Sustainability Statement

8 St Cuthberts Road, Camden, London, NW2 3QL

Produced for: ADA Architecture

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Arial View of Site Image Courtesy of Bing Maps

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Introduction

Purpose of statement

This Statement has been prepared in support of a Planning application submitted for 8 St Cuthberts Road, Camden, London, NW2 3QL.

Darren Evans Assessments has been commissioned by ADA Architecture to produce a Sustainability Statement and Renewable Technology Feasibility Assessment for the development.

This proposal seeks the demolition of the existing building, which contains two flats, and proposes to erect a new building with the addition of a basement level, which will comprise four new build flats. The proposed building will be in the same style as the existing building so as to be in keeping with the street. Two flats will be on the basement and ground floor level with a further two flats on the first and second floors.

The following statement seeks to outline how the proposed development will comply with the requirements and objectives of the National Planning Policy Framework (2012), policies 5.2 – 5.9, 5.15, 6.3, 6.11 and 6.13 of The London Plan 2016, Policies CC1, and CC2 of the Camden Local Plan (2017), Policy CS13 of the Camden Core Strategy (2010) and DP22 of the Camden Development Policies (2010). The Camden Planning Guidance on Sustainability (2015) also outlines the councils approach to sustainability within their planning policy.

Darren Evans Assessments have been commissioned to ensure the development incorporates sustainability by;

- Reducing carbon emissions associated with the development by following the Energy Hierarchy (Be Lean, Be Clean, Be Green)
- Carrying out a Renewable Energy Feasibility Assessment to determine the most viable low zero carbon technology for the development
- Targeting a 20% reduction in Carbon Dioxide emissions from on-site renewable energy technologies
- Addressing how the development will meet wider sustainable development issues

Policy Review

Policy context

Anthropogenic climate change can be described as the production of greenhouse gases and associated change in global climate caused by human activity. In response to the increased scientific awareness of the effect of human activities there has been a push in developed economies towards more sustainable development.

In 1992, the UK signed the Kyoto protocol committing itself and other nations to cut emissions of various greenhouse gases, the most significant being carbon dioxide. Since then, different policies and targets have been set at national, regional and local levels to stimulate and regulate more sustainable development. The Climate Change Act 2008 set carbon budgets to ensure that by 2050 there would be at least an 80% reduction in UK carbon emissions from the 1990 baseline. Additionally, the Conference of the Parties COP21 Paris agreement limiting global warming to 1.5 - 2°C above pre-industrial levels came into force in November 2016.

National Policy

The UK is set to ratify the above Paris Agreement by the end of 2016. Also, the National planning policy framework 2012 aims to make the planning system less complex and easier to understand.

*"At the heart of the National Planning Policy Framework is a **presumption in favour of sustainable development**, which should be seen as a golden thread running through both plan-making and decision-taking."*[1]

The framework encourages applications to comply with local plans on decentralised energy supply where feasible and to take into account landform, layout, orientation, massing and landscaping design to minimise energy consumption. Paragraph 97 encourages the use of renewable and low carbon energy where suitable and for applications to have a positive strategy to promote the above.

To support the move to a low carbon future the framework advises local planning authorities to:

- *"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."*[1]
  *(*NB Superseding the National Planning Policy Framework 2012, the government's 2015 productivity plan 'Fixing the Foundations: Creating a More Prosperous Nation' abolished Zero Carbon Homes and instead, a commitment to a review of energy performance requirements under Building Regulations was agreed. As a consequence, Part L of the Building Regulations 2013 and the Minimum Energy Efficiency Standards (MEES) coming into force from April 2018 set stringent targets in relation to carbon emissions and energy efficiencies in the built environment).

[1] National Planning Policy Framework

Regional Policy – Greater London Authority

Greater London, consuming 9% of UK carbon emissions has the lowest CO_2 per capita emissions in the UK (4.2tCO2 per person). This is due to the urban nature of the transport system, a high population density and a greater proportion of residential areas and lesser proportion of large industrial facilities[2]. Despite its relatively low share of UK emissions however, it is worth noting that with a population of 8.623 million in 2015[3] 4.2tCO2 per person equates to 36.217 million tCO2 which is more than all the energy consumed by Morocco (35.66 million metric tonnes), Slovakia (34.54) and Cuba (34.46)[4]. In order for London to reduce its emissions, it must not only save energy, but also make it from renewable sources. Taking the lead from the national targets, London has set its own targets in the London Plan.

Chapter 5 of the London Plan 2016 sets out a comprehensive range of policies underpinning London's 'Response to Climate Change'. These policies cover climate change mitigation and adaptation, waste, aggregates, contaminated land and hazardous substances.

"The Mayor seeks to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025."[5] It is thought that whilst challenging, the target set by the mayor should be achievable with the full commitment and collaboration of all stakeholders.

London Plan Policies state that energy must be integral in the design of any new development (p.9). Indeed, energy assessments must:

- be submitted at the planning application stage, not submitted post planning in response to a condition
- commit to reducing regulated CO2 emissions below those of a Part L 2013 of the Building Regulations compliant development through energy efficiency measures alone
- include information demonstrating that the risk of overheating has been mitigated through the incorporation of passive design measures
- demonstrate that connection to existing or planned district heating networks has been prioritised and provide correspondence to support this
- commit to a site wide heat network to allow connection to existing or planned district heating networks identified in the area
- commit to a single energy centre to supply the site wide heat network
- where CHP is applicable, select renewable technologies that are complementary with the optimal operation of the CHP.

This document sets out to address the following London Plan Policies

Policy 5.2 - Minimising Carbon Dioxide Emissions - the development proposals will 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

[2] Department for Energy and Climate Change 2014 Local Authority Carbon Dioxide Emissions
[3] UK Population 2016
[4] International Energy Statistics, EIA
[5] Chapter 5, London's Response to Climate Change, The London Plan 2015

As outlined in the Mayor's Sustainable Design and Construction Supplementary Guidance (SPG) published in April 2014, from 6 April 2014 the Mayor will apply a 35 per cent carbon reduction target beyond Part L 2013 of the Building Regulations for major developments - 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.

Policy 5.3 - Sustainable Design and Construction - requires that the highest standards of sustainable design and construction should be achieved to improve the environmental performance of new developments.

Policy 5.4 – Retrofitting – requires that programmes should be in place to bring existing buildings up to the Mayor's standards on sustainable design and construction.

Policy 5.5 - Decentralised Energy Networks - requires that 25% of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025.

Policy 5.6 - Decentralised Energy in Development Proposals – Development proposals should evaluate the feasibility of CHP systems

Policy 5.7 - Renewable Energy - requires that all major developments seek to reduce their CO2 emissions through the use of onsite renewable energy generation wherever feasible. As this is a Minor Development, the inclusion of renewable technologies is not mandatory.

Policy 5.8 – Innovative Energy Technologies – encourages the use of innovative technologies for example the uptake of electric and hydrogen fuel cell vehicles, hydrogen supply and distribution, and advanced conversion technologies for the treatment of waste.

Policy 5.9 – Overheating and Cooling – encourages the design of spaces to avoid overheating and excessive heat generation and to reduce overheating due to the impacts of climate change and the urban heat island effect.

Policy 5.15 – Water Use and Supplies – encourages the protection and conservation of water supplies and resources in order to secure London's needs in a sustainable manner

Housing Standards Policy 5.15 Water use and Supplies – Developments should minimise the use of mains water by incorporating water saving measures and designing to achieve a target of 105 litres or less per person per day.

Implementation of Zero Carbon Homes (from 1 October 2016)
Despite the government's announcement in July 2015 that it no longer intends to continue with the zero carbon allowable solutions carbon offsetting scheme 'Zero Carbon Homes', this remains in place within the London Plan for domestic buildings, with a view to preparing the city for 'Nearly Zero Energy Buildings' by 2020 (p.10)

'Zero carbon' homes are 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 of the Building Regulations) 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)

Local Policy

Camden Core Strategy (2010)
Policy CS13 – Tackling Climate Change though promoting higher environmental standards

The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

a) Ensuring patterns of land use that minimise the need to travel by car and help support local energy networks;
b) Promoting the efficient use of land and buildings;
c) Minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy: - ensuring developments use less energy, - making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks; - generating renewable energy on-site; and
d) Ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

The Council will have regard to the cost of installing measures to tackle climate change as well as the cumulative future costs of delaying reductions in carbon dioxide emissions.

Council will expect developments to achieve a reduction in carbon dioxide emissions of 20% from on-site renewable energy generation (which can include sources of site-related decentralised renewable energy) unless it can be demonstrated that such provision is not feasible. Details on ways to generate renewable energy can be found in our Camden Planning Guidance supplementary document.

Policy CC1 / CC2 – Climate Change Mitigation

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. The council will also require development to be resilient to climate change through sustainable design and construction measures.

Policy DP 22 – Promoting sustainable design and construction

The Council will require development to incorporate sustainable design and construction measures. Schemes must demonstrate how sustainable development principles, including the relevant measures set out in paragraph 22.5 below, have been incorporated into the design and proposed implementation.

Summary and Proposals

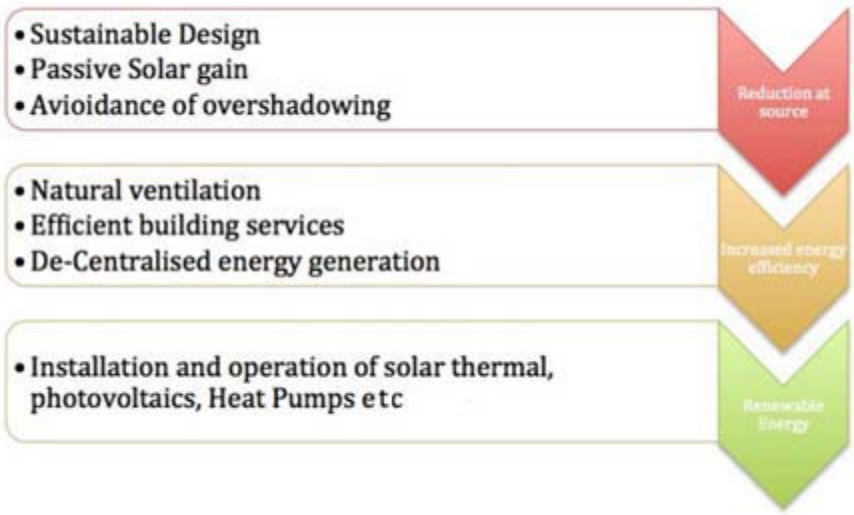
The conclusion of the energy strategy is that the development significantly reduces the buildings CO_2 emissions when compared to the baseline target, through a combination of passive measures, building fabric design improvements and the installation of high efficiency heating and hot water services.

A saving in CO_2 of **0.24%** is estimated to be achieved annually compared to the building regulations compliant baseline assessment across the site. This will ensure compliance with the London Plan 2016 Policy 5.2.

Camden Core Strategy (2010) Policy CS13 has been addressed and a 2.28kWp solar pv array across the site with an Air Source Heat Pump to Flat A has been proposed. The development has achieved the target of a 20% reduction in Carbon Dioxide emissions through maximizing the solar pv potential and installing an ASHP. It is predicted that a reduction of **20.04%** will be achieved by the use of on-site renewable technologies.

The Energy Hierarchy

The Energy Hierarchy adopts a set of principles to guide design development and decisions regarding energy, balanced with the need to optimise environmental economic benefits. The hierarchy, which is widely accepted approach amongst many local county councils, seeks to ensure that development incorporates energy efficiency through the approach:



It is considered that the above principles carbon reduction forms the most appropriate approach from both the practical and financial perspective. The industry is broadly in agreement that the energy efficiency and low carbon technologies have the greatest impact offsetting CO_2 emissions. Therefore, it is logical to encourage enhanced mitigation through energy efficiency and low carbon technologies in the first instance, as opposed to applying renewables as the first option at a significantly greater cost.

Major or Minor Development

As Defined by the Department for Communities & Local Government (DCLG), and the Greater London authority (GLA), the proposed development at 8 St Cuthberts Road would be classed as minor development. This is detailed in table 1 which has been adapted from the GLA Annex Six Glossary and guidance from the DCLG.

Scale	Description
Householder	Extensions to houses (including roof extensions)
Minor	Residential development of 1 to 9 units in scale including conversions. Non-residential development of up to 999 m2.
Major	Residential development over 10 units. Non-residential development over 1,000 m2
Large Scale Major	Residential development over 200 units or a site of 4 hectares or more. Non-residential development over 10,000 m2

Table 1: Definition of development scale

As the development consists of four dwellings the site is considered a Minor Development and therefore guidance sought will be in respect of Minor Development Policies. This includes the energy targets which are outlined in the London Plan 2016.

Assessment Methodology

This development is assessed as a minor development following the guidance from the London Plan (2016), GLA guidance on producing energy statements (March 2016) and The Department for Communities and Local Government's 'Planning Applications Decisions – Major and Minor Developments'.

This energy assessment includes the following details:

Calculation of a target energy demand and carbon dioxide emissions on a residual energy basis, showing the contribution of emissions from uses covered by building regulations (regulated emissions);

Proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services;

Proposals to further reduce carbon dioxide emissions through the use of decentralised energy where feasible, such as district heating and cooling and combined heat and power (CHP).

Proposals to further reduce carbon dioxide emissions through the use of onsite renewable energy technologies.

Conclusions on how the proposed development meets the regional and local planning policies.

Be Lean

At the earliest stage the buildings have been designed using a fabric first approach as to initially minimise energy and resulting CO_2 emissions. Best practice and appropriate measures have been included into the design as to minimise the environmental impact on the site as set out in Wealdstone Development Management Policy DM12 as well as Policy 5.2 and 5.3 of the London Plan.

The building has been designed to maximise the potential for passive energy savings. Particular attention will be paid to thermal envelope, and it will be designed to include high levels of insulation to meet and exceed Building Regulations Part L 2013 standards.

Given the early stage of this project the construction of certain thermal elements have not been finalized. Target u-values, which the client will achieve with their final specification, have been used in these instances.

The following tables provide a summary of the energy efficient and carbon reducing design characteristics incorporated across the development.

Design SAP Data Input Table			
Element		**Details**	**Comments**
Floor U-Values	Basement Floor	0.12 W/m²K	Target U-Values – Construction TBC
	Exposed Floor	0.15 W/m²K	Target U-Values – Construction TBC
Wall U-Values	External Walls	0.19 W/m²K	Target U-Values – Construction TBC
	Wall to Corridor	0.19 W/m²K	Target U-Values – Construction TBC
	Stud Walls	0.19 W/m²K	Target U-Values – Construction TBC
	Dormer Walls	0.19 W/m²K	Target U-Values – Construction TBC
Roof U-Values	Pitched Roof	0.16 W/m²K	Target U-Values – Construction TBC
	Basement Roof	0.14 W/m²K	Target U-Values – Construction TBC
	Ceiling to Roof Voids	0.14 W/m²K	Target U-Values – Construction TBC
	Ceiling under Ridge	0.14 W/m²K	Target U-Values – Construction TBC
	Dormer Roof	0.14 W/m²K	Target U-Values – Construction TBC
Opening U-Values	Windows	1.4 W/m²K	Double Glazed, Low-E Coated. G Value: 0.63
	Doors - Glazed	1.4 W/m²K	Double Glazed, Low-E Coated. G Value: 0.63
	Doors - Solid	1.4 W/m²K	-
	Rooflights	1.4 W/m²K	Double Glazed, Low-E Coated. G Value: 0.63
Ventilation	Air Tightness Mechanical Ventilation	5 Natural Ventilation	- Extract Fans in wet rooms
Heating	Primary Heating System	Gas fired condensing Boiler	New Flats – Ideal Logic ESP1 (89.6% efficient) Delayed Start Thermostat Radiators throughout
	Controls	Time and Temperature zone controls	
Lighting	Low Energy	100% LED Fittings	

Table 1: Energy Efficient Measures of SAP Calculations

Site Wide Summary of Be Lean Measures

All thermal elements and controlled fittings have been selected and designed to exceed the minimum Part L Building Regulations requirements. The heating and hot water systems and other fixed services improve on the requirements out lined in the Domestic Building Services Compliance Guide (2013).

Additionally, the new build flats have been specified with a very efficient 'A-Rated' modern combination boiler which will help further reduce the CO_2 emissions of these dwellings. LED light fittings have also been specified throughout.

Incorporating the above measures into the design will reduce the sites overall energy demand and subsequent CO_2 emissions beyond the requirements of Part L Building Regulations (See Table 2).

New Flats – Be Lean

Dwelling	Total Floor Area (m^2)	Target Emission Rate	Dwelling Emission Rate (kg CO_2/m2/year)	Total CO_2 (kg CO2/year)
Flat 1	72.48	18.92	18.45	1337.26
Flat 2	97.81	18.41	18.47	1806.55
Flat 3	60.93	21.03	21.15	1288.67
Flat 4	78.54	20.16	20.24	1589.65
			Total	**6022.13**

Table 2: Summary of emissions of 'Be Lean' stage

This specification improves upon building regulations emission targets by a margin of **0.24%** across the site.

Total Target Emissions: **6,036.73 KgCO_2/Year**
Total Design Emissions: **6,022.13 KgCO_2/Year**
Total Emissions Saving: **14.60 KgCO_2/Year**

Be Clean

Policy CS13 of the Camden Core Strategy, Policy CC1 of the Local Plan and Policy 5.5 and 5.6 of the London Plan encourage the move to decentralised generation of heat and power seeking to reduce the losses and inefficiencies of reliance upon a centralised system. The mayor has set a target of 25% to be generated through localised decentralised energy systems by 2025.

Connection to Existing Heat Distribution Networks

Following London Plan guidance the priority will be given to connection to any existing CCHP/CHP distribution networks.

The maps below detail the existing and proposed district heating networks in the London Borough of Camden. At present there are no nearby heat networks and no plans to extend any existing district heat networks to the vicinity of this development.

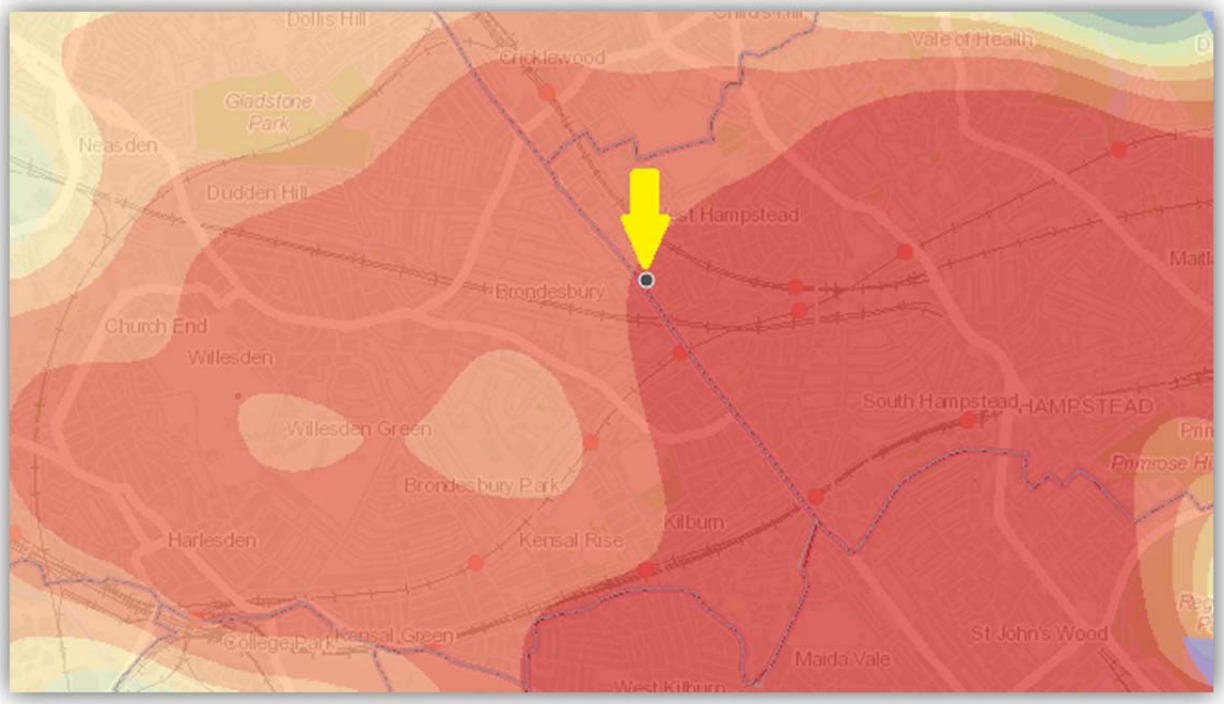


Figure 1: London Heat Density Map (http://www.londonheatmap.org.uk/Mapping/)

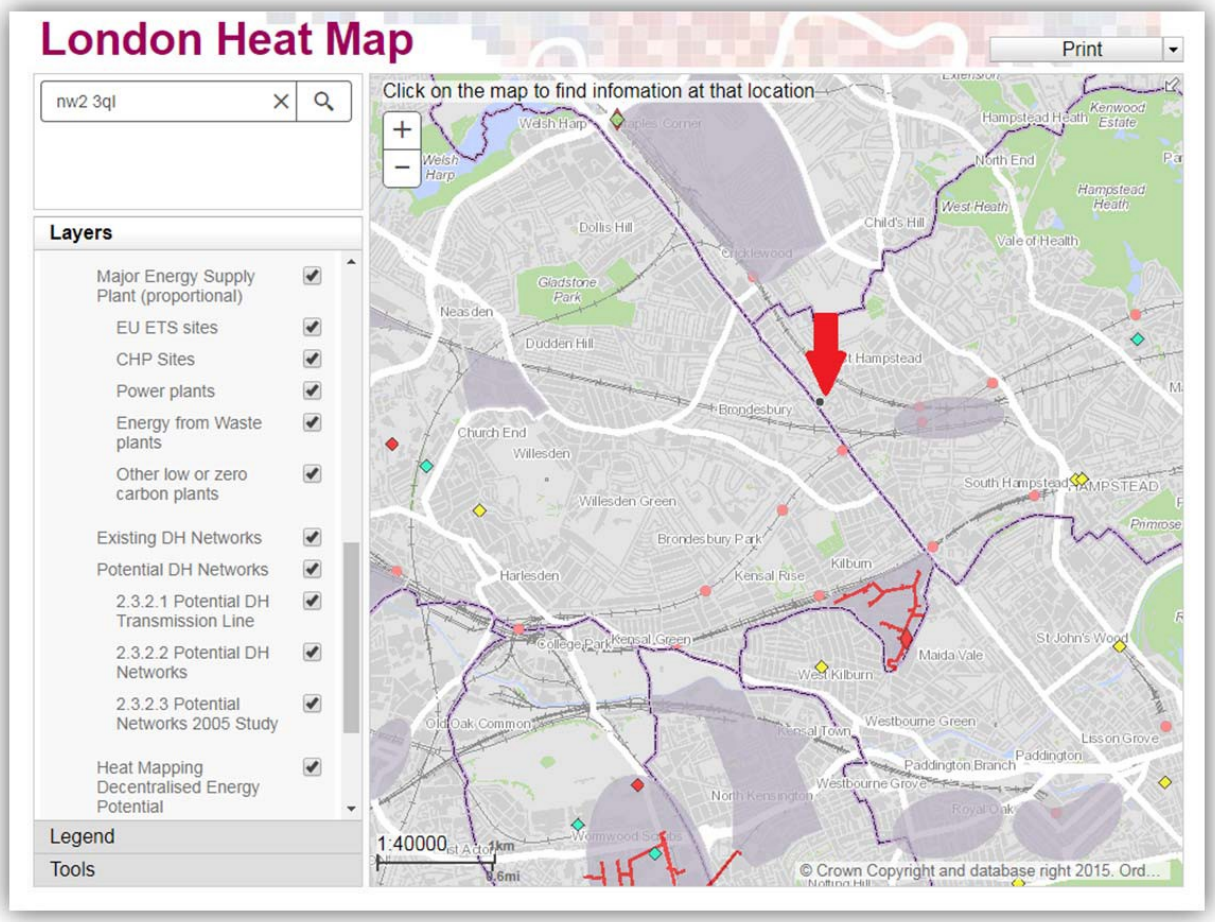


Figure 2: London Heat Network Map (http://www.londonheatmap.org.uk/Mapping/)

According to the interactive London Heat Map website, there are no current district heating networks in the area or imminent plans for a new network (See Figure 2). Therefore no provision to a supplement a network will be provided.

As per the Energy Planning guidance – April 2015, the proposed development is not required to have CHP. The proposed development falls under the criteria small- medium residential development:

"10.25 The following types of development need not install on-site CHP:

Small-medium residential developments (e.g. containing fewer than 500 apartments);

At this scale it is generally not economic to install CHP in residential led, mixed use developments (and where CHP is installed it tends to have lower electrical efficiencies). Due to the small landlord electricity demand, CHP installed to meet the base heat load would require the export of electricity to the grid. However, the administrative burden of managing CHP electricity sales at this small scale where energy service companies (ESCOs) are generally not active, and the low unit price available for small volumes of exported CHP electricity, means it is generally uneconomic for developers to pursue. This can lead to CHP being installed but not operated."

Be Green - Renewable Technologies

The GLA's guidance on preparing energy assessments states that there needs to be consideration of the impact of development phasing (where relevant) to ensure the scheme can meet future, more stringent planning or regulatory targets (p.9)

Policy 5.7 of the London plan states "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"

Individual projects are expected to consider renewable technologies and seek to reduce carbon dioxide emissions following the installation wherever possible.

The following renewable technologies have been evaluated for use:

- Solar Photovoltaic Cells
- Solar Hot Water
- Wind Turbines
- Ground Source Heat Pump
- Air Source Heat Pump
- Biomass

Photovoltaics

Solar photovoltaics (PVs) convert energy from daylight into electricity using a semiconductor material such as silicon. When light hits the semiconductor, the energy in the light is absorbed, 'exciting' the electrons in the semiconductor so that they break free from their atoms. The resultant flow of electrons through the semiconductor material produces electricity.

Feasibility	Further Consideration
The building has an available area of free roof slope, on the South West elevation. This section of roof would provide the best site for the location of solar pv panels as it is of a desirable pitch and orientation for the panels to work efficiently. There are, however, two rooflights on this section of roof which will limit the size of the array. Additionally, due to the angle of the hipped roof the space available for the array is further reduced. Despite the array being limited in size there is available roof space for solar pv to provide a meaningful contribution the carbon dioxide reductions of the development.	Yes

Solar Thermal (Hot Water)

Solar water heating systems convert solar radiation to heat carried by water for use in space heating or the provision of domestic hot water. Solar water heating systems normally operate with a back-up source of heat, such as gas condensing boilers. The solar water heating preheats the incoming water, which is topped up by the back-up heat source when there is insufficient solar energy to reach the target water temperature.

Feasibility	Further Consideration
This solution could be utilised to generate hot water using the energy from the sun. Unfortunately, the flats are set to use individual combination boilers which are not compatible with solar thermal. The use of solar thermal would require the addition of a water store in each dwelling which is not compatible or feasible with the proposed heating system.	No

Wind Turbines

Wind turbines are modern, high-technology descendants of the windmills that have been around for centuries. In modern windmills the kinetic energy of the wind is used to turn a turbine to generate electricity as opposed to moving water or turning a grist mill wheel. There are two types of wind turbine, the horizontal-axis type which faces up or downstream of the wind and where the rotational movement of the blade is connected to a generator to create electricity. The other is the vertical-axis design, which is by far the most flexible type of wind turbine being best suited to more urban sites as it is more cost effective and operates with wind coming from any direction.

Feasibility	Further Consideration
Owing to site-constraints, micro-wind turbines have not been considered as part of this feasibility study. The primary constraints include the character of the building, the urban surroundings (and associated potential planning restrictions) and relatively low wind speeds in this area, averaging ~ 4.8 ms-1 at 10m. (http://www.rensmart.com/Weather/BERR) Wind turbines are also likely to have a significant visual impact on local environment, as well as health and safety implications for occupiers or users on-site and on adjacent areas as a result of noise and light flicker associated with the wind turbines.	No

Ground Source Heat Pumps

Ground source heating takes advantage of the stable ground temperature of 12ºC to heat either air or water to provide energy efficient heating (and optional comfort cooling) to a building. The energy flow is driven by the temperature difference between the ground and the circulating fluid which can then be used to deliver heating (and optional cooling) to the building.

The direct bore hole type of installation requires a number of boreholes with a depth of up to 100m and a minimum centreline distance of 6m separating each bore hole.
Alternatively, closed loops can be installed along with the piles and or pad foundations of the building to take advantage of the foundation excavations to maximise the earth-connectivity of the system

Feasibility	Further Consideration
The building is situated in a built up area, surrounded by hard-standing, therefore there is inadequate space available to locate either horizontal or vertical ground loop systems to serve the site. Vertical ground loops can be combined with foundation piling, however, this technique is not being employed at the proposed site and the depths needed for the heating loops far exceed the foundations proposed.	No

Air Source Heat Pumps

An air source heat pump (ASHP) is a system which transfers heat from outside to inside a building. Under the principles of vapor compression refrigeration, an ASHP uses a refrigerant system involving a compressor and a condenser to absorb heat at one place and release it at another.

In domestic heating use, an ASHP absorbs heat from outside air and releases it inside the building, as hot air, hot water-filled radiators, under floor heating and/or domestic hot water supply.

Feasibility	Further Consideration
It has been assessed that there is adequate outside space to position the external condensers. The proposed heating systems associated with the dwellings are compatible with a low temperature heating system from an ASHP. The low temperature circuits and high efficiency of the external condenser results in a very efficient overall heating system that can reduce the associated emissions of the dwellings. Care has to be taken where the condensers are located to ensure there is no negative impact to the aesthetics of the building and to the building users through noise pollution. Any installation will be carried out any an MCS certified installer to ensure the design and installation of the system are correct.	Yes

Biomass

Biomass boilers are an alternative to conventional fossil fuel heating. They burn woodchip, wood pellets, cereal waste or a combination of organic fuels, and are a carbon neutral option. Using biomass as an energy source creates a 'closed carbon cycle' – i.e. as a biomass energy source grows it absorbs CO_2 from the atmosphere, when it is burnt the CO_2 stored by the biomass is released, making it carbon neutral.

Feasibility	Further Consideration
Consideration needs to be given to the size of the development and the frequent deliveries that would be required for the system in order to maintain operation. Furthermore, the fuel storage silo/tank would have to be located external to the building, taking up amenity and parking space for the residents. There are also potential noise, dust and odor problems associated with the deliveries as well as Air Quality issues from the burning of the fuel. The higher NOx emissions are also of concern in this borough and as a result of this and the aforementioned items; Biomass is not considered a viable option.	No

Summary

Following the feasibility assessment of the readily available Low and Zero Carbon technologies on the market, it has been established that solar pv is the most appropriate technology to be implemented. However, due to the orientation of the building, shape of the roof and the design and location of skylights the area available for solar pv is limited. Nevertheless, the space is deemed large enough for a meaningful contribution to be made towards the reduction of CO_2 emissions of the site. Air source heat pumps are also considered appropriate, providing suitable system design and installation is followed by a trained professional.

Site Wide Summary of Be Green Measures

After consultation with the client an agreement has been reached to proceed based on the use of Solar Photovoltaics on the site and an air source heat pump to Flat A. As mentioned in the feasibility assessment, the area available for solar pv is limited. It has been estimated that a 2.28kWp array (8 x285W modules) could be mounted on the South West facing roof slope. An in-depth calculation on the available roof space by an MCS registered solar pv installer will be undertaken as the project progresses, this will then determine the maximum capacity of the roof. An air source heat pump has also been used to supply the heating and hot water to Flat A to ensure the CO_2 emission targets set out in Policy CS13 are met. Calculations have been completed incorporating a 2.28 kWp array of photovoltaics and a NIBE F2015 6kW air source heat pump into the SAP calculations. The heat pump chosen is an example unit and is subject to change following a detailed design by an appropriately qualified heating engineer.

New Flats – Be Green

Dwelling	Total Floor Area (m^2)	Target Emission Rate (kg CO_2/m2/year)	Dwelling Emission Rate (kg CO_2/m2/year)	Percent Improvement (%)	Total CO_2 (kg CO2/year)
Flat 1	72.48	27.27	18.47	32.27	1338.71
Flat 2	97.81	18.41	16.04	12.87	1568.87
Flat 3	60.93	21.03	17.25	17.97	1051.04
Flat 4	78.54	20.16	17.22	14.58	1352.46
				Total	**5,311.08**

Table 2: Summary of emissions of 'Be Lean' stage

This specification improves upon building regulations emission targets by a margin of **20.04%** across the site.

Total Target Emissions: **6,641.94 KgCO_2/Year**
Total Be Green Emissions: **5,311.08 KgCO_2/Year**
Total Emissions Saving: **1330.86 KgCO_2/Year**

The incorporation of photovoltaic panels and an ASHP to SAP Calculation will ensure the total site wide Design Emission Rate will improve upon the Target Emission Rate by a margin of **20.04%.**

This satisfies the requirements of the local planning policies and the feasibility assessment has shown that, due to the building being specifically designed to be in-keeping with the surrounding buildings, this is the most technically, functionally and economically feasible method of making a reduction in carbon dioxide emissions through on-site renewables.

The above calculations have shown that the proposed development has met the emission reduction targets under Policy CS13 directly.

Wider Sustainable Targets

Water Conservation

This scheme will aim to reduce potable water consumption in the dwellings to below 105 litres per person per day to meet the Code for Sustainable Homes level 4 standards and meet Policy 5.15 of the London Plan 2016. This will be achieved through the use of internal potable water fixtures and fittings which utilise low flow rates and capacities without reducing an individual's ability to enjoy their property. An example of potential flow rates and fixtures is outlined in the table below:

Internal Potable Water Fixing	Flow Rate / Capacity
Toilet	Dual Flush 4 and 2.5 litres
Basin Taps	4 litres / min
Bath	160 litre capacity to overflow
Shower	8 litres / min
Kitchen Taps	7 litres / min

Table 5: Flow rates and capacities to achieve CfSH level 4

With this arrangement a figure of 104.01 litres per person per day has been achieved which surpasses the target of the Code for Sustainable Homes level 4 and is in line with Policy 5.15 of the London Plan 2016.

Conclusions and Summary

The developer has considered all sustainable solutions and has reduced the energy demand and resultant carbon dioxide emissions of the development above and beyond the requirements of the Building Regulations Part L1A. A significant reduction in both CO_2 and energy has been achieved compared to the baseline assessment.

This Sustainability Statement has shown how the proposed development has been designed using the principles of the Energy Hierarchy in order to deliver significant carbon dioxide savings as compared to the existing building. In particular, the design team has sought to minimise emissions at source by the incorporation of the "Fabric First" approach utilising the principles of passive design. Furthermore the implementation of sustainable design features such as the high efficiency boilers coupled with advanced controls, as well as high efficiency lighting throughout.

This approach is advantageous ensuring a reduction in energy consumption without being detrimental to the appearance of the building and removing the need for inhabitant interaction. In addition, this fabric first approach requires no maintenance by the inhabitants.

These improvements to the specification will ensure the development achieves a reduction of **0.24%** over building regulations Target Emissions.

A review of the possible low carbon or renewable energy strategies for the development has been carried out and the client proposes to introduce 2.28kWp of photovoltaic panels and an air source heat pump following the completion of the viability and feasibility study. This equate to approximately 13.12m² across the site (Based on a 285W panel being approximately 1.64m²).

The addition of the photovoltaic panels and an ASHP will reduce the onsite carbon dioxide emissions by **20.04%** and has been evaluated to be the most appropriate method to address the planning policies, both commercially and in respect to carbon emissions savings.

Therefore, the overall energy strategy through the combination of a fabric first approach, sustainable design and efficient services will ensure the proposed development at 8 St Cuthberts Road, Camden, London, NW2 3QL achieves the required reduction in CO_2 against the developments baseline case. The property also complies with Policy CS13 of the Camden Core Strategy, National Planning Policy Frame Work and complies with Polices 5.2 and 5.7 of the London Plan.

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