Ashroyd Business Park

ENERGY STRATEGY REPORT

FOR PLANNING

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Innovation through Experience

Document Control

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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 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 shall include the use of an extract fan to enhance the natural ventilation of office spaces whilst maintaining a low energy demand, efficient luminaires and lamps, day lighting control systems, a sized selection of radiators for heating of spaces and high efficiency electric heaters for domestic hot water use.

Gas fired boilers shall be only used for space heating purposes, minimising the used of carbon fuels and reducing installation costs.

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 produces. As the grid is connected to more sustainable sources of energy over time, the unit of CO_2 proceed for each unit of electricity will reduce.

2.00 Energy Demand Reduction and Increased Efficiency of Energy Use

The methodology employed to determine the potential technology(s) to provide 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

Passive Design Measures

Enhanced Building Fabric
The heat losses from each area of a development 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 have been selected against the expected natural heat gains such as lighting, electronic equipment, occupants, etc. These values have been calculated as far as is practical and the heat losses have been balanced to achieve a neutral point based on the lowest achievable value without excessive capital costs.

Therefore, commercial buildings will naturally achieve very low energy loads for heating of spaces and cooling of spaces, with U values and infiltration rates exceeding current recommended levels.

U-values (W/m^2K):

Element	2013 Building Regulations (Part L2A) U values (W/m^2K)	Proposed U Values (W/m^2K)
Walls	0.28	0.22
Ground Floor	0.22	0.15
Glazing	1.80	1.6
Doors	1.80	1.6
Roof (flat)	0.18	0.18

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

Solar Shading
The windows shall be fitted with glazing with low G values, reducing the solar radiation transmittance. This reduces the need for expensive additional solar shading. On buildings with enhanced natural ventilation schemes, reducing solar gain in the summer is a key factor to reduce overheating in office spaces.

Air Tightness
All the different units have been designed to target an air tightness of 3 $m^3/hr/m^2$ air loss at a pressure of 50 Pascals. Current building regulations allow for a maximum value of 10 $m^3/hr/m^2$. Such a significant reduction of the air leakage will result in a lower energy exchange with the surrounding environment which will reduce heating and cooling loads.

Active Design Measures

Mechanical Ventilation
Extract fans are to be installed in bathrooms to achieve the adequate level of ventilation. Office spaces will be ventilated using an enhanced natural ventilation scheme where a local fan will aid the air flow across the spaces.

The mechanical ventilation systems will also provide a reasonable level of free cooling when combined with the sensible use of openable windows.

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

LTHW Heating Boiler & Radiators
Space heating will be provided by gas-fired low NOx condensing boilers. The small space heating requirement make radiators the best way to meet the heating load. A sized and thoroughly located selection of radiators can provide an optimum level of heating. The use of insulation in pipes will reduce the heat losses throughout the distribution network.

Hot Water Plant
Hot water generation is a small portion of the load demand for buildings with high floor area to occupation ratio. The best way to meet this demand respecting both economic and environmental aspects is the use of local electric heaters. The reduced mass of stored water combined with the use of low U-value insulation in the tank and the lack of heat losses due to flue gasses make electric heaters the most efficient option.

Moreover, the electric national grid is ever improving the share of load taken by renewable sources. This will improve the environmental footprint of electric heaters over time.

The systems shall be fed with water supply with incoming water meter and any solar thermal system shall be complete with a heat meter for energy monitoring.

High Efficiency Lighting and Controls

Lighting throughout the units will be of LED lamp type. This will ensure there is a low maintenance factor on the luminaires and lower running costs will be provided for the duration of use. Lighting control systems will be used throughout to ensure the specified luminaires life is prolonged before replacement is required, this will further improve running costs.

Proposed lighting controls within the storage areas takes the form of presence detection. A sensor within the luminaire will monitor the space for movement and if no movement is detected between a pre-set time period then the luminaires would automatically turn off thus saving energy when the room is not in use.

Within circulation areas there will be presence detection. The sensor will detect movement, turn on the luminaires and will keep luminaires on a period of time defined by the end user (normally 30 minutes in toilets) until no movement is detected, then the luminaires would automatically turnoff reducing energy consumption.

In the reception and office spaces, daylight dimming shall be implemented to reduce the artificial lighting energy consumption and maximise natural daylight.

LV Power Metering

As part of the latest Building Regulations part L2A the whole site must have sufficient energy monitoring capabilities. This will be achieved by the main panel board monitoring (in kWh) all distribution boards throughout all buildings.

The distribution boards will be split metered (Lighting / Power circuits) to enable full monitoring capabilities for all areas throughout and identify where main power uses occur which gives the building managers the opportunity to address what items are using the most electrical energy and what can be reduced.

Meters shall also be fitted for HWS, VRV and ventilation plant.

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 following renewable technologies have been considered for the 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 have been considered. The energy model output document shows that by incorporating the above suggested methods and technologies, the building achieves the required energy reduction without the usage of renewable technologies.

As part of the energy model carried out by CJR, PV was reviewed, however due to the low electrical consumption of the building, the determined installation size is not large enough to be cost effective or contribute significantly to energy reduction.

Solar Thermal
Solar thermal has been considered to supplement heating to the HWS system.

Due to the low hot water demand, it was determined that the cost of implementing the technology would be prohibitive when considering life cycle costings and payback.

However, depending on the usage of the building and the future occupational requirements, Solar Thermal may become cost effective. As the technology is relatively simple to incorporate as a stand-alone system, a retrospective installation is possible, subject to life cycle and energy reduction analysis.