CASESTUDY

The Green Building | Temple Bar, Dublin – Ireland

Utilising external data to maximise energy efficiency

The Green Building in Dublin's Temple Bar district provides some pointers as to how low energy design can be achieved in city centre sites.

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Projekt Overview
Situated in Dublin's Temple Bar district, the Green Building was designed as a flagship for energy technologies which have minimal impact on the environment.

This building is a prime example of how environmentally-sound buildings can not only contribute towards achieving our climate change goals, but can be hugely profitable – and be built in urban areas. It is a mixed use building offering accommodation, office space and retail lettings.

It brings together all things green in building terms – photovoltaics, wind power, the use of exposed thermal mass as a climate moderator, heat pumps to extract heat from the bedrock below the building, heat recovery ventilation and oxygenation, ABB Cylon® energy saving control system installed by TechCon International, double-glazed windows and humidification via planting.

Crucially, all off these have been brought together without sacrificing design quality. Use of a central atrium running up through the building with opening roof lights during benign weather allows both natural ventilation through the stack effect and good day lighting – walls are also painted white to increase reflectance and reduce reliance on artificial lighting.

Project Summary	
Applications:	Monitoring, Heating, air handling cooling, Metering, Electrical Supply Management
Points:	100
Number/Type of Building:	1 building with commercial and domestic occupancy
Network:	Arcnet
ABB Cylon® Hardware Installed:	UCC4, UCXX Controllers
ABB Cylon® Software Installed:	WN3000

Use of weather forecasts linked to the ABB Cylon® BMS can achieve a 60% reduction in energy consumption compared with conventional optimiser controls and virtually eliminates over or under pre-heating

Solutions Benefits
Energy Savings via:
Data Trend Analysis – At the Green Building, the ABB Cylon® software receives weather data directly from the Met Office and uses this together with simulation models to predict heating requirements for the following 48 hours.

Management of Heat Recovery – The savings that can be made by using off-peak electricity to

generate and store heat for slow release the following day are heavily dependent on the weather. For example, the level of pre heat required can seriously affect the economics. Nowhere is this truer than in Ireland, where the rapidly changing weather patterns make it virtually impossible to predict the following day's conditions without appropriate data.

Electrical Load Management – While there is grid back-up the wind turbines are expected to contribute the lion's share (80%). Electricity generated from the rooftop equipment is stored in lead-acid battery packs in the basement. Inverters convert the electricity to AC before linking in with the lighting circuits. If needed, charging from the grid is done at off-peak periods.

Control of Cooling Time Schedules – Summertime cooling is achieved by circulating water through the structure at night dissipating surplus heat through the floor and ceiling of the basement which is cooled by evening air descending from the open roof light.

ABB Cylon® Solution

Core to the whole design system being effective in its objective, is the ABB Cylon® BMS, which keeps things running smoothly and enables accurate monitoring of the heating and ventilating system and of the solar/wind power electricity system. The Unitron system makes it possible to maximise the rate of extraction of energy from the bedrock. At extreme conditions the BMS can hold the temperature from the cooling side of the heat pump circulating through the borehole at 1.1 Degrees Celsius, the lowest temperature possible before ice will begin to form on the heat pump.

At other times, the controls strategy is to maximise the coefficient of performance of the system – typically of the order of 4.75 at water off the cooling side of the heat pump of 2.5-3 Degrees Celsius. The measured energy yield is higher than that predicted by a model of dry bedrock, suggesting some heat transfer by water circulating through cracks and fissures. The energy stored in the thermal reservoir heats the building via a grid of 20 mm diameter embedded coils in the exposed slabs. Covering as large a radiating surface as possible allows a relatively low distribution temperature of between 20 and 35 Degrees Celsius, which in turn leads to the high cop of the heat pump. In summer, the building is largely ventilated by natural means, with fresh air inlets into the atrium at low level and a high level roof light providing the openings. The rooflight is opened and closed by pneumatic rams under control of the ABB Cylon® BMS – in cold or wet conditions, the rooflight closes to protect the interior and also to conserve energy.