Energy Statement

Residential Development at 24 Ambleside Drive

Planning application number: **TBC**

Site Address: 24 Ambleside Drive
Oxford
Oxfordshire
OX3 0AQ

Client: Sabby Saini

Architect: Harjeet Suri

Assessor: Peter Yearsley
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Signed: [redacted]

Date: 07/11/2023

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1.0 Introduction

This report has been prepared by Apex Home and Energy Surveyors Ltd on behalf of Sabby Saini in support of the below planning application:

Application No: TBC

Proposal: Detached new build residential dwelling.

Site Address: 24 Ambleside Drive, Oxford, Oxfordshire, OX3 0AQ

In particular the report addresses Oxford City Council's policy RE1.
The condition states:

Policy RE1 also requires that new build residential dwellinghouses must achieve at least a 40% reduction in carbon emissions from a 2013 Building Regulations (or future equivalent legislation) compliant base case. This reduction is to be secured through on-site renewable energy and other low carbon technologies and/or energy efficiency measures. New dwellings are also required to meet the higher water efficiency standards within the 2013 Building Regulations Part G2 water consumption target of 110 litres per person per day.

An energy statement should be submitted with any future application demonstrating that the proposal would achieve the minimum of a 40% reduction in carbon emissions from a 2013 Buildings Regulations compliant base, alongside meeting the 2013 Building Regulations Part G2 water consumption target of 110 litres per day. The energy statement submitted should detail what methods would be used to meet the above requirements and SAP calculations should be provided to support these figures.

The proposals contained within this report are based upon detailed design and specification information particular to this project and are not based upon 'generic' dwelling design data. This includes full SAP calculations carried out on the dwelling designs that comply with the updated Building Regulations Approved Document L1 that came into force on 15th June 2022 which this dwelling will be required to comply with for planning purposes.

This report examines the various options for achieving the required provision of energy demand. The proposed solution involves improving the general construction specifications and using high efficiency heating systems.

2.0 Predicted energy demand methodology

Policy RE1 states that new build residential dwellinghouses must achieve at least a 40% reduction in carbon emissions from a 2013 Building Regulations (or future equivalent legislation) compliant base case. The energy demand is measured within the Standard Assessment Procedure (SAP) methodology. This is the Government's chosen method used to show compliance with Building Regulations Approved Document L1.

The SAP method assesses the energy uses from heating, hot water, ventilation and lighting and calculates the CO2 emissions associated with these uses. For each dwelling the SAP assessment calculates a Target Emissions Rate of CO2 (TER) and an as designed or as built Dwelling Emissions Rate (DER). In order to pass a SAP assessment, and therefore comply with Building Regulations Approved Document L1, the Dwelling Emissions Rate must be no greater than the Target Emissions Rate.

For the purposes of this report a baseline energy demand must be established against which the 40% reduction can be measured. The baseline that is to be used is the energy demand equivalent to the Target Emissions Rate as calculated by SAP.

3.0 Target energy demand

A full design stage SAP10 calculation has been carried out on the dwelling. The energy demand associated with the Target Emissions Rate for this dwelling will be used for the baseline energy demand as shown below.

Plot Number	Space Heating Requirement	Hot Water Requirement	Lighting Requirement	Pumps and Fans Requirement	SAP Floor Area	Energy from PV	CO2 Emissions	Total Energy Demand
-	kWh/Annum	kWh/Annum	kWh/Annum	kWh/Annum	m2	kWh/Annum	(t/year)	kWh/Annum
Data Set 1: Base Case Design (Part L 2012 Compliant)								
1	5077	829	435	0	227.8	-561	0.77	5780
Data Set 1: Base Case Design Total CO2 Emission's (t/year)								0.77

4.0 Technology feasibility study

In this section we will analyse at a number of available methods that could be utilised to reduce the total energy demand from the dwelling. This will include renewable technologies and passive measures.

4.1 Wind Turbines

Small scale on-site wind turbines can have the potential to make a contribution to on-site renewables targets. However barriers such as noise, surrounding features and visual impact (planning issues), can severely restrict their use.

The space available for locating wind turbines on this development is limited and probably restricted to the use of roof mounted units.

The performance of roof mounted turbines is considerably reduced when compared with freestanding models. Recent studies have also found that wind speeds actually seen in urban environments are considerably less than given in meteorological data. Consideration should be made to the local topography, such as the existing trees within and around the site, and how this affects the wind speeds and turbulence experienced.

In light of the visual impact and existing trees within the site we would consider that wind turbines are not viable for this development.

4.2 Biomass

The use of biomass systems to provide heating and hot water often lends itself towards a district heating approach whereby a central system is provided which distributes low temperature hot water to each unit. Smaller units are available for installation in individual dwellings but, despite their continual development, these are still quite large and require a dedicated plant room.

One of the key downsides of the use of biomass in development of this nature is the space required for the storage and delivery of fuel for both the district and individual systems.

Biomass led systems are also starting to fall out of favour with environmental agencies and environmentalists because of the increased flue and smoke emissions associated with them, the effect on the local air quality, and the requirement for regular fuel deliveries which increases local traffic, particularly in light of current strategies to reduce traffic on Britain's roads.

We therefore do not feel that a biomass scheme is suitable for use in this development.

4.3 Combined Heat and Power

Combined Heat and Power (CHP) is the simultaneous production of heat and electricity. Using a reliable internal combustion engine fed from a single source of fuel, such as natural gas or LPG, a CHP system can produce usable amounts of both heat and electricity.

The Government's Micro-generation Strategy has identified Micro-CHP as one of the key technologies which offers a realistic alternative to centrally generated electricity.

Previously, CHP systems have only been suitable for large developments due to the size and complexity of the systems available. Small scale CHP systems are now on the market for individual dwellings. These systems are not much larger than a typical gas boiler, and have a built-in turbine to produce electricity for the home.

However it is recommended that CHP is not installed in newly built dwellings. The system only produces electricity when the boiler is producing heat. In a new build the heating demand will be considerably less due to a tighter build quality and better U-Values of heat loss elements. The system would not be able to generate enough power to be considered financially viable.

We would therefore consider that combined heat and power is not viable for this Development

4.4 Ground Source Heat Pumps

Ground source heating takes advantage of the stable ground temperature of 12ºC to heat either air or water to provide energy efficient heating (and optional comfort cooling) to a building.

The energy flow is driven by the temperature difference between the ground and the circulating fluid which can then be used to deliver heating and cooling to the building. This type of system is suited to low temperature heating systems, such as underfloor heating, since it offers poorer efficiencies with circulating temperatures of 60°C or higher.

The system involves the installation of underground pipework laid in a horizontal or vertical pattern in land adjacent to the dwelling, usually underneath the garden or driveway.

The lack of space means that we would not recommend ground source heat pumps for this development.

4.5 Air Source Heat Pumps

Air source heat pumps are currently not classified as a renewable technology, although there is European Union document that has proposed they be classified as such, however they do fall within the category of low carbon source.

Air source heat pumps work in the same manner as ground source heat pumps, but instead of extracting low temperature heat from the ground, it extracts it from the air. It can extract heat from the air even when the outside temperature is -15°C.

As with ground source heat pumps, this type of system is more suited to a low temperature heating system, therefore the use of under-floor heating would be required in the dwellings to maximise savings.

The dwelling has a suitable outside area for the external units to be located.

Whilst the installation costs of these systems are not as high as with ground source heat pumps, they are still significant. Air source heat pumps are suitable for this development and is the preferred choice of the developer along with solar photovoltaic panels.

4.6 Photovoltaics

The cost of producing electricity by photovoltaic's was once seen as being prohibitive. However, with improved efficiencies, reduced costs, and the introduction of feed-in tariffs in the UK, the use of PV is now considered a viable renewable technology and is serious competition for solar water heating for available roof space.

To achieve maximum output from photovoltaic's they should ideally be located on south facing surfaces, with clear, unobstructed views of the sky.

The installation of PV is technically feasible and would lead to CO2 reductions for the dwelling and is a preferred option for the developer.

4.7 Solar Water Heating

Solar water heating systems use the energy from the sun to heat water for domestic hot water needs. Solar water heating systems use a heat collector that is usually mounted on a roof in which a fluid is heated by the sun, this fluid being used to heat water that is stored in a hot water cylinder.

Domestic installations usually comprise of 4m² collection area, which can provide 50%-70% of the hot water requirement for a typical home if provided on south facing roofs at the optimum 30° pitch.

The installation of Solar water heating is technically feasible and would lead to CO2 reductions for the dwellings, however the developer would prefer to use an alternative for this development.

5.0 Proposed technology to be adopted

Having reviewed the various options it has been concluded that improving the building fabric and using an Air Source Heat Pump along with solar photovoltaic panels would be the best fit for this development.

The dwelling will have enhanced insulation materials, glazing and air tightness together with low thermal mass and enhanced thermal bridging detailing.

This will significantly reduce the energy demand of the development.

5.1 Proposed energy demand

A full design stage SAP10 calculation has been carried out on the dwelling. The energy demand associated with the Target Emissions Rate for the dwelling will be used for the reduced energy demand as shown below.

Plot Number	Space Heating Requirement	Hot Water Requirement	Lighting Requirement	Pumps and Fans Requirement	SAP Floor Area	Energy from PV	CO2 Emissions	Total Energy Demand
-	kWh/Annum	kWh/Annum	kWh/Annum	kWh/Annum	m2	kWh/Annum	(t/year)	kWh/Annum
Data Set 2: Improved Case Design 19% Reduction (Part L 2012 Compliant)								
1	2633	1848	434	0	227.8	-1708	0.43	3207
Data Set 2: Improved Case Design Total CO2 Emission's (t/year)								0.43

As can be seen from the figures in Data Set 1 and Data Set 2 there is an overall reduction in CO_2 of 0.34 (t/year). This a reduction of 44.16%

6.0 Supporting information

Full notional and proposed SAP Calculations are available upon request.