212 SWAKELEYS ROAD, ICKENHAM UB10 8AY

Residential Development

Energy & Sustainability Assessment

July 2024

REVISION	DATE	BY
22.07.24	B	Sam Beckett

Mechanical, Electrical and Public Health Consulting Engineers
Wessex Court, Clarence Street, Swindon
SN1 2DN.
Telephone: 020 8898 9504
Email: info@zbsa.co.uk
Web: www.zbsa.co.uk

Zaidi Building Services Associates
Wessex Court, Clarence Street, Swindon, SN1 2DJ
0208 8989504 / info@zbsa.co.uk / www.zbsa.co.uk

Content Page

1. SUMMARY

It is our opinion that sufficient design works have been carried out at this early stage to demonstrate that the proposal is successfully addressing the requirements of policy 5.2 of the London Plan and the local energy policies of the London Borough of Hillingdon.

The energy hierarchy has been adopted to follow a BE Lean, Be Clean, Be Green methodology. The preferred energy strategy is to reduce energy demand and consequently the amount of conditioning and renewable energy contribution needed. This starts with a fabric first approach to improve thermal elements and controlled fittings. The feasibility of CHP systems and decentralised energy networks have been considered within the Be Clean case.

The final Be Green improvements have additionally explored the adoption and effect of adding renewable energy. The most appropriate renewable energy source has been identified as solar photovoltaic which produce a carbon saving over the baseline emissions to achieve carbon zero in regulated Co2: See Table 1

The calculations provided, draw upon the detailed SAP 2013 assessment. This gives as accurate a guide as possible to the energy usage of the final development in operation.

The Energy Assessment sets out to meet the requirements of national and local policies with regard to energy conservation in dwellings, reductions in global climate change gas emissions and the use of renewable technologies to meet energy demand. In particular this meets the requirements of the London Plan and its implementation by London Borough of Hillingdon.

The assessment of energy demand, the consequent reductions in that demand, and the choice of suitable renewable technologies follow a hierarchical step-wise process:

Dwelling	TER CO2/yr	DER CO2 t/y	% Reduction	% Reduction Via renewable
212 Swakeleys Road	45.54	27.18	40.3	27.4

The building CO2 emissions for the development have been calculated to be reduced by average 40.3% beyond current Building Regulation. This has been achieved through energy efficiency measures, using improved building fabric, increasing the efficiency of the building services and finally the installation of a renewable energy source.

The Clean total energy requirements and carbon dioxide emissions have been calculated taking full account of all regulated emissions (space & hot water heating, and electricity for pumps, fans, lights). The Lean calculations was determined by using the orientation and the use of building elements (walls, windows etc.) with U-values consistent with achieving compliance with Approved Document Part L1A.

2. INTRODUCTION

This Energy Assessment relates to a planning application to erection of a 4 bed dwelling detached dwellings at 212 Swakelys Road, Ickenham, UB10 8AY.

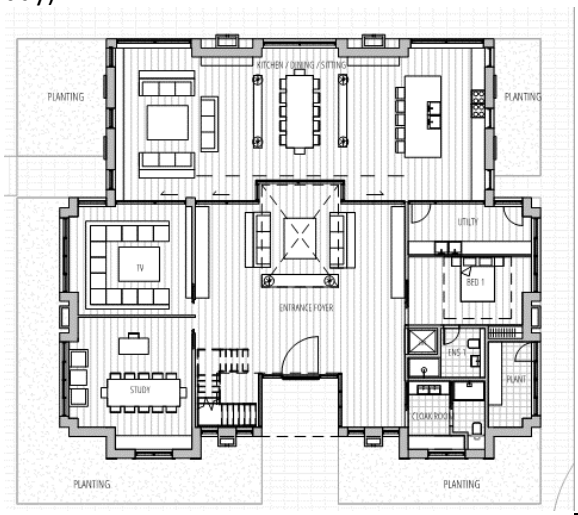
The requirement for new developments to obtain a proportion of their energy needs from on-site renewable energy sources is now a well-established feature of planning policy.

This Energy Assessment sets out the applicable policies on energy and CO2 emissions, and the methodology for and the results from an energy demand assessment.

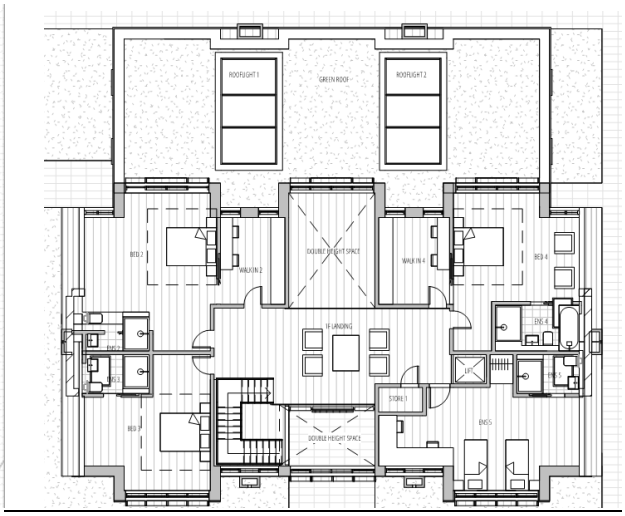
It includes an overview of possible renewable energy technologies and identifies the technology most suitable for this development and reasons why other technologies have been excluded.

In presenting the information, this Energy Assessment demonstrates that the proposed development will fully satisfy, the current applicable planning policies relating to energy conservation, and renewable energy.

A Sustainability Statement has been prepared to demonstrate a commitment to enhance the environmental performance of the development. This includes the specification of materials, waste reduction, biodiversity, and internal water use limited by design to 105 L/p/d (litres per person per day).



Ground floor Plan



First Floor Plan

3. PLANNING REQUIREDMENTS

The London Borough of Hillingdon Sustainability Policies

BUILDING REGULATIONS – PART L 2010
This section of the building regulations deals with the conservation of energy in new domestic and commercial buildings; specifically the energy used for space heating/cooling, water heating, cooking, lighting and appliances. The methodology for the assessment of such has been adopted from the Building Research Establishment's Domestic Energy Model energy assessment method for the domestic dwelling.

This method requires the calculation of a target emissions rate (TER), which assumes standard or typical building components and the calculation of the buildings actual emissions (DER for SAP). It is a requirement that the building's actual emissions will be lower than the target emission rate.

PLANNING POLICY ASSESSMENT 22: RENEWABLE ENERGY (ODPM, 2004) Planning Policy Assessment covers the consideration of issues relating to renewable energy technologies and their application to new developments.

Technical advice and guidance on the various individual renewable technologies and examples of good practice within development plans and developments are also available. Requirements include:

a) Renewable energy developments should be capable of being accommodated throughout England in locations where the technology is viable and environmental, economic, and social impacts can be addressed satisfactorily.
b) b) The wider environmental and economic benefits of all proposals for renewable energy projects, whatever their scale, are material considerations that should be given significant weight in determining whether proposals should be granted planning permission.
c) c) Development proposals should demonstrate any environmental, economic and social benefits as well as how any environmental and social impacts have been minimized through careful consideration of location, scale, design and other measures.

THE LONDON PLAN, MAYOR OF LONDON,

This report has been prepared in accompaniment to a planning application for New Dwelling and a proportion of the report seeks to address policy 5.2 of the London Plan as well as LBRUT policies CP1 and CP2 and policies DM H01, DM SDI and DM SD2 of the Development Management Plan. The extract below outlines the approach for producing energy assessments as per 'Energy Planning Greater London Authority guidance on preparing energy assessments April 2015'.

"On 6 April 2014 the 2013 changes to Part L of the Building Regulations came into effect. Part L 2013 delivers an overall reduction in CO2emissions for new residential and new non domestic buildings, with the targets for individual buildings being differentiated according to building type. This reduction in CO2emissions affected the percentage reduction necessary above the Part L 2013 regulations to meet the Mayor's targets in the London Plan.

As outlined in the Sustainable, Design and Construction SPG, since 6 April 2014 the Mayor has applied a 35 per cent carbon reduction target beyond Part L 2013 of the Building Regulations - this is deemed to be broadly equivalent to the 40 per cent target beyond Part L 2010 of the Building Regulations, as specified in Policy 5.2 of the London Plan for 2013-2016.

Detailed energy statements should be submitted as part of applications. This should demonstrate the predicted energy and associated carbon dioxide emission savings achieved through the

incorporated of energy efficiency measures, decentralised energy and low/zero carbon technologies. This should be demonstrated in line with policy 5.2 of the London Plan, which requires a 35% reduction in CO2 emissions above 2010 Building Regulations covering the period up to October 2013 and 40% thereafter."

The strategy outlined in this report has aimed to achieve a 35% reduction in CO2 emissions against a Part L1A. This target has been achieved following the energy hierarchy presented in the London Plan.

4. CALCULATION METHODOLOGY

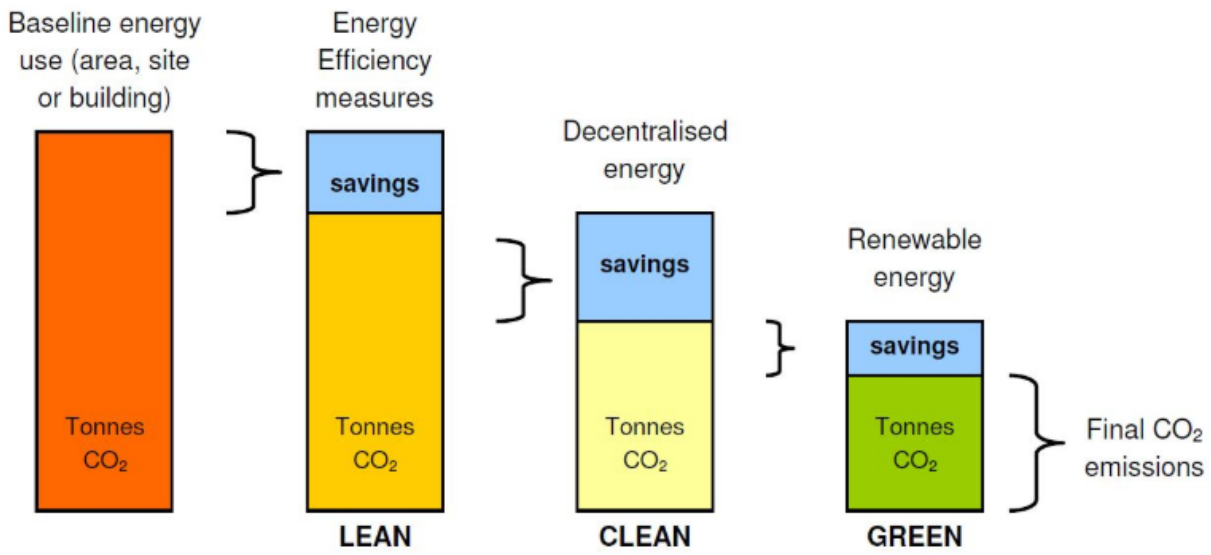
This Energy Assessment takes a standard hierarchical approach as follows:

1. Lean
A calculation of baseline energy demand, demonstrates the projected annual heating, cooling and electricity demand of the development. The assessment shows the carbon dioxide emissions resulting from the predicted energy use (Dwelling Emissions Rate)

2. Clean
A calculation showing the improvement of the services and fabric over the Lean Calculations.

3. Green
Details of renewable energy technologies to be incorporated in the development, demonstrating how much carbon dioxide emissions from expected energy use will be reduced through on-site renewable energy generation.

The starting point was to determine the performance of the "Lean" for the dwellings, using the orientation, level of insulation and the performance of building services equipment.



ENERGY DEMAND AND EFFICIENCY – Lean, Clean & Green

The total CO2 emissions has been calculated taking into full account of energy demands for space heating, hot water, and electricity for pumps, fans, lights. The baseline was determined by using the orientation and the building elements (walls, windows etc.) with U-values and other reference values.

Applied Details: Domestic

· Main wall to achieve u-value of 0.14 W/m^2K
· Roof to achieve 0.14W/ m^2K
· Floor to achieve 0.14W/ m^2K
· Windows to achieve u-value of 1.30 W/m^2K
· Doors to achieve 1.20W/ m^2K
· Highly efficient electric boiler
· Controls: Time and temperature zone controls, heaters
· Internal lighting 100% low energy lighting
· Air pressure test 5.00 or less
· Ventilation – intermittent extract fans
· Accredited construction thermal bridging to table K1 applied
· Party Walls – Full filled cavity with edge sealing, or solid walls

Be Clean -Improved Efficiency and services

The following improvements have been applied to the services over the baseline(lean) calculations reducing the CO2 emissions:

Applied Details: Domestic

· Main wall to achieve u-value of 0.11 W/m^2K
· Roof to achieve 0.08W/ m^2K
· Floor to achieve 0.08W/ m^2K
· Air pressure test 4.00 or less
. Introduction of PV Panels 8.6kWP

The tabulated calculations results are in table below. The results show the CO2 emissions from the baseline (lean) calculations.

Dwelling	TER CO2/yr	DER CO2 t/y	% Reduction	% Reduction Via renewable
212 Swakeleys Road	45.54	27.18	40.3	27.4

With reference to the boiler and the MVHR this has been chosen for the efficiency only and needs to be clarified that its suitable for use, if an alternative is used please inform us and we will check the efficiencies as an alternative boiler cold make the calculations fail L1A building regulations and the reduction in Co^2 for London Plan.

5. OVERVIEW OF RENEWABLE ENERGY

Energy from renewable sources has been defined in Article 2 of EU Directive 2010/13/EU 'on the energy performance of buildings' and includes wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. For the purposes of this energy Assessment and the use of renewable energy on a domestic scale these can be summarised as follows:

- Bio-fuels — combustion of solid or liquid bio-fuels to produce heat or electricity.
- Decentralised energy.
- Heat pumps — extraction of heat from the earth, atmosphere or water bodies.
- Hydroelectricity — use of water cycle driven flows to generate electricity.
- Photovoltaic — direct generation of electricity from sunlight.
- Solar thermal — direct heating of water for space heating or domestic hot water.
- Wind turbines — use of solar driven air movement to generate electricity.

The technologies and their potential application to this site are discussed in more detail in the following sections. However, one further pertinent point must be made. The reason for adopting renewable energy technologies is to reduce greenhouse gas emissions, mainly carbon dioxide, and none of the technologies are wholly "zero carbon". This is because, when the whole life cycle is taken into account some energy has to be put into every system to manufacture and maintain the equipment (which has a finite life) or to operate the equipment, and generally at present this energy is derived from non-renewable sources. Examples include the energy needed to refine and process the silicon used to manufacture photovoltaic panels, the diesel fuel used to transport wood pellets and to power the wood processing machinery for the production of wood fuel pellets.

Finally, due to the dynamic and innovative nature of the renewable energy technology industry even apparently similar products can differ in vital practical details which means that detailed design of installations must be undertaken by experts, often working closely with the product manufacturers, as virtually no two products are identical or interchangeable.

The following sections contain a summary of each possibly applicable technology, and a comparison of the advantages and disadvantages of technologies relevant to this development.

5.1 DECENTRALISED ENERGY

Not considered suitable for this development.

5.2 BIO-FUELS

Not considered suitable for this development.

5.3 AIR SOURCE HEAT PUMPS

A new technology which works very well in new build development. The ASHP can be used to provide both the hot water and heating for the dwelling.

Not considered suitable for this development.

5.4 Ground source heat pumps

Not considered suitable for this development.

5.5 HYDROELECTRICITY

Not considered suitable for this development.

5.6 PHOTOVOLTAIC

Photovoltaic (PV) systems use areas of semiconductor material that produce electricity when exposed to light. They are connected to the building electricity supply via an inverter which converts the output to a form which is compatible with the mains electricity voltage and frequency. This also allows excess electricity to be exported at times when the actual demand from the dwellings is less than that being produced by the PV system. This ensures that all the electricity produced is used and achieves a reduction in carbon dioxide emissions. For all purposes relating to planning, the exported electricity is by convention treated as if it were used on site.

The output of photovoltaic systems is generally specified as kW peak, or kWp with each 1kWp of system expected to produce an average 800 kWh of electricity per year, although this may be reduced depending on location, orientation and over shading. The area required to produce an output of 1 kWp varies but for this exercise 6.7m2 has been used. (The developer will be required to submit a quotation and technical evaluation to ensure that the calculated quantity of panels will produce the required on site generation per annum)

Because the availability of sunlight, to produce electricity, will generally not align with demand, it is normal for the system to be connected to the electricity grid and excess production exported. The introduction of the feed-in-tariff has improved the economics of solar PV systems.

There are no direct environmental consequences from the installation of PV panels but the installation can have a visual impact that may require consideration.

5.7 SOLAR THERMAL PANELS

Solar thermal panels harness solar energy to heat domestic hot water. They are usually supplemented with the main heating system, as they can only provide a portion of the hot water demand, depending on the time of year. Overall, it is estimated that a suitably sized system can provide up to 60% of the hot water energy. Solar thermal systems require the installation of a thermal store and / or a domestic hot water cylinder. This is not currently planned for this development as it is proposed to use combination boilers to provide the heating and domestic hot water.

It is for this reason that solar thermal systems are not considered suitable for the development.

5.8 WIND TURBINES

Not considered suitable for this development.

6. Be Green - Renewable - Conclusion

This section looks at how the development can reduce overall energy usage and demand from renewable energy sources.

All possible renewable energy technologies were evaluated in relation to the site, starting with Combined Heat and Power (CHP). Most technologies were excluded because of the small scale of the development and location. One technology was identified as being most suitable for installation; the use of photovoltaic (PV) panels mounted on the roof of the development. It has been calculated that a suitably sized installation to offset **8.6 KW peak photovoltaic panels** would contribute to a reduction in carbon dioxide emissions of compared with the baseline.

Photovoltaic Panel systems convert energy from the sun into electricity through semi-conductor cells mounted in collector panels. The panels are connected to an inverter to turn the DC output into AC for use in the building to which they are attached and to be fed back into the grid when not required.

In order to achieve the enhanced reduction, we propose to 8.6 kW peak photovoltaic panels for the dwelling.

Dwelling	TER CO2/yr	DER CO2 t/y	% Reduction	% Reduction Via renewable
212 Swakeleys Road	45.54	27.18	40.3	27.4

The building CO2 emissions have been calculated to be reduced by minimum of 40.3% beyond current Building Regulation. This has been achieved through energy efficiency measures, using improved building fabric, increasing the efficiency of the building services and finally the installation of a renewable energy source.

The developer will be required to submit a quotation and technical evaluation to ensure that the calculated quantity of panels will produce the required on-site generation per annum and the amount of required panels can fit on the building.