ENERGY STATEMENT
WILLOW BROOK,
DANWORTH LANE,
HURSTPIERPOINT,
WEST SUSSEX,
BN6 9LW.

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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.

ENERGY STATEMENT

Energy assessment calculations have been carried out to demonstrate that a minimum saving of 20% of the dwellings CO_2 emissions that can be achieved through the improvement in the fabric performance and incorporation of on-site renewable energy sources for the conversion of an existing barn building at Willow Brook, Hurstpierpoint.

An initial assessment was carried out to establish the "BASELINE" energy requirements and fuel use, for the dwelling using the information provided on the proposed planning submission drawings. For the purposes of these calculations the performance for the thermal elements and controlled fittings were chosen so that compliance with the all the criterion under the current Part L1B 2021 of the Building Regulations is achieved.

The following assumptions were made for the thermal elements, controlled fittings, heating and hot water for the dwelling: -

The following assumptions were made for the "BASELINE" case: -

Ground floor - 'U' value 0.15 W/m^{2}K (Part L1B Minimum)

Upgraded external walls - 'U' value 0.30 W/m^{2}K (Part L1B Minimum)

Windows – 'U' value 1.40 W/m^{2}K (Part L1B Minimum)

Solid doors – 'U' value 1.40 W/m^{2}K (Part L1B Minimum)

Roof – insulation at joist level - 'U' value 0.15 W/m^{2}K (Part L1B Minimum)

Roof – insulation at rafter level - 'U' value 0.15 W/m^{2}K (Part L1B Minimum)

Space heating – Air source heat pump serving underfloor heating & radiators.

Heating controls – Programmer, room thermostat & TRVs.

Thermal bridging – Default thermal bridging

Air Permeability – No air pressure test required for conversions.

Secondary heating – No secondary heating

Water heating – From ASHP

Ventilation – Individual extract fans

Lighting – All light fitting to be low energy.

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 be 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 creating the required

electricity will mean dumping the manufactured heat; this is fine if you have a swimming pool or similar but otherwise a waste.

Solar Photovoltaic

Photovoltaics' convert energy from the sun into electricity through semi-conductor cells mounted in solar panels. The panels are connected to an inverter to turn 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. This technology is considered suitable for the development however the client's preference is for an air source heat pump with further upgrades to the fabric of the building.

Solar Hot Water Systems

Solar water heating systems use energy from the sun to heat water stored in a hot water cylinder via solar collectors on the roof of the building. This technology is considered suitable for the development however the client's preference is for an air source heat pump with further upgrades to the fabric of the building.

Biomass Heating

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

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 passes 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 vertical via boreholes. This technology is not being considered for this development as there is insufficient space for a ground pipe system and the installation cost of boreholes would prohibitive.

Air Source Heat Pumps

Air source heat pumps are used to extract heat 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 fluid. The heat pump raises the temperature of the fluid via the compression cycle to supply hot water to the building. Because of the nature of air source heat pumps consideration must be given to the plant noise and the visual impact of the external plant. This technology is proposed for this development.

CONCLUSION

The dwellings thermal envelope will be designed to reduce the predicted energy load of the building using the improvement to the thermal element U values, air permeability and heating systems. The overall aim of the dwellings design is to ensure maximum possible reduction in carbon emissions within the constraints set by the nature and form of the development and the individual site characteristics.

To seek to achieve compliance with the requirements of Local Authority, the detailed design of the development sought to achieve as its objective a minimum 20% reduction in the overall carbon emissions using renewable technologies. Consideration has also been given to the overall appearance of the development

A second assessment "PROPOSED" was carried out to establish the reduction in CO_2 emissions. The following assumptions were made for the thermal elements, controlled fittings, heating and hot water for the dwelling: -

The following assumptions were made for the "BASELINE" case: -

Ground floor - 'U' value 0.11 W/m^{2}K

Upgraded external walls - 'U' value 0.16 W/m^{2}K

Windows – 'U' value 1.00 W/m^{2}K

Solid doors – 'U' value 1.00 W/m^{2}K

Roof – insulation at joist level - 'U' value 0.11 W/m^{2}K

Roof – insulation at rafter level - 'U' value 0.15 W/m^{2}K (Part L1B Minimum)

Space heating – Air source heat pump serving underfloor heating & radiators.

Heating controls – Time and temperature zone control.

Thermal bridging – Actis approved thermal bridging details.

Air Permeability – Air pressure test result of 5.00 @50Pa (blower door method).

Secondary heating – No secondary heating

Water heating – From ASHP

Ventilation – Systemair MVHR system proposed

Lighting – All light fitting to be low energy.

The proposed upgrades to the Part L1B (2021) minimum standards create an overall reduction of **39.53%.** The total carbon dioxide emissions have been highlighted on the first page of the SAP worksheets in the appendix.

RESULTS SUMMARY

BASELINE	**PROPOSED**	**% Reduction**
0.43tonnesCO_2/yr	**0.26tonnesCO_2/yr**	**39.53%**

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APPENDIX

SAP WORKSHEETS