Happy Daze Care Home

Energy Statement April 2011

1 Introduction

Happy Daze Care Home will provide accommodation and care for elderly people in a 40-bedroom, two-storey residential Care Centre with an internal floor area of 2000m2.

This Energy Statement assesses the possible renewable energy technologies for the Care Home, and their contribution to the 10% of energy required by Hotchester BC.

2 Energy Demand

The development will be built to the current stringent Building Regulations which ensure that all practical energy efficiency measures have been designed into the building from the start. Happy Daze Inc prides itself on providing a warm and comfortable environment for our residents. As elderly and vulnerable people, it is important to our values to ensure their comfort is our priority, and we will not compromise in providing sufficient heat and light for them.

Heating and hot water for Happy Daze Care Home will be provided from a centrally gas-fired boiler system. Electricity will be drawn from the grid.

Care Homes should be maintained at a temperature of at least 23°C, and our heating system is designed to ensure we can maintain this at all times. We will install a state-of-the-art control system to manage comfort levels whilst minimising wasted energy.

The energy demand of the development is shown below, compared to industry standards.

	Energy consumption kWh/m2	
	Happy Daze	Industry Best Practice
Heat	105	120
Electricity	35	40

3 Renewable Energy Supply Options

The following renewable energy and energy efficient supply technologies have been considered.

3.1.1 Wind Turbine

Wind speeds at the site are 5.0 m/s at 10m height and 5.8 m/s at 25m. To obtain 10% of the energy demand would require at least a 25 kW turbine on a 20m mast. Given the

location of the development in a residential area, with existing mature trees, such a turbine is not an appropriate option.

3.1.2 Solar PV

Solar photovoltaic (PV) systems convert sunlight to electrical energy. To work effectively, PV panels are best located on a 30% slope facing due south, with no over-shadowing from trees or buildings. Grid-connected PV systems can export excess electricity to the grid and import from the grid when the PV supply is insufficient to meet demand. It is most economic to size the system to meet the building's electricity base load, as export prices are significantly lower than the cost of electricity imported.

To provide 10% of the energy from PV would require an area panels covering 260m2. As the maximum south-facing roof area available is only 80m2, of which at most 72m2 is practically useable for PV, this is not considered a viable option.

3.1.3 Solar Thermal

Solar thermal systems use heat from the sun to provide heating, usually for hot water supply. To work effectively, solar panels are best located on a 30% slope facing due south, with no over-shadowing from trees or buildings. Between 40% - 60% of a building's hot water demand can be supplied by a solar thermal system, with a back-up heating system needed to provide hot water on cold and cloudy days.

Hot water accounts for around 35% of the total heat demand. As the roof is almost due south, 38m2 of solar panels supplying 50% of the hot water demand would provide 10% of the overall energy demand.

3.1.4 Ground Source Heat Pump

Ground source heat pumps convert low-grade heat collected from the earth in underground pipes into high-grade heat to feed into a wet heating system via a heat pump. A realistic "in operation" Coefficient of Performance for GSHP is 2.6 i.e. every unit of electricity used produces 2.6 units of heat. A GSHP designed to supply 21% of the heating demand would provide 10% energy savings. This would be backed up by a conventional boiler to manage variability in demand.

A GSHP system requires twice the internal floor area of the building for the external pipework. This could be installed under the car park and grounds.

3.1.5 Air Source Heat Pump

As an alternative to GSHP, an air-source heat pump could be installed. ASHP achieve a lower operational COP (2.4), so would need to supply 24% of the heat demand to achieve 10% energy savings.

3.1.6 Biomass Boiler

Biomass boilers ideally provide the heat baseload, backed up with a gas boiler to provide the seasonal and daily variability. On this basis the boiler should be designed to provide

no more than 30% of the heat demand. A biomass boiler sized to meet 10% of the total energy demand would provide 15% of the heat load.

However, successful operation of a biomass boiler depends on a number of factors;

- The availability of a local supply
- Sufficient dry storage space
- Regular access for delivery vehicles

Due to the lack of a local supplier, this option is not considered viable.

4 Summary

Three technologies are considered viable for this development;

- Solar Thermal
- Ground Source Heat Pump
- Air Source Heat Pump

Taking into account capital and maintenance costs of the different options, Happy Daze propose to install 38m2 of solar panels to meet the planning requirement.