ENERGY STATEMENT

30 Lincoln's Inn Fields, WC3A 3TL, LND

Produced by XCO2 for The Honourable Society of Lincoln's Inn

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EXECUTIVE SUMMARY

The energy strategy for the Lincoln's Inn Field development has been developed in line with the energy policies of the London Plan and of the London Borough of Camden policies. The three-step Energy Hierarchy has been implemented and the estimated regulated CO_2 savings on site are 49.7% for the development, against a baseline set out in line with Appendix 4 of the GLA's Energy Assessment Guidance document with SAP10 emission factors.

This report assesses the predicted energy performance and carbon dioxide emissions of the proposed development at Lincoln's Inn Field, located in the London Borough of Camden.

The proposed development comprises the replacement of building services plant and windows of the existing office building.

In line with London Plan policy SI2 Camden Local Plan CC1 the development will enable lower consumption once the building is in use and reduce CO_2 emissions. The reduction in regulated CO_2 emissions will be compared against the a notional baseline as detailed in Appendix 4 of the GLA's Energy Assessment Guidance document.

The energy strategy outlined in this report has been developed using the SAP10 emissions factors to ensure the development is reflective of the upcoming version of the Building Regulations.

The methodology used to determine the expected operational CO_2 emissions for the development is in accordance with the London Plan's three-step Energy Hierarchy (Policy SI2) and the CO_2 savings achieved for each step are outlined below:

BE LEAN – USE LESS ENERGY

The first step addresses reduction in energy demand, through the adoption of passive and active design measures.

The proposed energy efficiency measures include new windows that perform beyond current new build standards, efficient lighting and ventilation systems, as well as energy saving controls for space conditioning and lighting.

By means of energy efficiency measures alone, regulated CO_2 emissions are shown to reduce by 3.3% (0.6 tonnes/yr).

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

The application site is located in an area where district heating is not expected to be implemented in the future.

ASHPs are instead proposed to provide heat to the dwellings. Based on the strategy proposed, no savings are achieved at the Be Clean stage.

BE GREEN – USE RENEWABLE ENERGY

The renewable technologies feasibility study carried out for the development identified air source heat pumps as a suitable technology for the development.

The incorporation of renewable technologies will reduce CO_2 emissions by a further 46.3% (8.3 tonnes/yr).

CUMULATIVE ON SITE SAVINGS

The overall regulated CO_2 saving on site against a notional baseline is therefore 49.7% (8.9 tonnes/yr). Due to the minor refurbishment nature of the proposed development, the zero carbon target and associated carbon offsetting stipulated within the London Plan is not deemed applicable.

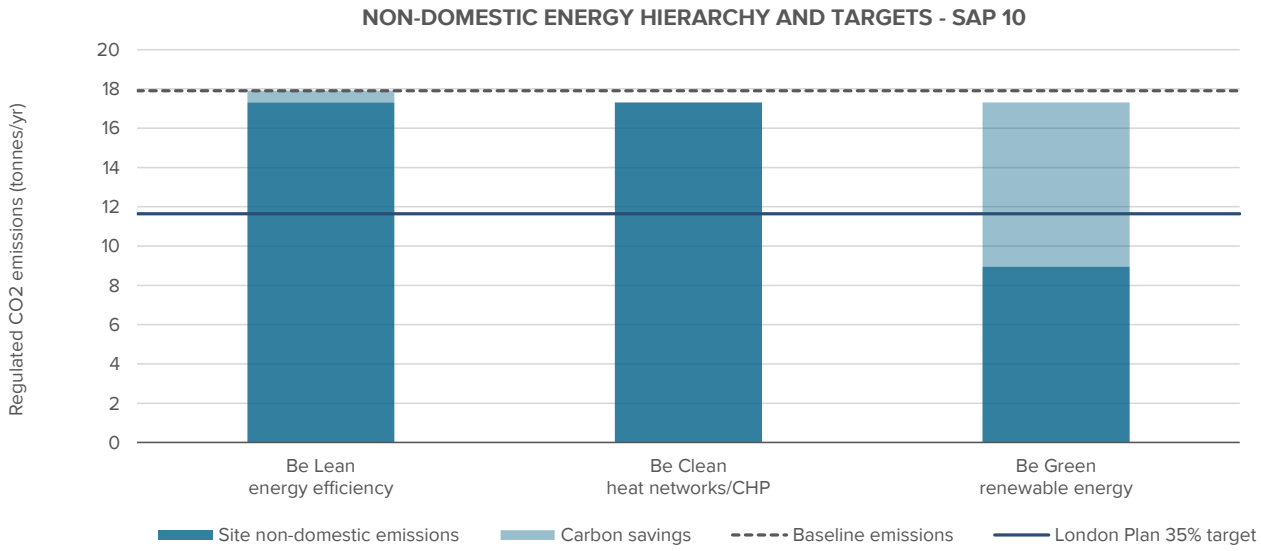


Figure 1: The Non-Domestic Energy Hierarchy (SAP10 carbon factors)

INTRODUCTION

This Chapter presents the description of the site and of the development proposal, the energy policy framework and the methodology employed for the energy assessment.

SITE & PROPOSAL

The site is located on Newman's Road, and the proposal consists of the replacement of windows and building services plant of the offices at 30 Lincoln's Inn Fields.

Figure 2: Location of application site.

POLICY FRAMEWORK

The proposal will seek to respond to the energy policies of the London Plan and of the policies within the London Borough of Camden Local Plan.

The most relevant applicable energy policies in the context of the proposed development are presented below.

THE LONDON PLAN (2021)

The London Plan (2021) published 2nd March 2021 sets out the Mayor's overarching strategic spatial development strategy for greater London and underpins the planning framework from 2019 up to 2041. This document replaced the London Plan 2016.

The new Plan has a strong sustainability focus with many new policies addressing the concern to deliver a sustainable and zero carbon London, particularly addressed in chapter 9 Sustainable Infrastructure.

The following policies, related to Energy, are of relevance for the proposed development:

POLICY SI2 MINIMISING GREENHOUSE GAS EMISSIONS

This policy sets the requirements for all major developments to follow the energy hierarchy and achieve net-zero-carbon for both residential and non-residential schemes (via on-site carbon reductions and offset payments) and introduces new targets at Lean stage:

"...
This means reducing greenhouse gas emissions in 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 operation
2) be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly
3) be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site
4) be seen: monitor, verify and report on energy performance.
..."

"...
A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should 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, in agreement with the borough, either:
1) through a cash in lieu contribution to the borough's carbon offset fund, or
2) off-site provided that an alternative proposal is identified and delivery is certain.
..."

This policy also sets the requirements to consider whole-life carbon emissions, including embodied carbon and unregulated emissions:

"...
Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.
..."

The policy supporting text provides additional clarifications on the requirements for major developments:

- Developments including major refurbishments should also aim to meet the net-zero carbon target.
- All developments should maximise opportunities for on-site electricity and heat production from solar technologies (photovoltaic and thermal), use innovative building materials and smart technologies.
- Recommendation to use SAP10 carbon factors as per GLA Energy Guidance.
- Recommended carbon offset price of £95 per tonne CO_2.

- Requirement for major developments to monitor and report operational energy performance to the GLA.

POLICY SI 3 ENERGY INFRASTRUCTURE

This policy requires all major developments within Heat Network Priority Areas will need to utilise a communal low-temperature heating system and follow the energy hierarchy to determine the most suitable system Where developments are utilising CHP this policy also requires them to demonstrate that 'the emissions relating to energy generation will be equivalent or lower than those of an ultra-low NOx gas boiler'. Any combustion on site should meet the requirements of part B of Policy SI1.

POLICY SI 4 MANAGING HEAT RISK

This policy requires:

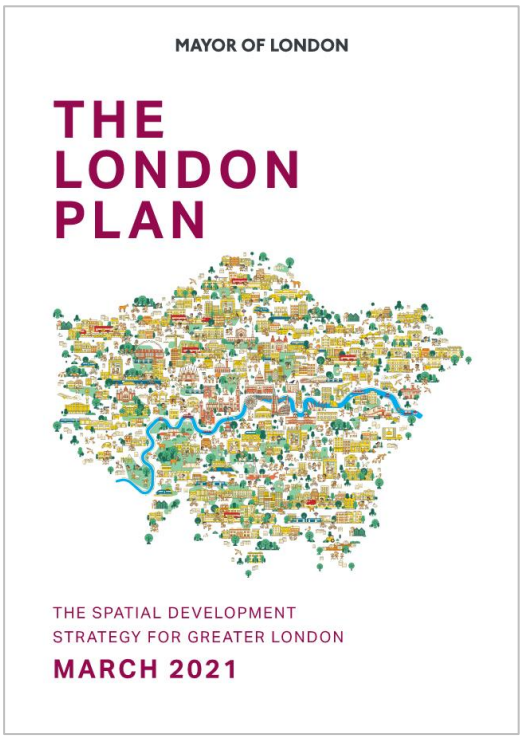
A Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B 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:
1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2) minimise internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems.

The London Plan also consists of a suite of guidance documents, such as the Energy Assessment Guidance: Greater London Authority guidance on preparing energy assessments as part of planning applications (April 2020)

It is noted that the proposed scheme does not constitute 'major' development, and therefore London Plan policies, intended for major developments, are not applicable in this case.

The London Plan's Energy Hierarchy has however been followed in developing the energy strategy for the proposals, in line with Local Plan guidance.



GLA GUIDANCE ON PREPARING ENERGY ASSESSMENTS

This document (last updated in April 2020) provides guidance on preparing energy assessments to accompany strategic planning applications; it contains clarifications on Policy SI 2, of the new London Plan, carbon reduction targets in the context of zero carbon policy, as well as detailed guidelines on the content of the Energy Assessments undertaken for planning.

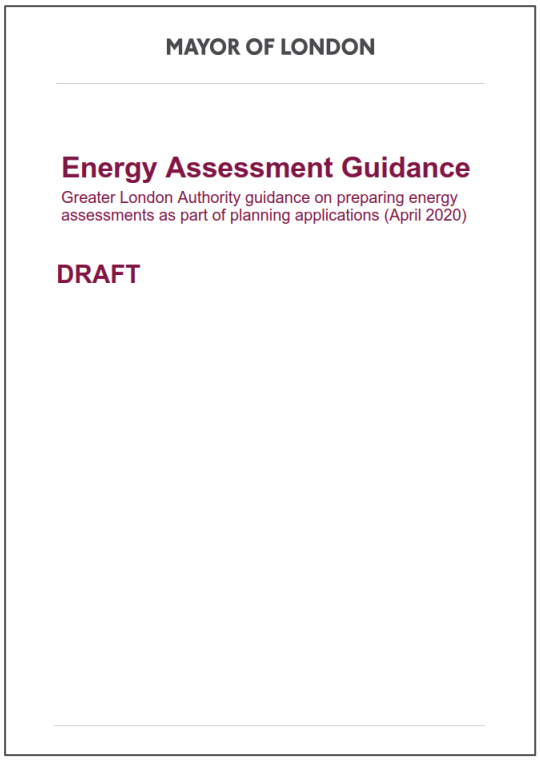
The guidance document specifies the emission reduction targets the GLA will apply to applications as follows:

The regulated carbon dioxide emissions reduction target for major domestic and non-domestic development is net zero carbon, with at least a 35% on-site reduction beyond Part L 2013 of the Building Regulations.

The new guidance also includes changes to technical requirements relating to the use of updated carbon factors, cost estimates, overheating risk analysis, the structure of the heating hierarchy and scrutiny over the performance of heat pumps. The guidance does not set out zero carbon targets to refurbishments, especially minor refurbishments.

Finally, the document provides information on how the new stage of the energy hierarchy 'be seen' is expected to be carried out in energy assessments.

The structure of this report and the presentation of the carbon emission information for the development follows the guidance in this document.


MAYOR OF LONDON

Energy Assessment Guidance

Greater London Authority guidance on preparing energy assessments as part of planning applications (April 2020)

DRAFT

CAMDEN LOCAL PLAN 2017

Policy CC1 Climate Change Mitigation

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

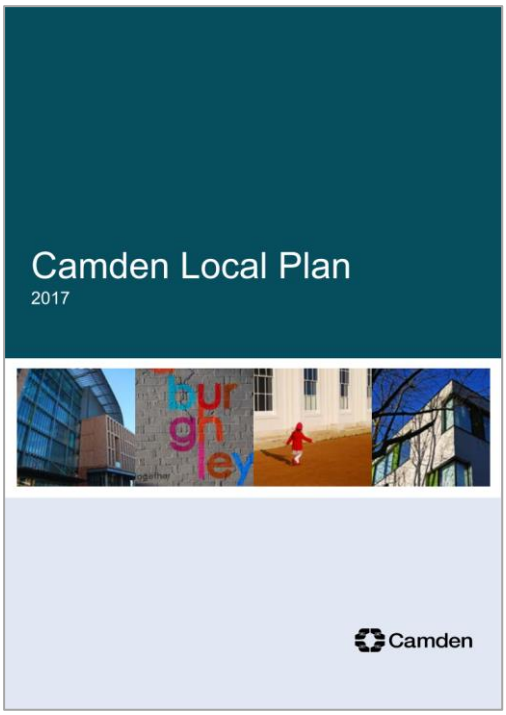
We will:

a) promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
b) require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
c) 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;
d) support and encourage sensitive energy efficiency improvements to existing buildings;
e) require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
f) expect all developments to optimise resource efficiency.

For decentralised energy networks, we will promote decentralised energy by:

g) working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;
h) protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and.
i) requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network.

To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.



METHODOLOGY

The sections below present the methodology followed in determining the on-site carbon savings for the proposed scheme.

ON-SITE CARBON SAVINGS – THE ENERGY HIERARCHY

The methodology employed to develop the energy strategy for the scheme and achieve on-site carbon savings is in line with the GLA's *Guidance on preparing energy assessments* and is as follows:

The **baseline** CO_2 emissions are first established, i.e. the emissions of a notional scheme that is constricted in line with the inputs set out in Appendix 4 of the GLA's Energy Assessment Guidance document.

The software used to model and calculate the energy performance and carbon emissions is SBEM. The baseline building emission rate (BER) is multiplied by its floor area to establish the total emissions.

The same approach is followed to determine the energy performance and CO_2 emissions of the proposed scheme for each of the steps of the **Energy Hierarchy**. The CO_2 emissions are estimated based on the SBEM Building Emission Rate (BER) figures. The Energy Hierarchy aims at delivering significant carbon savings on-site.

The three consecutive steps of the Energy Hierarchy are:

- **Be Lean** whereby the demand for energy is reduced through a range of passive and active energy efficiency measures; as part of this step the Cooling Hierarchy (see Policy SI4) is implemented and measures are proposed to reduce the demand for active cooling;
- **Be Clean** whereby as much of the remaining energy demand is supplied as efficiently as possible (e.g. by connecting to a district energy network or developing a site-wide CHP network), and,
- **Be Green** whereby renewable technologies are incorporated to offset part of the carbon emissions of the development. The uptake of renewable technologies is based on feasibility and viability considerations, including their compatibility with the energy system determined in the previous step.

The implementation of the Energy Hierarchy determines the total regulated carbon savings that can be feasibly and viably achieved on site.

The % improvement against the baseline emissions is compared to the relevant targets for each element and in case of a shortfall, savings through off-site measures should be achieved.

The structure of the main body of the assessment follows the Methodology presented above and comprises the sections:

- Be Lean;
- Be Clean;
- Be Green.

The Conclusions section summarises the energy strategy and associated carbon savings for the proposed development.

BE LEAN – USE LESS ENERGY

The proposals incorporate a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water and lighting. Measures will also be put in place to reduce the risk of overheating. The regulated carbon saving achieved in this step of the Energy Hierarchy is 3.3% over the notional baseline level with SAP10 emission factors.

PASSIVE DESIGN MEASURES

ENHANCED U-VALUES

The heat loss of different building fabric elements is dependent upon their U-value. A building with low U-values provides better levels of insulation and reduced heating demand during the cooler months.

The scope of the proposed development is limited. Windows will be replaced to incorporate double glazing with improved levels of insulation and high-performance glazing. There is no scope to change the rest of the building fabric.

The tables to the right demonstrate the existing and proposed building fabric for non-domestic uses. As shown, only the glazing will incorporate an improved U value, whilst the remaining building fabric will not be changed.

Table 1: Thermal Envelope U-values

Non-domestic (U-values in W/m².K)			
Element	**Existing fabric**	**Proposed**	**Improvement**
Walls	0.60	0.60	0%
Floor	0.69	0.69	0%
Roof	0.40	0.40	0%
Windows	3.1	1.9	39%

REDUCING THE NEED FOR ARTIFICIAL LIGHTING

The development has been designed to maximise daylight in all habitable spaces as a way of improving the health and wellbeing of its occupants.

Glazing with good light transmittance will be specified in all the habitable areas. The spaces will benefit from the existing glazing area, allowing for satisfactory daylight access where possible, this reduces the need for artificial lighting and delivers a healthy and pleasant space for the occupants.

ACTIVE DESIGN MEASURES

HIGH EFFICACY LIGHTING

The development intends to incorporate low energy lighting fittings throughout the development. All light fittings will be specified as low energy lighting, and will accommodate LED, compact fluorescent (CFLs) or fluorescent luminaires only.

HEAT RECOVERY VENTILATION

Mechanical ventilation heat recovery (MVHR) is proposed for the refurbishment of the development. The mechanical ventilation system will include heat recovery to achieve ventilation in the most energy-efficient way.

COMFORT COOLING

Air source heat pumps with high energy efficiency ratios may be used for both heating and cooling in the non-residential portions of the development, therefore the impact of active cooling in terms of energy use and carbon emissions will be minimised.

MONITORING

In addition to the above design measures, the development will incorporate monitoring equipment and systems to enable occupiers to monitor and reduce their energy use.

MINIMISING OVERHEATING

The potential risk of overheating will be mitigated by incorporating passive and active design measures, in line with the London Plan Policy SI4 and the Cooling Hierarchy, as follows.

THE COOLING HIERARCHY

MINIMISING INTERNAL HEAT GENERATION THROUGH ENERGY EFFICIENT DESIGN

The distribution of heat infrastructure within the development will be designed to reduce the lateral pipework lengths within the internal spaces to reduce heat loss.

USE OF THERMAL MASS AND HIGH CEILINGS TO MANAGE THE HEAT WITHIN THE BUILDING

During peak summer periods the thermal mass of the building will absorb and store excess heat. The building will release its heat in the cooler evenings to allow for cooler internal spaces dampening the peak diurnal weather conditions.

MECHANICAL VENTILATION

The building is being fitted with a mechanical ventilation system to serve all zones. The MVHR will be capable of operating in summer bypass mode allowing for the dissipation of any heat build-up during peak summer conditions.

OVERHEATING RISK ASSESSMENT

Please refer to the Overheating Assessment report issued by 3D Consulting Engineers for further information.

BE LEAN CO_2 EMISSIONS

At the ‘Be Lean’ stage, the proposed development has demonstrated emission reductions of 3.3% against the notional baseline with SAP10 emission factors.

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

The design and location of the refurbishment mean that connection to a DHN is not feasible and so local heating sources have been provided. No savings is achieved at this stage of the energy hierarchy.

ENERGY SYSTEM HIERARCHY

The energy system for the development has been selected in accordance with the London Plan decentralised energy hierarchy. The hierarchy listed in Policy SI3 states that energy systems should consider:

1. Connection to existing heating and cooling networks;
2. Site wide CHP network; and,
3. Communal heating and cooling.

Local heat and power sources minimise distribution losses and achieve greater efficiencies when compared to separate energy systems, thus reducing CO_2 emissions.

In a communal energy system, energy in the form of heat, cooling, and/or electricity is generated from a central source and distributed via a network of insulated pipes to surrounding residences.

CONNECTION TO AN EXISTING NETWORK

The London Heat Map identifies existing and potential opportunities for decentralised energy projects in London. It builds on the 2005 London Community Heating Development Study.

An excerpt from the London Heat Map can be seen on the following page which shows the energy demand for different areas. Darker shades of red signify areas where energy demand is high. The map also highlights any existing and proposed district heating networks within the vicinity of the development.

A review of the map shows that the site is over 600m from a proposed network, without taking into consideration navigation around buildings and across busy roads. A review of the boroughs heat mapping along with the proposed design and scale of works at the development mean that connection to a DHN is not a worthwhile option.

Figure 3: Excerpt from the London Heat Map. Existing district networks outlined in yellow, proposed networks in red.

COMMUNAL HEATING AND COOLING

A centralised air source heat pump system is being proposed for this building for both heating and cooling. The savings of which will be reported as part of the Be Green stage.

BE CLEAN CO_2 EMISSIONS

Given that it has not been found feasible or viable for the proposed development to incorporate the supply of low carbon heating and cooling, no carbon savings are achieved for this step of the Energy Hierarchy.

BE GREEN – USE RENEWABLE ENERGY

The renewable technologies feasibility study carried out for the development identified air source heat pumps as a suitable technology for the development. The regulated carbon saving achieved in this step of the Energy Hierarchy is 46.3% over the notional baseline with SAP10 emission factors.

RENEWABLE TECHNOLOGIES FEASIBILITY STUDY

Methods of generating on-site renewable energy (Green) were assessed, once Lean and Clean measures were taken into account.

The development of Lincoln's Inn Park will benefit from an energy efficient building fabric which will reduce the energy consumption of the proposed development in the first instance. No savings are assumed at the be clean stage as it was not possible to connect to a DHN or communal heat network. A range of renewable technologies were subsequently considered including:

- Biomass;
- Ground/water source heat pumps;
- Air source heat pump;
- Wind energy;
- Photovoltaic panels, and,
- Solar thermal panels.

In determining the appropriate renewable technology for the site, the following factors were considered:

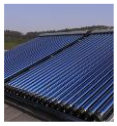
- CO_2 savings achieved;
- Site constraints;
- Any potential visual impacts.

RENEWABLE ENERGY APPRAISAL SUMMARY

The table on the next page summarises the factors considered in determining the appropriate renewable technologies for this project. This includes estimated capital cost, lifetime, level of maintenance and level of impact on external appearance. The final column indicates the feasibility of the technology in relation to the site conditions (10 being the most feasible and 0 being infeasible). It is important to note that the information provided is indicative and based upon early project stage estimates.

The feasibility study demonstrates that ASHP would be the most feasible renewable technology for the proposed Lincoln's Inn Fields development. Detailed assessment for the proposed technology can be found in the following section.

Table 2. Summary of renewable technologies feasibility study

		Comments	Lifetime	Maintenance	Impact on external appearance	Site feasibility
Biomass		Not adopted – burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location.	20 yrs.	High	High	2
PV		Not adopted – Refurbishment of existing building with pitched roof, area available for PV installation is very limited, and is overshadowed by surrounding mature trees.	25 yrs.	Low	Med	6
Solar thermal		Not adopted – Not a large enough hot water demand and not suitable for proposed heating and cooling strategy. Also, no roof area available.	25 yrs.	Low	Med	4
GSHP		Not adopted -the installation of ground loops requires significant space, as a minor refurbishment proposal, no groundwork is taking place.	20 yrs.	Med	Low	1
ASHP		**Adopted** – Providing highly efficient heating and cooling on site with no on-site combustion.	20 yrs.	Med	Med	10
Wind		Not adopted - Wind turbines located at the site will have a significant visual impact on the site and surroundings.	25 yrs.	Med	High	1

DETAILED ASSESSMENT OF AIR SOURCE HEAT PUMPS

Air source heat pumps (ASHPs) employ the same technology as ground source heat pump (GSHPs). However, instead of using heat exchangers buried in the ground, heat is extracted from the external ambient air.

The efficiency of heat pumps is very much dependent on the temperature difference between the heat source and the space required to be heated. As a result, ASHPs tend to have a lower COP than GSHPs. This is due to the varying levels of air temperature throughout the year when compared to the relatively stable ground temperature. The lower the difference between internal and external air temperature, the more efficient the system.

ASHP is considered a suitable technology for the development for the following reasons:

- It is a high efficiency system that can cater for the space heating and cooling of the most energy-intensive areas of the proposed development;
- Requires less capital cost than GSHP and other renewable technologies;
- It can be integrated with the proposed ventilation strategy; and,
- It is simple to install when compared to other renewable technologies.

The table below summarises the technical data for the proposed ASHP's and estimated CO_2 savings from the application of this technology. For this development two separate systems are to be installed, one for the ground and 1st floor, and the other for the 2nd and 3rd floor. In total, the ASHP technology would produce regulated CO_2 savings of 46.3% for the development.

Table 3: Summary of technical/operational data and estimated CO_2 savings for ASHP

ASHP for non-domestic spaces		
COP heating	3.93/4.69	
COP cooling	3.73/4.25	
Carbon intensity of electricity	0.233	$kgCO_2/kWh$
Proportion of non-domestic space heating and hot water met by ASHP	100	%
Proportion of non-domestic space cooling met by ASHP	100	%
Energy met by ASHP	62,804	kWh/yr.
Energy used by ASHP	19,747	kWh/yr.
Total CO_2 savings	8.3	t/yr.
Regulated baseline CO_2 emissions	17.9	t/yr.
Total baseline CO_2 emissions	22.2	t/yr.
% Regulated CO_2 reduction*	46.3	%
% Total CO_2 reduction*	37.4	%

* % reduction from site baseline

Figure 4: Outdoor units of ASHP

BE GREEN CO_2 EMISSIONS

Following the measures adopted at Lean stage further savings can be obtained through the incorporation of the proposed ASHP. Through the integrated performance of the proposed measures at each step in the Energy Hierarchy, the development meets the relevant London Plan and London Borough of Camden's policies.

CONCLUSIONS

Following the implementation of the three-step Energy Hierarchy, the cumulative CO_2 savings on site against the baseline notation building are estimated at 49.7% for the development with SAP10 emission factors,

ON SITE CO_2 SAVINGS

By implementing the three step Energy Hierarchy as detailed in the previous sections, the Regulated CO_2 emissions for the development have been reduced against a notional building through on site measures alone by 49.7% (8.9 tonnes/yr).

The tables in the following page summarise the implementation of the Energy Hierarchy for the proposed scheme and detail the CO_2 emissions and savings against the baseline scheme for each step of the hierarchy.

Overall, the proposed development has been designed to meet energy policies set out by the GLA and the London Borough of Camden, which demonstrates the client and the design team's commitment to enhancing sustainability of the scheme.

NON-DOMESTIC CUMULATIVE SAVINGS

Table 4: CO_2 emissions after each step of the Energy Hierarchy

	Carbon dioxide emissions (tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline	17.9	4.3
After energy demand reduction	17.3	4.3
After heat network/CHP	17.3	4.3
After renewable energy	9.0	4.3

Table 5: Regulated CO_2 savings from each stage of the Energy Hierarchy

	Regulated carbon dioxide savings	
	Tonnes CO_2 per annum	% over baseline
Savings from energy demand reduction	0.6	3.3%
Savings from heat network/CHP	0.0	0.0%
Savings from renewable energy	8.3	46.3%
Cumulative on site savings	8.9	49.7%

APPENDIX A – SBEM RESULTS

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Lincoln Inn Field SBEM Baseline

As built

Date: Thu May 19 17:17:43 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.13

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

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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, $kgCO_2/m^2.annum$	32.1
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	32.1
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	46.3
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	"BS000007_W1"
Floor	0.25	0.25	0.25	"BS000007_F"
Roof	0.25	0.18	0.18	"BS000002_C"
Windows***, roof windows, and rooflights	2.2	1.8	1.8	"BS000007_W1_O0"
Personnel doors	2.2	1.8	1.8	"BS00000E_W4_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = 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- Appendix 4 Version

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.84	2.5	-	2.2	0.7
Standard value	0.91*	N/A	N/A	1.6^	0.5
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.

1- SYST0001-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	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
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
WC	0.5	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
WC	0.5	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	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
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
WC	0.5	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Kitchen	0.5	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
WC	0.5	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	N/A
Shower	0.5	-	-	-	-	-	-	0.5	-	-	N/A
Office	-	-	-	-	-	-	-	0.5	-	-	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	
Office	51	-	-	217
Office	51	-	-	255
Office	51	-	-	533
Circulation	-	51	-	31
Cupboard	51	-	-	10
WC	-	51	-	70
Stairwell	-	51	-	41
Lift	-	51	-	26
Circulation	-	51	-	61
Office	51	-	-	218
Office	51	-	-	177
Office	51	-	-	213
Office	51	-	-	227
Office	51	-	-	204
Cupboard	51	-	-	9
Office	51	-	-	221
WC	-	51	-	70
Lift	-	51	-	23
Circulation	-	51	-	62
Office	51	-	-	218
Office	51	-	-	177
Office	51	-	-	213

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Office	51	-	-	227
Office	51	-	-	204
Cupboard	51	-	-	9
Office	51	-	-	221
WC	-	51	-	70
Stairwell	-	51	-	48
Lift	-	51	-	23
Circulation	-	51	-	62
Office	51	-	-	188
Office	51	-	-	249
Cupboard	51	-	-	7
Stairwell	-	51	-	46
Office	51	-	-	359
Office	51	-	-	306
Kitchen	-	51	-	110
Office	51	-	-	250
Office	51	-	-	252
Store	51	-	-	25
Circulation	-	51	-	73
Circulation	-	51	-	16
WC	-	51	-	56
Lift	-	51	-	23
Circulation	-	51	-	44
Office	51	-	-	241
Office	51	-	-	218
Shower	-	51	-	26
Cupboard	51	-	-	6
Circulation	-	51	-	72
Office	51	-	-	200
Stairwell	-	51	-	48
Circulation	-	51	-	19
Office	51	-	-	288

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?
Office	NO (-72.6%)	NO
Office	NO (-66.1%)	NO
Office	NO (-64.5%)	NO
Circulation	N/A	N/A
Cupboard	N/A	N/A
WC	N/A	N/A
Stairwell	N/A	N/A
Lift	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Circulation	NO (-71.6%)	NO
Office	NO (-60.6%)	NO
Office	NO (-52.6%)	NO
Office	NO (-66.4%)	NO
Office	NO (-69.2%)	NO
Office	NO (-59.3%)	NO
Cupboard	N/A	N/A
Office	NO (-54.1%)	NO
WC	N/A	N/A
Lift	N/A	N/A
Circulation	N/A	N/A
Office	NO (-60.6%)	NO
Office	NO (-52.6%)	NO
Office	NO (-66.4%)	NO
Office	NO (-69.2%)	NO
Office	NO (-59.3%)	NO
Cupboard	N/A	N/A
Office	NO (-54.1%)	NO
WC	NO (-82.4%)	NO
Stairwell	N/A	N/A
Lift	N/A	N/A
Circulation	N/A	N/A
Office	NO (-79.3%)	NO
Office	NO (-82.2%)	NO
Cupboard	N/A	N/A
Stairwell	NO (-91.2%)	NO
Office	NO (-80.4%)	NO
Office	NO (-72.7%)	NO
Kitchen	NO (-50.9%)	NO
Office	NO (-32.1%)	NO
Office	NO (-73.8%)	NO
Store	N/A	N/A
Circulation	N/A	N/A
Circulation	N/A	N/A
WC	N/A	N/A
Lift	N/A	N/A
Circulation	N/A	N/A
Office	NO (-57.5%)	NO
Office	NO (-70.9%)	NO
Shower	N/A	N/A
Cupboard	N/A	N/A
Circulation	N/A	N/A
Office	NO (-81.7%)	NO
Stairwell	N/A	N/A
Circulation	N/A	N/A
Office	NO (-77.8%)	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?	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
Area [m²]	597.6	597.6
External area [m²]	1121.2	1121.2
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	634.22	635.45
Average U-value [W/m²K]	0.57	0.57
Alpha value* [%]	16.74	20.52

* 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	71.52	26.41
Cooling	9.6	11.08
Auxiliary	28.4	18.37
Lighting	18.76	18.81
Hot water	9.78	9.03
Equipment*	30.94	30.94
TOTAL**	**138.07**	**83.69**

* 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]	268.89	221.48
Primary energy* [kWh/m²]	269.1	187.68
Total emissions [kg/m²]	46.3	32.1

* 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] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	201.4	67.5	71.5	9.6	28.4	0.78	1.95	0.84	2.6
	Notional	77.9	143.6	26.4	11.1	18.4	0.82	3.6	----	----

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	0.55	"BS000007_W1"
Floor	0.2	0.25	"BS000007_F"
Roof	0.15	0.18	"BS000002_C"
Windows, roof windows, and rooflights	1.5	1.8	"BS000007_W1_O0"
Personnel doors	1.5	1.8	"BS00000E_W4_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = 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

Lincoln Fields BRUKL Be Lean

As built

Date: Mon May 16 11:35:48 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.13

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

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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, $kgCO_2/m^2.annum$	32.1
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	32.1
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	42.3
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	0.6	0.6	"BS000007_W1"
Floor	0.25	0.69	0.69	"BS000007_F"
Roof	0.25	0.4	0.4	"BS000031_C"
Windows***, roof windows, and rooflights	2.2	1.9	1.9	"BS000007_W1_O0"
Personnel doors	2.2	3.01	3.01	"BS00000E_W4_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = 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- Be lean option Grd & 1st

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	2.5	-	1.4	0.9
Standard value	0.91*	N/A	N/A	1.6^	0.5
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- Be lean option 2nd & 3rd

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	2.5	-	1.4	0.9
Standard value	0.91*	N/A	N/A	1.6^	0.5
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.

1- SYST0002-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.84	-
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.

2- SYST0003-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.84	-
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**
Office	-	-	-	-	-	-	-	0.3	-	-	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
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Kitchen	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Shower	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	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	
Office	100	-	-	111
Office	100	-	-	130
Office	100	-	-	272
Circulation	-	100	-	16
Cupboard	100	-	-	5
WC	-	100	-	36
Stairwell	-	100	-	21
Lift	-	100	-	13
Circulation	-	100	-	31

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Office	100	-	-	111
Office	100	-	-	90
Office	100	-	-	109
Office	100	-	-	116
Office	100	-	-	104
Cupboard	100	-	-	5
Office	100	-	-	113
WC	-	100	-	36
Lift	-	100	-	12
Circulation	-	100	-	32
Kitchen	-	100	-	56
Office	100	-	-	128
Office	100	-	-	129
Store	100	-	-	13
Circulation	-	100	-	37
Circulation	-	100	-	8
WC	-	100	-	29
Office	100	-	-	123
Office	100	-	-	111
Shower	-	100	-	13
Cupboard	100	-	-	3
Circulation	-	100	-	37
Office	100	-	-	102
Stairwell	-	100	-	24
Circulation	-	100	-	10
Office	100	-	-	147
Office	100	-	-	111
Office	100	-	-	90
Office	100	-	-	109
Office	100	-	-	116
Office	100	-	-	104
Cupboard	100	-	-	5
Office	100	-	-	113
WC	-	100	-	36
Stairwell	-	100	-	24
Lift	-	100	-	12
Circulation	-	100	-	32
Office	100	-	-	96
Office	100	-	-	127
Cupboard	100	-	-	4
Stairwell	-	100	-	23
Office	100	-	-	183
Office	100	-	-	156

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Lift	-	100	-	12
Circulation	-	100	-	22

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?
Office	NO (-53.4%)	NO
Office	NO (-42.2%)	NO
Office	NO (-39.6%)	NO
Circulation	N/A	N/A
Cupboard	N/A	N/A
WC	N/A	N/A
Stairwell	N/A	N/A
Lift	N/A	N/A
Circulation	NO (-51.7%)	NO
Office	NO (-32.9%)	NO
Office	NO (-19.3%)	NO
Office	NO (-42.9%)	NO
Office	NO (-47.5%)	NO
Office	NO (-30.7%)	NO
Cupboard	N/A	N/A
Office	NO (-21.8%)	NO
WC	N/A	N/A
Lift	N/A	N/A
Circulation	N/A	N/A
Kitchen	NO (-16.5%)	NO
Office	YES (+15.7%)	NO
Office	NO (-55.4%)	NO
Store	N/A	N/A
Circulation	N/A	N/A
Circulation	N/A	N/A
WC	N/A	N/A
Office	NO (-27.7%)	NO
Office	NO (-50.5%)	NO
Shower	N/A	N/A
Cupboard	N/A	N/A
Circulation	N/A	N/A
Office	NO (-68.8%)	NO
Stairwell	N/A	N/A
Circulation	N/A	N/A
Office	NO (-62.3%)	NO
Office	NO (-32.9%)	NO
Office	NO (-19.3%)	NO
Office	NO (-42.9%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Office	NO (-47.5%)	NO
Office	NO (-30.7%)	NO
Cupboard	N/A	N/A
Office	NO (-21.8%)	NO
WC	NO (-70%)	NO
Stairwell	N/A	N/A
Lift	N/A	N/A
Circulation	N/A	N/A
Office	NO (-64.8%)	NO
Office	NO (-69.7%)	NO
Cupboard	N/A	N/A
Stairwell	NO (-85%)	NO
Office	NO (-66.7%)	NO
Office	NO (-53.5%)	NO
Lift	N/A	N/A
Circulation	N/A	N/A

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?	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
Area [m^2]	597.6	597.6
External area [m^2]	1121.2	1121.2
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	25	3
Average conductance [W/K]	809.37	635.45
Average U-value [W/m^2K]	0.72	0.57
Alpha value* [%]	13.11	20.52

* 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	78.97	26.41
Cooling	13.43	11.08
Auxiliary	22.22	18.37
Lighting	10.29	18.81
Hot water	9.29	9.03
Equipment*	30.94	30.94
TOTAL**	**134.21**	**83.69**

* 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]	325.84	221.48
Primary energy* [kWh/m^2]	245.2	187.68
Total emissions [kg/m^2]	42.3	32.1

* 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] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	237.6	99	83.1	13.3	21	0.79	2.07	0.9	2.6
	Notional	76.2	138.5	25.8	10.7	18.1	0.82	3.6	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	204	102.1	71.4	13.7	24.4	0.79	2.07	0.9	2.6
	Notional	80.9	152.9	27.4	11.8	18.9	0.82	3.6	----	----

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	0.6	"BS000007_W1"
Floor	0.2	0.69	"BS000007_F"
Roof	0.15	0.4	"BS000031_C"
Windows, roof windows, and rooflights	1.5	1.9	"BS000007_W1_O0"
Personnel doors	1.5	3.01	"BS00000E_W4_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = 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

Lincold Inn Field Be Green

As built

Date: Wed May 18 10:57:14 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.13

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

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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, $kgCO_2/m^2.annum$	31.8
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	31.8
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	33.6
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	0.6	0.6	"BS000007_W1"
Floor	0.25	0.69	0.69	"BS000007_F"
Roof	0.25	0.4	0.4	"BS000031_C"
Windows***, roof windows, and rooflights	2.2	1.9	1.9	"BS000007_W1_O0"
Personnel doors	2.2	3.01	3.01	"BS00000E_W4_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* 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- Grd&1st floor PURY P300YNW / MVHR LGH200RVX-E

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.93	3.73	-	1.4	0.9
Standard value	2.5*	N/A	N/A	1.6^	0.5
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- 2ND&3RDfloor PURY P200YNW / MVHR LGH150RVX-E (Copy)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.69	4.25	-	1.4	0.85
Standard value	2.5*	N/A	N/A	1.6^	0.5
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.

1- SYST0004-DHW

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

2- SYST0005-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	N/A	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**
Office	-	-	-	-	-	-	-	0.3	-	-	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
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Kitchen	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Shower	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
WC	0.3	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	0.4	-	-	N/A
Office	-	-	-	-	-	-	-	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	
Office	100	-	-	111
Office	100	-	-	130
Office	100	-	-	272
Circulation	-	100	-	16
Cupboard	100	-	-	5
WC	-	100	-	36
Stairwell	-	100	-	21
Lift	-	100	-	13
Circulation	-	100	-	31

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Office	100	-	-	111
Office	100	-	-	90
Office	100	-	-	109
Office	100	-	-	116
Office	100	-	-	104
Cupboard	100	-	-	5
Office	100	-	-	113
WC	-	100	-	36
Lift	-	100	-	12
Circulation	-	100	-	32
Kitchen	-	100	-	56
Office	100	-	-	128
Office	100	-	-	129
Store	100	-	-	13
Circulation	-	100	-	37
Circulation	-	100	-	8
WC	-	100	-	29
Office	100	-	-	123
Office	100	-	-	111
Shower	-	100	-	13
Cupboard	100	-	-	3
Circulation	-	100	-	37
Office	100	-	-	102
Stairwell	-	100	-	24
Circulation	-	100	-	10
Office	100	-	-	147
Office	100	-	-	111
Office	100	-	-	90
Office	100	-	-	109
Office	100	-	-	116
Office	100	-	-	104
Cupboard	100	-	-	5
Office	100	-	-	113
WC	-	100	-	36
Stairwell	-	100	-	24
Lift	-	100	-	12
Circulation	-	100	-	32
Office	100	-	-	96
Office	100	-	-	127
Cupboard	100	-	-	4
Stairwell	-	100	-	23
Office	100	-	-	183
Office	100	-	-	156

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Lift	-	100	-	12
Circulation	-	100	-	22

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?
Office	NO (-53.4%)	NO
Office	NO (-42.2%)	NO
Office	NO (-39.6%)	NO
Circulation	N/A	N/A
Cupboard	N/A	N/A
WC	N/A	N/A
Stairwell	N/A	N/A
Lift	N/A	N/A
Circulation	NO (-51.7%)	NO
Office	NO (-32.9%)	NO
Office	NO (-19.3%)	NO
Office	NO (-42.9%)	NO
Office	NO (-47.5%)	NO
Office	NO (-30.7%)	NO
Cupboard	N/A	N/A
Office	NO (-21.8%)	NO
WC	N/A	N/A
Lift	N/A	N/A
Circulation	N/A	N/A
Kitchen	NO (-16.5%)	NO
Office	YES (+15.7%)	NO
Office	NO (-55.4%)	NO
Store	N/A	N/A
Circulation	N/A	N/A
Circulation	N/A	N/A
WC	N/A	N/A
Office	NO (-27.7%)	NO
Office	NO (-50.5%)	NO
Shower	N/A	N/A
Cupboard	N/A	N/A
Circulation	N/A	N/A
Office	NO (-68.8%)	NO
Stairwell	N/A	N/A
Circulation	N/A	N/A
Office	NO (-62.3%)	NO
Office	NO (-32.9%)	NO
Office	NO (-19.3%)	NO
Office	NO (-42.9%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Office	NO (-47.5%)	NO
Office	NO (-30.7%)	NO
Cupboard	N/A	N/A
Office	NO (-21.8%)	NO
WC	NO (-70%)	NO
Stairwell	N/A	N/A
Lift	N/A	N/A
Circulation	N/A	N/A
Office	NO (-64.8%)	NO
Office	NO (-69.7%)	NO
Cupboard	N/A	N/A
Stairwell	NO (-85%)	NO
Office	NO (-66.7%)	NO
Office	NO (-53.5%)	NO
Lift	N/A	N/A
Circulation	N/A	N/A

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?	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
Area [m^2]	597.6	597.6
External area [m^2]	1121.2	1121.2
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	25	3
Average conductance [W/K]	809.37	635.45
Average U-value [W/m^2K]	0.72	0.57
Alpha value* [%]	13.11	20.52

* 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	17.09	8.9
Cooling	8.95	11.08
Auxiliary	22.25	18.37
Lighting	10.29	18.81
Hot water	7.81	9.03
Equipment*	30.94	30.94
TOTAL**	**66.38**	**66.19**

* 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]	326.4	221.48
Primary energy* [kWh/m^2]	198.7	181.02
Total emissions [kg/m^2]	33.6	31.8

* 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] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	237.6	99	18.9	9.3	21	3.49	2.97	3.93	3.73
	Notional	76.2	138.5	8.7	10.7	18.1	2.43	3.6	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	205.8	101.9	13.7	8.4	24.5	4.16	3.38	4.69	4.25
	Notional	80.9	152.9	9.2	11.8	18.9	2.43	3.6	----	----

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	0.6	"BS000007_W1"
Floor	0.2	0.69	"BS000007_F"
Roof	0.15	0.4	"BS000031_C"
Windows, roof windows, and rooflights	1.5	1.9	"BS000007_W1_O0"
Personnel doors	1.5	3.01	"BS00000E_W4_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = 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

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