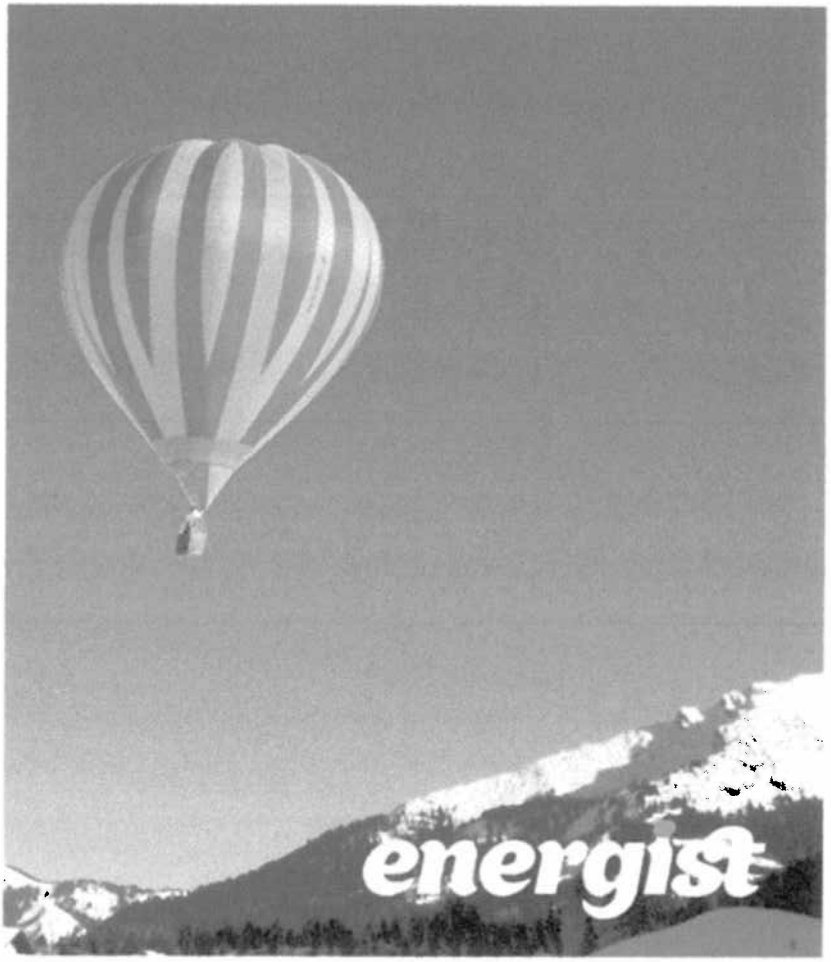
Energy Statement



194a Fordwych Road
London
NW2 3NX

from Energist UK

Version 1

December 2013

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PAGE 2 CONCLUSIONS

Summary of Results

The following statement shows how the proposed redevelopment of the site at 194a Fordwych Road, in London will meet the planning requirement of the local authority and the London Plan, Policies 5.5 – 5.7.

This document has assessed the CO_2 savings expected from proposed fabric improvements, and has also judged the feasibility of nine renewable and low carbon technologies.

The proposed changes to the fabric of the buildings and installation of new systems are expected to reduce annual carbon dioxide emissions by more than the 25% requirement.

This will be achieved through improving the insulation levels within the building envelope, and through the use of heat recovery and renewable energy.

For full details and alternative ways of showing compliance, refer to Page 9 onwards.

As a result of the improvements outlined in this document, it is expected the properties will use less fossil fuels; carbon dioxide levels will be reduced by 468.3 kilograms every year.

This is based on SAP2009 methodology.

CONTENTS

Individual Part L SAP reports can be made available on request.

Table 1 - Energy and Emissions Reduction Summary

(see box 272 of SAP Worksheets)	ENERGY kWh	%		EMISSIONS kgCO2	%	
Building Regulations Part L Compliance	9,234.7	0.0%		1,765.7	0.0%	
Proposed scheme after energy efficiency measures	7,596.4	17.7%	☚	1,447.7	18.0%	☚
Proposed scheme after onsite renewables, low carbon technology and CHP	6,841.5	9.9%	☚	1,297.4	10.4%	☚
Proposed scheme offset for financial contribution	6,841.5	0.0%		1,297.4	0.0%	
Savings shown from all above measures	2,393.2	25.9%	☚	468.3	26.5%	☚

*Indicates particular savings relevant to the local planning authority

INTRODUCTION

Executive Summary

Energist UK has been appointed by Peter Brades Architects to create this report, which examines whether the proposed redevelopment of...

194a Fordwych Road
London
NW2 3NX

...will suitably follow the guidance laid out in Policies 5.5 – 5.7 of the London Plan.

This Energy Statement has been written in accordance with the planning requirements of London Borough of Camden, which has requested this reduction as part of its local sustainable framework.

More information about planning requirements and restrictions can be found on the councils own website:

www.camden.gov.uk

This document will use the latest Part L approved calculation methods to compare the available savings through the use of a fabric first approach and judges the feasibility on a selection of low and zero carbon technologies.

A step-by-step approach has been taken to ensure clarity within this study, and plot-by-plot conclusions have been produced to show detailed accuracy of how the authority's anticipated reduction is being adhered to.

Comparisons will be drawn to signify the improvements the site will undergo, given the renewable and low carbon options which are considered feasible. It is possible that a mix of technologies is recommended to lower the energy demand of the site.

Smallprint

As is the requirement of most planning departments, those devices which generate electricity will be prioritized over other forms of renewable technology.

All calculations in this document are based on the Part L Standard Assessment Procedure (SAP) version 9.90 as used for the 2010 Building Regulations.

It is important to realize this document is not a design tool and should be used for guidance only. The content is intended for the use of our client and their council planning department only, bearing in mind the advice contained therein is based on Government approved methodology which is itself only a design tool. Results should not be taken as a definite answer.

Amendments

Where Energist UK has made alterations, inclusions or amendments to this document, a brief summary of all changes will be lodged here:

Version 1 – Original Document

CONTEXT

The Need for Energy Statements

Energy Statements - or Feasibility Studies – are becoming ever more popular with planning departments throughout the United Kingdom, as Government targets ensure energy saving and carbon emission reductions are considered in all parts of the country.

It is now quite common for planning requirements on houses to demand a proportion of energy demand is met by renewable means.

This requirement works alongside current mandatory Building Regulations (Part L) which can show large improvements on a dwellings SAP Calculation and Energy Performance Certificate (EPC) rating.

Many larger developments are also required to comply with the Code for Sustainable Homes (CSH) – again this is a requirement which varies from region to region. The introduction of some types of renewable and low carbon technologies can meet a higher number of CSH Credits, giving a better overall rating.

There is an additional argument to suggest the enforcement of renewable technology is not the only answer, as improved building design and fabric can reduce the overall energy demand without the need of using such technology.

Most planning departments will encourage the use of both techniques, and suggest enhanced building fabric is considered BEFORE the energy reduction is required.

This was known in the London Plan as **'Be Lean, Be Clean, Be Green'**.

Be Lean, Be Clean, Be Green

In order to reach these challenging, yet achievable, energy reduction targets, *an 'Energy Hierarchy'* has been defined to help developers, building designers and property owners contribute towards sustainable dwellings.

BE LEAN - Use less energy

A dwelling can be designed to use less energy through enhanced construction fabric, better heating controls and optimizing solar gains.

BE CLEAN – Supply energy efficiently

It is possible to receive energy for a building which is seen to be a cleaner alternative than standard means. For example: the use of Combined Heat and Power systems (CHP) or the use of renewably-focused electricity tariffs.

BE GREEN – Use renewable technology

It should be encouraged that as much energy as practically and financially possible should come from zero and low carbon sources.

This Energy Statement will be covering these three areas in more detail as the calculations and feasibilities are measured.

CONTEXT

Legitimate Calculations

There are several ways and interpretations of the best approach to take in order to show the conclusions of an Energy Statement, and there is currently no nationally approved method or accreditation body managing the content produced.

It is the responsibility of the individual planning departments to confirm the calculations shown in reports such as this are legitimately assessed.

Energist UK has based both the baseline assessment of the sample plot and all energy-saving calculations on the Standard Assessment Procedure (SAP) Methodology for domestic builds.

This is the only Government sanctioned way of ensuring the calculation techniques used are based on information as approved by the Secretary of State.

Energist UK confirms that all calculations in this document have been completed to the best of the assessor's ability.

If you have any queries or comments regarding this document, you can contact the creators directly:

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The Future

The future of Energy Statements is likely to be always one step ahead of the current Part L Building Regulations.

As the UK moves closer to achieving a zero carbon standard, the variance between Building Regulations and Energy Statements is likely to decrease.

The Part L 2013 documents were published on 15th November 2013. The updated Regulations come into force on 6th April 2014. It has been confirmed that the Target Emission Rate (TER) imposed on all new dwellings will be cut by a further 6% over 2010 standard.

A further re-write is scheduled in 2016, when regulations will start to come into force requiring new build developments to be built to a zero-carbon standard.

In 2018 all newly constructed Government owned buildings will also need to meet this zero standard. Finally, all remaining new buildings will need to achieve this requirement from 2019 onwards.

With such steep targets in place, additional ways of improving efficiency of buildings in the current day are seen as a vital approach to getting builders, developers and the end home-users more familiar with the latest energy efficiency technology.

LONDON PLAN

Relevant Policies

This development involves the creation of a new two-bedroom dwelling on the site of 194a Fordwych Road, London, so it needs to follow the guidance of Policy 5.2 of the London Plan:

Policy 5.2 *- Minimising carbon dioxide emissions*

Planning decisions

A Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy
1 Be lean: use less energy
2 Be clean: supply energy efficiently
3 Be green: use renewable energy

B The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.
Residential buildings:
Year Improvement on 2010
Building Regulations
2010 – 2013 25 per cent
(Code for Sustainable
Homes level 4)
2013 – 2016 40 per cent
2016 – 2031 Zero carbon

C Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.

D As a minimum, energy assessments should include the following details: a calculation of the energy demand and carbon dioxide emissions covered by the Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations (see paragraph

5.22) at each stage of the energy hierarchy

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

c 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)

d proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.

e The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

PROCESS

Assessment Methodology

This report will be based on calculation methods as approved by the Government for the purposes of measuring energy efficiency in new dwellings in the United Kingdom.

There are **FIVE** steps to this Energy Statement:

1. A sample SAP Calculation has been completed on the proposed building.
   This assessment has been designed to match Part L – in other words it is a worst-case or 'Baseline' assessment. The details from this Baseline become the target which all future variants are measured against.
   This assessment has been completed using accredited SAP software (either NHER Plan Assessor or Stroma FSAP) and will be based on the most appropriate version of Part L Building Regulations.

2. A secondary assessment has also been completed based on the developers proposed alterations to the building fabric and heating efficiencies.
   The savings shown in this section are noted. Any low or zero carbon systems which are proposed for these dwellings are NOT considered at this stage.

3. Summary reports have been created to compare the specifications as confirmed in Steps 1 and 2. This highlights if there are any areas of the dwelling specification which can be improved in order to further enhance the overall energy efficiency of the buildings. Additional points may also be added which are not considered by the Part L SAP assessment, but may be a viable option to be considered on this site.

4. A feasibility check has been completed to assess the most appropriate types of renewable and low carbon technology for this site, should they be considered as part of the 25% carbon emission reduction. This includes the inclusion of district heating and Combined Heat and Power systems. The findings will be listed in order of suitability, and reasons will be given as to why some options are not going to be considered for this particular property. On this point, it is worth noting there can be occasions where no forms of renewable technology are considered feasible – whether this be for technical, financial or legislative reasons.

5. The developers' preferred specification, including all low and zero carbon systems, will be measured to ensure the 25% improvement can be met.

6. A final summary of the key results will be produced in line with the final conclusions of this document. A brief summary has been included to Page 2 of this report. More detailed conclusions can be located at the end of this document.

THE SITE

Description and sample rate

This proposed development on 194a Fordwych Road is to build a two-bed, detached dwelling.

The site will be measured against Part L1A of current Building Regulations (2010) to show full compliance with the mandatory Target Emission Rate.

A google map shows the location of the site (below).

STEP 1 - ORIGINAL BUILDING

Construction Compliance

The first calculation is based upon how the dwelling currently perform based on a SAP assessment measured under 2009 methodology.

This specification shows the minimum details which can be used while still showing full compliance with Part L.

It can be confirmed the following specification creates a Dwelling Emission Rate of 22.24kgCO_2/m²/year. This equals the Target Emission Rate.

FLOOR: The ground floor baseline is set to a U-Value of 0.151W/m^{2}K
WALL: The external wall is set to a U-Value of 0.22 W/m^{2}K
ROOF: The flat roof baseline is set to a U-Value of 0.16 W/m^{2}K
OPENING: Windows have a baseline U-Value of 1.40 W/m^{2}K
DOOR: The front door has a baseline U-Value of 1.00 W/m2K
THERMAL BRIDGES: SAP default details are assumed for the development
VENTILATION: Natural ventilation will be adopted – including trickle vents and intermittent extraction fans to wet rooms and kitchen
AIR PERMEABILITY: The house will be air tested on construction to achieve a value no higher than 5.
HEATING: The baseline heating is gas combi boiler, has an efficiency of 90%.
LIGHTING: 100% of light bulbs will be low-energy
RENEWABLES: None are used at this stage, but will be added later in this document.

STEP 2 - IMPROVEMENTS

Fabric First – *BE LEAN!*

We have already investigated how the baseline specification for this development can show compliance with Approved Document Part L, we must now look at how this can be improved.

The developer intends to make the following improvements – these changes will reduce energy use in the dwellings, cutting both carbon emissions and running costs for the buildings.

1. U-Values of Building Fabric:

FLOORS: The heat loss floors were calculated with a U-Value of 0.151 for the Baseline.

The proposed ground floor- timber boarding on 65 screed on 150 Kooltherm K3 floorboard insulation with 25 edge strip all round, on dpm on concrete slab; inner block leaf sitting on Marmox insulation blocks to avoid cold-bridging between cavity and floor insulation. The specification achieves a U value of 0.13.

WALLS: The heat loss wall has been calculated in the Baseline with an assumed U-Value of 0.22.

The proposed walls - 105 painted brick outer leaf, 125 cavity fully-filled with Rockwool batts and with insulated cavity closers around openings, 'thermal' cavity ties, 100 aircrete blocks, 12.5 plasterboard on plaster dabs, skim coat finish. The specification is to create an impressive U-Value of 0.18.

ROOF: Within the Baseline assessment, the insulation in the roof has been assumed to be 0.16

Flat roof - sedum blankets on waterproof layer on 150 Kingspan Thermaroof TR31 on joists with 100 Kooltherm K7 insulation between upper part of joists, with plasterboard ceiling. The specification will achieve a U-Value of 0.13.

THERMAL BRIDGING: The Baseline assessment has been created based on the Standard Construction Details.

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All junctions within the house will be constructed in line with Accredited Construction Details. This will limit the amount of cold spots within the junctions of the building fabric.

GLAZING and DOOR: Part L1A requires all openings (external doors, windows and rooflights) to achieve a typical U-Value of 2.0. The Baseline has been created using a typical value of 1.40 for the windows and 1.00 for the front external door.
These U-Values include the frame – it is not the 'centre-pane' value.

The developer will meet this set of U-Values, and ensure all openings achieve a typical value of 1.40 and 1.00.

2. Orientation and Natural Light

This section investigates the possibility of creating a more energy efficient development by targeting the build and design to maximise natural daylight and solar gains.
This means there will be less of a demand for artificial lighting and mains heating.

SOLAR GAINS: It is an important feature to make sure new buildings have a sufficient amount of natural daylight available.
A room with lots of south glazing will benefit from high levels of solar gains, which means there is less of a need for heating and lighting when compared to an identical house where the majority of windows face north.

It is not possible to choose the onentation of the building in this case, given the existing surroundings.
It is therefore sensible for the developer to make the most of the rear, south-east facing windows by ensuring a good level of glass is used, while balancing the appearance of the dwelling to match neighbouring properties.

SUMMER OVERHEATING: It is possible for a dwelling to benefit from too much sunlight. When this happens, the internal temperature can be uncomfortable, leading to the use of cooling systems which require more energy.
As such, Appendix P of SAP methodology carries out a basic check to show internal temperatures for a typical year.

In this case, the proposed house has been shown to have a 'OK' risk of overheating in the summer months.

This is perfectly acceptable under Part L.

3. Air permeability and Ventilation

New buildings are required to have air permeability (or 'air leakage') tests completed once constructed to confirm the building work is sufficiently tight.

The Baseline for this assessment has been created using an assumed air leakage rating of 5.. The maximum allowed for a new build construction is 10.

The house will be air tested on construction to achieve a value no higher than 5.

The Baseline houses have been created based on a System 1 ventilation system (intermittent fans and trickle vents).

It is proposed the dwelling will use a natural ventilation system for the house. Intermittent extraction fans will be fitted to all wet rooms and kitchen, and trickle vents will be fitted to all windows to ensure a good level of natural air flow.

4. Lighting

LAMPS: Recent technological enhancement in low energy lighting, and changes to UK law regarding the production and importing of non-efficient light bulbs has led to a surge of new energy efficient light bulbs onto our shelves.

The baseline calculation has been created on the assumption that 100% of internal light bulbs will be low energy. The minimum allowed under Part L is 75%.

The developer will ensure ALL lighting in the house will be low energy.

Low energy lamps are defined as any which produce at least 45 lumens per circuit watt.

This is true of modern fluorescent lamps, energy saving bulbs (also known as compact fluorescents) and LED lamps.
Tungsten, halogen and xenon bulbs should be avoided, as the efficiency of these lamps is typically less than 25 lumens per watt.

5. Heating and Hot Water

The amount of energy which is required to provide heating and hot water for a building can be higher than typical occupancy rates, lighting and cooking combined, so it is essential that an efficient system is used with suitable controls.

MAIN HEATING: The baseline calculation was created using a notional mains gas boiler with an efficiency no lower than 90%.

This is based on SEDBUK2009 efficiency calculations.

Rather than using conventional, condensing gas boilers, the developer's preference is to install Ideal Logic Code Combi ES to the dwelling.

The boiler has an integrated flue gas heat recovery system (FGHRS) which captures waste energy from the boiler flue, and uses this to pre-heat the incoming water supply.

In doing so, the amount of energy required to heat the water in the dwellings is significantly reduced.

If an alternative energy saving system is deemed to be more appropriate, a different boiler system without FGHRS may be considered instead.

HEATING CONTROLS: As well as the high-efficiency boiler, the baseline dwelling has been created with time and temperature zone control to all plots over 150sqm (as is required by the Domestic Services Compliance Guide).

The developer will ensure Time and Temperature Zone Controls are installed to the dwelling.

The developer also incorporates a weather compensator to reduce emission rates.

HOT WATER:

Ideal Logic Code is a combi boiler and therefore a hot water cylinder is not required. This will reduce waste energy because heat losses from the water will be greatly reduced.

The above improvements to the assessment are summarised on the next page. This is known as the IMPROVED or FABRIC FIRST set of assessments

These amendments will reduce the annual emission rate of the dwelling when compared to the current construction and services within the building.

This revised specification is expected to create 1447.7 kgCO2 annually; this is a reduction against the Baseline of 18%.

Element	Notes	Target U-Value	Part L1A Limitation	
		W/m²K	W/m²K	
GROUND FLOOR	150mm PU foam board under s 65mm screed	0 13	0 25	☑
EXTERNAL WALL	125mm Rockwool 100 aircrete blocks	0 18	0 30	☑
ROOF (Flat)	150 Kingspan Thermaroof TR31 on joists 100 Isoltherm KF insulation bet	0 13	0 20	☑
WINDOWS	double glazed units 4-20-4 with low-e glass	1 40	2 00	☑
Door	solid timber door	1 00	2 00	☑
THERMAL BRIDGING	Accredited Construction Details	0 06	0 15	☑
VENTILATION SYSTEM				
		m³/hm² @50Pa	m³/hm² @50Pa	
AIR LEAKAGE (DESIGN)		5 0	10 0	☑
		%	%	
HEATING (MAIN 1)	Ideal Logic Code Combi ES has an integrated flue gas heat recovery system (IFGHRS) time and temperature zone control weather compensator	89 0	88 0	☑
HEATING (MAIN 2)	None	N/A	N/A	
ROOM HEATERS	None	N/A	N/A	
COMFORT COOLING	None	N/A	N/A	
HOT WATER SYSTEM	From main boiler - combi system	89 0	88 0	☑
LIGHTING	All light fittings will be low energy	100 0	75 0	☑
OTHER NOTES	None	N/A	N/A	

The updated Dwelling Emission Rate is now 18.53 $kgCO_2/m^2/year$.

The Target Emission Rate remains at 22.24 $kgCO_2/m^2/year$, as calculated within the Baseline assessment.

The next step is to look at how further improvements can be made by using reduced, low and zero carbon options.

FEASIBILITY CHECK

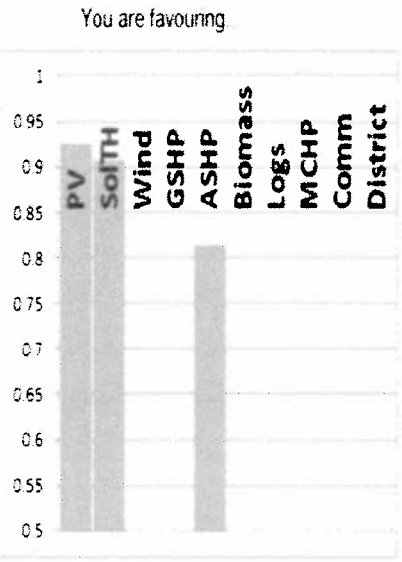
For Low and Zero Carbon Systems

The following calculation sheet measures the feasibility of ten different low and zero carbon services which could be applied to this property.

The below series of questions checks the appropriateness of each of the potential options, covering topics such as neighbouring land, storage space, roofspace and the general area.

The answer to each question is assessed using specifically designed software, and the results are summarised in the below chart.

Is the site in a conservation area?	No
Is the building listed or protected?	No
Could nearby houses be affected by noise created by renewables?	No
Could nearby buildings be affected by the appearance?	No
Would community heating be a viable option?	No
Is there a district heating supply available?	No
Is there roof space which faces SE / S / SW?	Yes
Is the roofspace relatively clear of obstructions?	Yes
Can fuel deliveries be made to the site easily?	No
Is there room to store fuel on site?	No
How much space is there for the heating system?	Minimal
How much space is there for the hot water tank?	Little
Wind speed region?	Thames
Location / surroundings?	City
Are these houses new or existing?	New
Are all U-Values in line with L1A / L1B limits?	Yes
Is the water tank new and properly insulated?	Yes
Is there space to bury heat pump coils?	No
Is the development in a flood risk area?	Not Sure
Do you think PV panels are suitable?	Yes
Do you think solar thermal is suitable?	Yes
Do you think ASHPs are suitable?	Yes
Do you think GSHPs are suitable?	No
Do you think Micro CHP are suitable?	No
Do you think Community heating is suitable?	No
Do you think turbines are suitable?	No
Do you think biomass is suitable?	No
Do you think log burners / fireplaces are suitable?	No



Top Feasible Options

PV
SOLAR
ASHP
TURBINES

The final stage of the assessment for this property will be based on:

SOLAR PV: To generate free electricity

SOLAR THERMAL: To provide free hot water to the occupants

AIR SOURCE HEAT PUMP: Using air source heat pumps instead of a mains gas boiler

The following options are not considered feasible, and will not be assessed further:

COMMUNITY: No district heating currently available in the area
MICRO CHP: Not suitable on well insulated buildings with a low heat demand
GROUND SOURCE HEAT PUMP: A bore-hole installation will be costly and is not proposed.
BIOMASS and WOOD BURNER: Limited access for deliveries on site. The London Borough of Camden has been designated a Smoke Control Area under the Clean Air Act 1993
TURBINE: Not suitable as site is small and surrounding by houses and trees.

STEP 3 - RENEWABLES

***Additional Savings** – BE GREEN!*

Given the expected energy use, location and feasibility of various renewable and low-carbon systems, the following five options would appear to be the most suitable.

The reductions shown include the Fabric First improvements as covered in the previous section.

OPTION 1: Solar PV Panels

A 26.37% reduction

By installing photovoltaic panels to the south-east / south-west facing roofs, it is possible to achieve an 8.36% reduction in overall energy use.

A 0.35 kWp of PV is required on this site. This option can be considered feasible, and is expected to have good payback times through the Feed-In-Tariff.

OPTION 2: Solar Thermal

A 26.5% reduction

It is possible to show a 10.4% reduction in overall energy use by generating free hot water in the dwelling:

To this dwelling, install 4sqm of flat plate solar thermal panels to the south-east / south-west facing roof. This would require a 110 litres of dedicated storage space in the dwelling.

This technology is simple and easily understood by the developer.

OPTION 3: Air source heat pump

A negative reduction.

Although a heat pump is more efficient than a gas boiler, it uses electricity which has a much higher energy factor than mains gas. As such, comparing a heat pump to a gas baseline assessment creates a negative effect.

ASAP could be used but care would need to be taken to ensure the location of the outside does not create a noise nuisance. This option will not be considered further.

FINAL CONCLUSIONS

For Low and Zero Carbon Systems

By making fabric improvements to the dwellings at 194a Fordwych Road, and by incorporating a heat recovery system and a 4 sqm solar thermal, it is possible to reduce the total carbon emissions of the buildings by 26.5%. The developer's preferred way forward is to use OPTION 1 – install a 4 square meters solar thermal.

(see box 272 of SAP Worksheets)	ENERGY kWh	%		EMISSIONS kgCO2	%	
Building Regulations Part L Compliance	9,234.7	0.0%		1,765.7	0.0%	
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This report has considered the inclusion of other technologies, and has concluded the option 1 is the most feasible when it comes to financial, practical and technical concerns.

The proposed improvements to the building fabric show an 18% reduction in carbon emissions. The inclusion of the solar system systems improves the CO2 reduction to 26.50%.

These improvements to building fabric, heating, ventilation and lighting will be enough to satisfy Policy 5.2 the London Plan in this case.

SAP Worksheets showing the Baseline, Fabric and 'Option 1' calculations should accompany this report for verification purposes.

Once planning approval has been granted for this dwelling, the final Design SAP Calculations will be issued to demonstrate full compliance with current Part L Building Regulations.

After construction, the As Built SAP Calculation and Energy Performance Certificate will be issued.

These documents will take into account any alterations to the building during the construction process which may affect the overall energy requirement of the house.

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