eight
associates

31-32 John Street
Energy Assessment
Planning Statement

Eight Associates
178 Ebury Street
London SW1W 8UP

+ (44) 020 7881 3090 Telephone
+ (44) 0845 458 1522 Fascimile

www.eightassociates.co.uk
info@eightassociates.co.uk

Prepared by:
Cyril Knabe-Nicol
Eight Associates
The Old School House
London SW1W 8UP

email:
cyril@eightassociates.co.uk

Prepared for:
Jonathan Kennedy
Cousins | Wojciechowski Architects
28 Margaret Street
London
W1W 8RZ

Date:
07 November 2011

Our Ref:
E300-Energy-1111-07ckn

eight associates

Issue Status
31-32 John Street

Prepared by:	Cyril Knabe-Nicol
Company Name:	Eight Associates
Signature:	
Quality Assured by:	Emma Storey
Signature	

Revision Number	Issue Date	Issued by
Revision 1	07.11.2011	Cyril Knabe-Nicol

DISCLAIMER

This report is made on behalf of Eight Associates. By receiving the report and acting on it, the client - or any third party relying on it - accepts that no individual is personally liable in contract, tort or breach of statutory duty (including negligence).

Contents
31-32 John Street

Summary

eight
associates

Executive Summary
31-32 John Street

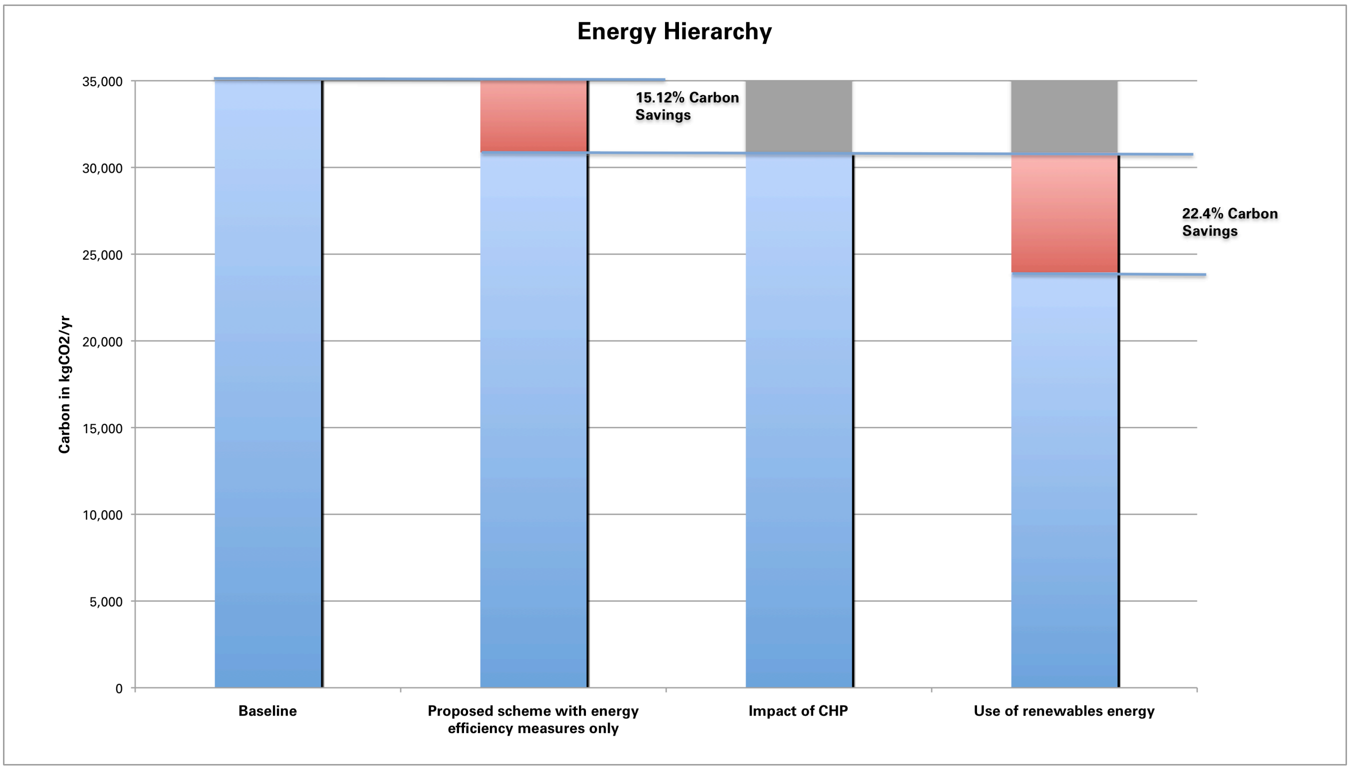
Introduction	The proposed residential scheme at 31-32 John Street is required to make carbon emission reductions in accordance with the London Plan's energy hierarchy. The Borough of Camden requires the scheme to target an EcoHomes VERY GOOD rating. The development is required to achieve carbon reductions of 25% over Part L 2010 requirements across the site.
Aim of this Study	The aim of this study is to assess feasible carbon emissions reductions through low and zero carbon technologies and the potential to reach a 25% carbon emissions reduction over Part L 2010 across the site. This target is set out in the 2011 version of the London Plan – under Chapter 5 'London's Response to Climate Change'. This report demonstrates how the site has followed the London Plan's energy hierarchy by reducing energy demand through passive design, energy-efficiency measures, generating heat in a clean and efficient system and by using on-site renewable energy systems to further reduce the overall carbon emissions of the development.
Methodology	The methodology followed in this report follows the guidance set out by the Greater London Authority (GLA) for developing energy strategies as detailed in the following "GLA Energy Planning - Guidance on Energy Assessments", September 2011. In particular, the London Plan's Energy Hierarchy has been observed. Energy consumption figures, for the residential part of the scheme, are based on SAP modelling data produced under NHER Building Regulations software. These findings are subject to detailed analysis from a services engineer and quantity surveyor.
Site description	The proposed scheme is a major refurbishment of two, Grade II listed, six-storey town houses in central London. There will be a change of use from commercial to residential use, with the new scheme incorporating 15 apartments. The scheme is predominantly oriented West / East. The building is predominantly made up of heavy-weight blockwork construction.

Executive Summary
31-32 John Street

Recommendation	The proposed scheme will implement significant energy efficiency measures as well as individual Air Source Heat Pumps to achieve carbon emission reductions. The measures within this report have followed the GLA's Energy Hierarchy and meet a 15.1% carbon emissions saving through energy efficiency measures alone and a further 22.4% saving through the implementation of Air Source Heat Pumps and photovoltaic system. The scheme will achieve a 34.13% improvement in CO_2 emissions over Building Regulations. The baseline carbon emissions for the scheme are 36,363 $kgCO_2$/yr. Following implementation of measures within this report a total saving of 12,410$kgCO_2$/yr will be made. These measures include: - Be Lean (15.1% savings over baseline): Energy efficiency measures to improve the building fabric and services: high performance U-Values. - Be Green (22.4% savings over Clean case): Green energy generation to include individual Air Source Heat Pumps to provide space heating and Domestic Hot Water, and a Photovoltaic system to generate electricity.

Executive Summary
31-32 John Street

GLA's Energy Hierarchy				
	Baseline	Be Lean: Energy Efficiency Measures	Be Clean: CHP	Be Green: Renewable
Carbon emissions in $kgCO_2/yr$	36,363	30,867	30,867	23,954
Carbon emission savings in $kgCO_2/yr$	-	5,497	-	6,913
Percentage reduction in carbon emissions over the previous stage	-	15.1%	-	22.4%



Planning Requirement
31-32 John Street

Planning Requirement	The Borough of Camden's policy document requires developments to achieve a 25% reduction in carbon emission over Part L 2010. This should be achieved across the whole site.

Energy Statements

Applications for major developments should be accompanied by an energy statement, which provides information as set out below:

- A calculation of the baseline energy requirements and CO_2 emissions including regulated emissions (i.e. space heating, hot water, fixed electricity).
- Baseline regulated emissions should equal the energy modelling output, using the Part L 1B default values and were calculated using the following methodology:
  Residential: SAP (Standard Assessment Procedure)
- A demonstration of how the Mayor's energy hierarchy has been followed (i.e being 'lean, clean, green') including consideration of passive design and decentralised energy options (including CHP/CCHP). Description of proposed energy efficiency measures includes details of these measures (e.g. U-values, air permeability, percentage of energy efficient light fittings, heating efficiencies, etc).
- Calculation of the 'energy efficient' baseline (i.e. the reduced energy demand and CO_2 emissions after the application of energy efficient measures and decentralised energy provision) and predicted target for CO_2 reduction through renewables.

An assessment of the feasibility of different renewable technologies on the site and the potential contribution to CO_2 reduction from each option, explaining which technologies have been investigated and why any technologies have been ruled out, (i.e. technical limitations, costs, etc).

Remit of this report

This report aims to provide cost-effective options to meet carbon emission reductions for the building, through renewables sources. Calculations were carried out using NHER and Design Builder software Building Regulations compliant software.

The requirement to meet an EcoHomes rating for the scheme is covered directly within the accompanying EcoHomes report. However, consideration has been given to the elements that overlap between the development of the energy strategy.

Energy Hierarchy
31-32 John Street

London Plan Energy Hierarchy Taken from GLA Energy Planning - Guidance on Energy Assessments, September 2011	Section 5.0, 'London's Response to Climate Change' of The London Plan details the energy hierarchy, which takes a 'whole energy' approach and addresses energy efficiency use, energy supply efficiency and use of renewable energy. The purpose is to demonstrate that climate change mitigation measures are integral to the scheme's design and evolution, and that they are appropriate to the context of the development.
Baseline calculations Section 5.0	The baseline calculations are taken from the energy modelling output, using the Part L 1B default values from the SAP modelling. This has identified that the building has the energy profile outlined in the following pages.
Be Lean Section 6.0	Demand reduction (Be Lean) measures specific to the scheme are encouraged at the earliest design stage of a development and aim to reduce the demand for energy. Measures typically include passive design: both architectural and building fabric measures, and active design: energy efficient services. It is possible to exceed Building Regulations requirements (Part L 2010) through demand reduction (Be Lean) measures alone.
Be Clean Section 7.0	A 'clean' energy supply refers to the energy efficiency of heating, cooling and power systems. Planning applications should demonstrate how the heating, cooling and power systems have been selected to minimise CO_2 emissions in accordance with the order of preference in Policy 5.6, such as through high-efficiency CHP units or low NOx gas boilers.
Be Green Section 8.0	Use of renewable energy in developments is encouraged at the 'Be Green' third stage. Each renewable energy technology in Policy 5.7 of the London Plan are technically feasible in London and each should be considered in the Energy Assessment. An assessment of what is achievable and compatible with the measures implemented in Be Lean and Be Clean is also required.

Base line
31-32 John Street

Base line	The scheme is a refurbishment, therefore it is not possible to used the target from the NHER software as this is compared against the Part L 1A. To calculate the carbon savings from the proposed development against the Part L1B, a base line modelling has been undertaken with the following assumptions. These assumptions are the default values provided by the Building Regulations, Approved Document Part L1B 2010.
U-Values Modelled	

Element	Building Regulations minimum U-Value (W/m^{2}K) Part L1B
New Roof	0.18
Existing Walls	0.70
New Walls	0.28
Floors	0.70
Windows	2.0
Existing windows	4.5

Air-Tightness	The air tightness levels of each dwelling will not exceed an air permeability level of 15 m^3/hr/m^2 at 50 pascal.
Ventilation	The dwellings will be naturally ventilated.
Cooling	Cooling will be provided for the apartments.
Heating	Individual condensing gas combi-boiler, with a seasonal efficiency of 90.2% have been included in the modelling to provide space heating and domestic hot water. Space heating will be provided by a radiator system and will be controlled by room thermostats.

eight
associates

Energy Profile
31-32 John Street

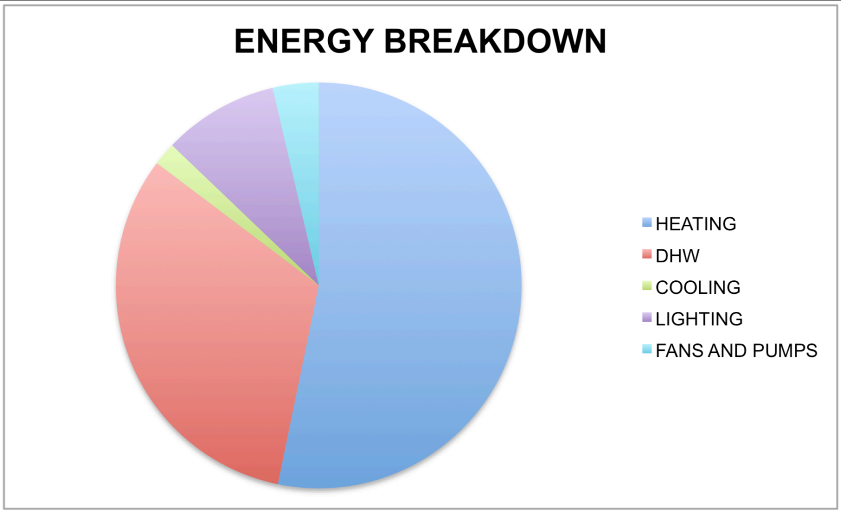
Introduction

Energy modelling allows designers to explore the performance of a scheme in terms of the likely energy usage and related carbon emissions. Through this understanding it is possible to reduce energy usage, use renewable energy and supply energy efficiently.

The scheme comprises 15 apartments. The modelling of the apartments has been undertaken with NHER software to estimate the likely energy demands and carbon emissions of the proposed scheme.

Carbon Emissions in $kgCO_2/yr$	Heating	Cooling	Hot Water	Fans and Pumps	Lighting
Baseline	18,381	637	11,069	1,266	3,173

Graph showing the site's carbon emissions breakdown in terms of heating, hot water, cooling and lighting and fans over the course of a year.



'Be Lean': Energy Efficiency Measures
31-32 John Street

Energy Efficiency Targets	Energy efficiency measures through optimising the building fabric will be incorporated to reduce the energy demand and carbon footprint of the proposed scheme. The measures outlined below result in an annual carbon emission saving of 2.0% or 641 $kgCO_2$/yr over baseline.
U-Values Modelled	

Element	Building Regulations minimum U-Value (W/m^2K) Part L1B	Proposed U-Value (W/m^2K) Indicative build-up
New Roof	0.18	0.18
Existing Walls	0.70	0.28
New Walls	0.28	0.28
Floors	0.70	0.22
Windows	2.0	1.8
Existing windows	N/A	4.5

Air-Tightness	The air tightness levels of each dwelling will not exceed an air permeability level of 15 $m^3/hr/m^2$ at 50 pascal during.
Ventilation	The dwellings will be naturally ventilated.
Cooling	Cooling will be provided for the apartments.
Heating	To identify the savings due to the building fabric efficiency, individual condensing gas combi-boiler (with a seasonal efficiency of 90.2%) have been included in the modelling to provide space heating and domestic hot water. Space heating will be provided by an underfloor system, and will be controlled by a programmer and room thermostats. The apartments will include a weather compensator.

eight
associates

'Be Clean': Use of Combined Heat and Power

31-32 John Street

Use of Combined Heat and Power	The inclusion of gas combined heat and power (CHP) within the energy strategy has been considered and proposed as a viable option to reduce the carbon footprint of the building. This section demonstrates how decentralised energy generation has been considered in accordance with the Mayor's London Plan section 4A.1. The following guidance hierarchy was followed: Option One - Connection to existing CCHP/CHP networks This option is not deemed feasible in this instance due to the lack of an existing CCHP/CHP network in the vicinity of the proposed development. Option Two – Site-wide CCHP/CHP generation powered by renewables CCHP/CHP generation powered through renewables such as biomass is not considered feasible in this instance due to issues relating to air quality. Option Three - Gas CCHP/CHP accompanied by renewables This favoured option proposes that a lead CHP boiler system would provide hot water and heating with a gas boiler to provide the remaining heating load. Photovoltaics are proposed to supply LZC electricity with remaining electricity demand sourced from the grid.
Site-wide Combined Heat and Power (CHP) Generation	A communal heating and hot water system will not be provided in this scheme. Carbon emissions reductions will be achieved on individual dwellings with individual systems. The profile of this residential scheme is not suitable to CHP given the peaky load of the dwellings.

Feasible Renewable Energy Technologies
31-32 John Street

Feasible Renewable Energy Technologies	A reduction in carbon emissions through the use of on-site renewable energy can be achieved through several technologies to generate either heat or power. Following the analysis of the carbon emissions related to the scheme, the objective of this section is to determine the feasible renewable energy options that provide cost-effective and practical emissions reductions. The renewable energy options for the proposed scheme are provided in the table below. Each technology is also assessed as either feasible or rejected based on its implications for the scheme in terms of their implementation, cost-effectiveness, site-related constraints, planning issues or other issues. The following sections will explore the feasible technologies in depth and explain why certain technologies have been rejected.

Technology and feasibility	Rationale
Biomass Rejected	Biomass would be able to provide a significant overall reduction in carbon emissions. However, this technology would have a significant impact on local air quality in the Borough and development access restraints preclude the possibility of biomass pellet delivery.
Ground Source Heat Pump (GSHP) Rejected	A ground source heat pump could supply heating and hot water to the proposed scheme. However, there is insufficient room to allow for horizontal closed loop pipes; therefore, additional boreholes would be required at a depth of approximately 50-100m. This option is capital intensive and is subject to uncertainty with regards to the ground conditions.
Photovoltaic (PV) Accepted	Roof mounted PV units are a possible solution on the roof space. This system is capital intensive, but there are significant subsidies for selling electricity back to the grid. The electricity produced onsite will be used within the dwelling, additional electricity generated and unused will be fed back to the grid and will be eligible for the "Feed-in-tariff".
Air Source Heat Pump (ASHP) Accepted	Individual air source heat pump units could supply heating and hot water to each dwelling. The outside units can be accommodated on the roof of the development.
Solar Hot Water (SHW) Rejected	Roof-mounted SHW units could be located on the limited roof space. However, this technology will not be able to meet a significant reduction of carbon as a stand-alone. The site is near a conservation area; therefore they will have to be located in a discrete location.
Wind Turbine Rejected	Turbulence created from surrounding buildings makes this an inefficient solution.

Air Source Heat Pumps
31-32 John Street

Air Source Heat Pump	Air Source Heat Pumps use the vapour compression cycle to efficiently extract heat from one place and transfer it to another. The air source heat pumps extract heat from external air, and transfer this heat to water, which is then used for the domestic hot water and space heating.
Site-specific considerations	The flat roof would be able to accommodate the outside units of the Air Source Heat Pumps. The Air Source Heat Pumps would have to be located away from the edge of the roof. A noise assessment report have been provided, the report assessed the noise from the air source heat pump unit.
Manufacturer's Details	Daikin have been identified at this stage as potential ASHP suppliers. Their ERHQ range will be suitable for the scheme and achieve around 6,119 kgCO_2 savings per year.

Air Source Heat Pumps
31-32 John Street

Performance Calculations for ASHP		Air Source Heat Pumps
	Predicted Annual Energy Saved (kWh/yr)	11,834.66 kWh/yr
	Annual Carbon Emissions Reductions (kgCO2/yr)	6,119 kgCO_2/yr
	% CO_2 Emissions Reduction	23.6%
Recommended Supplier	Daikin – 0845 6419355 http://www.daikin.co.uk	
Examples of Proposed Fittings		

Solar Photovoltaic
31-32 John Street

Roof-mounted Solar Photovoltaic	Roof-mounted panels can be used to utilise the sun's energy for conversion into electricity. When exposed to light, the cells generate electrical energy (DC current) that is conducted away to an inverter to create mains electricity (AC current). Power would then be exported to the national grid at times of low demand in order to 'store' the unwanted 'green' energy and would be credited against the electricity bought from the grid at times of low production (i.e. at night). There are several different types of solar panels differentiated by the type of crystalline medium used. They have different efficiencies and relative merits. The panels will need to be connected to an inverter and then to the grid in order to sell electricity when usage on-site is low and power generation is high.
Site-specific considerations	The flat roof would be able to accommodate 10 m^2 of PV providing 1.75 kWp. The panels are of dimensions 0.861m x 1.610 m (1.4 m^2) and would be fixed on a post of a minimum of 150mm height. These panels are rated 250W per panel. The panels would lie at a pitch of 12-30 degrees and would therefore not be visible from the street unless located adjacent to the roofline. The panels will be located in a discrete location to the roof, as indicated on the roof plan in Appendix 1 of this report. PV panels would have to be located away from the edge of the roof as they are susceptible to catch up draft of wind. They do not make any noise.
Manufacturer's Details	Sanyo have been identified at this stage as potential PV suppliers. Their HIT range of panels would suit this commercial application and achieve the carbon savings outlined below in addition to a good return.
Estimated Capital Expenditure	The capital cost of PV is approximately £4,500 for 1 kWp or 4.8 m^2 of photovoltaic panel.
Grants	It should be noted that the "Feed-in-tariff" is currently subject to review, with grants likely to be significantly reduced as of December 2011. For systems of the order <4 kW, the proposed generation tariff is 21p per kWh of electricity generated (down from 37.8 p per kWh at present).

Solar Photovoltaic
31-32 John Street

Performance Calculations for Photovoltaic Panels		Solar PV – 1.75 kWp
	Predicted Annual Energy Production (kWh/yr)	1,502.20 kWh/yr
	Annual Carbon Emissions Reductions (kgCO2/yr)	794.66 $kgCO_2$/yr
	% CO_2 Emissions Reduction	3.21%
	Estimated kWp	1.75kWp

Examples of Proposed Fittings and Panel

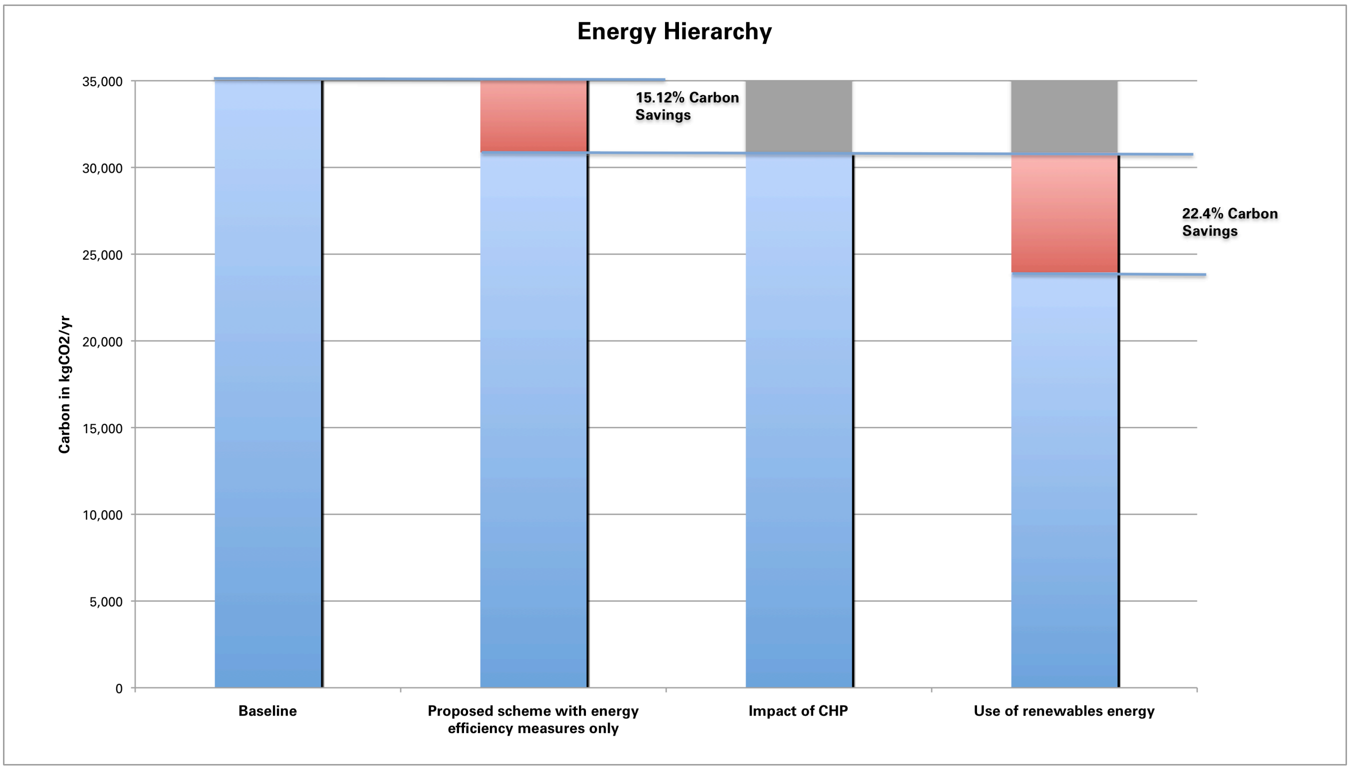
Summary of Applicable Renewable Technologies
31-32 John Street

Explanation of Applicable Renewable Technology Options

The following graph demonstrates the carbon savings achievable through renewable energy technologies applicable to this scheme following implementation of energy efficiency measures.

Reasoning in technical terms, the ASHP could provide a maximum of 19.8% carbon reduction across the site. With the PV panels the proposed development will achieve a 22.4% from renewable technologies.

The PV panels are subject to limitations in terms of roof area. The location of the panels on the roof could be in a discrete location and not a prominent part of the streetscape.



Conclusion
31-32 John Street

Recommendation

The proposed scheme will implement significant energy efficiency measures as well as individual Air Source Heat Pumps to achieve carbon emission reductions. The measures within this report have followed the GLA's Energy Hierarchy and meet a 15.1% carbon emissions saving through energy efficiency measures alone and a further 22.4% saving through the implementation of Air Source Heat Pumps and photovoltaic system.

The scheme will achieve a 34.13% improvement in CO_2 emissions over Building Regulations.

The baseline carbon emissions for the scheme are 36,363 $kgCO_2/yr$. Following implementation of measures within this report a total saving of 12,410$kgCO_2/yr$ will be made. These measures include:

- Be Lean (15.1% savings over baseline): Energy efficiency measures to improve the building fabric and services: high performance U-Values.
- Be Green (22.4% savings over Clean case): Green energy generation to include individual Air Source Heat Pumps to provide space heating and Domestic Hot Water, and a Photovoltaic system to generates electricity.

GLA's Energy Hierarchy	Baseline	Be Lean: Energy Efficiency Measures	Be Clean: CHP	Be Green: Renewable
Carbon emissions in $kgCO_2/yr$	36,363	30,867	30,867	23,954
Carbon emission savings in $kgCO_2/yr$	-	5,497	-	6,913
Percentage reduction in carbon emissions over the previous stage	-	15.1%	-	22.4%

eight
associates

Appendix 1
31-32 John Street