ENERGY & SUSTAINABILITY STATEMENT

160-161 Drury Lane, London, WC2B 5PN

KUT LLP
First Floor
2E Berol House
25 Ashley Road
London N17 9LJ

ASSESSMENT INFORMATION

Prepared by:
Ondrej Gajdos,
KUT LLP

Date:
09 April 2019

DISCLAIMER

The findings, conclusions and recommendations of this report are based on the information supplied. KUT LLP disclaims responsibility in respect of incorrect information imparted to them or for the actual performance of any of the building services installations.
This Report is prepared for the use of 160-161 Drury Lane; a duty of care is not owed to other parties.

CONTENT

EXECUTIVE SUMMARY

160-161 Drury Lane, London, WC2B 5PN

ABOUT THE ENERGY STATEMENT

KUT LLP have been appointed to provide an Energy and Sustainability Statement for the proposed development at 160-161 Drury Lane

This statement covers possible active and passive measures including renewable energy sources to make this development sustainable and environmentally friendly.

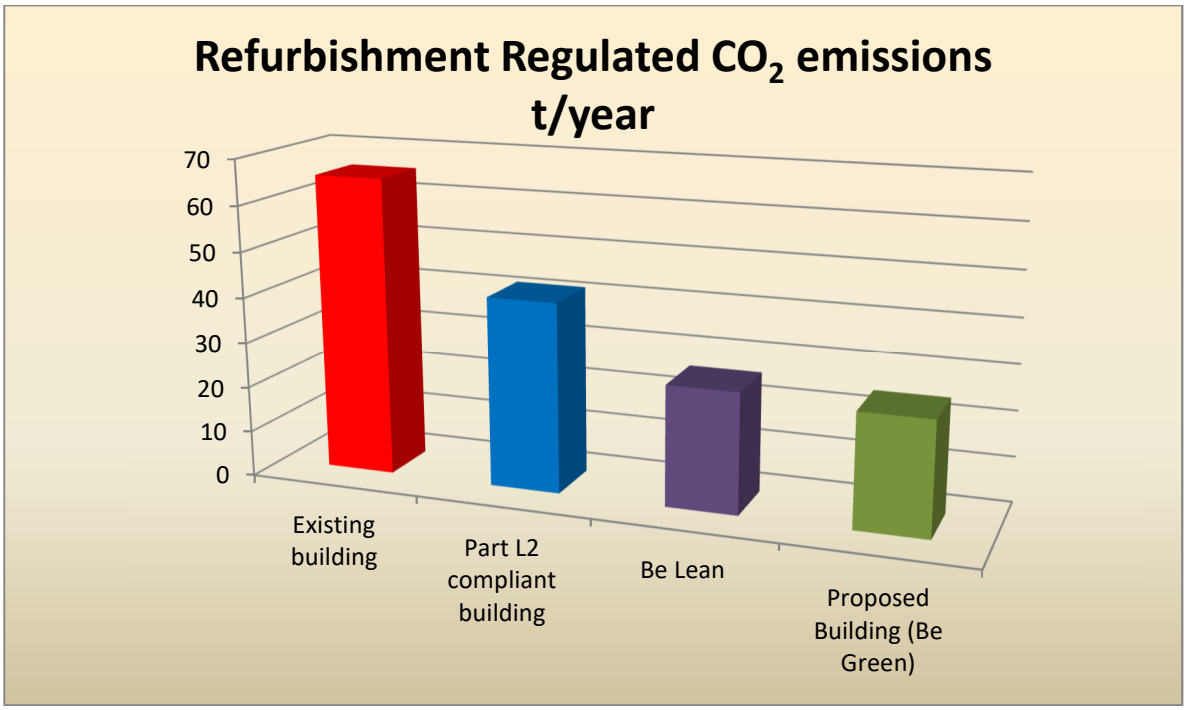
Baseline and all estimated energy consumptions have been calculated using full SBEM 2015 assessment of the development in accordance with Part L procedures.

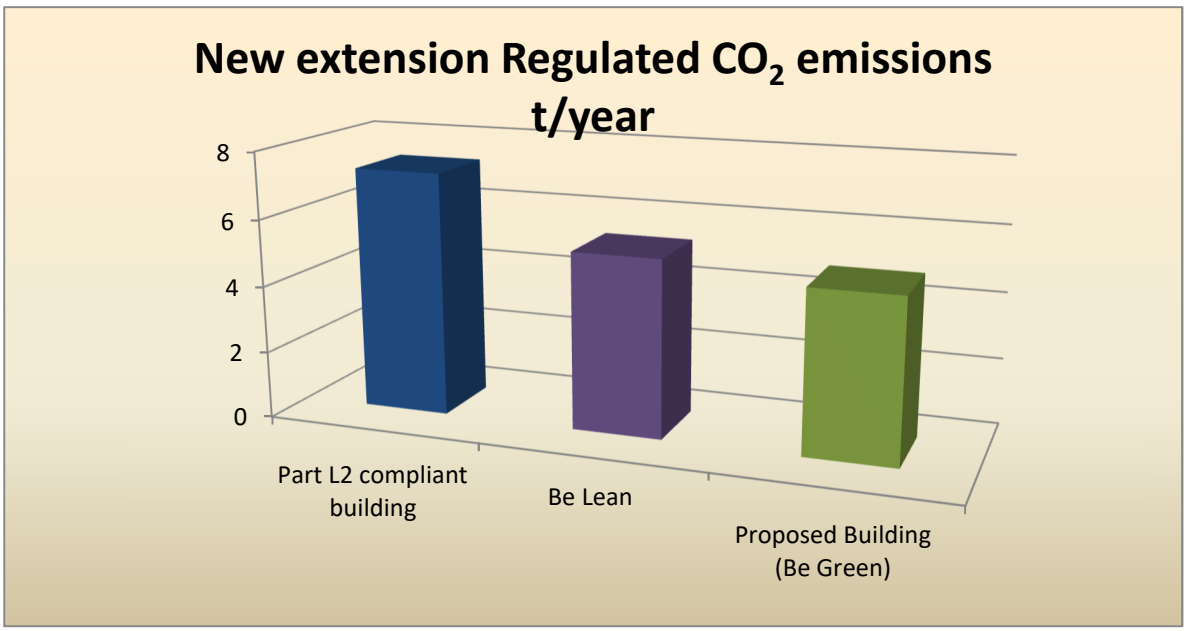
The proposed development will achieve a 41.6% overall regulated CO2 reduction against 2013 Part L2B compliant baseline and 54.5% reduction against the existing building. The extension alone will achieve a 33.5% reduction in regulated CO2 emissions against 2013 Part L2A.

This energy statement has been prepared in line with Camden Planning Guidance (CPG) 'Energy efficiency and adaptation' (March 2019).

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

	New build commercial		Commercial Refurbishment		Overall area weighted reductions		
	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	Total tCO2	% reduction at each stage	% reduction against existing
Existing	-	-	65.50		65.50		
2013 Part L Compliant	7.31	-	41.80	36.2%	49.11	25.0%	25.0%
Be Lean	5.31	27.3%	26.38	36.9%	31.69	35.5%	51.6%
Be Clean	5.31	0.0%	26.38	0.0%	31.69	0.0%	51.6%
Be Green	4.87	8.4%	24.92	5.5%	29.79	6.0%	54.5%





The table below shows the specification for each stage of the energy hierarchy:

Table 3: SBEM calculation specification for each stage of the energy hierarchy

Specification	Existing building	Notional Baseline (Part L2B compliant)	Energy Demand Reduction (Be Lean)	Proposed Development (Be Green)
Existing External Wall U-value	1.61	1.61	1.61	1.61
Newly constructed External Wall U-value		0.28	0.25	0.25
Ground Floor U-value	0.25	0.25	0.25	0.25
Roof U-value	2.30	0.18	0.18	0.18
Windows U-value	3.9 (existing double glazed)	3.9 (existing double glazed)	1.50	1.50
Display Windows U-value	5.0 (single)	5.0 (single)	1.50	1.50
Air Permeability - newly constructed	-	5	5	5
Space Heating System	Existing VRF system, assumed heating SCoP 3.0	Existing VRF system, assumed heating SCoP 3.0	Existing VRF system, assumed heating SCoP 3.0	New VRF system with seasonal SCoP of 5.0 e.g. Mitsubishi Y-series
Space Cooling System	Existing VRF system, assumed cooling SEER 4.0	Existing VRF system, assumed cooling SEER 4.0	New VRF system with seasonal SEER of 7.0 e.g. Mitsubishi Y-series	New VRF system with seasonal SEER of 7.0 e.g. Mitsubishi Y-series
DHW System	Instantenous electric water heaters	Instantenous electric water heaters	Instantenous electric water heaters	Instantenous electric water heaters
Ventilation System	Mechanical suply and extract without heat recovery	MVHR with SFP of 1.2 W/l.s and 70% heat recovery efficiency	MVHR with SFP of 1.0 W/l.s and 80% heat recovery efficiency	MVHR with SFP of 1.0 W/l.s and 80% heat recovery efficiency
Lighting	Standard fluorescent lighting	Luminaire efficacy 70 lm/cW, manual control, separate metering of electricity for lighting	Luminaire efficacy 100 lm/cW, constant illuminance photoelectric control in offices, presence sensors in all areas, separate metering of electricity for lighting with 'out of range' alarm	Luminaire efficacy 100 lm/cW, constant illuminance photoelectric control in offices, presence sensors in all areas, separate metering of electricity for lighting with 'out of range' alarm
% Improvement in CO2 over existing building	**0.0%**	**22.1%**	**51.7%**	**54.5%**

Except for the new air source heat pump VRF system for space heating and cooling, there are no other renewable systems proposed in the building.

Table 4: SBEM result summary of the proposed development

Non-Residential			Energy Consumption Breakdown						SBEM 2015	% Improvement over notional
	Description	Floor area (m2)	Space Heating (Main) (kWh/an)	DHW (kWh/an)	Cooling (kWh/an)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	BER (kgCO2/a.m2)	
	Refurb	1257.8	4,203	16,941	6,630	14,450	5,795	59,433	**19.81**	**40.4%**
	New	366.41	1,291	919	2,332	3,378	1,460	13,874	**13.28**	**33.4%**
Total / Average		1624.21	**5,494**	**17,860**	**8,961**	**17,828**	**7,255**	**73,307**	**18.34**	**39.3%**

The proposed development will achieve a 41.6% overall regulated CO2 reduction against 2013 Part L2B compliant baseline, 54.5% reduction against existing building and 5.9% reduction by renewable sources (air source heat pumps)
The extension alone will achieve a 33.5% reduction in regulated CO2 emissions against 2013 Part L2A.

INTRODUCTION

BACKGROUND

KUT LLP have been appointed to provide an Energy Statement for the proposed development. Planning permission is sought for:

- Reconfiguration of ground floor to provide a consistent architectural approach
- Minor internal reconfiguration and refurbishment of 3 typical levels from level 1 to level 3
- Demolition and re-clad of existing level 4, in the same style as levels 1 to 3
- Addition of a typical storey in the same style as levels 1 to 3
- Addition of new accommodation within a mansard roof

This statement covers possible active and passive measures including renewable energy sources to make this development sustainable and environmentally friendly.

DESCRIPTION OF THE SITE

The site is located in the Seven Dials (Covent Garden) Conservation Area, in the London Borough of Camden (LBC). Drury Lane also forms the boundary to the Covent Garden Conservation Area, in the City of Westminster.

The existing building comprises basement, ground plus four storeys; three masonry upper floors and a panel-clad fourth floor. The existing building has a mixed-use ground floor comprising two retail units, a stand alone office unit and ancillary office space serving as an entrance lobby to the upper floors.

The proposals include providing two additional storeys of office space and reconfiguration of the ground floor to introduce a flexible retail and restaurant use at ground floor.

NATIONAL POLICY

DCLG sets out basis for local policies in section 14 of National Planning Policy Framework. It requires new development to be planned in ways that can help to reduce greenhouse gas emissions, such as through its location, orientation and design. To help increase the use and supply of renewable and low carbon energy and heat, plans are encouraged to:
a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

THE LONDON PLAN

The London Plan is the name given to the Mayor's spatial development strategy. The current version of London Plan was published in 2011 with Further Alterations to the London Plan published in March 2015. The aim is to develop London as an exemplary sustainable world city, based on three interwoven themes.

- Strong, diverse long term economic growth
- Social inclusivity to give all Londoners the opportunity to share in London's future success
- Fundamental improvements in London's environment and use of resources.

Specific requirements on development sustainability are set out in the following policies:

POLICY 5.2 MINIMISING CO2 EMISSIONS

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

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

POLICY 5.6 – DECENTRALISED ENERGY IN DEVELOPMENT PROPOSALS

Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites. Major development proposals should select energy systems in accordance with the following hierarchy:

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

Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.

CAMDEN LOCAL PLAN 2017

POLICY CC1 CLIMATE CHANGE MITIGATION

All development is required to minimise the effects of climate change and encouraged to meet the highest feasible environmental standards that are financially viable during construction and occupation.

POLICY CC2 ADAPTING TO CLIMATE CHANGE

All development should adopt appropriate climate change adaptation measures such as:

a. the protection of existing green spaces and promoting new appropriate green infrastructure;

b. not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;

c. incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and

d. measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy

BUILDING REGULATIONS 2013 PART L2B

Part L2B sets out the following criteria for energy efficiency in newly constructed extensions and conversions in non-residential buildings:

- U-values of thermal elements need to be lower than threshold values
- Efficiencies of fixed services (heating, cooling, lighting, ventilation and DHW) has to be follow the requirements of Non-domestic Building Services Compliance Guide

Existing Building energy consumption & CO2 emissions

160-161 Drury Lane, London, WC2B 5PN

Energy assessment using SBEM 2015 has been carried out on the existing building using. The specification is set out in Table 3 above.
As a result of the baseline energy calculation, the following values of energy and CO_2 emissions have been obtained. SAP 2012 carbon emission factors have been used for the CO_2 emissions calculation.

Non-Residential	Energy Consumption Breakdown						SBEM 2015
Floor area (m2)	Space Heating (Main) (kWh/an)	DHW (kWh/an)	Cooling (kWh/an)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	BER
1257.85	32,268	6,944	19,212	60,339	7,438	43,820	**52.07**

Passive design measures and measures improving energy efficiency of building services described in Table 3 have been applied to the SBEM model to show how the overall CO2 emissions are reduced by bringing the whole building to Part L2B standards, in spite of increasing the floor area.

Non-Residential			Energy Consumption Breakdown						SBEM 2015
	Description	Floor area (m2)	Space Heating (Main) (kWh/an)	DHW (kWh/an)	Cooling (kWh/an)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	BER (kgCO2/a.m2)
	Refurb	1257.8	12,760	16,941	14,650	29,241	6,954	59,433	**33.24**
	New	366.41	2,179	1,063	4,142	6,454	1,002	13,874	**19.95**
Total / Average		1624.2	**14,939**	**18,004**	**18,792**	**35,695**	**7,956**	**73,307**	**30.24**

OVERHEATING AND COOLING

Overheating assessment is included as part of SBEM assessment of the proposed building. It has been ascertained, that compliance with Part L overheating criteria is achieved using specification in table 3.

As the next stage in the energy hierarchy, energy efficiency measures beyond Part L2B are implemented in the building design. This scenario uses the same heating system as the existing and Part L2B compliant baseline.
However, a significant improvement against Part L2B compliant notional baseline is achieved by:

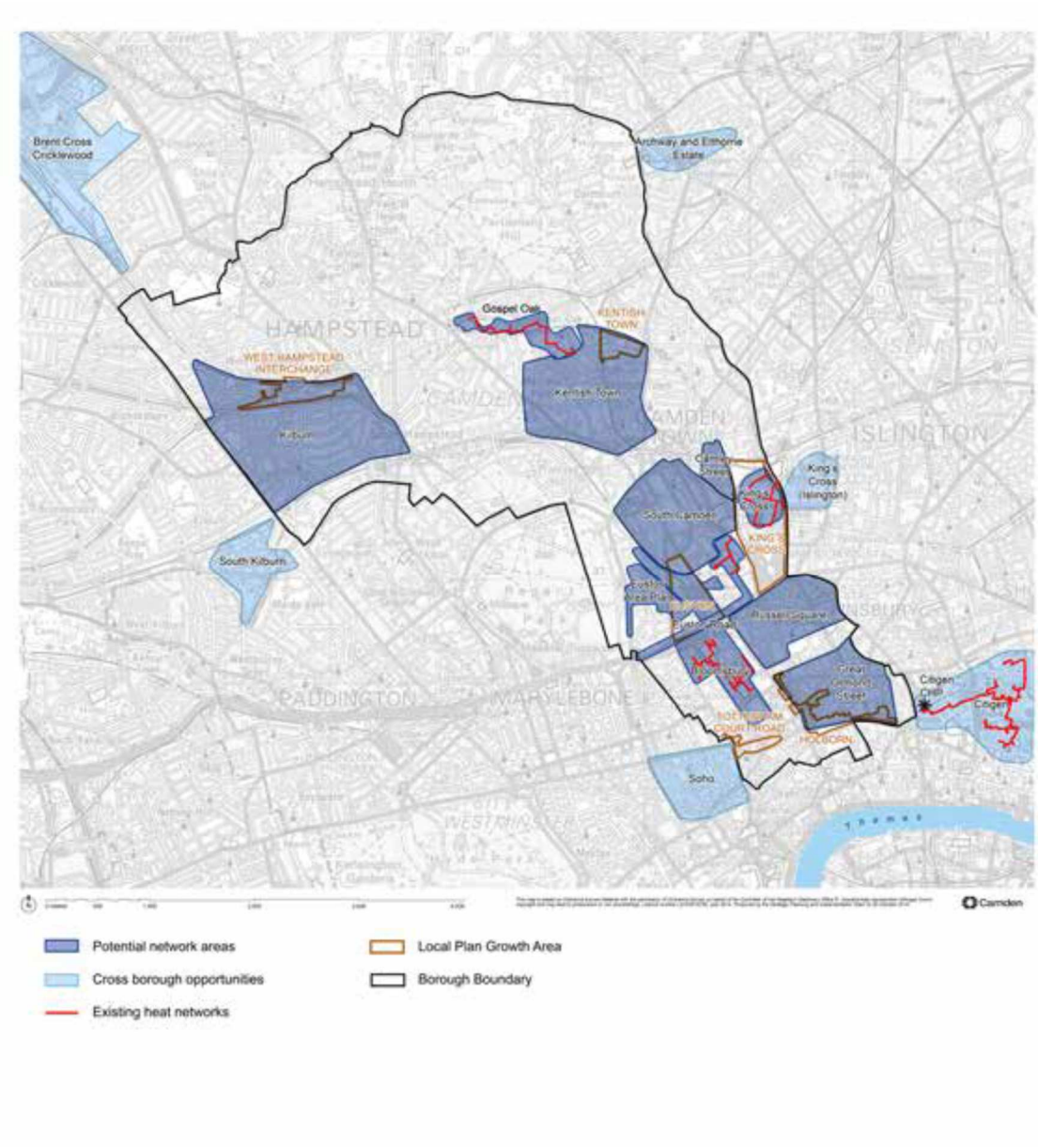
- Replaced windows
- High efficiency cooling
- Ventilation system with high heat recovery efficiency and low specific fan powers
- Lighting with high efficiency led luminaires with photoelectric control and presence detectors

Non-Residential			Energy Consumption Breakdown						SBEM 2015	% Improvement over notional
	Description	Floor area (m2)	Space Heating (Main) (kWh/an)	DHW (kWh/an)	Cooling (kWh/an)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	BER (kgCO2/a.m2)	
	Refurb	1257.8	7,004	16,941	6,630	14,450	5,795	59,433	**20.97**	**36.9%**
	New	366.41	2,151	919	2,332	3,378	1,460	13,874	**14.50**	**27.3%**
Total / Average		1624.2	**9,155**	**17,860**	**8,961**	**17,828**	**7,255**	**73,307**	**19.51**	**35.5%**

BE CLEAN: HEATING INFRASTRUCTURE

160-161 Drury Lane, London, WC2B 5PN

The Camden Council Energy Network Map (shown below) has been consulted to establish the possibility of connecting to heating infrastructure. A review of the Map demonstrates that there are no existing networks present within connectable range of the scheme, therefore a connection is not possible.
The map also shows that the site lies outside of potential network areas and cross borough opportunity areas.

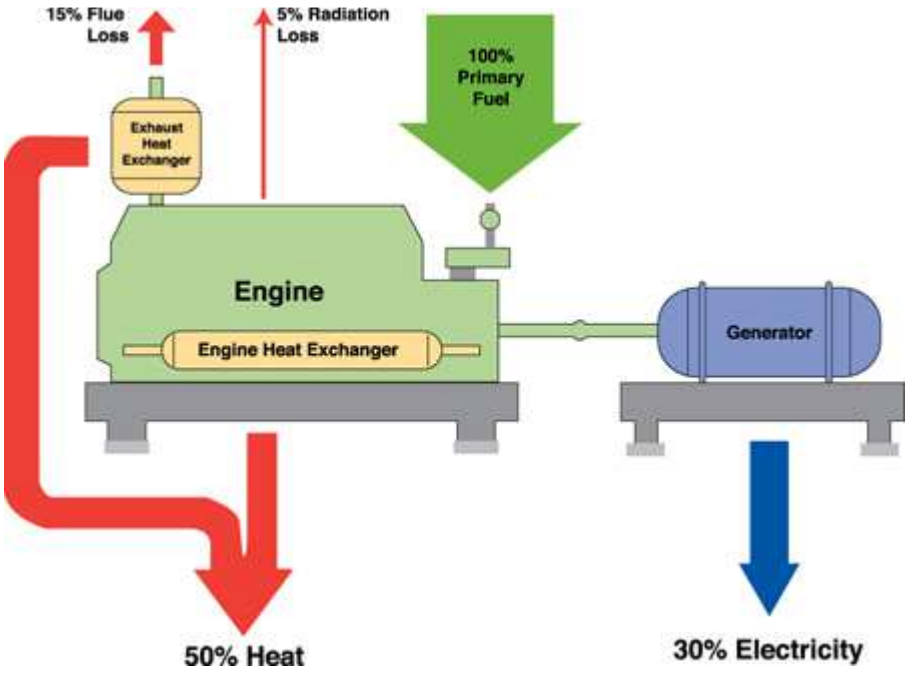


BE CLEAN: COMBINED HEAT AND POWER

160-161 Drury Lane, London, WC2B 5PN

GENERAL INFORMATION

Although not using any renewable energy source, gas CHP helps to reduce CO2 emissions by delivering heat and electricity locally and reducing the losses that normally occur by conventional power plants. Produced electricity can be exported to grid if the on-site demand is lower than production.



RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Heat demand of the proposed development is considered too low to make a CHP installation feasible. The heat demand will vary significantly throughout the year which makes a CHP installation economically unfeasible.

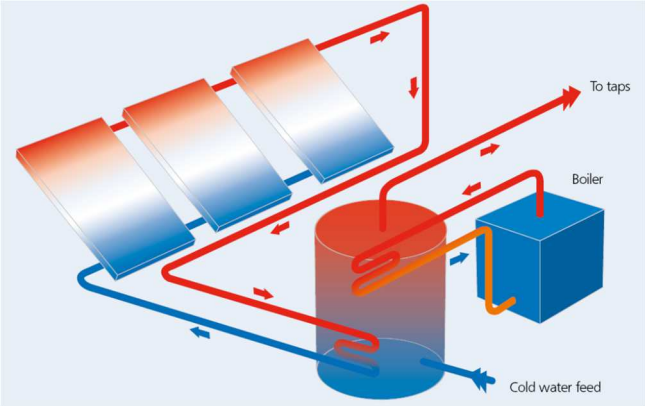
This development will therefore not achieve any improvement in the "Be Clean " stage of the energy hierarchy.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - SOLAR HOT WATER (SHW)

160-161 Drury Lane, London, WC2B 5PN

GENERAL INFORMATION

Solar hot water systems use collector which provides a separate heating circuit for hot water cylinder. This is usually backed up by electric immersion heater or other source of heat.
Two types of collectors are available:
- Flat Plate – less expensive, less efficient
- Evacuated Tube – more expensive and more efficient



RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Solar hot water system is considered not feasible due to low hot water demand for office type of building. Heat losses through storage and distribution pipework and energy for pumping would make the system much less efficient than some other (e.g. residential) buildings.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - AIR SOURCE HEAT PUMP (ASHP)

160-161 Drury Lane, London, WC2B 5PN

GENERAL INFORMATION

An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside temperature is as low as minus 15° C.

On 17 December 2008, the European Parliament adopted the EU Directive on promoting the use of energy from renewable sources. For the first time however, in addition to geothermal energy, aerothermal and hydrothermal energy are also recognised as renewable energy sources.

There are two main types of ASHP:

AIR-TO-WATER SYSTEM

Air-to-water system uses the heat to warm water. Heat pumps heat water to a lower temperature than a standard boiler system would, so they are more suitable for underfloor heating systems than radiator systems. Although some ASHP systems are capable of heating the water to the higher temperature, the efficiency is higher when using low temperature underfloor heating or low temperature fan convectors.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - AIR SOURCE HEAT PUMP (ASHP)

160-161 Drury Lane, London, WC2B 5PN

AIR-TO-AIR SYSTEM

Air-to-air system uses the heat to warm the indoor air. The air is heated through individual fan-coils or centrally and then distributed to rooms via ductwork.

RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Air source heat pumps are proposed to provide heating and cooling in the proposed building. Installation of new high efficiency VRF air source heat pump system will achieve a 5.9% reduction in regulated CO2 emissions compared to “Be Lean” baseline. This reduction represents only the heating function of the heat pump as the heat pumps are considered a renewable energy source only when they are in heating mode (not cooling).
The system will consist of roof positioned outdoor condensing units and indoor ceiling cassette fan coil units, i.e. air-to-air system. The indoor and outdoor units will be connected with a variable refrigerant flow pipework.

By using this system it is considered that the development complies with the London Plan requirement to 'be green' and use renewable energy.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - SOLAR PHOTOVOLTAICS (PV)

160-161 Drury Lane, London, WC2B 5PN

GENERAL INFORMATION

This system uses semi-conductor cells to convert solar energy into electricity. Two main types of PV panels are available:
- Monocrystalline – More expensive and more efficient
- Polycrystalline – Less expensive and less efficient

RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

PV system has not been included as it is not necessary to comply with building regulations 2013 Part L2B. Specification of the proposed development including heat pumps and energy efficiency measures achieves results which meet and exceed all energy efficiency targets.

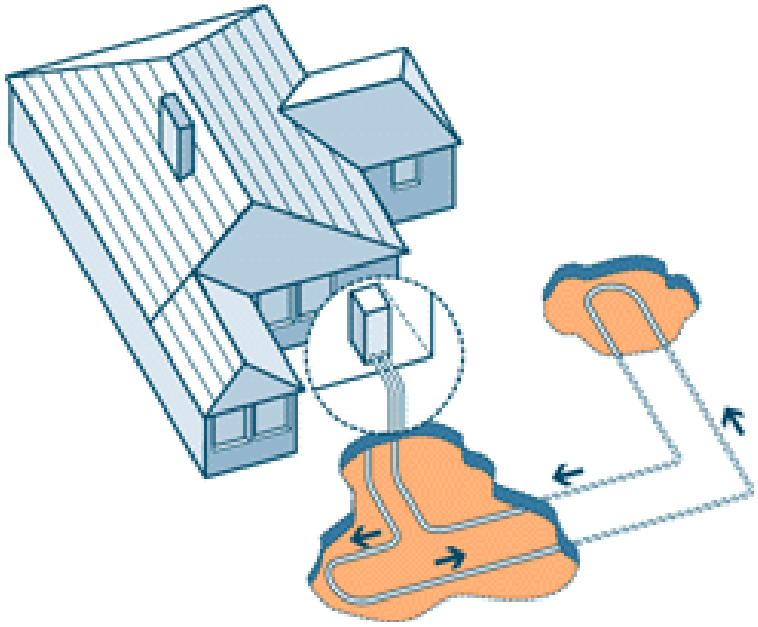
BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - GROUND SOURCE HEAT PUMP (GSHP)

160-161 Drury Lane, London, WC2B 5PN

GENERAL INFORMATION

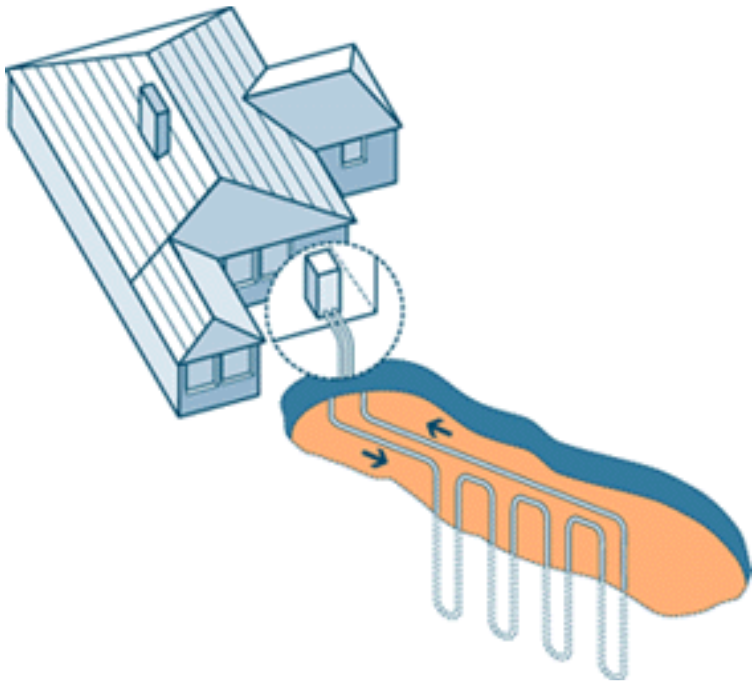
Ground source heat pumps use a buried ground loop which transfers heat from the ground into the building through heating distribution system. GSHP technology can be used both for heating and cooling. Two main types of GSHP are available:

- Horizontal loop is suitable for applications where sufficient area is available to accommodate horizontally buried pipes



BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - GROUND SOURCE HEAT PUMP (GSHP)

- Vertical loop system can be used where ground space is limited, but will require boreholes typically 15-150m deep, and is consequently more expensive to install than horizontal systems.



RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Ground source heat pump has been ruled out as not technically feasible. It is extremely technically and economically demanding to create boreholes in existing buildings. Energy savings against air source heat pumps would be minimal.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - BIOMASS / BIOFUELS

160-161 Drury Lane, London, WC2B 5PN

GENERAL INFORMATION

Producing energy from biomass has both environmental and economic advantages. It is a carbon neutral process as the CO2 released when energy is generated from biomass is balanced by that absorbed during the fuel's production.
There are two main ways of using biomass to heat a domestic property:

- Standalone stoves providing space heating for a room. These can be fuelled by logs or pellets but only pellets are suitable for automatic feed. Generally they are 6-12 kW in output, and some models can be fitted with a back boiler to provide water heating.

- Boilers connected to central heating and hot water systems. These are suitable for pellets, logs or chips, and are generally larger than 15 kW.

RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Biofuels are ruled out due to negative impact on air quality, high running cost, delivery issues and environmental issues surrounding liquid biofuels as currently there are no established standards relating to the sustainability of biofuels.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE – WIND ENERGY

160-161 Drury Lane, London, WC2B 5PN

GENERAL INFORMATION

Wind power is a clean, renewable source of energy which produces no carbon dioxide emissions or waste products. The turbines can have horizontal or vertical axis (Darrieus type). Wind turbines use the wind's lift forces to rotate aerodynamic blades that turn a rotor which creates electricity. Most small wind turbines generate direct current (DC) electricity and are not connected to the national grid. A special inverter and controller is required to convert DC electricity to AC at a quality and standard acceptable to the grid if the turbine is to be connected to national grid.

RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Wind energy systems will not be considered due to high capital cost, negative visual effects, interference, flicker and noise risk, making them inappropriate for inclusion within this development.

Besides the energy efficiency measures aimed at reducing the regulated energy demand, provision will be made for a number of other sustainability aspects with will help to minimise the environmental impacts during and after construction.

WATER

Internal water consumption will be reduced by specification of water efficient fittings (taps, showers, toilets, urinals)

MATERIALS

Environmental impact of construction materials will be taken into account. Where possible, construction materials will be sourced from local producers and suppliers with environmental impact certification. All timber will be FSC (or equivalent) certified. Significant demolition will be avoided by retaining and re-using or large part of the existing building structure.

ENERGY

Besides the energy efficiency measures relating to regulated energy, which are described in the energy statement, there will be additional energy saving measures implemented in the development:

- Energy efficient white goods will be used

- Low energy external lighting

WASTE

Adequate internal and external storage of recycled and non-recycled waste will be ensured. The external storage will be sized according to the frequency of collection, based on guidance from the recycling scheme operator.

Construction waste will be minimised by implementing a site waste management plan containing procedures to minimise and divert waste from landfill

CONCLUSION

The proposed development will result in a highly efficient and sustainable office building with significant improvement against both the existing building and building regulations compliant baseline. All possible renewable and low carbon energy sources have been carefully considered. Air source heat pumps for space heating and cooling have been selected as the most appropriate renewable source for the development with no negative visual impacts, significant CO2 savings and optimal installation and maintenance cost, in line with the London Plan Policy 5.2 energy hierarchy and Camden Local Plan policies.

The proposed development will achieve a 41.6% overall regulated CO2 reduction against 2013 Part L2B compliant baseline, 54.5% reduction against existing building and 5.9% reduction by renewable sources (air source heat pumps)

The extension alone will achieve a 33.5% reduction in regulated CO2 emissions against 2013 Part L2A.

The proposed development is therefore compliant with regional and local planning policy