ENERGY STATEMENT

Proposed Dwellings

55 and 57, Camden Mews, London, NW1 9BY

On Behalf of

John Kerr Associates Ltd

Produced by

Jennifer Bantin

Issue Status (v. 2/Aug 2018)

Date	Issue	Assessor
09/04/20	1	Jennifer Bantin

1.0 SUMMARY

This report was carried out on behalf of John Kerr Associates Ltd to in order to satisfy planning conditions made in relation to the demolition of an end terrace two storey dwelling which will be replaced with two, four storey new build mews dwellings.

This report should be read in conjunction with the SAP reports;

B133227 Baseline
B133227 19% Reduction
B133228 Baseline
B133228 19% Reduction

This report is in response to the London Borough of Camden Council's Local Plan 2016 and specifically deals with CC1- Climate Change Mitigation and CC2-Adapting to Climate Change.

2.0 CONTENTS PAGE

Title Page

1.0 Summary

2.0 Contents Page

3.0 Introduction

- 3.1 Aims
- 3.2 Design Strategy
- 3.3 Energy Efficient Design Specification
- 3.4 Energy and CO2 Reduction Summary

4.0 Low and Zero Carbon (LZC) Technologies

References and links

3.0 INTRODUCTION

3.1 Aims

This report is to demonstrate a 19% Carbon Reduction over Part L1a of the current Building Regulations in order to meet Policy CC1- Climate Change Mitigation.

The proposed development has been assessed for compliance with the current documentation, namely, Part L1a 2013 of the Approved Documents “Conservation of Fuel and Power” and SAP worksheet 9.92 of SAP 2012. The assessment was undertaken by Jennifer Bantin, an accredited On Construction SAP assessor.

Policy CC1 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.

We will:

a. promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
b. require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
c. ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
d. support and encourage sensitive energy efficiency improvements to existing buildings;
e. require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
f. expect all developments to optimise resource efficiency.

For decentralised energy networks, we will promote decentralised energy by:

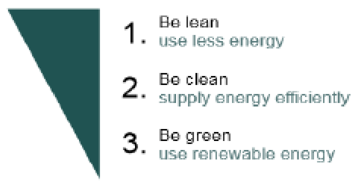
g. working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;
h. protecting existing decentralised energy networks (e.g. at Gower Street Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and
i. requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network.

To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.

The energy hierarchy

The Council's Sustainability Plan 'Green Action for Change' commits the Council to seek low and where possible zero carbon buildings. New developments in Camden will be expected to be designed to minimise energy use and CO2 emissions in operation through the application of the "energy hierarchy". The energy hierarchy is a sequence of steps that minimise the energy consumption of a building. Buildings designed in line with the energy hierarchy prioritise lower cost passive design measures, such as improved fabric performance over higher cost active systems such as renewable energy technologies.

The following diagram shows a simplified schematic of the energy hierarchy, which is explained further in supplementary planning document Camden Planning Guidance 3: Sustainability.



All developments involving five or more dwellings and/or more than 500 sqm of (gross internal) any floorspace will be required to submit an energy statement demonstrating how the energy hierarchy has been applied to make the fullest contribution to CO2 reduction. All new residential development will also be required to demonstrate a 19% CO2 reduction below Part L 2013 Building Regulations (in addition to any requirements for renewable energy). This can be demonstrated through an energy statement or sustainability statement.

Be lean

Proposals should demonstrate how passive design measures including the development orientation, form, mass, and window sizes and positions have been taken into consideration to reduce energy demand, demonstrating that the minimum energy efficiency requirements required under building regulations will be met and where possible exceeded. This is in line with stage one of the energy hierarchy 'Be lean'.

Be clean

The second stage of the energy hierarchy 'Be clean' should demonstrate how the development will supply energy efficiently through decentralised energy. Please refer to the section below on decentralised energy generation.

Be green

The Council will expect developments of five or more dwellings and/or more than 500 sqm of any gross internal floorspace to achieve a 20% reduction in carbon dioxide emissions 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. This is in line with stage three of the energy hierarchy 'Be green'. The 20% reduction should be calculated from the regulated CO2 emissions of the development after all proposed energy efficiency measures and any CO2 reduction from non-renewable decentralised energy (e.g. CHP) have been incorporated.

All major developments will also be expected to demonstrate how relevant London Plan targets for CO2 reduction, including targets for renewable energy, have been met. Where it is demonstrated that the required London Plan reductions in carbon dioxide emissions cannot be met on site, the Council will require a financial contribution to an agreed borough wide programme to provide for local low carbon projects. The borough wide programme will be connected to key projects identified in the Council's Green Action for Change.

Elmhurst Energy Consultancy, 16 St Johns Business Park, Lutterworth, LE17 4HB
Tel: 01455 883259 email: consultancy@elmhurstenergy.co.uk

Policy CC2 Adapting to climate change

The Council will require development to be resilient 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 run-off 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.

Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement.

Sustainable design and construction measures

The Council will promote and measure sustainable design and construction by:

e. ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation;
f. encourage new build residential development to use the Home Quality Mark and Passivhaus design standards;
g. expecting developments (conversions/extensions) of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and
h. expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.

3.2 Design Strategy:

- To produce a Part L Compliant Baseline SAP calculation for the proposed dwellings based information supplied by John Kerr Associates.
- Produce a SAP calculation using the Energy hierarchy methodology…..fabric first to reduce the energy demand, energy efficient building services and then to generate energy from renewable sources.

3.3 Energy Efficient Design Specification:

The following Energy Efficient design measures are recommended in order to meet the Local Authority Plan requirements; high levels of insulation, passive solar gains, and high level of air tightness. The design specification includes the provision of an MVHR (Mechanical Ventilation Heat Recovery) system which provides fresh filtered air into the dwelling whilst retaining most of the heat energy that has already been used in heating the dwelling by constantly extracting this warm moist air out of the dwelling. This air is passed over a heat exchanger where the warmth is recovered and retained. This retained heat is then transferred to incoming fresh filtered air which is distributed to the habitable rooms such as living rooms and bedrooms. This reduces the amount of heat losses and provides a more comfortable environment.

The key energy efficient design specification measures are;

- All exposed floors, including basement floors to achieve a u-value of 0.10
- All external walls, including basement walls to achieve a u-value of 0.16
- All exposed Flat roofs to achieve a u-value of 0.10
- All windows and roof lights to achieve a u-value of 1.20, the design of the windows would also include minimal frame.
- The solid entrance doors to achieve a u-value of 1.00
- Use of Accredited Construction details for all relevant thermal bridges.
- Use of Insulated lintels such as Hi-Therm
- 100% low energy lighting internally and externally
- An ‘A Rated’ (89.5%) natural Gas regular boiler with ‘zoned’ heating controls and a delay start stat
- A higher performance hot water cylinder
- A Design Stage Air Permeability result of $4.0m^3/(h.m^2)$ @ 50 Pa
- MVHR system – a Zehnder ComfoAir Q350.

3.4 Energy & CO2 Reduction Summary:

Solar Hot Water, Photovoltaic Panels and Heat pumps have been investigated for their suitability to the site and the development, however on this occasion no renewable technologies have been specified. The 19% reduction in Carbon emissions has been achieved by suggesting a highly insulated envelope and energy efficient heating and ventilation.

These measures have reduced the energy demand by 27% and the Carbon Emissions have been reduced by 20.40%

SITE BASELINE ENERGY REQUIREMENT				
Use	**kWh/year**	**Fuel Type**	**fuel factor**	**CO_2 kg/year**
Space Heating	17,517.46	Gas	0.216	3,783.77
Secondary Heating	0.00			0.00
Water Heating	5,588.59	Gas	0.216	1,207.14
Pumps and fans	60.00	Electric	0.519	31.14
Lighting	1,081.52	Electric	0.519	561.31
Total	**24,247.57**	-		**5,583.35**

SITE IMPROVMENTS ENERGY REQUIREMENT				
Use	**kWh/year**	**Fuel Type**	**fuel factor**	**CO_2 kg/year**
Space Heating	10,012.48	Gas	0.216	2,162.70
Secondary Heating	0.00			0.00
Water Heating	5,624.56	Gas	0.216	1,214.90
Pumps and fans	973.78	Electric	0.519	505.39
Lighting	1,081.52	Electric	0.519	561.31
Total	**17,692.33**	-		**4,444.30**
reduction	**-27.03%**	-		**-20.40%**

4.0 LOW AND ZERO CARBON (LZC) TECHNOLOGIES

LZC Introduction

The Kyoto Protocol has raised the public profile of the potential harm caused by carbon emissions and has led to a number of guidance documents being produced to support local development plans. Although the Kyoto Protocol contains no specific requirements, it is accepted that these LZC technologies will play a "...significant role..." in meeting the targets set out in the Protocol.

Low and Zero Carbon (LZC) technologies is the term applied to either renewable sources of energy or technologies that are significantly more efficient than traditional solutions or emit less carbon in providing heating , cooling or power (TM38, 2006). These systems include harnessing energy from the surrounding environment as shown in Figure 4:

Source	Resulting Technology
Sun	• Solar Panels – used to supplement the energy used for water heating. • PV Cells – used to generate electricity to supplement the primary energy demand
Wind / Air	• Wind Turbines – used to generate electricity and supplement the primary energy demand • Air source heat pump – used to extract residual heat from external air to provide space and water heating
Ground	• Ground source heat pump – harnesses residual geothermal heat source and produces heat thus reducing the primary energy demand for space and water heating
Other	• CHP and Micro-CHP – These systems operate on a range of scales (as the name suggests) and recovers and uses heat from the generation process. • Biomass – using a fuel source with little emissions to generate heat.

Figure 4: Introduction to the main LZC technologies utilised

The technologies on offer to the market are continuing to advance at every available opportunity and have advantages and disadvantage associated with each one. The following sections will give a brief overview of the technologies on offer and conclude which technology is to be used on the development noted.

LZC Technologies – System Analysis

Solar Hot Water Panels

Solar Hot Water Panels or, Solar Panels as they are commonly known, are used to supplement the energy required for the domestic hot water requirement. The system will collect and absorb solar radiation and transfer the heat directly to the storage tank. The circulation may then be either 'passive' thus relying on the natural convection or 'active' using a pump which increases a system's efficiency, but has additional costs for the controls and energy requirement.

There are two main types of solar panel collector available to the UK market. The first is Flat Plate Collectors which consist of a dark absorber sheet with pipes built into the sheet encased in a weatherproof box. This will pump the collected solar radiation to the storage device to heat the water for use. The second main system is Evacuated Tube Collectors. These devices are more efficient and are effective under a "...wider range of conditions..." (TM38:2006) due to the energy being drawn from "...light rather than outside temperature..." This therefore allows this type of system to adapt to cooler climes.

Solar water heating systems can achieve savings on your energy bills. Based on the results of a recent field trial, typical savings from a well-installed and properly used system are £55 per year when replacing gas heating and £80 per year when replacing electric immersion heating; however, savings will vary from user to user.

Typical carbon savings are around 230kgCO_2/year when replacing gas and 510kgCO_2/year when replacing electric immersion heating. (www.energysavingtrust.co.uk) You may be able to receive payments for the heat you generate from a solar water heating system through the government's Renewable Heat Incentive.

Photovoltaic (PV) Cells

Solar panel electricity systems, also known as solar Photovoltaic's (PV), capture the sun's energy using photovoltaic cells. These cells don't need direct sunlight to work - they can still generate some electricity on a cloudy day. The cells convert the sunlight into electricity, which can be used to run household appliances and lighting.

PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on your roof.

The power of a PV cell is measured in kilowatts peak (kWp). That's the rate at which it generates energy at peak performance in full direct sunlight during the summer. PV cells come in a variety of shapes and sizes. Most PV systems are made up of panels that fit on top of an existing roof, but you can also fit solar tiles.

An average domestic system size is around 3kWp. The Department of Energy and Climate Change undertook an assessment of solar PV system costs in May 2012 and based on the results of this a 3kWp system will cost around £7,700 (including VAT at 5%). Costs have fallen significantly over the last few years and as costs vary between installers and products, we recommend consumers get quotes from at least three installers.

Ground Source Heat Pumps (GSHP)

Ground source heat pumps use pipes which are buried in the garden to extract heat from the ground. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in the home.

A ground source heat pump circulates a mixture of water and antifreeze around a loop of pipe - called a ground loop - which is buried in the garden. Heat from the ground is absorbed into the fluid and then passes through a heat exchanger into the heat pump. The ground stays at a fairly constant temperature under the surface, so the heat pump can be used throughout the year - even in the middle of winter.

The length of the ground loop depends on the size of the home and the amount of heat needed. Longer loops can draw more heat from the ground, but need more space to be buried in. If space is limited, a vertical borehole can be drilled instead.

Installing a typical system could cost around £9,000 to £17,000. Running costs will depend on a number of factors - including the size of the dwelling and how well insulated it is. It may be possible to receive payments for the heat generated using a heat pump through the government's Renewable Heat Incentive (RHI).

Air Source Heat Pumps (ASHP)

Air source heat pumps absorb heat from the outside air. This heat can then be used to heat radiators, underfloor heating systems, or warm air convectors and hot water in dwellings.

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 get heat from the air even when the temperature is as low as -15° C. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground, air, or water is constantly being renewed naturally.

Installing a typical system could cost around £6,000 to £10,000. Running costs will vary depending on a number of factors - including the size of the home, and how well insulated it is, and what room temperatures are achieved .It may be possible to receive payments for the heat generated using a heat pump through the government's Renewable Heat Incentive (RHI).

Wind Turbines

Wind turbines harness the power of the wind and use it to generate electricity. Forty percent of all the wind energy in Europe blows over the UK, making it an ideal country for domestic turbines (known as 'microwind' or 'small-wind' turbines). A typical system in an exposed site could easily generate more power than a dwelling's lights and electrical appliances use.

Wind turbines use large blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized wind turbine:

Pole mounted: these are free standing and are erected in a suitably exposed position, often around 5kW to 6kW

Building mounted: these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Wind turbines are eligible for the UK government's Feed-in-Tariffs which means money can be earned from the electricity generated by the turbine. Payments for the electricity not use and export to the local grid are available as well. To be eligible, the installer and wind turbine product must be certified under the Microgeneration Certification Scheme (MCS). If the turbine is not connected to the local electricity grid (known as off grid), unused electricity can be stored in a battery for use when there is no wind.

Biomass

Energy from Biomass is produced by burning organic matter. Biomass fuel sources include trees, crops or animal dung are "...harvested and processed to create energy in the form of Electricity, Heat and Steam." (TM38:2006) Biomass is carbon based and when used as a fuel, produces carbon emissions. However, the carbon emitted during the combustion process is "...equivalent to the amount absorbed during growth..." (TM38:2006) The only carbon emissions associated with this energy source is treatment and transportation costs of the fuel to the end user.

Carbon savings that can be attributed to this technology type are significant. Biomass boiler installation can "...deliver all of the heating requirements for a building...using an almost carbon neutral fuel source." (TM38:2005) Biomass can be cost effective when directly compared to convention as oil and electricity heating sources. The benefit can be increased when the biomass source, for example wood chips, is diverted from the waste stream. However, maintenance requirements of a biomass system are higher and should be taken into account when installing one. Additionally, the UK introduced the Clean Air Act (1993) (www.uksmokecontrolareas.co.uk) to control the smoke pollution in areas caused by burning of smoky fuels.

LZC technology Conclusions

The author has come to the following conclusions regarding the renewable technologies available;

- Solar hot water would contribute to the reduction of CO_2 and energy demand but would need to be used in conjunction with other measures, therefore solar hot water panels could be considered for this site.
- Heat pumps; ASHP could be used to reduce the energy demand but the CO2 output would increase.
- Photovoltaic panels would contribute to the reduction of CO_2 and energy demand but would need to be used in conjunction with other measures, therefore photovoltaic panels should be considered here.

The author can therefore confirm that the LZC technologies best suited to the development site are Solar Hot Water Panels or Photovoltaic panels when used in conjunction with other measures if practical to do so.

REFERENCES and LINKS:

Approved Document L1A 2013.

SAP 2012; The Government's Standard Assessment Procedure for Energy Rating of Dwellings, October 2013.

https://www.camden.gov.uk/documents/20142/4823269/Energy+Efficiency+and+Adaptation+CPG+-+March+2019.pdf/6732a28c-2c90-7101-c11e-3372e29e032d