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ASSESSMENT INFORMATION

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EXECUTIVE SUMMARY

BRIDGE HOUSE, OXFORD ROAD, UXBRIDGE UB8 1HS

ABOUT THE ENERGY STATEMENT

OG Energy Ltd have been appointed to provide an Energy Statement for the proposed development.

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

Specific requirements of London Plan on Energy Efficiency and Renewable Energy will be met through a combination of passive design features, energy efficient building services and renewable energy sources. This is to comply fully with the London Plan Policies and ensure they are following the "Energy Hierarchy". Specific London Plan policies about CO2 reduction and renewable energy will be met by implementation of passive measures, efficient services and renewable sources. This document has been prepared in line with the GLA Energy Team Guidance on Planning Energy Assessments.

Baseline and all estimated energy consumptions have been calculated using full SAP 2012 assessment of the development in accordance with Part L procedures.

The tables below show a summary of energy requirements for baseline scheme and reduction proposed to be achieved by passive measures, efficient services and on-site renewable energy sources.

EXECUTIVE SUMMARY

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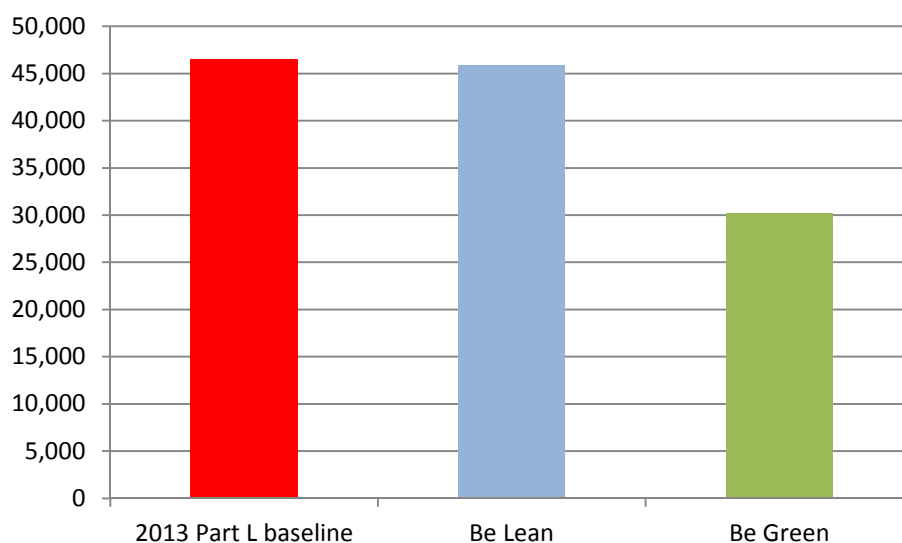
Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy

	Carbon dioxide emissions (Tonnes CO2 per annum)		
	Regulated	Unregulated	Total
Building Regulations 2013 Part L Compliant Development	46.53	33.02	79.56
After energy demand reduction	45.89	33.02	78.92
After PV	30.20	33.02	63.23

Table 2: Carbon Dioxide Savings from each stage of the Energy Hierarchy

	Carbon dioxide savings (Tonnes CO2 per annum)		Carbon dioxide savings (%)	
	Regulated	Total	Regulated	Total
Savings from energy demand reduction	0.64	0.64	1.4%	0.8%
Savings from PV	15.69	15.69	34.2%	19.9%
Total Cumulative Savings	16.33	16.33	35.1%	20.5%

Regulated CO2 emissions kgCO2/year



EXECUTIVE SUMMARY

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Number of passive design measures and energy efficiency measures to reduce CO2 emissions before applying the renewable sources has been included in the design. The table below shows the specification for each stage of the energy hierarchy:

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

Specification	Notional Baseline	Efficient Baseline (Be Lean)	Proposed Development (Be Green)
External Wall U-value	0.18	0.16	0.16
Internal heat loss wall (between flats and unheated corridors, stairs and plant)	0.18	0.20	0.20
Internal heat loss floor (between flats and unheated corridors below)	0.13	0.20	0.20
Party-Wall U-value	0 (fully filled with insulation and sealed on edges)	0 (fully filled with insulation and sealed on edges)	0 (fully filled with insulation and sealed on edges)
Roof U-value	0.13	0.12	0.12
Windows U-value	1.50	0.9 (triple)	0.9 (triple)
Thermal bridging	Accredited construction details throughout	Accredited construction details throughout	Accredited construction details throughout
Air Permeability	5	4	4
Space Heating System	Individual condensing combi boiler in each unit, SEDBUK 2009 efficiency 88%, underfloor heating, programmer and at least 2 room thermostats	Electric panel heaters with programmer and appliance thermostat	Electric panel heaters with programmer and appliance thermostat
DHW System	Individual condensing combi boiler in each unit, SEDBUK 2009 efficiency 88%,	Megaflor Eco direct 145 L or equivalent	Megaflor Eco direct 145 L or equivalent
Ventilation System	Natural with intermittent mechanical extracts	MVHR Vent Axia Kinetic Advance or similar	MVHR Vent Axia Kinetic Advance or similar
Overheating prevention	-	Light coloured curtains or roller blinds, Openable windows	Light coloured curtains or roller blinds, Openable windows
Energy Efficient Lighting	75%	100%	100%
Renewable energy sources			PV system with total peak output of 35kWp with panels facing south at 15-35 degree pitch
% Improvement in CO2 over Building regulations compliant	0.0%	1.4%	35.1%

Proposed renewable systems include PV system with peak output of 35 kWp.

EXECUTIVE SUMMARY

BRIDGE HOUSE, OXFORD ROAD, UXBRIDGE UB8 1HS

Table 4: SAP result summary of the proposed development

Residential		Energy Consumption Breakdown						PVs		SAP 2012		% Improvement DER over TER
Unit	Floor area (m2)	Space Heating (Main 1) (kWh/an)	DHW (kWh/an)	Cooling (kWh/a)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	PVs output (kWp)	PVs Energy Offset (kWh/a)	DER	TER	
Flat 1	74.6	1,393	1,676		328	111	2,712	1.477	-1,275	15.53	25.92	40.1%
Flat 2	89.3	2,499	1,774		374	133	3,065	1.767	-1,526	18.91	28.12	32.7%
Flat 5	62.5	1,161	1,563		292	93	2,370	1.237	-1,068	16.95	26.90	37.0%
Flat 9	57.5	1,434	1,510		262	86	2,220	1.138	-982	20.84	29.60	29.6%
Flat 11	55.1	1,035	1,484		256	82	2,146	1.090	-941	18.04	28.01	35.6%
Flat 17	94.6	2,333	1,799		389	166	3,177	1.872	-1,616	16.85	25.07	32.8%
Flat 19	79.3	1,736	1,711		343	139	2,830	1.568	-1,354	16.86	25.83	34.7%
Flat 20	77.9	1,672	1,702		339	137	2,796	1.541	-1,331	16.77	25.81	35.0%
Flat 22	73	1,396	1,662		321	128	2,668	1.444	-1,247	16.07	25.00	35.7%
Flat 24	86.4	1,702	1,758		366	152	3,001	1.709	-1,476	15.02	24.39	38.4%
Total	1769	38,580	39,239		7,716	2,889	63,631	35.00	-30,227	17.07	26.31	35.1%

The proposed development will achieve:

35.1% overall site regulated CO2 reduction against 2013 Part L compliant baseline. This is more than 35% London Plan requirement and significantly more than 19% Code level 4 requirement.

34.2% reduction in regulated CO2 by renewable sources.

INTRODUCTION

BRIDGE HOUSE, OXFORD ROAD, UXBRIDGE UB8 1HS

BACKGROUND

OG Energy have been appointed to provide an Energy Statement for the proposed development.

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

DESCRIPTION OF THE SITE

Erection of 25 No newly constructed apartments formed as a two storey roof extension on existing office building.



PLANNING FRAMEWORK

BRIDGE HOUSE, OXFORD ROAD, UXBRIDGE UB8 1HS

NATIONAL POLICY

Joining over 170 other nations the UK has committed to reduction of carbon dioxide emissions, with consequent constraints to its energy policy. The UK produced four percent of the world's greenhouse gases as of 2003. The long term reduction goal for carbon emissions is 60 percent decrease by the year 2050. According to Energy Review issued by Government in 2002 it was recommended that renewable sources should contribute 20% of energy generation by 2020. These figures were incorporated in Planning Policy Statement Note 22: Renewable Energy (2004) which became a base for local planning policies.

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

PLANNING FRAMEWORK

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Major developments are required to meet the following targets for CO₂ reduction against building regulations Target Emission Rate (TER):

Residential buildings:

Year Regulations	Improvement on 2010 Building Regulations
2010 – 2013	25 per cent (Code for Sustainable Homes level 4)
2013 – 2016	40 per cent
2016 – 2031	Zero carbon

Non-domestic buildings:

Year Regulations	Improvement on 2010 Building Regulations
2010 – 2013	25 per cent
2013 – 2016	40 per cent
2016 – 2019 requirements	As per building regulations
2019 – 2031	Zero carbon

IMPLEMENTATION OF 2013 BUILDING REGULATIONS

Policy 5.2 of the London Plan states that from 2013 to 2016 energy assessments should be produced to meet a target of 40 per cent carbon reduction beyond Part L 2010 of the Building Regulations. The draft SPG on Sustainable Design and Construction confirmed that this requirement would apply for Stage 1 applications received by the Mayor on or after 1 October 2013.

From 6 April 2014 the 2013 changes to Part L of the Building Regulations came into effect. Part L 2013 delivers an overall reduction in CO₂ emissions for new residential and new non-domestic buildings, with the targets for individual buildings being differentiated according to building type. This reduction in CO₂ emissions affects the percentage reduction necessary above the new Part L 2013 regulations to meet the Mayor's targets in the London Plan.

As outlined in the Sustainable, Design and Construction SPG a 35 per cent carbon reduction target beyond Part L 2013 of the Building Regulations is currently applied - this is deemed to be broadly equivalent to the 40 per cent target beyond Part L 2010 of the Building Regulations, as specified in Policy 5.2 of the London Plan for 2013-2016.

PLANNING FRAMEWORK

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ZERO CARBON POLICY

As outlined in the Housing SPG, from 1 October 2016 the Mayor applies a zero carbon standard to new residential development. The Housing SPG defines 'Zero carbon' homes as homes forming part of major development applications where the residential element of the application achieves at least a 35 per cent reduction in regulated carbon dioxide emissions (beyond Part L 2013) on-site. The remaining regulated carbon dioxide emissions, to 100 per cent, are to be off-set through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere (in line with policy 5.2E). This payment is currently fixed (in most boroughs) at £60/tonne of CO₂ per year for 30 years.

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.

POLICY 5.7 - RENEWABLE ENERGY

The Mayor seeks to increase the proportion of energy generated from renewable sources, and expects that the projections for installed renewable energy capacity outlined in the Climate Change Mitigation and Energy Strategy and in supplementary planning guidance will be achieved in London. Within the framework of the energy hierarchy (see Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.

PLANNING FRAMEWORK

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There is a presumption that all major development proposals will seek to reduce carbon dioxide emissions by at least 20 per cent through the use of on-site renewable energy generation wherever feasible.

POLICY 5.9 – OVERHEATING AND COOLING

Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

1. minimise internal heat generation through energy efficient design
2. reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls
3. manage the heat within the building through exposed internal thermal mass and high ceilings
4. passive ventilation
5. mechanical ventilation
6. active cooling systems (ensuring they are the lowest carbon options)

BASELINE ENERGY CONSUMPTION & CO₂ EMISSIONS

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Energy assessment using SAP 2012 has been carried out on the actual proposed dwellings using notional baseline specification achieving compliance with 2012 Part L. The specification is set out in Table 3 above.

As a result of the baseline energy calculation, the following values of energy and CO₂ emissions have been obtained. SAP 2012 carbon emission factors have been used for the CO₂ emissions calculation.

Residential		Energy Consumption Breakdown						SAP 2012	
Unit	Floor area (m ²)	Space Heating (Main 1) (kWh/an)	DHW (kWh/an)	Cooling (kWh/a)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	DER	TER
Flat 1	74.6	2,822	2,332		328	75	2,712	25.92	25.92
Flat 2	89.3	4,375	2,427		374	75	3,065	28.12	28.12
Flat 5	62.5	2,247	2,204		292	75	2,370	26.90	26.90
Flat 9	57.5	2,423	2,136		263	75	2,220	29.60	29.60
Flat 11	55.1	1,982	2,114		256	75	2,146	28.01	28.01
Flat 17	94.6	3,897	2,465		389	75	3,177	25.07	25.07
Flat 19	79.3	3,096	2,371		343	75	2,830	25.83	25.83
Flat 20	77.9	3,003	2,361		339	75	2,796	25.81	25.81
Flat 22	73	2,514	2,321		322	75	2,668	25.00	25.00
Flat 24	86.4	3,185	2,427		366	75	3,001	24.39	24.39
Total	1769	69,668	54,614		7,719	1,769	63,631	26.31	26.31

BE LEAN: PASSIVE DESIGN MEASURES AND EFFICIENT SERVICES

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Number of passive design measures and measures improving energy efficiency of building services have been included in the design to help to reduce the CO2 emissions. Full specification of the efficient baseline is described in Table 3. The following table shows results obtained with the improvements over the notional baseline.

Residential		Energy Consumption Breakdown						SAP 2012		% Improve ment DER over TER
Unit	Floor area (m2)	Space Heating (Main 1) (kWh/an)	DHW (kWh/an)	Cooling (kWh/a)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	DER	TER	
Flat 1	74.6	1,393	1,676		328	111	2,712	24.40	25.92	5.9%
Flat 2	89.3	2,499	1,774		374	133	3,065	27.78	28.12	1.2%
Flat 5	62.5	1,161	1,563		292	93	2,370	25.82	26.90	4.0%
Flat 9	57.5	1,434	1,510		262	86	2,220	29.71	29.60	-0.4%
Flat 11	55.1	1,035	1,484		256	82	2,146	26.91	28.01	3.9%
Flat 17	94.6	2,333	1,799		389	166	3,177	25.72	25.07	-2.6%
Flat 19	79.3	1,736	1,711		343	139	2,830	25.73	25.83	0.4%
Flat 20	77.9	1,672	1,702		339	137	2,796	25.64	25.81	0.7%
Flat 22	73	1,396	1,662		321	128	2,668	24.94	25.00	0.2%
Flat 24	86.4	1,702	1,758		366	152	3,001	23.89	24.39	2.1%
Total	1769	38,580	39,239		7,716	2,889	63,631	25.94	26.31	1.4%

OVERHEATING AND COOLING

All the flats modelled in SAP have also been assessed against overheating criteria set out in SAP Appendix P.

Flats comply with the criteria using passive measures - openable windows. Mechanical cooling is not proposed for the development.

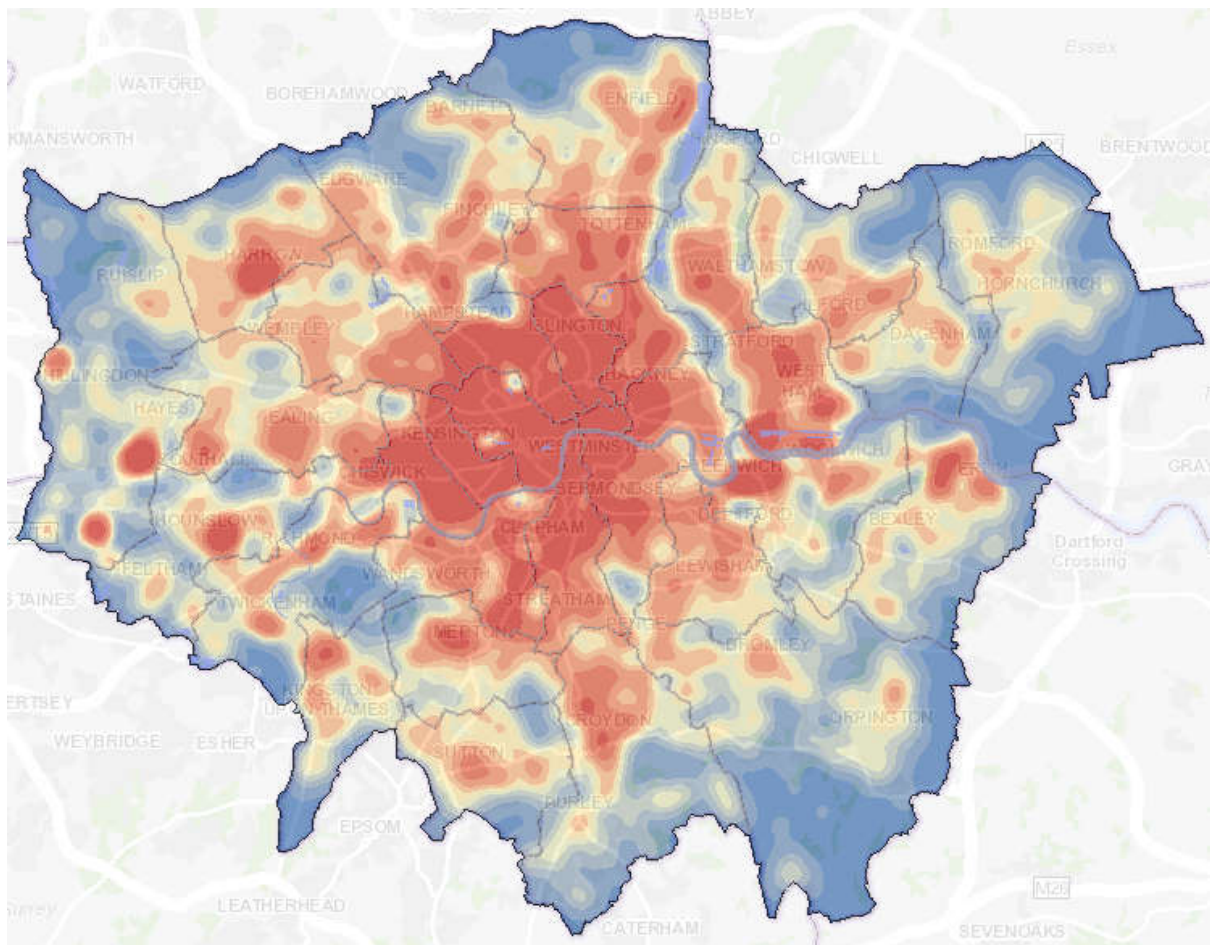
MVHR system with heat recovery and with summer bypass will further contribute to overheating prevention.

BE CLEAN: HEATING INFRASTRUCTURE

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LONDON HEAT MAP

The London Heat Map (shown below) has been consulted to establish the possibility of connecting to heating infrastructure. The review is detailed on the following page..



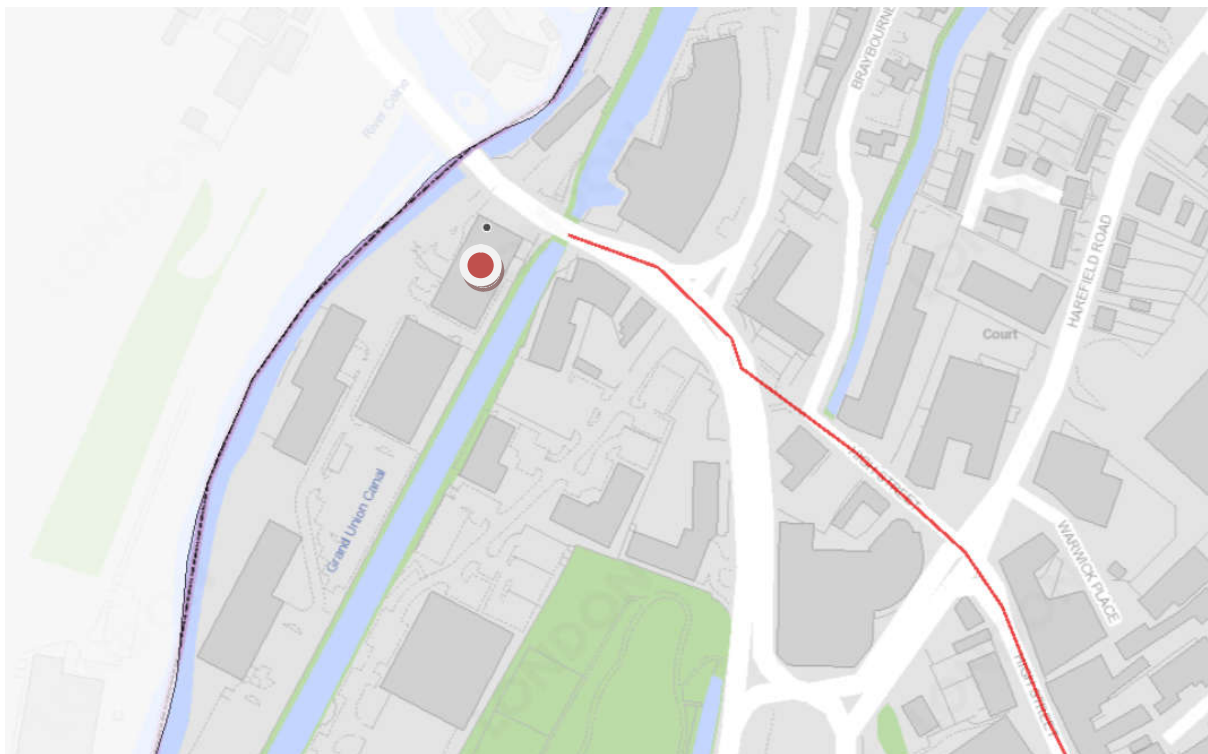
BE CLEAN: HEATING INFRASTRUCTURE

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EXISTING AND PLANNED NETWORKS

A review of the London Heat 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 there are no networks planned within the vicinity of the scheme.



Bridge House



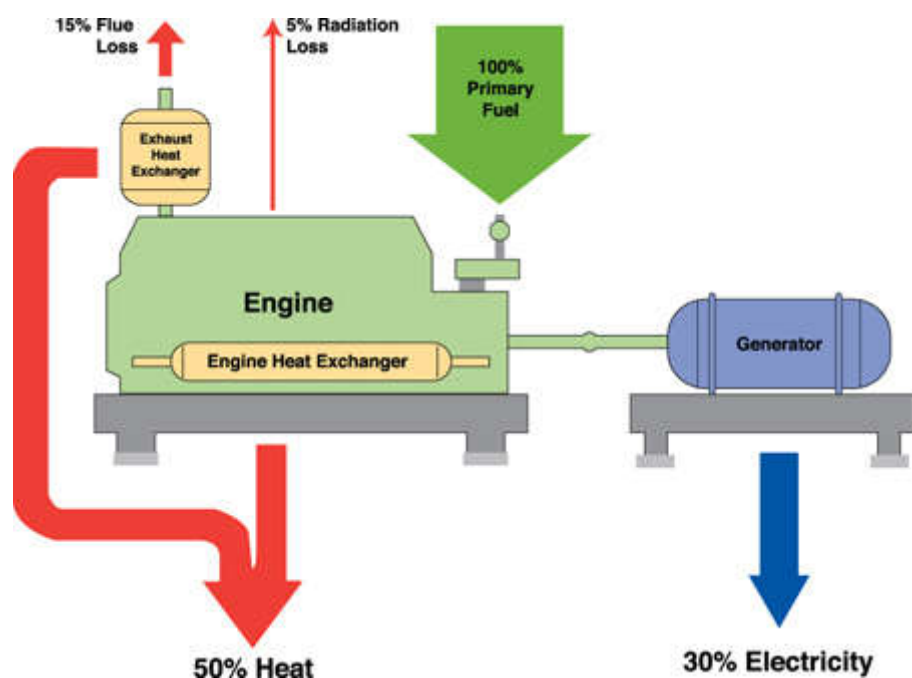
Potential DH network

BE CLEAN: COMBINED HEAT AND POWER

BRIDGE HOUSE, OXFORD ROAD, UXBRIDGE UB8 1HS

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

Communal heating system is generally not feasible for this project being a rooftop extension on existing building.

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

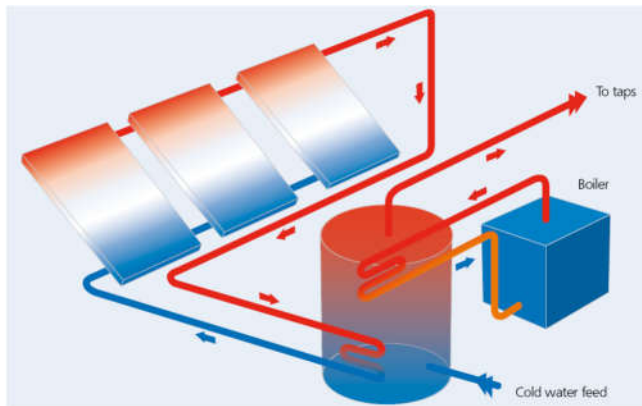
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GENERAL INFORMATION

Solar hot water systems for dwellings 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 have been considered, however, compact air source heat pumps are recommended as a system with higher CO₂-saving potential and lower installation and maintenance cost.

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

BRIDGE HOUSE, OXFORD ROAD, UXBRIDGE UB8 1HS

GENERAL INFORMATION

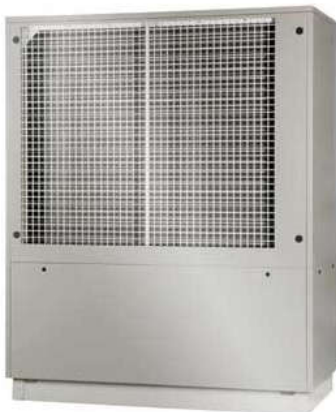
An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside temperature is as low as minus 15° C.

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)

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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 not recommended due to higher capital and running cost compared to gas boilers.

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

BRIDGE HOUSE, OXFORD ROAD, UXBRIDGE UB8 1HS

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

Depending on type, the output of 1 kWp (kilowatt peak) can be achieved by panels with area between 8 and 20 m².

The use of PV panels generally requires relatively large unshaded roof area where they can be mounted facing south, ideally having between 30° and 40° inclination.

The cost per tonne of CO₂ saved would be between £550 and £1,100,



RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

A PV system with total peak output of 35 kWp is proposed for roof installation. The panels are proposed to be installed at a 15-35 degree angle facing south. The proposed PV system will produce 30.227 kWh of electricity per year, which represents an offset of 15.69 tonnes of CO₂.

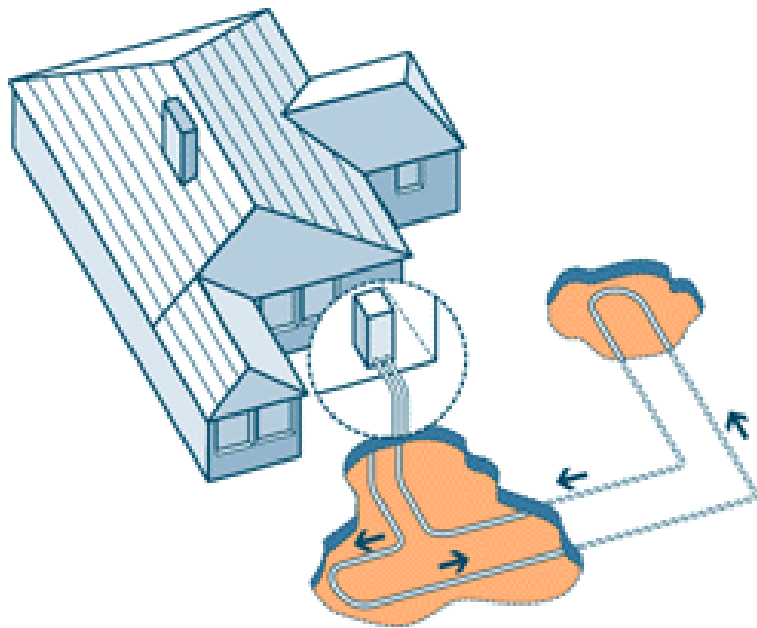
BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - GROUND SOURCE HEAT PUMP (GSHP)

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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:

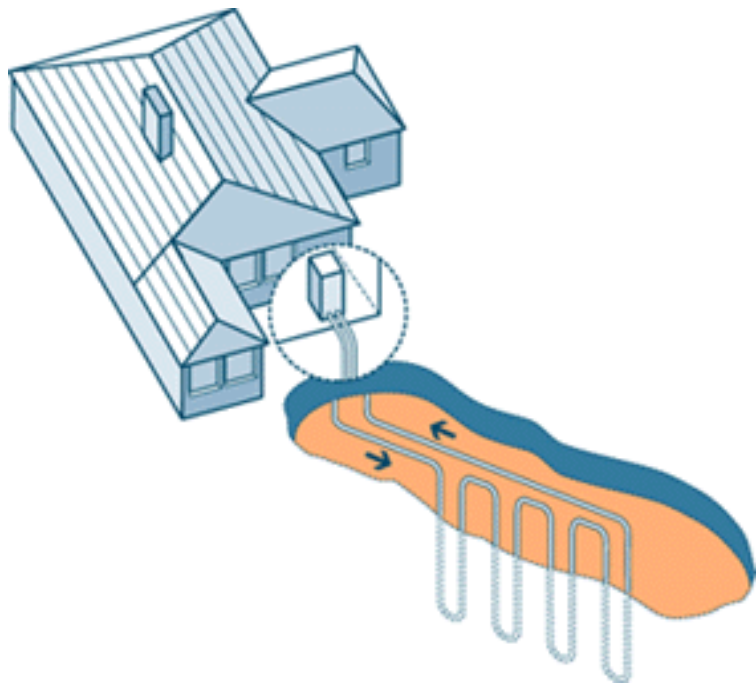
- Horizontal loop is suitable for applications where sufficient area is available to accommodate horizontally buried pipes



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

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- 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 pumps are not feasible because of the development being a rooftop extension.

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

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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 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

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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 negative visual effects, interference, flicker and noise risk. Exposure to wind would be limited by surrounding buildings.