

Edge Hill University

Highly commended – sustainable construction and refurbishment

“The Durning Centre”

Summary

Completed in July 2010, the £4.2m Durning Centre at Edge Hill University is a building that incorporates unique innovations. It avoids the carbon equivalent of planting 823 trees per year. The building is entirely heated by recovering waste heat from IT servers and the University Data Centre. The building is also served with an array of photovoltaic cells.

Project partners

- **AECOM:** Design Team
- **Tweeds:** Design Team
- **Alan Johnston Partnership Consulting:** Design Team
- **Bardsleys:** Construction
- **Architect NJSR:** Construction
- **QS MDProject Services:** Construction

The problem

The findings of a series of independent waste/energy reviews showed that:

- Support functions were disparate; there was a need to co-locate resources.
- Existing support function buildings were inefficient with duplicate energy intensive services; there was a need to achieve economies of scale and increase energy efficiency.
- Distributed IT servers and University mainframe were producing significant waste heat; there was a need to recycle this high grade waste heat energy economically.
- Expansion of the University meant reaching the limits of existing power infrastructure; there was a need to reduce power demand through efficiency and economies of scale.

The approach

Various sustainability options studied on whole life cycle basis; study recommended Biomass Heating or CHP. Final design stage it became apparent that loads from the Data Centre would be significant and further requirements for cooling needed which would reject energy to atmosphere.

Workshop convened, led by the University, to consider better solutions.

Decision made to stop final design of CHP and undertake studies to determine more sustainable solutions. It was concluded that it would be possible to totally heat the Durning Centre from waste heat and also export heat to two other buildings using recovered energy which would have been otherwise rejected into the atmosphere.

Profile

- 14,692 FTE students (24,689 FT / PT students)
- 1,680 staff (FT and PT)
- 26 non-residential buildings
- 13 residential buildings housing
- 31 halls of residence
- Semi-rural



Our goals

- Bring together University's support functions (Estates, Capital Projects, Maintenance and IT) that were spread out throughout the Ormskirk Campus
- To continue with the University philosophy that new buildings are designed to be low energy/low carbon and sustainable
- To reuse heat energy generated from the IT equipment which would otherwise be exhausted to atmosphere

Obstacles and solutions

Obstacles	Solutions
To combine mechanical and electrical facilities between the IT department and the remainder of the building; this traditionally would be separate.	Design solutions discussed with University IT department, the combined system provided with resilience to ensure continuity of server room cooling.
To ensure that maximum heat recovery was achieved from the IT systems which operate 24hrs a day year round when heating demand is seasonal	Reviewed adjacent buildings and undertook energy profiling to investigate the daily and annual demand against the load generated from the IT servers
That the system could easily be extended and adapted as the IT load changed over the 5 year business plan	Flexible system layout within the plant room to ensure system could easily be extended as the server room load increased

Performance and results

- Generates 25.2MW / year – using photovoltaic actual data for 12 month period 2011 (avoiding 14.8t CO2/year)
- Recovers 30.6MW / year – of waste heat from the University Mainframe Computer (avoiding 17.3t CO2/year)
- 49,385 urban trees – avoided CO2 emissions equivalent to planting urban trees over the service life of the building.
- 37.6% CO2 reduction in emissions - improvement on Building Regulations requirement
- 33% CO2 reduction in emissions for the same services in the previous year.
- 46% reduction in energy use for the same services in the previous year.
- 100kW/hr reduction to the University's reliance on fossil fuel derived power.
- Building Energy Performance Certificate Band 'B'

Lessons learned

Key lessons learnt during the design and construction of the the building and from the first year of performance review include:

- Ensure robust testing and commissioning of the building management systems and Building Services plant, to include testing in failure conditions and emergency procedures.
- Good communication between designers, University IT and Capital Projects departments.
- Photovoltaics are performing slightly below anticipated annual energy generation.
- Underfloor heating is an effective method for delivering space heating using low temperature waste heat.

Further information

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