malcolm hollis

Energy Statement
45 Holmes Road, Kentish Town, London, NW5 3AN

Prepared for	**Tiuta Properties Limited**
Prepared by	**David Watkins CEng (Hons) MCIBSE**
Date	**28 March 2014**
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Malcolm Hollis LLP
5 Brooks Court, Kirtling Street, London SW8 5BP
T 020 7622 9555 **F** 020 7627 9850 **W** malcolmhollis.com

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Tiuta Properties Limited

Energy Statement
45 Holmes Road, Kentish Town,
London, NW5 3AN

Contents

Page

1. Executive Summary

1.1.1 This report has been produced on behalf of Tiuta Properties Limited to form part of the planning application to Camden Council for the development entitled 45 Holmes Road, Kentish Town, London, NW5 3AN.

1.1.2 The development consists of 8 residential dwellings developments and 845m² of commercial floor space. Malcolm Hollis have been appointed to produce an Energy Statement presenting how the development will comply with the requirements of both the GLA London Plan and Camden Council. As required within these documents, a 40% improvement over Part L Building Regulation 2010 is to be evidenced. In addition, achievement of Code for Sustainable Homes Level 4 and 60% of un-weighted credits in the Energy category of the BREEAM assessment.

1.1.3 The strategy is based on the Mayor of London's Energy Hierarchy, as follows:

- Use less energy (Be Lean)
- Supply energy efficiently (Be Clean)
- Use renewable energy (Be Green).

1.1.4 In order to minimise the use of energy by this building, a low carbon approach for the design of the building's fabric and associated engineering system has been used.

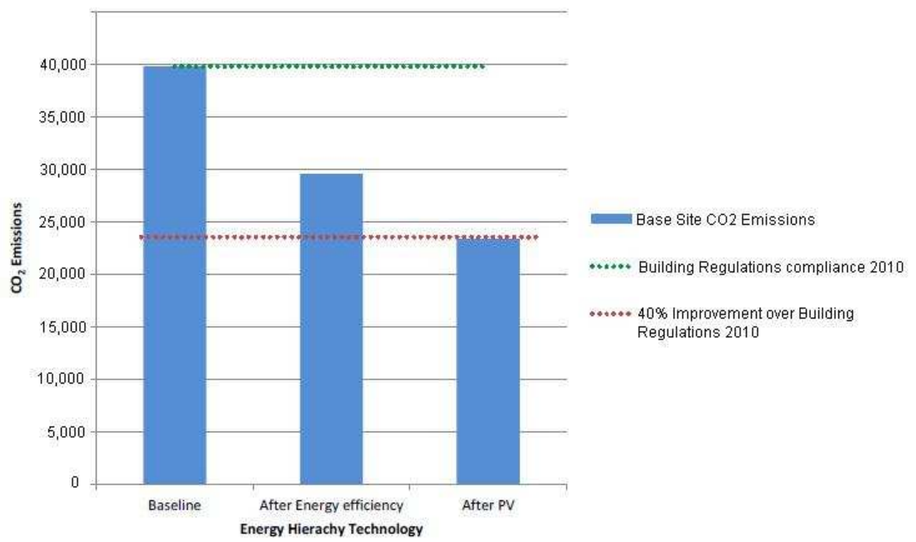
1.1.5 The building design has incorporated the use of solar light tubes and natural ventilation openings to reduce the use of artificial light and minimise/eliminate the need for cooling in the commercial areas. Additionally, the architecture has been designed so as to maximise the use of natural light and natural ventilation within the residential buildings though use of natural ventilation openings and careful location of external shading. The use of natural light whilst minimising heat gain has been achieved by utilising a number of north facing windows and rooflights.

1.1.6 Heat energy to both the commercial and residential areas is provided by Air Source Heat Pumps (ASHP). The proposal incorporates the use of a number of dedicated heating ASHPs to provide a reduction in CO_2 emissions from both the commercial and residential elements of the proposed development.

1.1.7 To provide further CO_2 reductions, it is proposed to install photovoltaic panels on the roof of the residential properties to further increase the amount of electrical energy generated on site. The PV panels shall be installed on the south facing roof areas of the residential units allowing for the maximisation of the PV installation without increasing the height of the building. The domestic PV installation shall provide a total of 8 kWp. The commercial area will also be served by a 55m^2 Monocrystaline PV array. Final development of positioning and design will be undertaken during RIBA Stage E by a solar specialist.

1.1.8 It has been identified that these measures have resulted in a reduction in CO_2 emissions of approximately 40% when measured against Part L 2010 Building Regulations.

1.1.9 The following table and chart detail the reductions in CO_2 emission reductions as a result of following the energy hierarchy.



Graph of Results In Energy Reduction

Total Site CO_2 Emissions			
	Baseline	**After Energy Efficient Design**	**After PV**
Site CO2 Emissions	39,275	29,966	23,749

45 Holmes Road CO_2 Emissions Results (CO_2 / Year)

2. Introduction

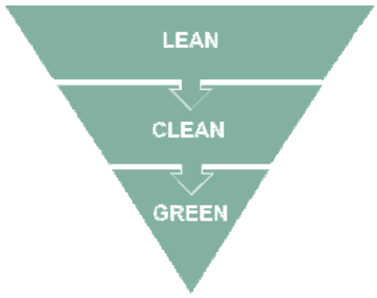
2.1.1 Tiuta Properties Limited are proposing to submit a planning application to Camden Council for the development entitled *'45 Holmes Road'*.

2.1.2 Malcolm Hollis LLP have been appointed to produce a site-wide Energy Statement identifying how the development will address the policies set out by both the GLA London Plan and Camden Council. In line with these policies, the development must achieve the following measures of sustainability:

- 40% reduction in CO_2 emissions over Part L 2010 requirements.
- Code for Sustainable Homes Level 4.
- 60% of un-weighted credits in the Energy category of the BREEAM assessment.

2.1.3 The strategy is based on the Energy Hierarchy, as follows:

- Use less energy (Be lean)
- Supply energy efficiently (Be clean)
- Use renewable energy (Be green)



2.1.4 The use of passive design and energy efficient features are key to reducing energy demand. The proposed energy efficiency measures include a well-insulated building fabric, alongside a ventilation strategy that maximises the use of natural ventilation. These measures will go some way towards achieving compliance, however, Low or Zero-Carbon (LZC) energy technologies will be required in order to demonstrate compliance with requirements set out under relevant planning policy. The strategy is based on information provided by the project design team.

2.1.5 The embodied energy of the development is out of the scope of this report. The focus will be on delivered energy demand.

2.2 Site Location and Development Proposal

2.2.1 45 Holmes Road proposes the development of 8 residential units and 845m² (GIA) of commercial floor space located between floors lower ground, ground, first, second and third.

Arial photo of existing site

3. Planning Policy Guidance & Legislation

3.1.1 The following policies will apply to the development;

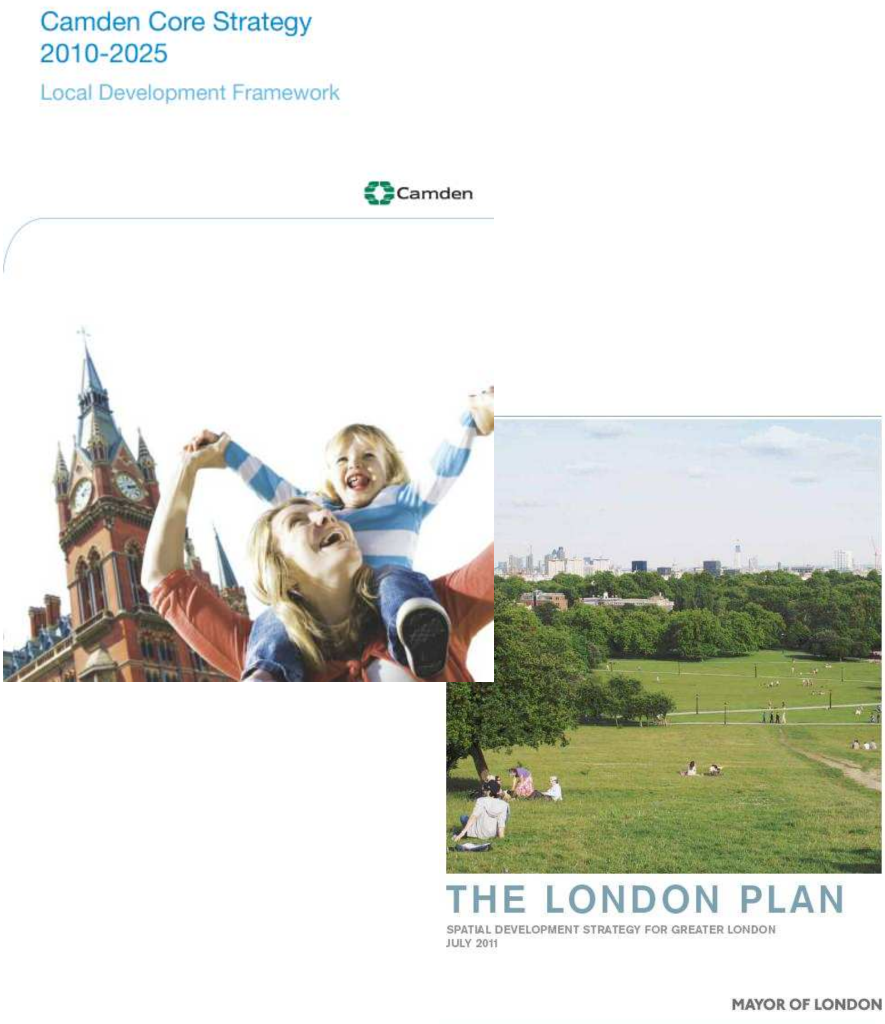
London Plan 2011

- Mayor of London SPD on Sustainable Design and Construction
- Policy 5.2 – Minimising Carbon Dioxide Emissions
- Policy 5.3 – Sustainable Design & Construction
- Policy 5.5 – Decentralised Energy Networks

Camden Council:

- Core Strategy Policy CS13

4.



Energy Strategy

4.1 Objective

4.1.1 The purpose of this energy strategy is to demonstrate that climate change mitigation measures have been fully considered and appropriately selected and specified as part of the 45 Holmes Road scheme's design.

4.1.2 In accordance with the guidance notes, after establishing the baseline energy demand and profile for the site, the strategy for Holmes Road follows the Mayor's Energy Hierarchy (Use Less Energy – 'Be Lean', Supply Energy Efficiently – 'Be Clean' and Use Renewable Energy – 'Be Green') in appraising appropriate measures to reduce carbon emissions and other climate impacts from the development.

4.1.3 The following sections provide more details on each of the steps of the Energy Strategy following the London Plan's Energy Hierarchy.

4.1.4 Within the London Plan, the energy hierarchy establishes a strategy of firstly establishing the baseline energy use of the proposed development and then applying potential energy measures within the structure of the 'Energy Hierarchy'. The stages of the hierarchy are defined as follows:

Use Less Energy – 'Be Lean'	Reduce use through behaviour change Improve insulation Incorporate passive heating. Install Energy Efficient lighting and appliances
Supply Energy Efficiently – 'Be Clean'	Use efficient heating products.
Use Renewable Energy – 'Be Green'	Install renewables on site Import renewable energy

4.2 Methodology (Residential)

4.2.1 Energy demand and resultant CO_2 emissions are estimated for the base case Target Emissions Rate (TER) and the improved, through energy efficiency, Dwellings Emissions Rate (DER). Low and zero-carbon energy technology is then applied to further enhance performance to meet the target.

4.2.2 Government approved software (SAPPER version 9.03.0) has been used to calculate energy consumption based on current SAP methodology (2009). Energy demand and resultant CO_2 emissions are estimated for the base case Target Emissions Rate (TER) and the improved, through energy efficiency, Building Emissions Rate (BER). Low and zero-carbon energy technology is then applied to further enhance performance to meet the target.

4.3 Methodology (Commercial)

4.3.1 Government approved software and associated calculation engines (Hevacomp V25) have been used to calculate energy consumption based on the iSBEM methodology for Part L 2010.

5. Energy Strategy (Residential)

5.1 Baseline Energy Assessment

5.1.1 Before energy efficiency measures are investigated, it is important to establish the baseline energy consumption of the development, for comparison and evaluation of energy proposals for the development.

5.1.2 Energy modelling shows that the base energy consumption (Part L 2010 Target Emissions Rate) across the development is 24,319.2 kg CO_2/pa.

5.1.3 Once established, achievement of the goals of the energy report utilising the energy hierarchy can be undertaken

5.2 Be Lean

5.2.1 The primary focus for providing an energy efficient development is driven through the generation of a design that takes advantage of energy use reduction through improved building fabric and engineering services.

5.2.2 The energy demand of the development will be reduced through incorporation of measures including high levels of thermal insulation, detailing to reduce air permeability and thermal bridging, and the use of low-energy lighting.

5.2.3 The use of building fabric specifications that better the minimum requirements of Part L as well as maximising daylight though the use of north facing windows and light tunnels will allow for the reduction in the need for heating and lighting though better building design.

5.3 Be Clean

5.3.1 The next step in the Energy hierarchy is the 'be clean' strategy of supplying the required energy, after all possible passive energy efficiency measures have been incorporated, as efficiently as possible.

5.3.2 Heating energy efficiency has been addressed through the proposed use of air to water air source heat pumps (ASHP). Each residential dwelling will have its own high efficiency ASHP which will provide all of the heat required to serve the heating and hot water demands.

**Please note that system sizing is based on the provision of space heating and hot water requirements.*

5.3.3 The use of natural ventilation is proposed to provide cooling and fresh air ventilation to all residential dwellings to eliminate the need for the use of fan driven fresh air ventilation. As the residential dwellings are all intended to be provided with opening windows, the annual efficiency of heat recovery ventilation systems can be greatly compromised by users opening windows. This lack of efficiency will affect the balance between CO_2 saving through heat recovery vs fan energy CO_2 expended. By minimising the use of fan powered systems through good architectural design, the associated CO_2 emissions from the fan power can be eliminated. Fans will only be used in toilets to provide the minimum required extract ventilation in accordance with Building regulations.

5.4 Be Green

5.4.1 The third and final stage of the energy hierarchy is 'be green'. The potential of a range of renewable energy systems have been assessed to ascertain if their characteristics will be suited to serve the energy requirements of this development and thereby be used to offset CO_2 emissions.

5.4.2 As will be seen in section 7 of the Energy Report, a number of high efficiency or renewable technologies have been reviewed for use in this development. The review of green technologies identifies that the development will be suitable for the inclusion of photovoltaic panels in addition to ASHP technology.

5.5 Specification

5.5.1 Based on this review, the specification of the building has been selected to achieve or better the standards identified in the Camden Planning Guidance for Energy Efficiency: New Buildings wherever possible:

- U-value of heat-loss floors 0.12 W/m2K
- U-value of heat-loss walls 0.16 W/m2K
- U-value of roofs 0.12 W/m2K
- U-value of windows 1.4 W/m2K (g-value of 0.50)
- U-value of doors 1.4 W/m2K
- Air permeability: 5 m3/m2.h (100% testing)
- Natural ventilation with local extract ventilation to WCs - SFP ≤0.3
- No flues, open fireplaces, or flueless gas fires
- No cooling via air conditioning
- Underfloor heating provided by air source heat pumps (no cooling provided)
- Individual heating programmer and temperature control
- 100% low energy light fittings
- 8kWp total Photovoltaic Installation, mounted at roof level at 10° (1kWp per dwelling)

5.6 Energy Efficiency Results

5.6.1 By recording the baseline TER emissions for the development we are able to assess the effects of improvements detailed above on the development. These effects are detailed for the development at the end of the report.

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6. Energy Strategy (Commercial)

6.1 Baseline Energy Assessment

6.1.1 Before energy efficiency measures are investigated, it is important to establish the baseline energy consumption of the development, for comparison and evaluation of energy proposals for the development.

6.1.2 Energy modelling shows that the base energy consumption across the commercial aspect of the development is 14,956.5kg CO_2/pa.

6.1.3 Once established, achievement of the goals of the energy report utilising the energy hierarchy can be undertaken

6.2 Be Lean

6.2.1 The energy demand of the development will be reduced through incorporation of measures including high levels of thermal insulation, detailing to reduce air permeability and thermal bridging, and the use of low-energy lighting.

6.2.2 The building fabric specification utilises fabric U-values that better the minimum requirements of Part L2010. Additionally, daylight provision has been maximised though the use of light tunnels and north facing rooflights. Maximisation of daylight has been designed to allow the commercial area to occupy lower ground areas of the site without significantly affecting utilisation of natural light. The electric lighting will be designed to automatically sense the levels of natural light within all commercial areas and automatically dim/turn off in the event that daylight levels are sufficient. The location of much of the commercial area below ground also reduced heat loss though the fabric.

6.3 Be Clean

6.3.1 Heating energy efficiency has been addressed through the proposed use of air to water air source heat pumps (ASHP). The commercial areas will use ASHPs to serve the heating demands.

6.3.2 Although much of the commercial area is at lower ground, the external light wells have been used to allow stack effect natural ventilation to be provided to all commercial areas. Natural ventilation will be used to provide a base level of cooling to reduce the need for mechanical comfort cooling systems as well as fresh air ventilation. Fans will only be used in toilets to provide the minimum required extract ventilation in accordance with Building regulations.

6.4 Be Green

6.4.1 The third and final stage of the energy hierarchy is 'be green'. The potential of a range of renewable energy systems have been assessed to ascertain if their characteristics will be suited to serve the energy requirements of this development and thereby be used to offset CO_2 emissions.

6.4.2 As will be seen in section 7 of the Energy Report, a number of high efficiency or renewable technologies have been reviewed for use in this development. The review of green technologies identifies that the development will be suitable for the inclusion of photovoltaic panels in addition to ASHP technology.

6.5 Specification

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- U-value of heat-loss floors 0.12 W/m2K
- U-value of heat-loss walls 0.16 W/m2K
- U-value of roofs 0.12 W/m2K
- U-value of windows 1.4 W/m2K (g-value of 0.50)
- U-value of doors 1.4 W/m2K
- Air permeability: 5 m3/m2.h (100% testing)
- Natural ventilation with local extract ventilation to WCs - SFP = 1.40
- Heating & Cooling via air source heat pumps. SCoP = 5, SEER = 5.20
- Hot water via electric instantaneous heater. Efficiency 100%
- Minimum lighting efficiency = 80 luminaire lumens per circuit Watt
- Lighting PIR controlled.
- Luminaire light output ratio of 100%
- Energy sub metering of heating system
- Out of range warning on the metering systems
- Power factor correction to >0.95
- The following HVAC controls:
- $55m^2$ Monocrystaline Silicone Photovoltaic Array

7. Technology Consideration

7.1 Code for Sustainable Homes Ene 7 & BREEAM Ene 4 *'Low and Zero Carbon Technologies'*

7.1.1 This development is required to achieve a rating of Code for Sustainable Homes Level 4. As part of this process, a number of technologies have been considered, with feasibility / viability and practicality considered given the various design considerations.

7.1.2 As detailed under BREEAM Ene 4 *'Low and Zero Carbon Technologies'* criteria, a feasibility study has been undertaken, identifying the following:

- Appropriate technologies
- Energy generated from Low and Zero Carbon Technologies per annum
- Available funding grants
- Life cycle cost of specification (including allowances for payback)
- Local planning criteria (Inc. preferred solutions)
- Feasibility of exporting heat / electricity from chosen system

7.1.3 In order to fully identify appropriate technologies, an initial evaluation has been undertaken based on the expected baseline energy demand. Baseline Energy is calculated on a development with identical geometry built to meet Building Regulations, thus using standard building fabric parameters and notional heating systems.

7.1.4 Energy modelling details that the base energy consumption across the whole development is 78,551 kg CO_2/pa.

7.2 PHOTOVOLTAICS

7.2.1 The PV panel should be orientated between southeast and southwest (optimally south). The optimal tilt angle (inclination of panel from horizontal) should be calculated to ensure the best possible output of the system during the year. In the UK, the angles of most pitched roofs are suitable for mounting PV panels.

7.2.2 Panels can also be mounted on A-frames on flat-roofed buildings. PV technology comes in a range of forms: PV panels that can be retrofitted to the roof of an existing building or equally, sunk to fit flush with the roof line; PV cells that are 'laminated' between sheets of glass to provide shading in a glazed area, and PV cladding.

7.2.3 PV systems are low maintenance as they have no moving parts and panels generally have 25 year warranties, although the lifetime of the panel can be expected to be beyond this time.

TECHNICAL CONSIDERATIONS

7.2.4 The PV systems should not be shaded. Shading caused by other buildings, greenery and roof 'furniture' such as chimneys or satellite dishes, even over a small area of the panel, can significantly reduce performance. Excess energy can be exported to the grid. Although the feed-in tariffs are generally not high, exporters can negotiate with their utility company.

ECONOMIC CONSIDERATIONS

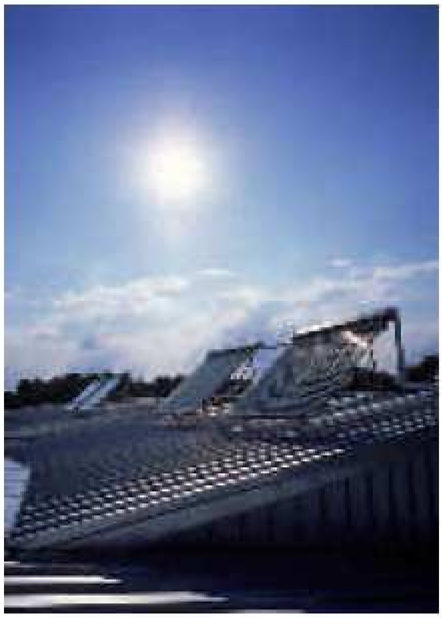
7.2.5 Payback times for this technology are usually in excess of twenty years; but this is reducing year on year as the technology matures and are set to reduce further as fuel prices increase. Integrating PV into a building and replacing other building materials can further offset the cost.

APPLICABILITY

7.2.6 PV has been identified as a suitable technology for incorporation at 45 Holmes Road .

7.3 SOLAR WATER HEATING

7.3.1 A solar collector comprises the housing that contains piping through which the carrier fluid circulates and a glass panel to retain the radiation from the Sun. The temperature inside the collector increases and this heat is then transferred to a carrier fluid. In an open loop system, the hot water is heated directly.



7.3.2 Solar thermal panels are generally black in appearance for maximising energy adsorption and the glass panels have a special coating in order to retain as much heat as possible.

7.3.3 Two types of collector exist: flat plate and evacuated tube. Flat plate collector can be mounted on or flush with the roof. The air in the collection tubes can be evacuated to reduce heat losses within the frame by convection. Evacuated tube collectors need to be re-evacuated every few years. They are more difficult to install but are more efficient and allow higher temperature heating.

BENEFITS

7.3.4 Solar thermal collectors offer a good price-performance ratio. Solar hot water systems are best suited to developments with high hot water requirements, such as hotels, care homes and leisure centres. Many systems have been installed in the UK and they work well, even without direct sunlight.

TECHNICAL CONSIDERATIONS

7.3.5 Solar thermal systems should be sized to the hot water requirements of the user since any excess heat that is generated cannot be exported elsewhere. The optimal angle for mounting depends on when the water demand is greatest. Ideally, the collectors should be mounted onto a non-shaded, south-facing roof.

ECONOMIC CONSIDERATIONS

7.3.6 Solar thermal technology is a cost effective way to reduce Carbon emissions, especially if it is replacing electric water heating.

APPLICABILITY

7.3.7 Due to limited roof space, solar hot water cannot be used effectively alongside photovoltaic arrays. Accordingly it is considered preferable to install photovoltaic arrays over solar hot water where only one technology can be favoured.

7.4 AIR SOURCE HEAT PUMPS

7.4.1 Air source heat pumps work by converting the energy of the outside air into heat, creating a comfortable temperature inside the building as well as supplying energy for the hot water system. As with all heat pumps, air source models are most efficient when supplying low temperature systems such as underfloor heating.

7.4.2 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. Cold water or another fluid is circulated through pipes, picking up the ambient temperature and then passing through the heat exchanger (the evaporator) in the heat pump unit.

7.4.3 The heat exchanger extracts heat from the fluid, using a refrigerant compression cycle to upgrade the heat to a usable temperature (+55°C). This heat is then transferred to the heating system via another heat exchanger, the condenser of the heat pump.

7.4.4 Accordingly ASHP heating systems generally run at a lower temperature than conventional heating systems. There are two main types of air source heat pumps. An 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 better suited to underfloor heating systems than radiator systems.

7.4.5 An air-to-air system produces warm air, which is circulated by fans to heat the building. Whilst heat pumps are not a wholly renewable energy source due to use of electricity, the renewable component is considered as the heat extracted from the air. It is measured as the difference between heat outputs, less the primary electrical energy input. Using this heat, for every Watt of electrical energy supplied to the system, 4 Watts or more of heating energy can be supplied to a heating system. This 'Coefficient of Performance' (CoP) of 4 is effectively an 'efficiency' of 400% for the system and compares very favourably with even the best gas condensing boiler's efficiency of around 85%. The smaller the temperature difference between the source and the output temperature of the heat pump (i.e. the temperature of the distribution system) the higher the heat pump's COP.

BENEFITS

7.4.6 Unlike boilers, there is no pollution on-site and as the mix of power stations used to supply the electricity grid gets 'cleaner', with more renewable electricity generation being brought on line, so the Carbon emissions from the heat pumps system will decrease even further.

7.4.7 The key operational benefit of air source heat pumps for the user is the reduction in fuel bills. In addition, space savings can be made over other plant types as an air source heat pump unit is compact, and requires no storage space for fuel.

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TECHNICAL CONSIDERATIONS

7.4.8 Since air source heat pumps produce less heat than traditional boilers, it is essential that the building where the air source heat pump is proposed is well insulated and draught proofed for the heating system to be effective. Fans and compressors integral to the air source heat pump unit generate some noise, but this is generally acceptable especially where outdoor units can be located away from windows and adjacent buildings. By selecting a heat pump with an outdoor sound rating of 7.6 dB or lower and mounting the unit on a noise-absorbing base these issues can be resolved for the site.

ECONOMIC CONSIDERATIONS

7.4.9 Costs for installing a typical system vary but they are considerably more economic to install than an equivalent capacity ground source heat system and can produce similar levels of energy and carbon savings. Actual running costs and savings for space heating will vary depending on a number of factors - including the size and use pattern of the building and how well insulated it is.

APPLICABILITY

7.4.10 Due to the need to install a highly efficient heat source, ASHPs have been considered as suitable for this site. Due to their highly efficient use of electricity they will also benefit from the proposed installation of photovoltaic arrays. This will allow maximum use of onsite generated electricity to power the heating system.

7.5 BIOMASS HEATING

7.5.1 Biomass can be burnt directly to provide heat in buildings using wood from forests, urban tree pruning, and farmed coppices or as liquid biofuel, such as bio diesel. In non-domestic applications, biomass boilers replace conventional fossil fuel boilers and come with automated features to enable reduced user intervention.

7.5.2 With the long term availability of fossil fuels such as oil and gas, and the persistent number of price rises of oil and natural gas a growing concern in the UK, alternative heating methods such as wood burning boilers are becoming more popular.

7.5.3 Due to technical advances in wood burning technology, and improvements in the preparation of wood fuels, efficiencies of new wood pellet burning boilers have increased to around 90%, with Carbon monoxide emissions dropping dramatically.

7.5.4 There are three types of wood burning boiler - logs, woodchips and wood pellets. Wood logs are the most readily available, generally produced as a by-product from forestry and woodland from sawmills, tree surgery and wind damage.

7.5.5 Wood chips have a high moisture content which tends to restrict their efficiency to only 50% and they tend to suffer from blockages hence we would be cautious about their use on this site. Storage space requirements are also high due to the irregularity of the chips. Wood pellets are made from dry waste wood, such as used pallets and off-cuts/sawdust from furniture manufacturers. The waste wood is compressed into uniform, high density pellets that are easier to transport, handle and store than other forms of wood fuel.

TECHNICAL AND ECONOMICAL CONSIDERATIONS

7.5.6 Biomass combustion systems (BCS) are generally more mechanically complex than conventional boiler heating systems, especially when it comes to fuel delivery, storage, handling and combustion. The complexity is necessary because of the different combustion characteristics of biomass as compared to conventional fossil fuels. The increased complexity means higher capital costs than for conventional systems. BCSs typically require more frequent maintenance and greater operator attention than conventional systems. As a result, the degree of operator dedication to the system is critical to its success. They often require special attention to fire insurance premiums, air quality standards, ash disposal options and general safety issues.

APPLICABILITY

7.5.7 Due to the size of the proposed project, biomass energy has not been considered as an economically suitable technology.

8. Energy Generation, Life Cycle Costing & Funding

8.1.1 As the technologies Considerations section of the report identified that Photovoltaics and ASHP were suitable for use in this development, consideration must be made to identify the expected energy demand and related off-set of energy use throughout the development.

8.2 Photovoltaics

8.2.1 Photovoltaics require careful consideration during design development, owing to efficiency associated with generation and presence of overshadowing. Initial studies have been undertaken to identify useable and suitable roof-space.

Roof areas available for Photovoltaic's

8.2.2 As the diagram shows, a number of roof sections were identified as suitable for installation of photovoltaic panels. From this review it was identified that a maximum area of 300m² is available for any proposed photovoltaic installation.

8.2.3 Following the identification of roof space, a number of initial layouts have been completed in collaboration with Part L1A & L2A modelling in order to ascertain expected CO_2 emissions as a result of the use of proposed building services systems.

8.2.4 A total PV installation of 8 kWp is proposed for the domestic units, with allowances made for overshading and access. In addition, a degree of tilt has been assumed (10°) in order to prevent water build up and allow for self-cleaning.

8.2.5 The proposed 8 kWp installation generates approximately 5971 kWh of electricity per annum and is eligible for income generated funding under the Feed-in-Tariff (FiT)

8.2.6 The FiT scheme is an environmental programme introduced to promote widespread uptake of a range of small-scale renewable and low-carbon electricity generation technologies. The scheme allows people and companies to install renewable technologies, in return for a guaranteed payment from an electricity supplier of their choice for the electricity they generate and use, and any surplus energy exported back to the grid.

8.2.7 Installations of 50kW or below are eligible for the scheme and can apply through the Microgeneration Certification Scheme (MCS). Both the installed product and installed company must be MCS certified.

8.2.8 The following underlines the process for this scheme:

- *Contact the Energy Saving Trust http://www.energysavingtrust.org.uk/*
- *Use the MCS website to search for installers and products online http://www.microgenerationcertification.org/*
- *Contact a minimum of 3 installers listed on the MCS website for quotes*
- *Choose one installation company to carry out the installation for you, making sure they are MCS credited*
- *You will receive an MCS Certificate for the installation to show it is MCS compliant*

8.2.9 Under current guidance issued by the Energy Saving Trust (EST), generation tariffs have been provided, detailing that for >4-10kW PV installations, £0.1399 is paid for each kWh of electricity generated.

Total Installed Capacity (kW)	Generation Tariff With Eligibility Date 1 Aug – 31 Oct 2012	Generation Tariff With Eligibility Date 1 Nov 2012 – 30 April 2013
<4kW (New build and retrofit)	16.0p/kWh	15.44p/kWh
>4-10kW	14.5p/kWh	13.99p/kWh
>10-50kW	13.5p/kWh	13.03p/kWh
Stand-Alone	7.1p/kWh	7.1p/kWh

8.2.10 It should be noted that funding arrangements are subject to change based on the date of application and implementation as detailed by Ofgem under article 13 of the FiT and therefore further calculation regarding expected payback periods should be completed upon dates agreed during the construction period.

No. of Years	**kWh Generated (Cumulative)**	**FiT Payable (Cumulative)**
1	5,971.20	£ 835.37
5	29,856.00	£ 4,176.85
10	59,712.00	£ 8,353.71
15	89,568.00	£ 12,530.56
20	119,424.00	£ 16,707.42
25	149,280.00	£ 20,884.27

8.2.11 Based on the above It is anticipated that the proposed 8 kWp installation would cost approximately £15,000 (exc VAT) and provide a payback period (based on capital cost) of 18 years.

8.2.12 It is not expected that the electricity generated will be regularly exported to the National Grid however, it is possible that there will be occasional excess electricity that could be exported. In light of this, a G59 application must be completed in order to identify with the utilities provider the expected amount of kWh exported that cannot be utilised on-site.

8.2.13 Based on initial discussions and proposals to-date, this is a feasible exercise and can provide additional levels of income to the building owner. The rate of income available should be detailed upon installation and application to the relevant utilities provider accordingly.

9. Conclusion

9.1.1 This strategy is based on the Energy Hierarchy, as follows:

- Use less energy (Be lean)
- Supply energy efficiently (Be clean)
- Use renewable energy (Be green)

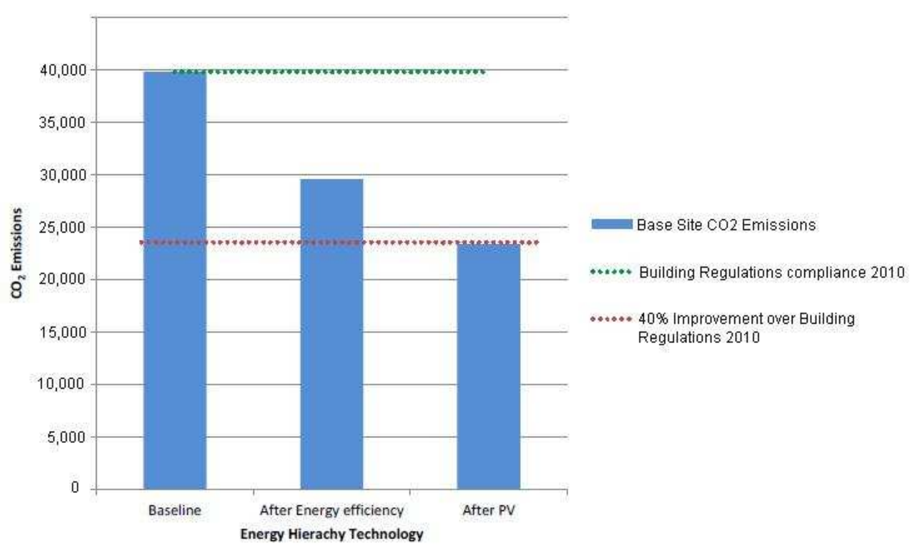
9.1.2 These measures result in a reduction in CO_2 emissions of approximately 40% when measured against Part L 2010 Building Regulations.

9.1.3 CO_2 emission savings can be sought through the use of a combination of the following proposals:

- Air Source Heat Pumps (ASHP)
- Photovoltaic panels (8 kWp) (Domestic)
- Photovoltaic panels (55m^2) (Commercial)

9.1.4 It should be noted that the photovoltaic panels will require some degree of tilt (>10°) in order to allow for self-cleaning of panels and the avoidance of water build up.

9.1.5 The following table and chart detail the reductions in CO_2 emission reductions as a result of following the energy hierarchy.



Graph of Results In Energy Reduction

Total Site CO_2 Emissions			
	Baseline	After Energy Efficient Design	After PV
Site CO2 Emissions	39,275	29,966	23,749

45 Holmes Road CO_2 Emissions Results (CO_2 / Year)