ENERGY & SUSTAINABILITY STATEMENT

25 THE AVENUE, NORTHWOOD HA6 2NJ

FHP ENGINEERING SERVICES SOLUTIONS LTD
17 Bevis Marks
Aldgate
London EC3A 7LN

ASSESSMENT INFORMATION

Prepared for:

Prepared by:
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Date:
21 December 2023

DISCLAIMER

The findings, conclusions and recommendations of this report are based on the information supplied. FHP ESS 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 25 The Avenue, Northwood; a duty of care is not owed to other parties.

CONTENT

The London Plan approach of "Be lean" – "Be clean" – "Be green" is fully adopted by implementing:
- Passive measures (low U-values and air permeability) High efficiency services, i.e. low energy lights, high efficiency gas boilers
- Renewable sources: Air source heat pumps

Excluded renewable sources are:
- Solar hot water
- Solar Photovoltaics
- Biomass
- Wind turbines

The proposed development will achieve:

- 34% regulated CO2 reduction against 2013 Part L compliant baseline

- 2% regulated CO2 reduction by efficiency measures (Be Lean)

- 32% regulated CO2 reduction by renewable sources

ABOUT THE ENERGY STATEMENT

FHP ESS 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. SAP 10.2 emission factors have been used for all presented CO2 emission calculations.

The table below shows 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.

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

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013 of the Building Regulations Compliant Development	10.4	2.5
After energy demand reduction (be lean)	10.2	2.5
After renewable energy (be green)	6.9	2.5

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: Savings from energy demand reduction	0.2	2%
Be green: Savings from renewable energy	3.3	32%
Cumulative on site savings	**3.5**	**34%**

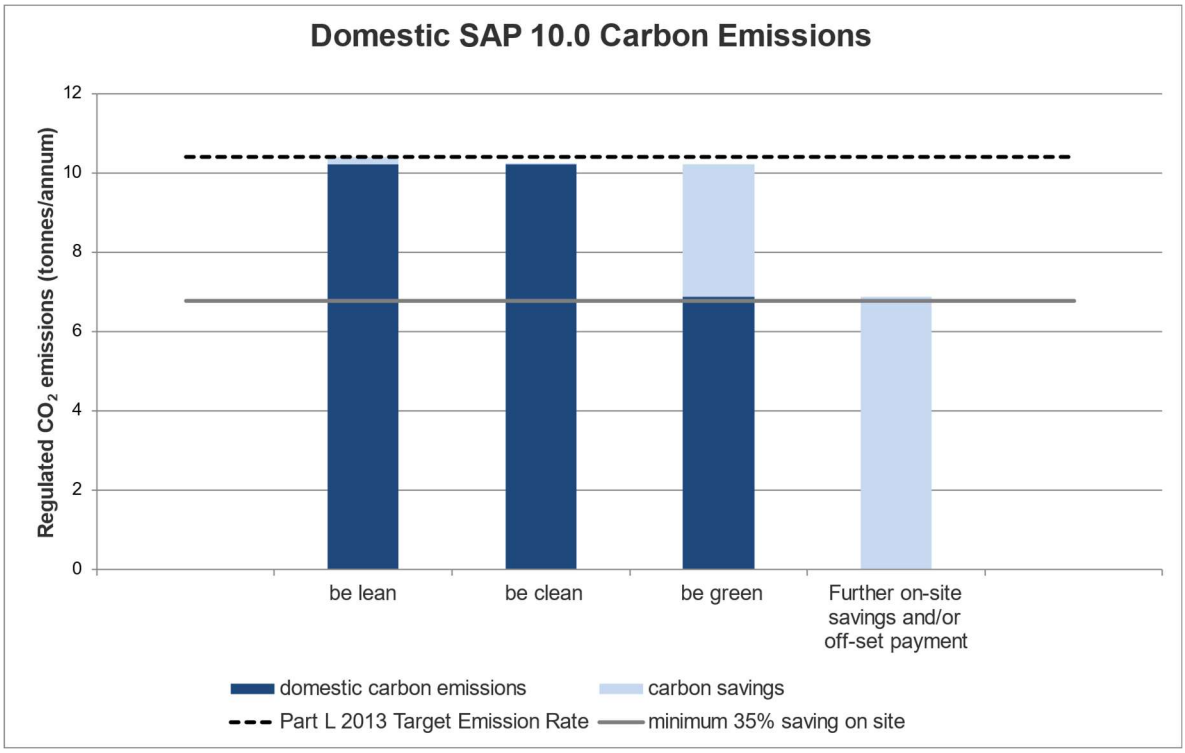

Domestic SAP 10.0 Carbon Emissions
Regulated CO_2 emissions (tonnes/annum)
12
10
8
6
4
2
0
be lean
be clean
be green
Further on-site savings and/or off-set payment
domestic carbon emissions
carbon savings
Part L 2013 Target Emission Rate
minimum 35% saving on site

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

Specification	Notional Baseline	Efficient Baseline (Be Lean)	Proposed Development (Be Green)
Ground floor U-value	0.13	0.16 100mm celotex below screed	
External Wall U-value	0.18	0.18 facing brick, 90mm Kingspan K106 in cavity, Porotherm brick 100mm inner leaf, plaster	
Dormer cheeks and attic dwarf walls U-value	0.18	0.18 100mm Kingspan K7 between studs + 52.5 K118 internally	
Flat Roof U-value	0.13	0.18 125mm Kingspan TR27	
Pitched roof with insulation at joist level U-value	0.13	0.12 2 layers of 170mm mineral wool	
Pitched roof with insulation at rafter level U-value	0.13	0.18 120mm Kingspan K7 between rafters + 32.5mm K118 below rafters	
Windows and glazed doors U-value	1.4	1.5 Alitherm Smart metal frame windows with double glazing	
Rooflights U-value	1.4	1.3 Velux double glazed	
Air Permeability (m3/h.m2)	5	4	
Thermal bridging	Accredited construction details	Thermal bridging junctions compliant with Porotherm and Kingspan Standard details; independent lintels	
Main Space Heating System	Gas boiler, SEDBUK efficiency 89.5%, ratdiators, time and temperature zone control, weather compensator	Gas boiler Worcester Greenstar 27i, radiators, time and temperature zone control, Worcester Comfort weather compensator	Air source heat pump system with low temperature wet underfloor heating Daikin Altherma ERGA08DVA - EHVH08SU23D6V or equivalent
Second Main Space Heating System	-	-	Multi-split Air source heat pump system with fan coils Mitsubishi PUMY-SP R410A; CoP 4.10
DHW System	Indirect cylinder 300 L	Indirect cylinder 300 L JAB DUC	
Ventilation System	Natural ventilation with intermittent mechanical extracts	Natural ventilation with intermittent mechanical extracts	Natural ventilation with intermittent mechanical extracts
Low energy lights	100%	100%	100%
% Improvement in CO2 over Building regulations compliant baseline	**0.0%**	**1.8%**	**34%**

SAP results summary of the proposed development

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE GREEN' SAP DER WORKSHEET						SAP 10.2 REGULATED CO_2 EMISSIONS PER UNIT			
		Space Heating (Heat Source 1)	Domestic Hot Water (Heat Source 1)	Space Heating (Heat source 2)	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	SAP 10.2 CO_2 emissions ($kgCO_2$ p.a.)	Calculated DER SAP 10.0 ($kgCO_2$ / m^2)
House 1	*204.5*	*4247*	*2842*	*987*	*610*	*75*	*15*	**1,026**	**597**	**1,718**	**8.4**
House 2	*204.5*	*4247*	*2842*	*987*	*610*	*75*	*15*	**1,026**	**597**	**1,718**	**8.4**
House 3	*204.5*	*4247*	*2842*	*987*	*610*	*75*	*15*	**1,026**	**597**	**1,718**	**8.4**
House 4	*204.5*	*4247*	*2842*	*987*	*610*	*75*	*15*	**1,026**	**597**	**1,718**	**8.4**
Sum	818	16,987	11,369	3,950	2,442	300	62	4,104	2,387	6,873	8.4

BACKGROUND

FHP ESS 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

The project at the 25 The Avenue includes a new construction of two pairs of high quality semi-detached 3-storey, 4-bedroom houses.

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 NEW LONDON PLAN

The London Plan is the name given to the Mayor's spatial development strategy. The current version of London Plan was adopted in March 2021. 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 SI 2 MINIMISING CO2 EMISSIONS

A. Major development should be net zero-carbon. 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.

B. Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations 152 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.

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

POLICY SI 3 D – ENERGY INFRASTRUCTURE

Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system:

1) the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
   a) connect to local existing or planned heat networks
   b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
   c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
   d) use ultra-low NOx gas boilers

2) CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of Policy SI 1 Improving air quality

3) where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.

POLICY SI 4 – MANAGING HEAT RISK

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.

HILLINGDON LOCAL PLAN

Policies DMEI 2 and DMEI 10 of the Hillingdon Local Plan: Part 2- Development Management Policies (2020) require to demonstrate how a 10% reduction in carbon dioxide emissions beyond Building Regulations requirement Part L 2013 (TER Baseline) is achieved.

BASELINE ENERGY CONSUMPTION AND CO2 EMISSION

BASELINE ENERGY CONSUMPTION & CO2 EMISSIONS

Energy assessment using SAP 2012 has been carried out for the building using notional baseline (TER) 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 CO_2 emissions have been obtained. SAP10.2 carbon emission factors have been used for the CO_2 emissions calculation.

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - TER WORKSHEET				SAP 10 REGULATED CO_2 EMISSIONS PER UNIT			
		Space Heating	Domestic Hot Water	Lighting	Auxiliary	Space Heating	Domestic Hot Water	SAP 10.0 CO_2 emissions ($kgCO_2$ p.a.)	Calculated TER SAP 10.0 ($kgCO_2$ / m^2)
House 1	*204.5*	*9167*	*2746*	*666*	*75*	1,925	577	2,602	12.7
House 2	*204.5*	*9167*	*2746*	*666*	*75*	1,925	577	2,602	12.7
House 3	*204.5*	*9167*	*2746*	*666*	*75*	1,925	577	2,602	12.7
House 4	*204.5*	*9167*	*2746*	*666*	*75*	1,925	577	2,602	12.7
Sum	818	36,667	10,983	2,664	300	7,700	2,306	*10,410*	12.7

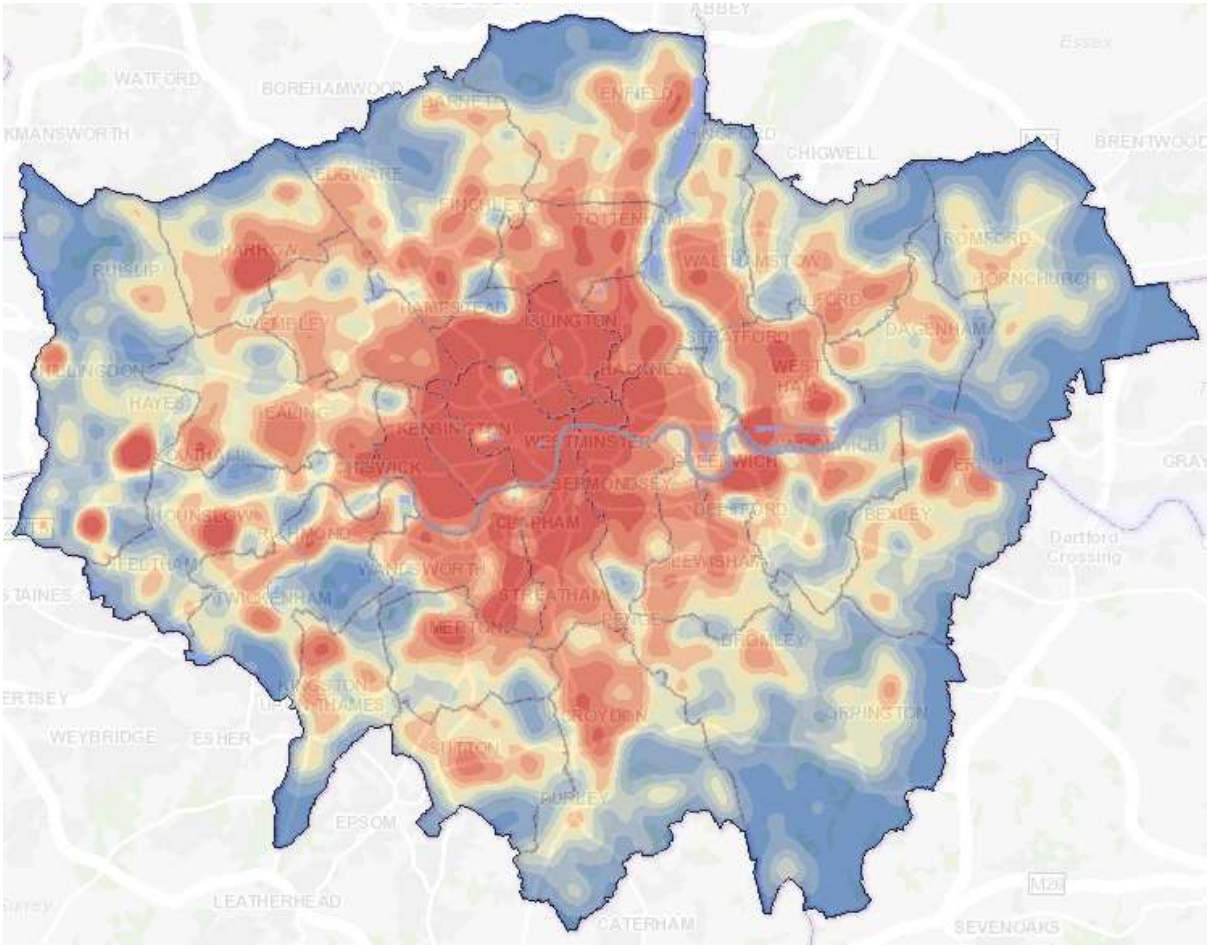
BE LEAN: PASSIVE DESIGN MEASURES AND EFFICIENT SERVICES

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

DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS										
Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m^2)	REGULATED ENERGY CONSUMPTION PER UNIT (kWh p.a.) - 'BE LEAN' SAP DER WORKSHEET					SAP 10.2 REGULATED CO_2 EMISSIONS PER UNIT			
		Space Heating	Domestic Hot Water (Heat Source 1)	Lighting	Auxiliary	Cooling	Space Heating CO_2 emissions ($kgCO_2$ p.a.)	Domestic Hot Water CO_2 emissions ($kgCO_2$ p.a.)	SAP 10.0 CO_2 emissions ($kgCO_2$ p.a.)	Calculated DER SAP 10.0 ($kgCO_2$ / m^2)
House 1	*204.5*	*8883*	*2812*	*648*	*75*	*15*	1,865	591	2,556	12.5
House 2	*204.5*	*8883*	*2812*	*648*	*75*	*15*	1,865	591	2,556	12.5
House 3	*204.5*	*8883*	*2812*	*648*	*75*	*15*	1,865	591	2,556	12.5
House 4	*204.5*	*8883*	*2812*	*648*	*75*	*15*	1,865	591	2,556	12.5
Sum	818	35,533	11,249	2,590	300	62	7,462	2,362	*10,226*	12.5

LONDON HEAT MAP

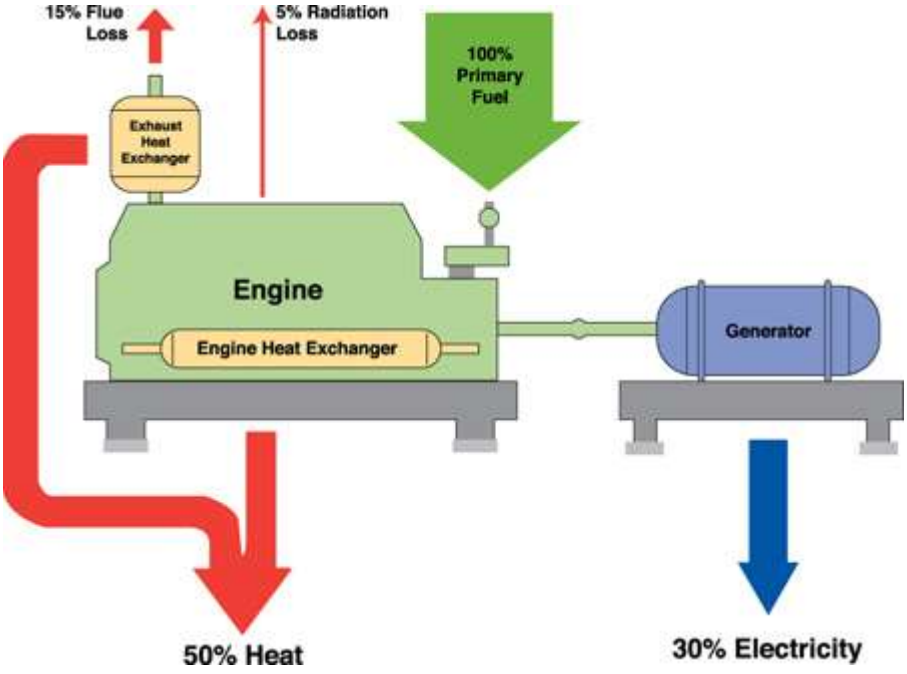
The London Heat Map (shown below) has been consulted to establish the possibility of connecting to heating infrastructure. There are no existing networks present within connectable range of the scheme, therefore a connection is not possible.



BE CLEAN: COMBINED HEAT AND POWER

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.



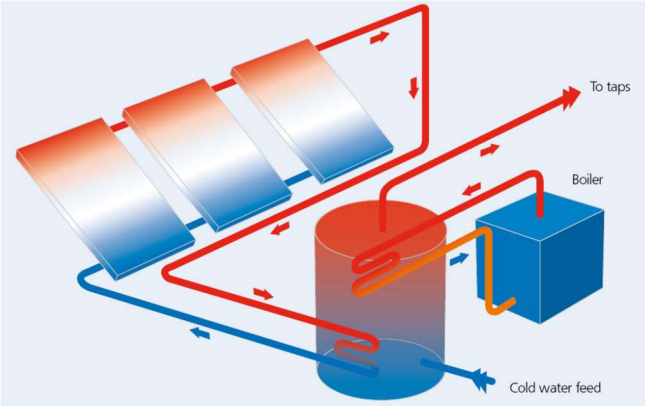
RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

CHP is no longer considered suitable due to low electricity carbon factor in SAP10

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCES – SOLAR HOT WATER

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 has been ruled out due to lower efficiency, higher installation and maintenance cost compared to other proposed renewable technologies.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCES

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - AIR SOURCE HEAT PUMPS

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 SOURCES

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

It is proposed to install an individual air source multi-split heat pump system Mitsubishi PUMY-SP + PEFY-P in each house, comprising indoor and outdoor units. These heat pumps will provide space cooling and will also serve as the second main heating system providing 50% of space heating in each house through fan coil units

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCES

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - SOLAR PHOTOVOLTAICS

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 6 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.

RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Solar photovoltaic system has been ruled out due to lower efficiency, higher installation and maintenance cost compared to other proposed renewable technologies. Solar PV can be retrofitted in future.

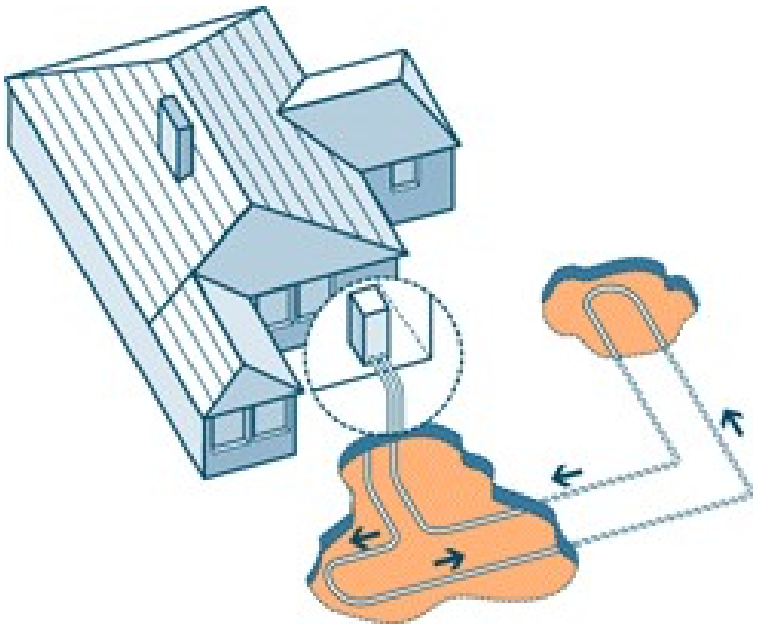
BE GREEN: ON-SITE RENEWABLE ENERGY SOURCES

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

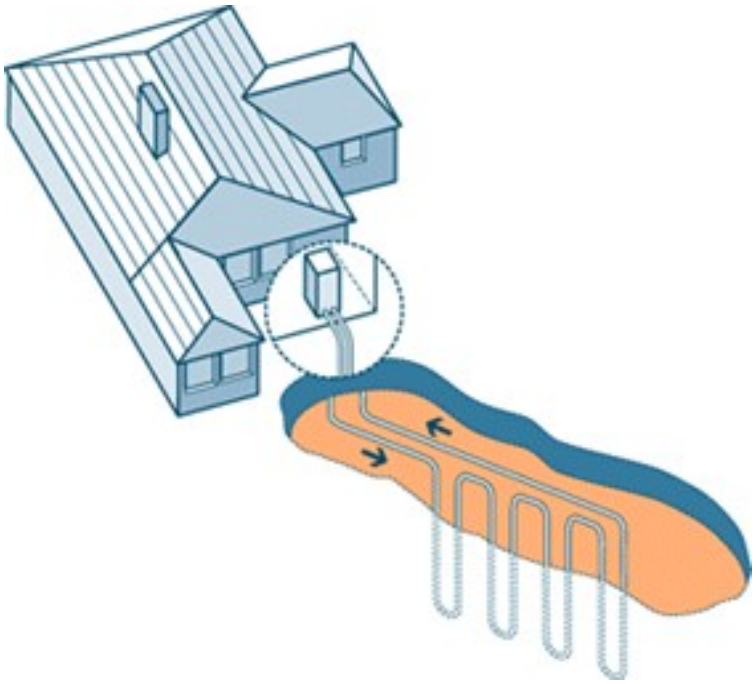
GENERAL INFORMATION

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



- 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 have been ruled out due to significantly higher capital cost and relative small energy saving compared to the proposed air source system.

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

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 SOURCES

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

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

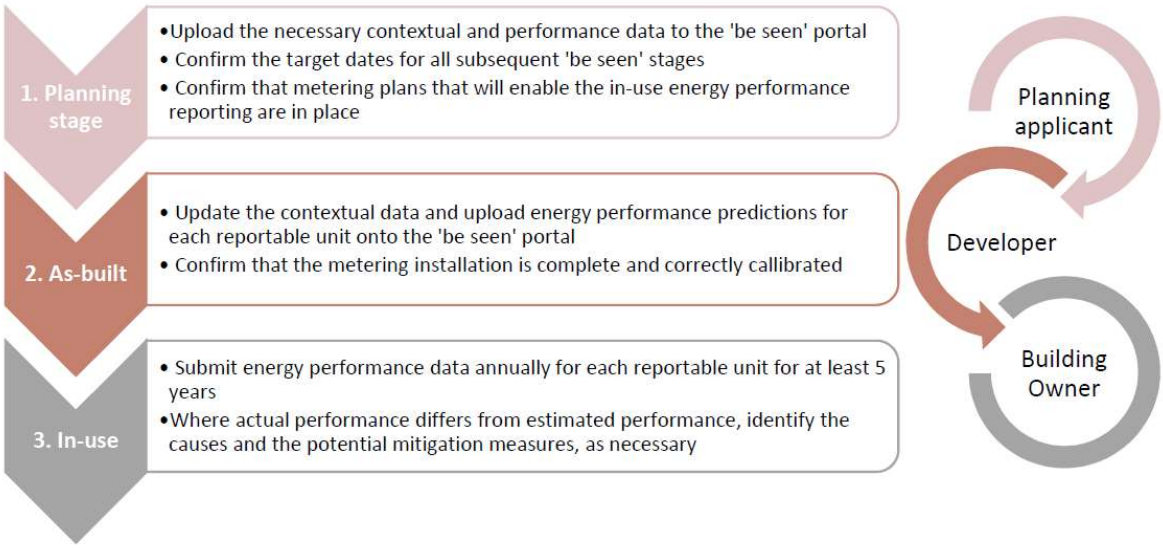
Wind energy systems will not be considered due to negative visual effects, interference, flicker and noise risk. Exposure to wind would be limited by surrounding buildings.

BE SEEN – ENERGY MONITORING

25 THE AVENUE, NORTHWOOD HA6 2NJ

New London Plan Policy SI 2 sets out the 'be seen' requirement for all major development proposals to monitor and report on their actual operational energy performance. The 'be seen' policy will help to understand the performance gap and identify ways of closing it while ensuring compliance with London's net zero-carbon target.

To fully address the "be seen" requirements, the development will be designed to enable post construction monitoring and the information set out in the 'be seen' guidance will be submitted to the GLA's portal at the appropriate reporting stages



Internal Water consumption will be reduced by specification of water efficient fittings. The water consumption in the proposed houses will be reduced to 108.9 litres per person per day or less by installing water fittings with the following parameters:

WC's: All dual flush capacity 3/6 Litres
Bathroom taps flow rate: 5 l/min
Cloak room tap: 10 l/min
Kitchen tap flow rate: 7 l/min
Showers flow rate: 8.7 l/min
Hand shower in loft bathroom: 10 l/min
Bath capacity to overflow: 130 l
Washing Machines water consumption: 5.9 l/kg dry load
Dishwashers water consumption 0.59 l/place setting

The London Plan approach of "Be lean" – "Be clean" – "Be green" is fully adopted by implementing:

- Passive measures (low U-values and air permeability) High efficiency services, i.e. low energy lights, high efficiency gas boilers
- Renewable sources: Air source heat pumps

Excluded renewable sources are:

- Solar hot water
- Solar Photovoltaics
- Biomass
- Wind turbines

The proposed development will achieve:

- 34% regulated CO2 reduction against 2013 Part L compliant baseline

- 2% regulated CO2 reduction by efficiency measures (Be Lean)

- 32% regulated CO2 reduction by renewable sources