Low energy buildings - Case Study: Cork Institute of Technology

Category / year	Renovation – Research facility / 2012
Address	Cork Institute of Technology's (C.I.T) main campus in Bishopstown (Ireland)
Contact details	**Owner:** C.I.T **Architect:** Henry J. Lyons **For further questions:** Kingspan Limited Carrickmacross Road, Kingscourt, Co. Cavan, Ireland Tel.: +353 42 969 85 40 Fax: +353 42 969 85 72
Pictures	 

Description of the building

Detailed description:
Cork Institute of Technology's (C.I.T) main campus in Bishopstown is being refurbished using Kingspan Benchmark's Ceramic Granite Façade and Karrier Panel System to help transform both the aesthetics and the performance of their 1970's building stock. The retrofit was developed by the C.I.T Zero2020 research team in partnership with Kingspan and Architectural Metal Systems (AMS), and forms the first stage of an ambitious target to achieve Net Zero Energy, whereby the building would generate as much energy as it uses, by 2020.

The 1974 building which served as the project test bed featured precast concrete walls with external envelope U-value of 2.4 W/(m²·K) and air loss of 14.77 $m^3/hr/m^2$@50Pa. The key priority on the first stage of the project was therefore to reduce this heat loss and minimise the building's overall energy requirements.

This project has attracted significant funding from the Department of Education and Skills and will house both the Centre for Advanced Manufacturing and Management Systems (CAMMS) and the Medical Engineering Design and Innovation Centre (MEDIC) including research space, training rooms, offices and meeting rooms.

Only the upper floor part of the envelope forms the Zero2020 test bed.

Building envelope:

- *External walls:* an Architectural Metal Systems's (AMS) renovate curtain wall was installed around the building's original façade. A modular system, combining Benchmark's Karrier Panel with AMS's triple glazed Thermstrip Window System, was then constructed offsite and installed in stages onto the curtain wall. Finally, Ceramic Granite Panels were installed onto the Karrier Panels.

  Natural ventilation is provided by manual control of insulated openable panels behind a louvered section incorporated into the window system. A BMS controlled insulated panel, also located behind the louver, is used for night purging. Solar control is achieved by manually controlled interstitial blinds situated behind the triple glazed unit and a fourth pane of glass.

Renewables:

- An air to water heat pump coupled to high efficiency radiators was incorporated into Phase 1 of the project. C.I.T are currently reviewing a wide variety of energy generating technologies including PV solar technologies, Micro CHP and wind energy to be used as part of Phase 2 of the project. To assist this process current energy usage is already being carefully monitored allowing the energy burden to be properly assessed.

<Energy consumption

Energy values:

- *External envelope average U-value before renovation, U_a:* 2.4 W/(m²·K)
- *Air permeability before renovation:* 14.77 $m^3/hr/m^2$@50Pa
- *External envelope average U-value after renovation, U_a:* 0.31 W/(m²·K)
- *Air permeability after renovation:* 1.76 $m^3/hr/m^2$@50Pa
- *Total delivered energy demand before renovation:* 210 kWh/m^2/year
- *Total delivered energy demand after renovation (Phase 1):* 70 kWh/m^2/year

Use of renewables:

- An air to water heat pump used in Phase 1
- PV solar technologies, Micro CHP and wind energy to be used as part of Phase 2 of the project
- The building should generate as much energy as it uses in/or before 2020