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SWEDISH ENERGY SAVING HOMES

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Energy Statement for New Dwelling at Land Rear of Hartlea House High Drive Woldingham Surrey CR3 7EL

This Report provides a brief overview of the range of opportunities for sustainable energy and is not intended as detailed design advice. As Such data and information should only be treated as indicative at this stage of the process. Further investigation can be undertaken when more accurate and detailed information is required on specific measures.

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Energy Assessment

Energy assessment calculations have been carried out to demonstrate that a minimum saving of 10% of the dwellings carbon emissions can be achieved through the incorporation of onsite renewable energy production equipment as required by Tandridge District Council.

An NHER assessment was considered the most appropriate to form the basis of the calculations since it considers energy consumption in use for not only space and water heating in addition to internal lighting (as SAP 2009) but includes cooking and electrical appliances.

An initial assessment was carried out to establish the 'base line' energy requirements and fuel use, for the dwelling using information provided on the proposed planning drawings. For the purpose of these calculations the performance of the thermal elements and controlled fittings were chosen so that compliance with all the criterion under the current Part L1A (2010) of Building Regulations was achieved.

The space and water heating services for the 'Base Line' calculations were specified as set out in the Domestic Heating Compliance Guide and used in Ene7 (Low or Zero Carbon Technologies) in Code for Sustainable Homes and are detailed below:

Space Heating – Gas fired condensing boiler with interlock and a minimum SEDBUK rating of 86% serving Underfloor Heating.

Heating Controls – Programmer, room thermostat and TRV's

Secondary Heating – None

Water Heating – 300 litre indirect cylinder with a manufacturer's loss factor of 2.62 kWh/day, insulated primary pipework, cylinder thermostat and pumped primary system.

The following assumptions were made for thermal elements and controlled fittings for the 'Base Line' dwelling:

Ground Floor – 'U' value 0.18 W/m^2K

External Walls - 'U' value 0.16 W/m^2K

Windows and Fully Glazed Doors - 'U' value 1.00 W/m^2K

Front Entrance Door - 'U' value 1.00 W/m^2K

Roof - 'U' value 0.14 W/m^2K (Insulation between and over ceiling joists) 'U' value 0.14 W/m^2K (Insulation between and under rafters)

Ventilation – Air permeability rate of 5m3/hm2 (@50pa)

Thermal Bridging – Accredited construction details to be used

The following assumptions were made for the actual dwelling space and water heating:

Space Heating – Air Source Heat Pump serving underfloor heating.

Heating Controls – Time and Temperature zone control and weather compensator

Water heating – 300 litre indirect cylinder with a manufacturer's loss factor of 1.56 kWh/day; Insulated primary pipework, cylinder thermostat and pumped primary system.

Renewable Technologies Considered

Combined Heat and Power

We consider that for such a small development with no year round heat demand, that this technology would not be appropriate. A CHP plant is usually gas, biomass or coal driving a turbine to create electricity. The problem with this system is that you create a large amount of heat for a smaller amount of electricity. In the summer therefore to create the required electricity will mean dumping the manufactured heat; this is fine if you have a swimming pool or similar but otherwise a waste.

Photovoltaic

Photovoltaic's convert energy from the sun into electricity through semi conductor cells mounted in solar panels. The panels are connected to an invertor to turn DC output into AC for used in the building to which they are attached and to be fed back into the grid when not required. Solar panels would be difficult to orientate on the roof to make them efficient, so have been considered unsuitable for the development.

Solar Hot Water Systems

Solar water heating systems use energy from the sun to heat stores in a hot water cylinder in the building. The main disadvantage with solar hot water systems over photovoltaic's is their comparative high cost. This technology is considered unsuitable for the proposed development due to the high cost and the better performance of other systems.

Biomass Heating

Domestic scale boilers such as woodchip-fed systems remain very costly and very large and the requirements for siting both the boiler and the fuel source are considered impractical for this development.

Air Source Heat Pumps

Air source heat pumps are used to extract hear from the air to provide both space and water heating. Heat pumps take in heat at a certain temperature and release it at a higher temperature, using the same process as a refrigerator. Air passes through a heat exchanger in the heat pump which extracts heat from the air and passes that to the fluid. The heat pump raises the temperature of the fluid via the compression cycle to supply hot water to the building. We consider this system to be suitable in this case.

Ground Source Heat Pumps

Ground heat pumps are used to extract heat from the ground to provide both space and water heating. Heat pumps take in heat at a certain temperature and release it at a higher temperature, using the same process as a refrigerator. Fluid is circulated through pipes buried in the ground which pass through a heat exchanger in the heat pump which extracts heat from the fluid. The heat pump raises the temperature of the fluid via the compression cycle to supply hot water to the building. The ground pipe system can be horizontal or via vertical boreholes. There is a limited area to incorporate a ground pipe system and bore holes are financially prohibitive.

CONCLUSION

To reduce the dwellings CO_2 emissions by 10% through the incorporation of on-site renewable energy as required by Tandridge District Council we suggest the use of an Air Source heat Pump to be most appropriate in this case.