NPH Billing Brook Road Supported Living

ENERGY STATEMENT FOR NEW DEVELOPMENT

MAY 2019
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1.00 EXECUTIVE SUMMARY

The methodology used to determine the energy demands and contributions are in accordance with the energy hierarchy outlined below:

Reduce the overall energy use of the development

The development will incorporate a range of energy reduction techniques in order of priority.

Firstly, reducing energy loads by passive measures, secondly selection of energy efficient methods and technologies and the use of sustainable energy sources to supplement traditional sources.

Reduce the need for energy by use of passive measures

The design team will firstly aim to reduce energy loads by passive measures. These will include the use of lowest economic U values for building fabric and high-performance glazing, improved air tightness, minimising solar gains, making good use of natural daylight and selection of room design conditions to not exceed the needs of occupants. This shall include utilising spaces that are generally unheated, and making use of residual heat from persons, lighting and equipment.

Use energy more efficiently

The annual energy demand shall be reduced by the passive measures employed above, resulting in some reductions in plant sizing and plant or equipment use. Energy efficient equipment to be considered shall include high efficiency heat pumps and heat recovery plant for ventilations systems, along with efficient luminaires and lamps. The design of the ventilation systems will also aim to achieve reduced energy use for HVAC plant by reducing system pressure losses through careful design.

Use of renewable energy

At present the national grid provides electricity generated from sources that produce significantly high levels of carbon dioxide emissions relative to the units of energy produced. As the grid is connected to more sustainable sources of energy over time, the unit of CO₂ produced for each unit of electricity will reduce. Solar PV shall be considered to offset the CO₂ emissions from the development, providing sufficient energy can be used at source.
2.00 ENERGY DEMAND REDUCTION AND INCREASED EFFICIENCY OF ENERGY USAGE

The methodology employed to determine the potential technology(s) to provide the strategy for the provision of building services for this development has been achieved by implementing the Energy Hierarchy outlined below.

Energy Hierarchy
- Passively reduce the need for energy
- Use energy more efficiently
- Use renewable energy where feasible, yet to be determined.

Passive Design Measures

Enhanced Building Fabric
The heat losses from the buildings and heat gains from outside to the buildings is dependent on the fabric construction of the building and the infiltration rates.

The U value for the spaces and specified air infiltration rates shall be selected against the expected natural heat gains such as lighting, electronic equipment, occupants, etc. These values shall be calculated as far as is practical. The heat losses shall be balanced to achieve a neutral point based on the lowest achievable value without excessive capital costs.

Therefore, the building shall naturally achieve improved energy loads for heating of spaces, with U values and infiltration rates aiming to achieve a 25% betterment on current recommended levels.

This shall be finalised depending on final budget constraints and requirements of the building.

Day Lighting
Daylight should be considered and maximised where possible in the design of a building. Appropriately positioned large windows are recommended to improve the health and well-being of occupants.

Active Design Measures

Mechanical Ventilation
The occupied rooms will be provided with opening windows for natural ventilation. In addition, heat recovery mechanical ventilation plant shall be installed serving each unit.
The unit proposed uses waste heat from any area where the heat builds up, extracting hot and possibly moist air from that room, harvests the thermal energy and exhausts cool, dry air. The harvested energy shall be used to heat the hot water cylinder, minimising wasted energy and maximising efficiencies. The system has the potential to cost up to four times less than heating water with a traditional system such as an immersion heater or fossil fuels.

The above should provide a clean and fresh environment for all occupants while minimising energy use.

**Heat Pumps**

It is envisaged that new high efficiency, air source heat pumps operating at up to 400% efficiency shall be installed.

The controls shall incorporate intelligent programming, allowing maximum efficiencies to be achieved from the plant.

Generally the dwelling shall be heated via underfloor heating systems, the low water content of underfloor heating systems and lower required operating temperatures allows the heat pumps to work more efficiently to maintain comfort within the dwellings.

**Hot Water Plant**

Hot water generating plant for the building shall be undertaken by the air source heat pump, along with pre-heat of the water via the waste heat from the ventilation system. This allows for extremely high efficiencies with the hot water generation. Hot water demand is expected to be fairly low considering the low occupancy of the development. Consideration could be given to the use of Solar Thermal panels to assist further with hot water generation, although given the high efficiency of the proposed system, it is expected that the cost of Solar Thermal will be prohibitive when taking into account the minor efficiency increase to the hot water generation.

**High Efficiency Lighting and Controls**

The lighting throughout the dwellings will be of LED lamp type. This will ensure there is a low maintenance factor on the luminaires and cheaper running costs will be provided for the duration of use.

It is proposed that lighting will be controlled via manual switching, however this requirement may change due to the residents needs.
3.00  LOW ZERO CARBON AND RENEWABLE TECHNOLOGY

Renewable Energy
Once energy demand has been reduced, methods of generating low and zero carbon energy can be assessed.

The renewable technologies to be considered for this project:
- Photovoltaic panels
- Solar thermal panels for HWS

In order to determine the feasibility of the above technologies, their suitability for the site and compatibility with the measures already implemented through the earlier stages of this report have been appraised.

Photovoltaic Panels
Renewable energy solutions such as Photovoltaic panels could be installed on the dwelling roofs, with the extent of panels to be determined by roof orientation, amount of sunlight available and budget for renewables energy. These panels could reduce the amount of electricity required from the mains supply and also has cost benefits such as savings on electricity bills, government funded generation tariffs and electrical supplier feed-in tariffs.

Photovoltaics appear to be the most suitable renewable technology for the following reasons:
- There is sufficient roof space available to install a good array of PV modules to have some impact on the energy demand for the scheme.
- The installation of photovoltaics is much simpler when compared to other renewable technologies.

Solar Thermal
Some solar thermal panels will be considered to supplement heating to the HWS system, for topping up by the air source heat pump. These are a good solution to providing low energy heat source, however as the hot water demand for the dwellings is low, and the proposed system is already extremely efficient and uses renewable technology, it is expected that the cost of Solar Thermal will be prohibitive when taking into account the minor efficiency increase to the hot water generation.