon Design

The scheme was subjected to an analysis at the early stage which considered the following matters:

- Building analysis to influence design decisions;
- Identification of passive design solutions;
- Implementation of passive design solutions.

A model was developed in EDSL TAS that accounted for the following:

- Site location;
- Local weather;
- Micro-climate;
- Building layout;
- Building orientation;
- Building form;
- Building fabric;
- Occupancy type.

3.4 Demand Reduction (Be Lean)

The efficiency measures modelled at planning were as follows:

- Extant Building
  - Walls – 0.3W/m2K (Part L target of 0.3W/m2K)
  - Floors – 0.25W/m2K (Part L target of 0.25W/m2K)
  - Roofs – 0.16W/m2K (Part L target of 0.16W/m2K)
  - Doors – 1.4W/m2K (Part L target of 1.4W/m2K)
  - Glazing – 1.4W/m2K (Part L target of 1.4W/m2K)
  - Accredited construction details (Default);
  - Air permeability – 5m3/m2/hr (vs 25 as baseline in GLA guidance)
  - 120 lumens per circuit Watt (vs 60 as baseline in GLA guidance)
  - Heat recovery 90%
- New Element
  - Walls – 0.18W/m2K (Part L target of 0.3W/m2K)
  - Floors – 0.13W/m2K (Part L target of 0.25W/m2K)
  - Roofs – 0.12W/m2K (Part L target of 0.16W/m2K)
  - Doors – 1.4W/m2K (Part L target of 1.4W/m2K)
  - Glazing – 1.4W/m2K (Part L target of 1.4W/m2K)
  - Air permeability – 3m3/m2/hr
  - 120 lumens per circuit Watt
  - Heat recovery 90%

3.5 Cooling Hierarchy

The cooling hierarchy is set out below together with the scheme responses to it:

1. Minimize internal heat generation through efficient design;
   a. The building is North facing. The new extension has most of its glazing facing North and East (low risk facades in terms of overheating) with smaller areas to the South and West. The East, South and West facades are heavily overshaded by the surrounding buildings that are 5-10 storeys high.

   b. Servicing pipes to be fully insulated to reduce uncontrolled heat loss into the spaces;
   c. Vertical nature of building allows for efficient services and pipe runs Floor plates are shallow above 1st floor;
   d. All lighting to be low energy (target 120 lumens /circuit Watt);
   e. Night-cooling will be considered when the detailed design of the HVAC system is done to maximize the free-cooling opportunity and to minimize running costs;
2. Reduce amount of heat entering building during summer:
   a. Natural shading from tall surrounding buildings to East, South and West;
   b. Main façade North facing;
   c. Glass to be low g value (g 0.4) to control solar gain;
   d. Air tightness to help restrict unwanted solar gain through the fabric;
   e. Ventilation levels will be determined by the end-use.
3. Use of thermal mass and high ceilings:
   a. Extant building has substantial mass to the walls – where internal and no insulation requirements apply, mass to be exposed to temper temperature peaks and troughs;
   b. Ceiling to extant building very high in places.
4. Passive ventilation:
   a. Stack ventilation to cool services ducts may be an option. The occupied spaces, due to the nature of the occupancy, will require some active ventilation and cooling solutions.
5. Mechanical ventilation:
   a. Mechanical ventilation will be used throughout with heat recovery (design target of 90%).
   b. System efficiency will be one of the guiding principles for when the detailed HVAC design takes place;
6. Active cooling;
   a. Heat pumps will be used – this will likely involve VRF type heating and cooling as a low carbon option.

3.6 Heating Infrastructure (Be Clean)

The heating hierarchy is as follows:

1. Connection to an existing or planned heating network;
2. Communal heating system:
   a. Site-wide heat network;
   b. Building level heating system;
3. Individual heating system.

The London Heat Map has been used to identify potential opportunities for connections to existing and proposed heat networks. There are no existing heat networks adjacent to the development site. There is a heat network proposed, but as yet no progress has been made in building it (South Westminster Area Network). A partnership has been pulled together to deliver it, but the participating buildings have not yet been determined. Further, there are complexities in connecting to heat networks whilst achieving compliance with Part L and planning carbon targets – this issue is yet to be fully resolved.

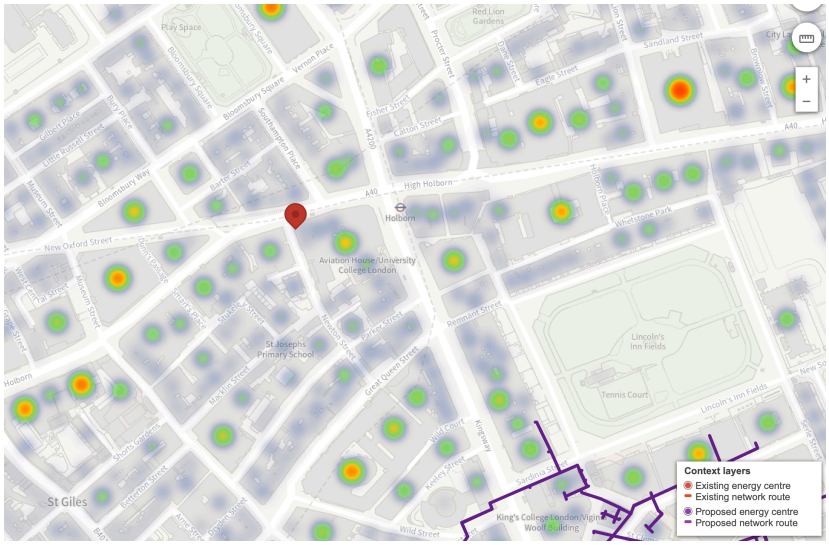

Figure 3 - London Heat Map Findings[1]

At this stage, there is no realistic prospect of a connection that would meet the project deadlines.

3.7 Renewable Energy (Be Green), Carbon Offsetting and Futureproofing

The proposed scheme incorporates a heat pump-based HVAC system that will provide low carbon heating and space cooling, likely to be VRF. The solar PV provision has been reviewed and the roof capacity is considered to be more like 10kWp rather than the 50kWp estimates in the previous report. All calculations have been revisited to address this. GLA table demonstrated the final carbon savings to be as follows:

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	5.2	47%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	4.3	40%
Total Cumulative Savings	**9.5**	**87%**
Annual savings from off-set payment	1.5	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**44**	-
Cash in-lieu contribution (£)	**4,176**	

Figure 4 - Emissions Summary and Carbon Offset Calculation

The scheme is future proofed to achieve zero carbon as the grid will decarbonise and as it does so, the heat pump system will achieve lower and lower carbon emissions.

[1] London Heat Map context layers on: extant and proposed heat networks, transmission routes, and study areas.

3.8 Other Renewable Energy Technologies

The London Plan sets a target of 20% renewable energy where feasible. This policy was originally the key energy policy in the London Plan in 2008 but has been increasingly ignored in favour of the overall CO2 targets set.

3.8.1 Biomass

Biomass and biomass CHP bring significant logistical issues in terms of fuel supply that are not compatible with the Site. There is a range of technical hurdles that the site would struggle to overcome. Neither are considered viable.

3.8.2 Solar Thermal and PV

Solar PV is preferred to solar thermal as it is a much more flexible technology. The scheme has integrated 50sqm of panels, estimated to equate to 10kWp.

3.8.3 Wind Power

Wind power is generally not suitable for the urban environment.

3.9 Energy Strategy Summary

The proposed energy strategy comprises the following:

1. Energy efficiency measures for both fabric and fittings;
2. Air source heat pump driven heating and cooling;
3. Solar PV (10kWp).

4 ENVIRONMENTAL SUSTAINABILITY

4.1 BREEAM

The scheme seeks BREEAM certification and pre-assessments for both the new construction and the refurbishment have been submitted previously. This addresses the following sustainability aspects of the project:

- Management;
- Health and wellbeing;
- Energy;
- Transport;
- Water;
- Materials;
- Waste
- Land use and ecology;
- Pollution.

4.2 Resource Efficiency

The Camden Guidance notes the importance of retaining existing buildings in terms of embodied carbon. The proposals herein retain the existing building, and allow the extant building to be modernised, thereby extending its useful commercial life. The proposals also maximise the use of land in what is a highly accessible and sustainable location. Materials and waste are addressed in depth in the approach to BREEAM.

4.3 Circular Economy

4.3.1 Principles

The environmental impacts of construction are substantial, not just with regard to embodied energy and embodied carbon emissions. Resource consumption is substantial and that has its own implications globally. There is now a pressing need to address how resources can be used sustainably to reduce the associated lifecycle impacts, including how waste streams are dealt with. The diagram below represents visually the progression from a linear economy to a circular economy:

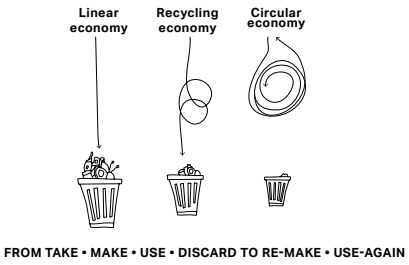

Figure 5 - Progression to a Circular Economy (GLA Guidance, 2022)

The end goal is to retain the value of materials and resources indefinitely, although this will take transformational change throughout the economy. The principles that sit behind the circular economy are:

- Building in layers – ensuring that different parts of the building are accessible and can be maintained and replaced where necessary
- Designing out waste – ensuring that waste reduction is planned in from project inception to completion, including consideration of standardized components, modular build, and reuse of secondary products and materials
- Designing for longevity
- Designing for adaptability or flexibility
- Designing for disassembly
- Using systems, elements or materials that can be reused and recycled.

4.3.2 Circular Economy Hierarchy and Approaches

In addition to the principles set out above, the hierarchy for Circular Economy approaches is as follows:

- Retain
- Refit
- Refurbish
- Reclaim/Reuse
- Remanufacture
- Recycle/compost

4.3.3 Site Specific Approach

The decision tree leads the scheme to focus on design for Adaptability, Flexibility and Replaceability. A summary of the site-approach to the circular economy is as follows:

- Whole building strategy of Retain/Refit/Refurbish and Extend
    - Retain and refurbish the majority of the extant building, minimising embodied carbon and waste generated by demolition;
    - By upgrading and extending the building, prolong its commercial life;
    - Enhancing the utility of the big-volume spaces through the introduction of a larger mezzanine;
- Adaptability:
    - The extant building has already proved adaptable in terms of spaces. The new open plan approach in the new extension will lend itself to future adaptation through internal partitioning;
- Flexibility:
    - Through extending, creating new spaces that benefit from extant walls in areas, reducing materials demand;
- Replaceability:
    - Utilise building systems that allow for deconstruction at end of life including dismantlable curtain walling and rainscreen cladding systems;
    - Cladding is flexible and dismountable so can be replaced with ease on the framing system;
    - Fit-out materials are beyond the scope of the applicant.

4.3.4 Waste

A waste management plan will be put in place to reduce site waste generation typically using some or all of the following:

1. Identification of pre-requisites for waste contractors and sub-contractors;
2. Identification of key parties and individuals responsible for waste monitoring and management (main contractor, waste sub-contractors);
3. Identification of appropriate benchmarks for waste generation/recycling including the use of appropriate tools for generating suitable benchmarks for the development such as;
    a. WRAP Net Waste Tool;
    b. BRE SMART Waste;
4. Identification of processes for dealing with different waste streams;
5. Processes for monitoring total waste arisings, proportion reused onsite, proportion recycled offsite, proportion sent to landfill;
6. Reporting mechanisms to capture the waste management data.

The applicant team are happy to engage with materials recyclers at the appropriate time. During occupation, all units will be required to provide waste segregation and recycling both internally and externally. A full site waste management plan and operational waste management plan will be prepared to support the scheme.

5 CONCLUSION

5.1 Purpose of Document

This report provides an updated energy strategy following the request by the local authority as the previous Energy Strategy had been outdated during the determination period of the project. This revised document is based upon a revised energy model that accounts for the latest Part L and the GLA energy guidance and spreadsheet.

5.2 Approach

Through a dynamic thermal model approach, both the old and the new elements of the scheme have been modelled to provide an overall carbon emissions estimate of the scheme. The extant building was modelled in line with the GLA Energy Guidance Appendix 4 requirements, and the new according to the main text within the GLA Energy Guidance Document. The supporting BRUKL documents are provided in support of the application.

5.3 Findings

The scheme performs well based on the strategic approach previously outlined. The planning-stage estimate notes that the scheme is projected to achieve an estimated savings of 81% CO2 onsite, with the remainder being addressed through a carbon offset payment. All proposals are developed to the planning application stage and will be subject to further design revisions as the scheme progresses. All planning conditions should make due allowances for this. A summary of the energy and CO2 position is as follows:

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	5.2	47%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	4.3	40%
Total Cumulative Savings	**9.5**	**87%**
Annual savings from off-set payment	1.5	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**44**	-
Cash in-lieu contribution (£)	**4,176**	

Figure 6 - Summary of CO2 Performance

As part of the analysis, the heating and cooling hierarchies have been addressed, as well as the circular economy principles, and indeed the energy and carbon savings requirements of new developments all within the latest policy and regulatory framework.

5.4 Statement of Policy Compliance

In the development of the proposals, the design team has reviewed, interpreted and addressed the relevant planning policy on energy and CO2 emissions and sustainable development. The proposals have reviewed early-stage opportunities for efficiency and clean and renewable energy technology. It is compliant with the following documents:

The National Planning Policy Framework (Dec 2023)

The London Plan (2021)

The Mayor's Guidance on Preparing Energy Strategies (2022)

Camden Council Adopted Local Plan

5.5 Supporting Documentation

The following documents are appended to this document or provided separately:

- BRUKL for Baseline and Proposed stages (appended).

APPENDIX 1 - BRUKL OUTPUTS

Extant Building – Baseline

Extant Building – Energy Efficient

Extant Building – Proposed

New Element – Energy Efficient;

New Element – Proposed (Baseline TER and Proposed BER)

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Extant Building, Retail Space

As designed

Date: Tue Nov 26 14:53:56 2024

Administrative information

Building Details

Address:

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

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

Certifier details

Name:

Telephone number:

Address: , ,

Foundation area [m^2]: 45.41

The CO_2 emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	2.6	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	5.97	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	28.64	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	63.51	
Do the building's emission and primary energy rates exceed the targets?	BER > TER	BPER > TPER

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

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.29	0.29	Existing External Wall
Floors	0.18	0.24	0.24	Ground Floor
Pitched roofs	0.16	-	-	No pitched roofs in project
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	1.66	1.84	0.7x1.0
Rooflights***	2.2	-	-	No rooflights in project
Personnel doors^	1.6	1.48	1.48	1.4x2.5 Door
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project

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

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

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

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

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	25

Building services

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

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

1- New HVAC System (4 Zones)

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	2.64	5	-	2	0.7
Standard value	0.93*	3	N/A	1.5^	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 and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- New HWS Circuit

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	2	0
Standard value	0.91	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	**General luminaire**	**Display light source**	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
Retail space	60	60	-
B1_Circulation 1	60	-	-
B1_Circulation 2	60	-	-
B1_Circulation 3	60	-	-

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

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
Retail space	NO (-59%)	NO
B1_Circulation 1	N/A	N/A
B1_Circulation 2	N/A	N/A
B1_Circulation 3	NO (-96%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	318	318
External area [m^2]	405	405
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	25	3
Average conductance [W/K]	150	145
Average U-value [W/m^2K]	0.37	0.36
Alpha value* [%]	28.75	13.75

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

Building Use

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

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

	Actual	Notional
Heating	14.38	1
Cooling	1	3.77
Auxiliary	8.61	4.15
Lighting	17.94	10.2
Hot water	0.57	0.4
Equipment*	16.22	16.22
TOTAL**	**42.5**	**19.52**

* 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	162.76	72.9
Primary energy [kWh_{PE}/m^2]	63.51	28.64
Total emissions [kg/m^2]	5.97	2.6

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] Variable refrigerant flow, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	140.8	18.9	14.8	1.1	9.1	2.64	5	2.64	5
	Notional	9.8	62.9	1	4	4.4	2.64	4.4	----	----

Key to terms

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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Extant Building, Retail Space EE

As designed

Date: Tue Nov 26 15:06:54 2024

Administrative information

Building Details

Address:

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

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

Certifier details

Name:

Telephone number:

Address: , ,

Foundation area [m^2]: 45.41

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$annum	2.61	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	2.36	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	28.8	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	25.33	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.5	0.5	Existing External Wall
Floors	0.18	0.24	0.24	Ground Floor
Pitched roofs	0.16	-	-	No pitched roofs in project
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	1.66	1.84	0.7x1.0
Rooflights***	2.2	-	-	No rooflights in project
Personnel doors^	1.6	-	-	No personnel doors in project
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project

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

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

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

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

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	5

Building services

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

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

1- New HVAC System (4 Zones)

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	2.64	4.5	-	0.6	0.9
Standard value	0.93*	3	N/A	1.5^	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 and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- New HWS Circuit

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	2.86	0
Standard value	0.91	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	**General luminaire**	**Display light source**	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
Retail space	120	120	-
B1_Circulation 1	120	-	-
B1_Circulation 2	120	-	-
B1_Circulation 3	120	-	-

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

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
Retail space	NO (-59%)	NO
B1_Circulation 1	N/A	N/A
B1_Circulation 2	N/A	N/A
B1_Circulation 3	NO (-96%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	318	318
External area [m^2]	405	405
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	188	140
Average U-value [W/m^2K]	0.46	0.35
Alpha value* [%]	28.75	13.75

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

Building Use

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

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

	Actual	Notional
Heating	3.91	0.84
Cooling	1.17	4.13
Auxiliary	2.58	4.15
Lighting	8.97	10.12
Hot water	0.4	0.4
Equipment*	16.22	16.22
TOTAL**	**17.03**	**19.65**

* 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	59.11	77.33
Primary energy [kWh_{PE}/m^2]	25.33	28.8
Total emissions [kg/m^2]	2.36	2.61

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] Variable refrigerant flow, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	39.1	20	4.1	1.2	2.7	2.64	4.5	2.64	4.5
	Notional	8.3	68.9	0.9	4.4	4.4	2.64	4.4	----	----

Key to terms

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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Extant Building, Retail Space

As designed

Date: Tue Nov 26 15:26:14 2024

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

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

Foundation area [m^2]: 45.41

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	2.61	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	1.95	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	28.8	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	21.04	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.5	0.5	Existing External Wall
Floors	0.18	0.24	0.24	Ground Floor
Pitched roofs	0.16	-	-	No pitched roofs in project
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	1.66	1.84	0.7x1.0
Rooflights***	2.2	-	-	No rooflights in project
Personnel doors^	1.6	-	-	No personnel doors in project
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project

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

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

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

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

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	5

Building services

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

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

1- New HVAC System (4 Zones)

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	7.08	8.67	-	0.6	0.9
Standard value	0.93*	3	N/A	1.5^	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 and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- New HWS Circuit

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	2	0
Standard value	0.91	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	**General luminaire**	**Display light source**	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
Retail space	120	120	-
B1_Circulation 1	120	-	-
B1_Circulation 2	120	-	-
B1_Circulation 3	120	-	-

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

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
Retail space	NO (-59%)	NO
B1_Circulation 1	N/A	N/A
B1_Circulation 2	N/A	N/A
B1_Circulation 3	NO (-96%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	318	318
External area [m^2]	405	405
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	188	140
Average U-value [W/m^2K]	0.46	0.35
Alpha value* [%]	28.75	13.75

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

Building Use

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

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

	Actual	Notional
Heating	1.46	0.84
Cooling	0.61	4.13
Auxiliary	2.58	4.15
Lighting	8.97	10.12
Hot water	0.57	0.4
Equipment*	16.22	16.22
TOTAL**	**14.19**	**19.65**

* 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	59.11	77.33
Primary energy [kWh_{PE}/m^2]	21.04	28.8
Total emissions [kg/m^2]	1.95	2.61

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] Variable refrigerant flow, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	39.1	20	1.5	0.6	2.7	7.08	8.67	7.08	8.67
	Notional	8.3	68.9	0.9	4.4	4.4	2.64	4.4	----	----

Key to terms

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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

New Office, Energy Efficient

As designed

Date: Tue Nov 26 12:17:46 2024

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

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

Foundation area [m^2]: 59.44

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	2.29	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	2.18	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	25.11	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	23.38	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.17	0.17	External Wall
Floors	0.18	0.13	0.13	Exposed Floor
Pitched roofs	0.16	-	-	No pitched roofs in project
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	0.92	0.98	1.1x2.4
Rooflights***	2.2	-	-	No rooflights in project
Personnel doors^	1.6	-	-	No personnel doors in project
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project

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

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

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

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

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

Building services

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

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

1- New HVAC System (5 Zones)

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	2.64	8.67	-	0.6	0.9
Standard value	2.5*	3	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- New HWS Circuit

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	2.86	0
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	**General luminaire**	**Display light source**	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
B1_Circulation 1	120	-	-
B1_Circulation 2	120	-	-
B1_Office 1	120	-	-
B1_Office 2	120	-	-
B1_Toilet 1	120	-	-

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

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
B1_Circulation 1	N/A	N/A
B1_Circulation 2	N/A	N/A
B1_Office 1	NO (-36%)	NO
B1_Office 2	NO (-35%)	NO
B1_Toilet 1	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	416	416
External area [m^2]	465	465
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	322	248
Average U-value [W/m^2K]	0.69	0.53
Alpha value* [%]	26.37	11.37

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

Building Use

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

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

	Actual	Notional
Heating	5.07	2.6
Cooling	1.45	4.47
Auxiliary	2.28	2.6
Lighting	6.15	6.7
Hot water	0.73	0.73
Equipment*	33.98	33.98
TOTAL**	**15.69**	**17.09**

* 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	98.42	100.44
Primary energy [kWh_{PE}/m^2]	23.38	25.11
Total emissions [kg/m^2]	2.18	2.29

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] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	50.8	47.7	5.3	1.5	2.4	2.64	8.67	2.64	8.67
	Notional	25.8	74.5	2.7	4.7	2.7	2.64	4.4	----	----

Key to terms

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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

New Office, Proposed

As designed

Date: Mon Dec 02 13:08:44 2024

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

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

Foundation area [m^2]: 59.44

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	2.29	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	-1.09	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	25.11	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	-14.05	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.17	0.17	External Wall
Floors	0.18	0.13	0.13	Exposed Floor
Pitched roofs	0.16	-	-	No pitched roofs in project
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	0.92	0.98	1.1x2.4
Rooflights***	2.2	-	-	No rooflights in project
Personnel doors^	1.6	-	-	No personnel doors in project
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project

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

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

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

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

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

Building services

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

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

1- New HVAC System (5 Zones)

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	7.08	8.67	-	0.6	0.9
Standard value	2.5*	3	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- New HWS Circuit

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	2	0
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	**General luminaire**	**Display light source**	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
B1_Circulation 1	120	-	-
B1_Circulation 2	120	-	-
B1_Office 1	120	-	-
B1_Office 2	120	-	-
B1_Toilet 1	120	-	-

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

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
B1_Circulation 1	N/A	N/A
B1_Circulation 2	N/A	N/A
B1_Office 1	NO (-36%)	NO
B1_Office 2	NO (-35%)	NO
B1_Toilet 1	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	416	416
External area [m^2]	465	465
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	322	248
Average U-value [W/m^2K]	0.69	0.53
Alpha value* [%]	26.37	11.37

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

Building Use

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

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

	Actual	Notional
Heating	1.89	2.6
Cooling	1.45	4.47
Auxiliary	2.28	2.6
Lighting	6.15	6.7
Hot water	1.05	0.73
Equipment*	33.98	33.98
TOTAL**	**12.82**	**17.09**

* 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	22.62	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*22.62*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	98.42	100.44
Primary energy [kWh_{PE}/m^2]	-14.05	25.11
Total emissions [kg/m^2]	-1.09	2.29

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] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	50.8	47.7	2	1.5	2.4	7.08	8.67	7.08	8.67
	Notional	25.8	74.5	2.7	4.7	2.7	2.64	4.4	----	----

Key to terms

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