Bernard Smith
Consulting
Engineers

Mechanical and Electrical Design Proposal

for the

Proposed New Visitors Centre

in the

Dublin Mountains

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Bernard Smith
Consulting
Engineers

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1 Introduction

The proposed new Dublin Mountains Visitors Centre will be two new custom built low energy buildings with the Mechanical and Electrical services designed specifically with the buildings' use, size, geometry and location in mind.

The primary energy fuel to serve the site will be electricity, considering the close proximity of the existing electricity infrastructure and the opportunities to benefit from onsite electricity generation.

2 Heating

Heating throughout will be provided by underfloor heating in conjunction with a number of air-to-water heat pumps. Underfloor heating will allow the floor to be gently heated throughout the annual heating period, maintaining a comfortable temperature during the day and a lower setback temperature outside opening hours. Operating the heat pumps with a setback temperature (e.g. 17 degrees Celsius) at night is more efficient than switch off the heating system completely and allowing the building to cool down.

Image 1- Underfloor Heating Pipework Before Screed Pour

The underfloor heating will be zoned to take account of the different areas and uses of the building. Each area will have separately time and temperature control.

The benefits of underfloor heating include the following:

1. Help to keep floors dry in wet weather with a lot of pedestrian traffic passing through.
2. Eliminates wall space required for radiators.
3. No exposed equipment susceptible to vandalism and accidental damage.
4. Allows flexibility to re-arrange room layouts.

Image 2 – Ochsner Air-Source Heat Pump

Electric warm air curtains will be used over public entrance and exit doors to minimise heat loss.

Image 3 - Overdoor Warm Air Curtain

3 Ventilation

Ventilation will be provided by mixed mode ventilation which is a combination of natural ventilation from operable windows (either manually or automatically controlled) and mechanical ventilation. Toilets, internal rooms and areas without openable windows will require forced air mechanical ventilation. High occupancy areas, such as the Café, Retail space and Interpretation Room, will also require a mechanical ducted ventilation system.

This ductwork can be concealed with just ceiling grilles visible or exposed as indicated below.

Image 4 - Exposed Ventilation Ductwork

The ductwork can be circular or rectangular and will range in size but is not likely to exceed 600mmØ circular of 400x200mm rectangular in any area. Externally, ductwork will terminate in a wall louvre or roof terminal. Wall louvres will be finished in a RAL colour dependant on the surrounding wall finish and agreed with the Architect. Roof cowls can take many different forms including those indicated below.

Image 5 - Roof Cowl options

4 Water Services

The cold water storage tank will be located in the plantroom with a boosted cold water supply provided to all areas. Hot water will be produced using an exhaust air heat pump which will recover excess heat from the Café space and kitchen and upgrade this waste heat, through a heat pump cycle, to provide domestic hot water. The hot water calorifier will be located in the plantroom.

Toilet flushing and water flow control from wash hand basin taps will be provided by non-touch wave sensors to minimise water wastage and promote better hygiene control.

Image 6 - Sensor controlled tap and toilet

A further investigation into extending mains water to the site and establishing the likely mains pressure will need to be carried out.

5 Building Energy Management System (BEMS)

A BEMS is a computer or cloud based system that controls and monitors the services in the building, e.g. heating, hot water, ventilation. It can also be used to monitor energy and water use (electricity, water, etc.) and to data log energy use for several years. The system can be a very basic and simple to operate system or more elaborate depending on the functionality required.

The BEMS will also monitor the renewable energy produced from the roof mounted photovoltaic (PV) panels.

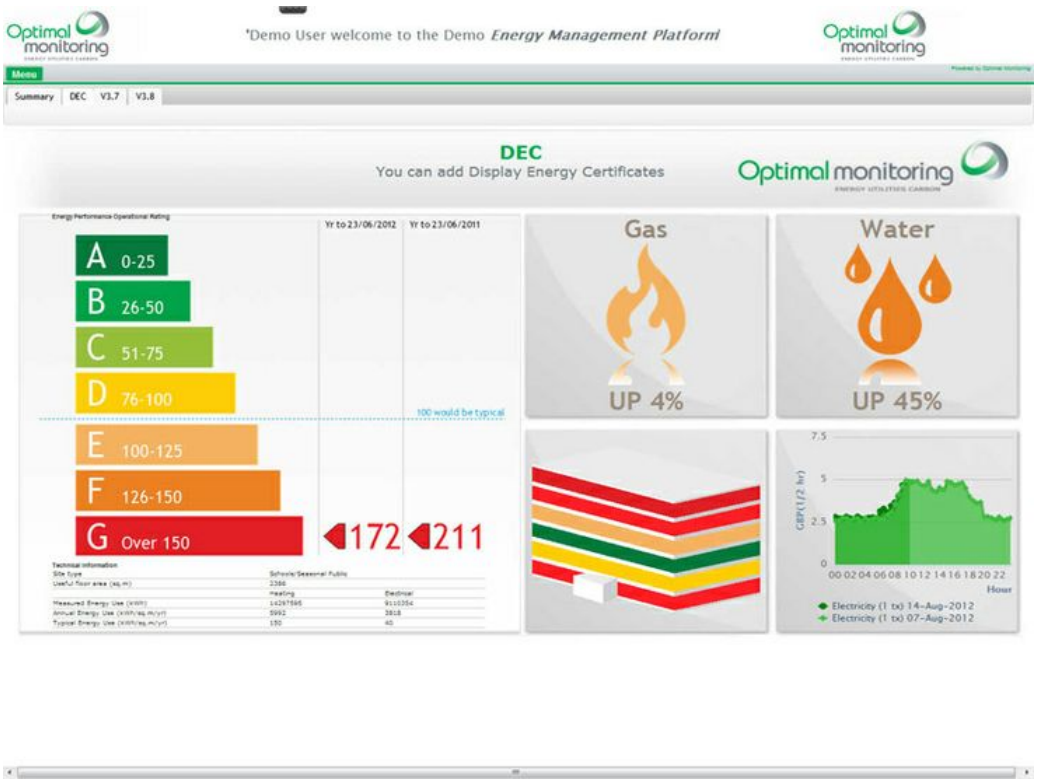

Image 7 - Sample Dashboard Image from a BEMS

6 Photovoltaic (PVs) Panels

Photovoltaic panels convert daylight into electricity. The panels will be located on the roof of the ESB Networks substation and switchroom building and will help reduce the electricity usage of the main buildings. The exposed nature of the site and the daylight visiting hours make this particular site very suited for PV panels.

Image 8 - PV Panels on a Green Roof

7 Internal and External Lighting

General “artificial” lighting will be provided to complement the natural day lighting within the space. The lighting will be designed to maximise opportunities for energy reduction, notably making use of daylight sensing and in the selection of general light fittings to the specified installed luminous efficacy.

LED lighting will be specified for all areas unless alternative specialist lighting is required in some areas. The style of fittings will be agreed with the Architect during design stage.

8 Lighting System Controls

Lighting control will be provided by combined photocell, daylight and presence control detector. Where there is no natural light manual switching and presence detection will be used.

The external lighting will be controlled through a time schedule on photocell so that the lights will automatically switch on during the timed schedule once daylight levels drop and switch off when the time schedule is ended.

9 Emergency Lighting

Emergency Lighting Installations will be provided internally by a standalone LED emergency lighting system (as opposed to conversion packs in the general light fittings).

Image 9 - Examples of LED Emergency Light Fittings

10 General Services and Power Services

Wall socket outlets will be provided throughout the building where deemed necessary. They will be metalclad finish in all public areas to avoid damage.

Image 10 - Metalclad socket to public areas

Where floor sockets are required in certain areas of the exhibition rooms, high quality unobtrusive floor outlets will be provided.

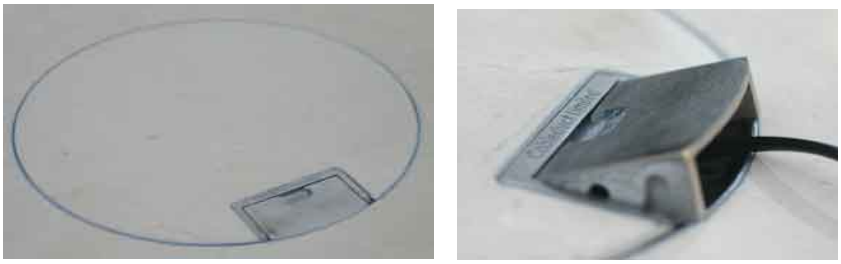

Image 11 - High Quality Floorbox

11 Protective Service, Fire Detection and Alarm System

An addressable fire alarm system will be provided throughout the system comprising a fire alarm panel at the main entrance, smoke detectors and sounders throughout. Both buildings will be provided with a separate fire alarm panel with a network cabled link between them.

The fire alarm system will be interfaced with various systems in the building to fail safe in the event of a fire alarm activation, e.g. door access control system, heating system and ventilation system.

12 Security, Door Access Control and CCTV

Door Access Control will be agreed in consultation with the Client and Architect. It is expected that all doors from public areas to private areas will be access controlled.

CCTV cameras will be provided to cover the entrances and approaches to both buildings. Internally, cameras will be provided in all public areas and back of house corridors. The location of the CCTV recorder

The buildings will be wired for a computer and wifi network.