120 Holborn Investment Limited Partnership

120 Holborn

Leisure Centre Energy Statement

Job No: 1005811

Doc No: 1005811-RPT-00042

Latest Revision: E

Date: 21/05/2015

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Project name	120 Holborn	**Job Number**
Report Name	Leisure Centre Energy Statement	1005811

Document Revision History

Revision Ref	**Issue Date**	**Purpose of issue / description of revision**
-	2/04/2014	Draft Issue for comment
A	03/04/2014	Updated to reflect sustainability statement
B	04/04/2014	Updated to reflect comments
C	13/05/2015	Updated to reflect new energy strategy
D	14/05/2015	Updated to reflect comments

Document Validation (latest issue)

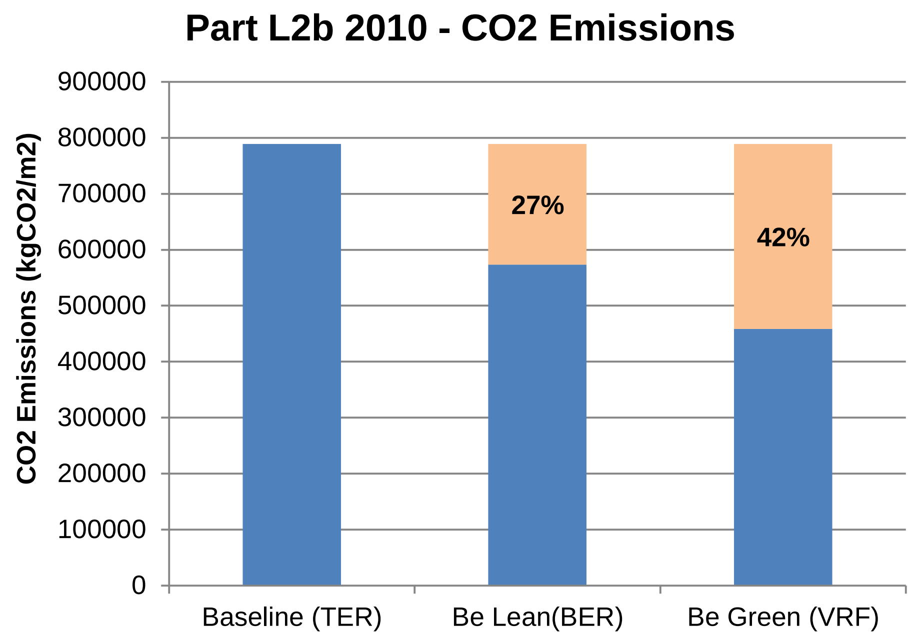
Revision	**Issue Date**	**Purpose of issue / description of revision / version**			
E	21/05/2015	Issued for Planning			
			Prepared by	Checked by	Approved by
		Name	Chris Turner	Simon Wyatt	
		Signature			

Contents

1. Executive Summary

In accordance with the London Borough of Camden's Planning requirements and the GLA's London Plan 2015 the following energy strategy has been developed for the proposed 120 Holborn leisure centre development:

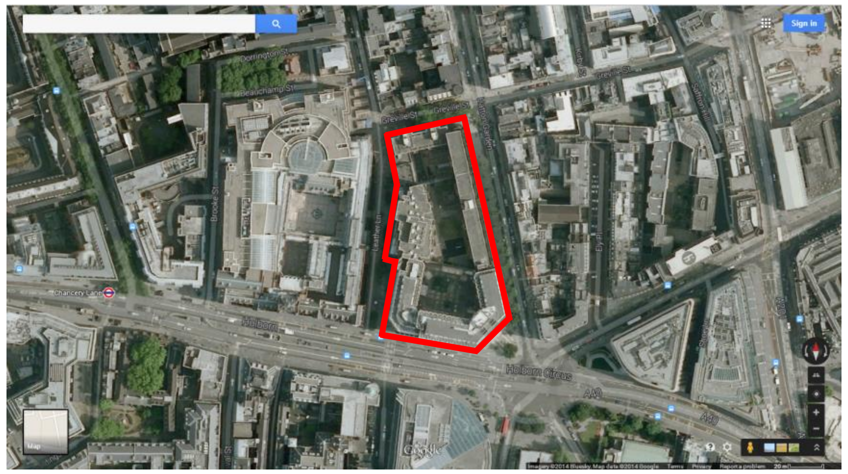
- Thermal insulation levels for all the existing building elements will be increased beyond the new build standards, thereby substantially reducing the building's heat losses;
- The leisure centre will be mechanically ventilated with heat recovery, reducing the heating demand
- High efficiency gas boilers will provide the development's DHW demand and all showers will be equipped with high efficiency waste water heat recovery units;
- Space heating will be provided by Variable Refrigerant Flow (VRF) heat pumps with high seasonal coefficients of performance;
- The same VRF heat pumps will provide cooling during summer months;
- The development will use low energy lighting with timers, dimmers and zoning controls to reduce energy consumption;
- The London heat map indicates that the Citigen district heating network is proposed to run within 100m of the development and as such during the detailed design development negotiations will be opened with Citigen regarding potential connection. Whilst there is no time scale on this district network expansion as a minimum provision for plate heat exchangers will be provided in the plant rooms. We recommend further investigation into the technical and financial feasibility of connection is undertaken at the detailed design stage;
- As part of the leisure centre plant room the feasibility of incorporating a Combined Heat & Power (CHP) has been investigated. CHP was disregarded on basis of limited electrical demand within the development;
- An extensive range of low and zero carbon technologies have been considered in terms of providing a proportion of the development's energy demand;
- Using VRF heat pumps results in a 15% reduction in the development's CO_2 emissions when the heat pumps supply all of the development's heating and cooling;
- Biomass boilers are not compatible with the development's underground location due to refuelling and local air quality issues;
- The development has limited roof space meaning that solar thermal collectors and photovoltaic panels are not viable for this site;
- Wind turbines and ground source heat pumps are not viable due to the constraints associated with being a basement development;
- The combination of the aforementioned passive design measures and air source heat pumps in the development achieving a 42% improvements over the 2010 Building Regulation standards, exceeding the 40% target as set out in Policy 5.2 of the London Plan 2015.



Carbon Offset Fund		
40% Carbon Target Offset	315486	kg
Design Offset	330193	kg
Shortfall	-14707	kg
Carbon Cost (Zero Carbon Hub)	46	£/T
Years	30	
Total Offset Cost	-20296	£

	Regulated Carbon dioxide	
	(Tonnes CO_2 pa)	(%)
Savings from Energy Demand	215.26	27%
Savings from CHP	0.00	0%
Savings from Renewable Sources	114.94	42%
Total Cumulative Savings	**330.19**	**42%**
Total Target Savings	**315.49**	40%
Annual Surplus	**14.71**	

2. Introduction



Proposed Site Location

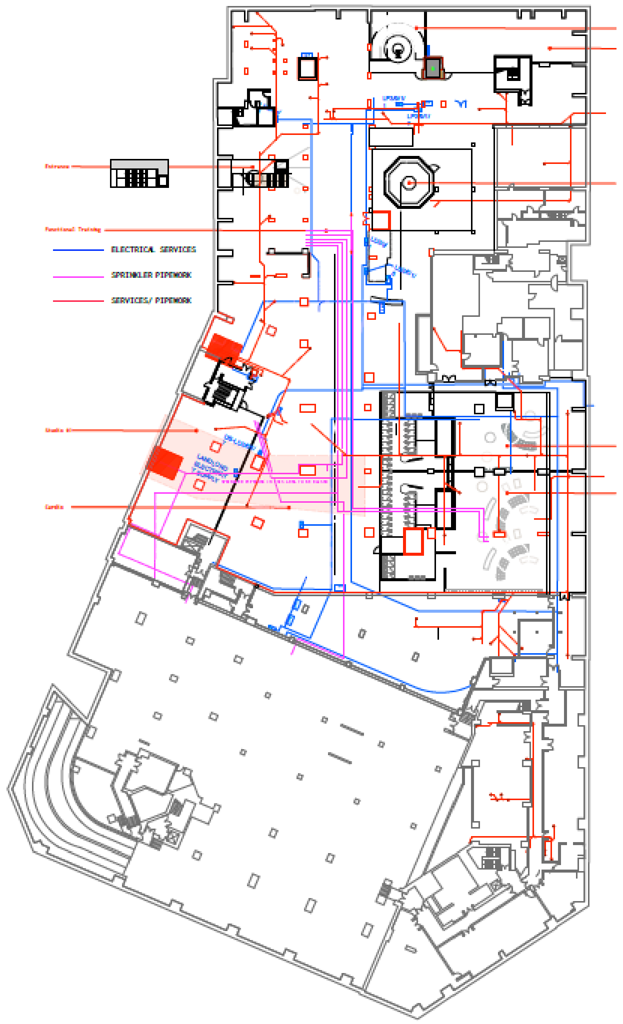


Illustration of Proposed Development

This Energy Statement has been prepared in support the application to amend the permission secured for the change of use to a gym within the basement of 120 Holborn. It aims to meet the energy and climate change requirements of the Borough of Camden and the Greater London Authority.

The format of the statement is intended to reflect and respond to the issues raised in the GLA's 'Spatial Development Strategy for Greater London' - the 'London Plan 2015'.

The principal objectives are to reduce the site's contribution to the causes of climate change by minimising the emissions of CO_2, by reducing the site's needs for energy and providing some of the requirement by renewable/sustainable means. Issues such as water, waste, biodiversity, etc. have also been addressed in the study.

The London Plan 2015 and GLA Energy Planning Guidance (September 2013) are considered to be the benchmark for local planning regulation. Together they provide a useful tool against which to undertake energy assessments.

2.1 Outline Description of Development

The proposals for the redevelopment of 120 Holborn will constitute a material change of use from B1 ancillary storage office to D2 leisure centre.

The basement development will be accessible from a street level entrance located on Leather Lane.

The site is located in central London just off the High Holborn Road within close proximity to the local shops, tube and rail stations.

The total floor size of the development is 3,962m^2.

The breakdown of area usages of the development is shown below:

Areas	m^2	%
Changing Facilities	522.0	13%
Toilets	59.9	2%
Studios	2345.9	59%
Offices	25.0	1%
Swimming Pool	0.0	0%
Plant	150.0	4%
Kitchens	0.0	0%
Stores	41.0	1%
Circulation Areas	818.2	21%
Total	**3962**	**100%**

Indicative Area Schedule

3. Planning Policy

The National Planning Policy Framework (NPPF) was published in March 2012, which states a clear presumption in favour of sustainable development. The NPPF supports the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourage the reuse of existing resources, including conversion of existing buildings, and encourages the use of renewable resources.

The NPPF replaces PPS22 and in Section 10 outlines its energy and climate change policies. Paragraph 95 states that to support the move to a low carbon future, local planning authorities should:

- Plan for new development in locations and ways which reduce greenhouse gas emissions;
- Actively support energy efficiency improvements to existing buildings; and
- When setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards.

Paragraph 96 states that in determining planning applications, local planning authorities should expect new developments to:

- comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption;
- have a positive strategy to promote energy from renewable and low carbon sources;
- consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources;
- identify opportunities where development can draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

The key focus of the NPPF is to support local and regional planning authorities. Paragraph 93 states that authorities should approve applications if its impacts are (or can be made) acceptable.

3.1 The London Plan 2015

The GLA's London Plan 2015 and Guidance on Preparing Energy Assessments September 2013 document are considered to be the benchmark for local planning regulation. Together they provide a useful tool against which to undertake energy and sustainability assessments.

The London Plan 2015 sets out a number of core policies for major developments with regards reducing CO_2 emissions and providing energy in a sustainable manner.

Policy 5.2 **-** requires that major developments achieve a 40% improvement over the 2010 Building Regulation CO2 Emission Target.

Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- Be lean: use less energy
- Be clean: supply energy efficiently
- Be green: use renewable energy

Policy 5.6 **-** requires all major developments to evaluate the feasibility of connecting to existing or proposed district heating networks and where no opportunity existing consider a site wide Combined Heat and Power (CHP) systems. Major development proposals should select energy systems in accordance with the following hierarchy:

- Connection to existing heating or cooling networks;
- Site wide CHP network;
- Communal heating and cooling.

Policy 5.7 **-** requires that all major developments seek to reduce their CO_2 emissions by at least 20% through the use of onsite renewable energy generation wherever feasible. Individual development proposals will also help to achieve these targets by applying the energy hierarchy in Policy 5.2. All renewable energy systems should be located and designed to minimise any potential adverse impacts on biodiversity, the natural environment and historical assets, and to avoid adverse impacts on air quality.

3.2 London Borough of Camden

The London Borough of Camden set out their approach to sustainable development through their Core Strategy, Development Policies and Supplementary Planning Documents (Camden Planning Guidance CPG3). Core Strategy Policy 13 sets out the overarching approach to sustainability in the borough, with the aims of mitigating and adapting to climate change, promoting local energy generation, managing water resources and reducing carbon dioxide emissions

The Development Policies provide further detail as to how the Core Strategy policies can be achieved. In this instance *"Development Policy 22 – Promoting Sustainable Design and Construction*" provides the details as to how the targets of CS13 will be meet and states:

"The council will require development to incorporate sustainable design and construction measures. Schemes must:

- Demonstrate how sustainable development principles, including relevant measures set out in paragraph 22.5 below, have been incorporated into the design and proposed implementation; and
- Incorporate green or brown roofs and green walls wherever suitable."

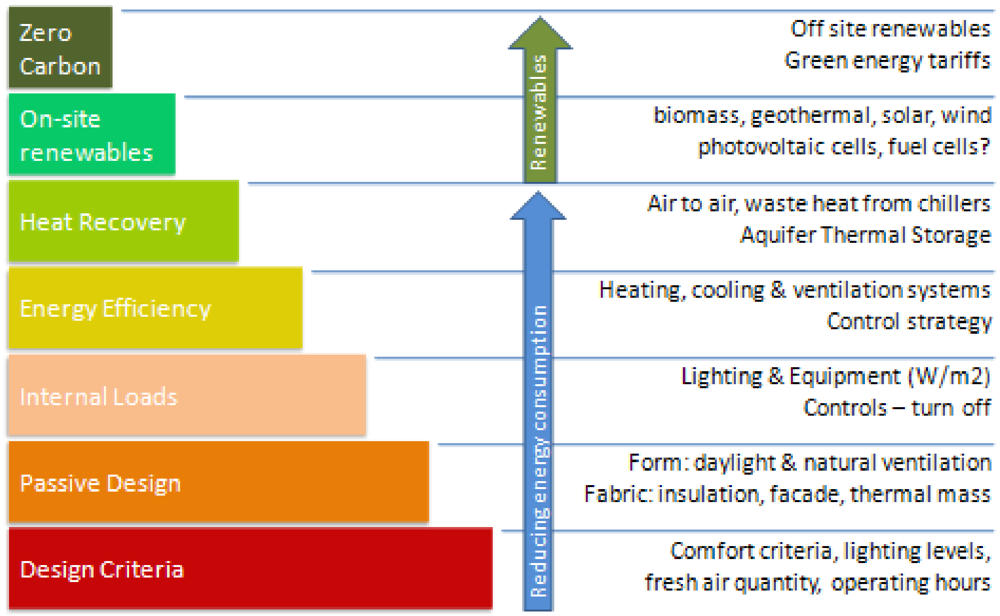
The council will promote and measure the sustainable design and construction by:

- Expecting non-domestic developments of 500sq m of floor space or above to achieve "very good" in BREEAM assessments and "excellent" from 2016 and encouraging zero carbon from 2019.

The council will require developments to be resilient to climate change by ensuring scheme include appropriate climate change adaption measures, such as:

- Summer shading and planting;
- Limiting run-off;
- Reducing water consumption;
- Reducing air pollution;
- No locating vulnerable uses in basements in floor-prone areas.

In addition to this policy, the Supplementary Planning Document *"Camden Planning Guidance 3 – Sustainability"* provides greater detail on the targets for developments and the approach that should be adopted in meeting these targets.



Cundall's Steps to Low Carbon

4. Energy Strategy

The application proposes the change of use of the existing 120 Holborn building from basement B1 ancillary storage office to D2 sports centre (leisure centre). The new development will follow the Borough of Camden's Sustainability guidance for the energy strategy.

The designs of the proposed leisure centre has been developed to reduce the annual energy consumption, whilst providing energy in the most environmentally friendly way to reduce the annual CO_2 footprint. In order to achieve this, Cundall's "Steps to Low Carbon" methodology has been applied.

4.1 Passive Design

Substantial reductions in energy usage for the scheme will be achieved through consideration of the passive elements of the design, together with improved occupancy comfort. The aim for the design of the proposed development is to optimise the passive building elements, where practical and hence reduce the energy consumption associated with the mechanical systems, whilst maintaining a balance between a range of requirements and accounting for factors such as site constraints and acoustic considerations.

The unusual location of the development means that factors such as solar gain and heat loss through glazing are not applicable to the leisure centre.

4.2 Building Envelope

The existing basement office building is being converted into a new leisure centre and the existing building envelope will be thermally enhanced. This will include new internal dry lining to the basement walls, increased insulation levels to the basement roof and floor that is enhanced beyond the Building Regulation standards.

All retained and new thermal elements will therefore be specified to achieve the following area weighted U-values to reduce the heat losses though the building's fabric:

Detail	Design
Basement floor average area weighted U-value	0.20W/m^{2}K
Basement wall average area weighted U-value	0.25W/m^{2}K
Roof average area weighted U-value	0.18W/m^{2}K
Air permeability @ 50 Pascals	5m^3/hr/m^3

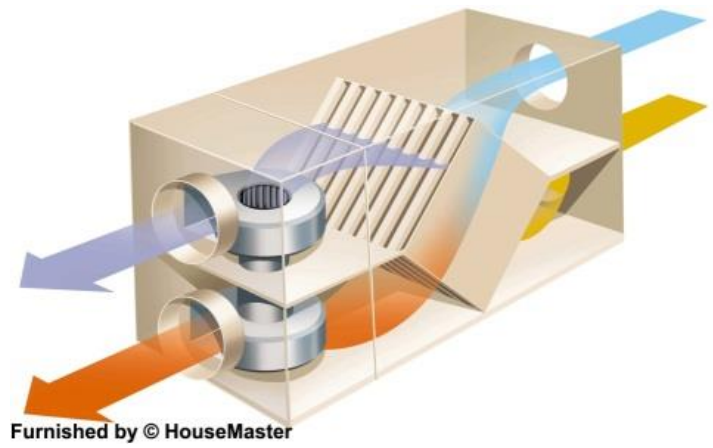
Building Fabric Performance

4.3 Air Permeability

Although not required by Building Regulations, an air pressure test is being considered for the development in order to determine their air leakage rates and take any remedial actions to improve it. An air leakage rate of 5m^3/hr/m^2 at 50Pa will be targeted for the development.

4.4 Ventilation- Mechanical Ventilation with Heat Recovery

All elements of the development will be mechanically ventilated with heat recovery (MVHR), substantially reducing the heating requirements.



The proposed MVHR units will provide all of the fresh air for the development whilst reducing the space heating load by pre-warming incoming air. Units with low specific fan powers will be selected to reduce the auxiliary energy consumption of the development.

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4.5 Energy Efficient Systems & Appliances

After assessing the contribution of the passive elements to the overall energy balance, the aim is to further reduce CO_2 emissions by selecting efficient mechanical and electrical systems and efficient controls to manage the energy used during operation.

The leisure centre is to be delivered as a shell and core development, therefore the following good practice design parameters are recommended to the fit out team and have been used in the assessment in order to reduce the CO_2 emissions of the development.

4.6 Low-Energy Lighting

To reduce the energy consumption associated with artificial lighting, 100% of all internal lighting fittings in all areas will be dedicated energy efficient light fittings*:

Due to an absence of natural light in the development, choosing energy efficient lightings is essential in reducing the energy consumption of the development, as the lights will be in constant use during building operating hours.

** Fittings that comprise the lamp, base, control gear, and an appropriate housing, reflector, shade or diffuser. The fitting must be dedicated in that it must be capable of only accepting lamps having a luminous efficacy greater than 40 lumens per circuit Watt. The fixing must be permanently fixed to the ceiling or wall.*

4.7 HVAC Plant Efficiencies

The design team will specify plant that meets or exceeded the minimum requirements of the domestic HVAC guide. It provides guidance on the means of complying with the requirements of Part L2B of the Building Regulations for conventional space heating systems, hot water systems and ventilation systems.

4.8 Variable Speed Pumps and Drives

All fans and pumps will be specified with variable-speed drives, which will reduce their energy consumption by more than two-thirds compared with equivalent non variable speed alternatives, by only supplying the required flow rate to meet the demand.

4.9 Controls

The heating/cooling systems shall be appropriately zoned, with local fast responding thermostatic controls. Appropriate lighting controls, including timers, occupancy controls and dimming shall be specified where applicable for all internal lighting.

4.10 Energy metering

Separate metering of the energy uses within the development will help the building users identify areas of increased consumption and highlight potential energy-saving measures for the future, hence reducing the associated annual CO_2 emissions from these systems.

All gas/heat and electrical supplies will be metered using smart meters to enable building users to be responsible for their own consumption and hence CO_2 emissions. There will be a central display area for building users and utility companies to view the meter readings.

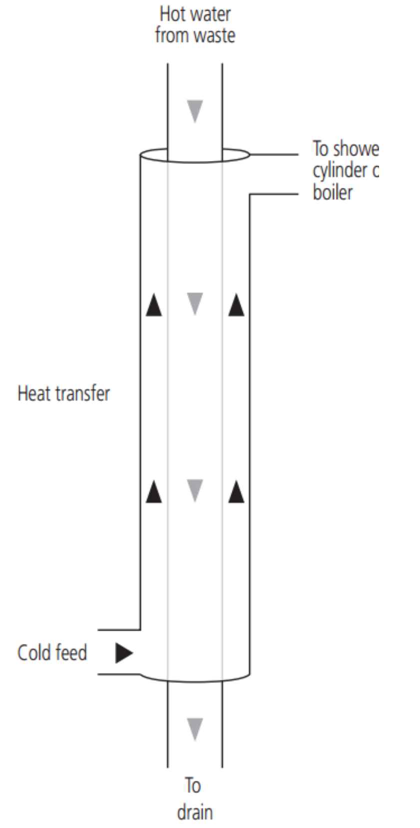
4.11 Energy Efficient Gym Equipment

Modern gym equipment can consume a large amount of energy. We recommend that energy efficient gym equipment is chosen with low energy consumption or energy generation incorporated.

Many manufacturers now offer cardio equipment whereby the user generates the electricity needed to run the machine through their exertions.

4.12 Waste Water Heat Recovery

As a large proportion of the development's heating demand is due to the requirements of the showers, waste water heat recovery on the showers is proposed to capture some of the energy that would otherwise be lost down the drain. These devices utilise the temperature of waste water (usually around 40ºC) to pre-warm the incoming cold feed to the source of heating, reducing the load on the source.



Typical detail of waste water heat recovery

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5. Estimated Annual Energy Consumption

In accordance with the London Borough of Camden's and the Mayor's Energy Hierarchy the estimated energy consumption for the development has been based on the National Calculation Methodology (NCM).

The preliminary energy assessment has been carried out using the approved dynamic simulation software IES Virtual Environment 2014, even though material change of use are not required to carry out an assessment or meet any targets under Part L2b of the 2010 Building Regulations.

The results have been compared against a baseline case, with minimum fabric standards and plant efficiencies and the proposed scheme with the aforementioned passive and energy efficient measures. The Fixed Building Services Inputs outlines the design parameters used in the base case and proposed models.

The analysis indicates that the leisure centre is likely to perform significantly better than the than base case, achieving an improvement of **27%.**

Building Fabric Performance

Detail	Base Case	Design
Basement floor average area weighted U-value	0.22W/m^{2}K	0.20W/m^{2}K
Basement wall average area weighted U-value	0.28W/m^{2}K	0.25W/m^{2}K
Roof average area weighted U-value	0.18W/m^{2}K	0.18W/m^{2}K
Air permeability @ 50 Pascals	25m^3/hr/m^3	5m^3/hr/m^3

Building Fabric Performance

Fixed Building Services

Detail	Base Case	Design
LTHW boiler gross seasonal efficiency	84.0%	95.0%
DHW boiler gross seasonal efficiency	84.0%	95.0%
LTHW distribution delivery efficiency	91.0%	91.0%
DHW distribution delivery efficiency	80.0%	90.0%
AHU Specific Fan Power general SFP (W/l/s)	2.5	1.8
AHU heat recovery sensible efficiency	65%	80%
Terminal fan SFP (W/l/s)	0.6	-
Chiller Cooling SEER	2.5	4.0
VRF Heating SCoP	-	-
Storage Volume of DHW (L)	1000	1000
Storage Losses from Cylinder (kWh/(l.day))	0.0047	0.0027
General Lighting efficacy (lumen/circuit watt)	55	75
Parasitic Power of Lighting Controls	0.3	0.1
Whole site electrical power factor	<0.9	0.9-0.94
Full BEMS system with the ability to draw attention to HVAC 'out of range' values		
All fans & pumps will be variable speed with multiple pressure sensors		
Manual On/Auto Off Controls in Office, Plant Room	No	Yes

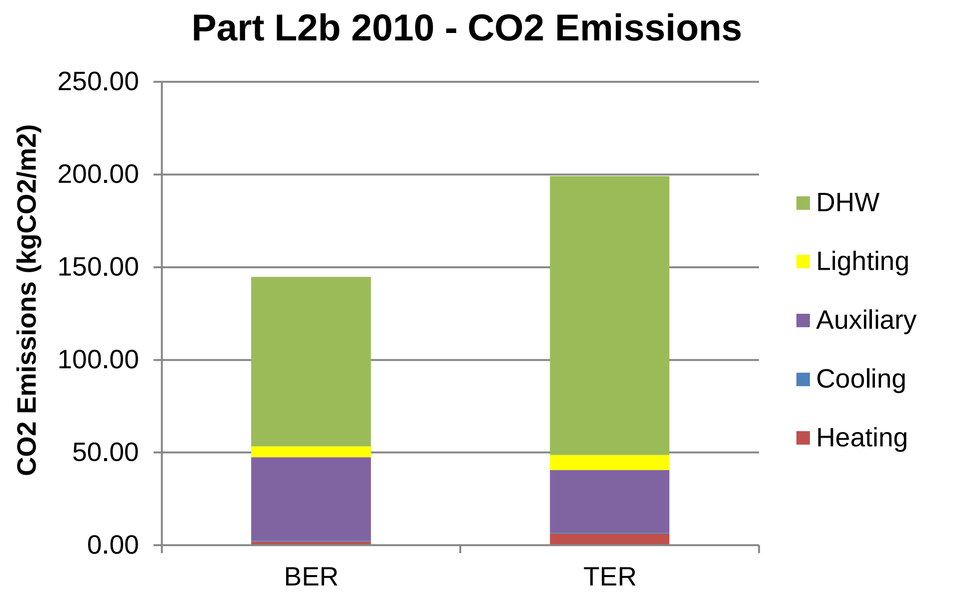
Fixed Building Services

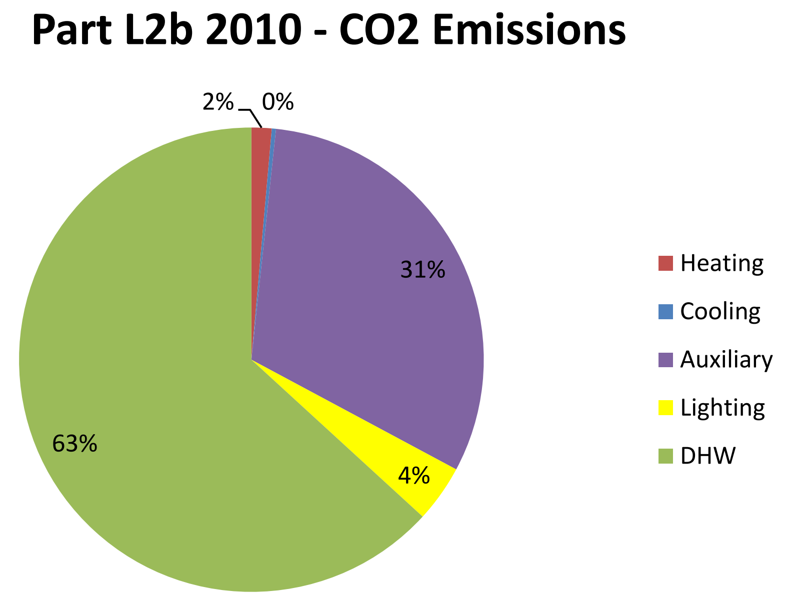
Part L2b 2010 Results

System	CO_2 Emissions (kgCO_2/m^2)	
	BER	TER
Heating	2.03	6.48
Cooling	0.42	0.64
Auxiliary	45.07	33.52
Lighting	5.76	8.00
DHW	91.46	150.43
Renewables	-	-
Total (kgCO2/m²)	**144.7**	**199.1**

Part L2b 2010 CO_2 Emissions Results	
TER	**199.1**
BER	**144.7**
Pass Rate	**27.3%**
Status	**PASS**

Be Lean Energy Efficient Systems Results

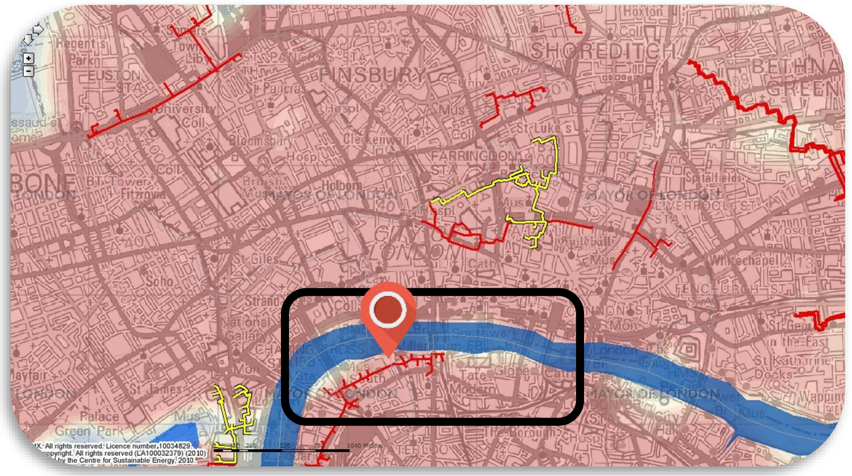




6. Decentralised Energy Networks

The feasibility of connecting to an existing or proposed district network has been investigated for the site in accordance with Policy 5.6 of the London Plan 2015.

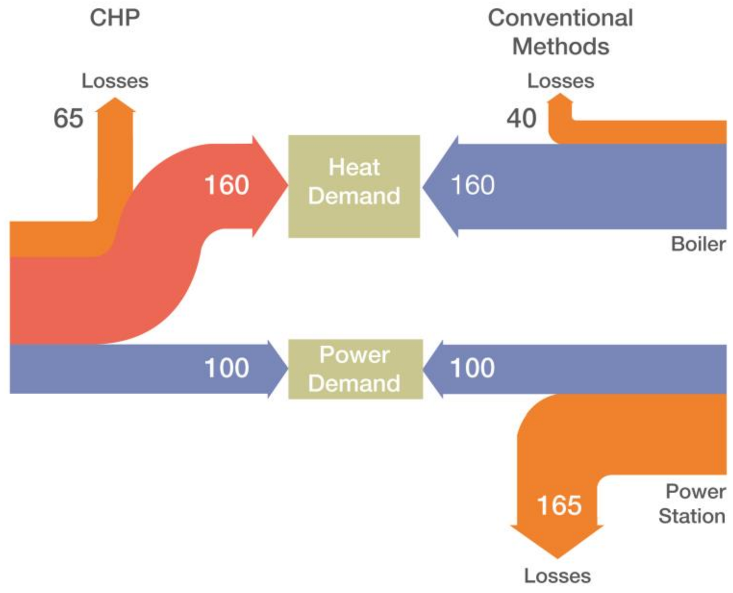
The London Heat Map indicates that there are no current networks with a feasible connection distance to the site. There is however potential for the Citigen network to expand to the opposite side of the Holborn Circus roundabout, a distance of around 256m. To future proof the development to connect to any potential network, we recommend that as a minimum provision to install plate heat exchangers at a later date are included within the plant room.



District Heating Networks in Proximity to the site (yellow = installed, red = potential)

7. Combined Heat & Power (CHP)

In accordance with the Decentralised Energy Hierarchy in Policy 5.6 the feasibility of a site wide CHP network has been investigated. It is proposed that a CHP unit could provide the base heating load of the development, supplemented by high efficiency gas boilers. The high DHW demand of the development means that a CHP could be well suited for this application. The following analysis is recommended to inform the decisions of the fit out team for the shell and core leisure centre development.



CHP Efficiency Diagram

In the original application a CHP engine was proposed to meet the DHW and swimming pool heating load, however the proposed design on longer includes a pool and hence a CHP engine is on longer viable.

Furthermore, CHP units generate higher amounts of NOx than equivalent gas boilers. For these reasons, CHP has not been considered for this development.

8. Low and Zero Carbon Energy Sources

The following technologies have been investigated to determine the feasibility of delivering a reduction in the CO_2 emissions through renewables. The feasibility of each of the energy sources listed has been assessed with regard to the potential contribution each could make to supply a proportion of the development's delivered energy requirement, whilst considering the technical, planning, land use and financial issues.

8.1 ASHP (Air Source Heat Pump)

Air source heat pumps exchange heat between the outside air and a building to provide space heating in winter and cooling in the summer months. The efficiency of these systems are inherently linked to the ambient air temperatures.

Heat pumps supply more energy than they consume, by extracting heat from their surroundings. Heat pumps can supply as much as 3kW of heat output for just 1kW of electrical energy input. They can also be used to provide cooling.

They are most efficient when they work at lower temperatures, typically around 40^{o}C. The proposed development will use variable refrigerant flow (VRF) heat pumps to deliver both heating and cooling to the development.

The advantage of variable refrigerant flow is that it can deliver simultaneous heating and cooling, and send either heat or coolth around the development, increasing the seasonal efficiency of both the heat and cooling delivery.

The proposed development will retain the high efficiency gas boilers in conjunction with waste water heat recovery to deliver effective domestic hot water. Space will be provided by the estate for the external VRF units.

Replacing the proposed gas boilers and chillers with a VRF heat pump system could result in a 15% reduction in CO_2 emissions. This technology is the preferred solution for the 120 Holborn development.

8.2 GSHP (Ground Source Heat Pumps)

As this is an existing building on a constrained site it not feasible to drill new boreholes under the site. As no major excavations are planned neither vertical piles nor horizontal trenches are considered viable for this site. Furthermore the site has a relatively small cooling requirement compared to the heating requirement that would result in the ground warming up over time.

8.3 Wind Turbines

The output from wind turbines are highly sensitive to wind speed. Hence it is essential that turbines should be sited away from obstructions, with a clear exposure or fetch for the prevailing wind.

The urban location of the site coupled with the adjacent buildings will result in a turbulent flow regime across the site. As such it is not proposed to include wind turbines as part of the development.

8.4 Photovoltaics

Photovoltaic solar cells convert solar energy directly into electricity. The cells consist of two layers of silicon with a chemical layer between. The incoming solar energy charges the electrons held within the chemical. The energised electrons move through the cell into a wire creating an electrical current.

The proposal's subterranean location with a lack of roof space for photovoltaic panels means this technology is not viable for the site.

8.5 Solar Thermal

Solar thermal collectors utilises solar radiation to heat water for use in water heating of a building. The optimum orientation for a solar collector in the UK is a south facing surface, tilted at an angle of 30º from the horizontal.

Solar collectors are typically designed to meet a development's base heat load, associated with its domestic hot water requirements. For leisure centre development these usually equates to 60-70% of the total DHW annual load, with the natural gas-fired boilers meeting the remainder of the load.

However, as previously stated the underground location of the development means there is not sufficient roof space for solar collectors. Furthermore, they would compete with the CHP system for the base heat load, making solar thermal unviable for this development.

8.5.1 Biomass Heating

Biomass in the form of logs, wood chips and wood pellets are classified as a renewable source of energy due to the fact that the carbon dioxide emitted when the biomass is burned has been taken out of the atmosphere by the growing plants. Even allowing for emissions of carbon dioxide in planting, harvesting, processing and transporting the fuel they will typically reduce net CO_2 emissions by over 90%.

In accordance with the London Plan's energy hierarchy a central energy centre is already proposed for the leisure centre development. The CHP will provide the development's base heat load and hence the feasibility of installing a base load biomass boiler has not be considered viable, as it would compete with the CHP scheme.

In addition, the development is in an Air Quality Management Area and a biomass boiler would increase the local CO_2, NOx, SOx and PM10 particles emissions.

Biomass boilers also have issues with the noise, congestion and local pollution issues related to the delivery of solid fuels to a busy urban location.

9. Proposed Energy Strategy

In accordance with the Mayor's Energy Hierarchy and the Borough of Camden's policy, the estimated energy consumption for the development has been based on the National Calculation Methodology (NCM) calculated with the approved software IES Virtual Environment 2014 against Part L2b of the 2010 Building Regulations.

Energy Strategy

The leisure centre will be well insulated ensuring heat losses are kept to a minimum with enhanced fabric U-values in both the retained fabric and improved detailing will contribute to making the development significantly more air tight.

Mechanical ventilation with heat recovery will be used to recover as much useful heat from the air as possible, reducing the heating demand whilst providing all fresh air into the basement.

Variable speed pumps and fans will reduce the auxiliary energy associated with the low temperature hot water and air in the development.

The combination of passive and energy efficiency systems result in the leisure centre achieving an area weighted improvement of **27%** over the baseline Building Regulations standard, based upon a high efficiency gas boiler and chiller arrangement providing heating and cooling.

Renewable Energy Strategy

The feasibility of connecting to an existing or proposed district network has been investigated for the site in accordance with Policy 5.6 of the London Plan 2015. The London heat map indicates that the proposed Citigen scheme will introduce a district heating network that will runs to the opposite side of Holborn Circus and it is proposed that the financial and technical feasibility of connection is explored in the detailed design stage. We recommend that space for plate heat exchangers is provided as a minimum.

As part of the leisure centre energy centre design the feasibility of incorporating a Combined Heat & Power (CHP) has been investigated. The development's limited electrical demand would result in electricity being exported offsite, reducing the effectiveness of the CHP unit and minimising the carbon reduction possible using the system. Therefore, CHP has not been considered for this development.

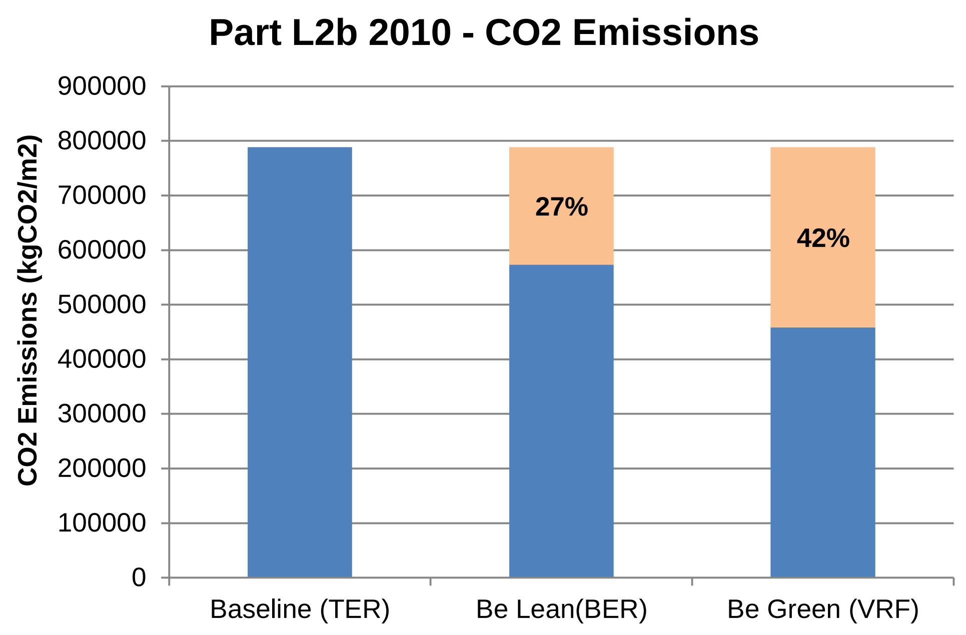
The potential of using low and zero carbon technologies was investigated under Policy 5.7 of the London Plan 2015.

Replacing the gas boiler and chiller arrangement with a high efficiency VRF heat pump system, providing the development's heating and cooling could potentially reduce the development's CO_2 emissions by a further 15% across the site. This strategy would retain the gas boilers and waste water heat recovery for the domestic hot water.

The development's underground siting rules out ground source heat pumps, solar thermal collectors and photovoltaic panels on spatial constraints, with limited opportunity for boring under the existing slab and very limited roof space with solar coverage.

Biomass boilers were deemed unviable on the basis of the difficulty of refuelling an underground boiler combined with concerns over local air quality.

Therefore, the combination of aforementioned passive design measures, energy efficient systems and services together with the VRF heat pump solution to deliver heating and cooling could potentially result in a site-wide CO_2 emissions reduction of **42%**. This therefore complies with Policy 5.2 of the London Plan 2015.



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