

Good Practice Case Study

BMS Linked Heating Controls and Gas Conversion, at the University of Ulster, Belfast Campus



Energy savings of up to 25% could be possible by upgrading individual services control to a building management system. At the Belfast Campus of the University of Ulster, the benefits resulting from the controls upgrade include:

- **Increased Occupant Comfort**
- **Annual Cost Savings of £4,540 or 8%**
- **Carbon dioxide savings of over 327 tonnes/annum**
- **Payback period of about 3.5 years**

The University of Ulster

The University of Ulster has four campuses - Jordanstown, Magee, Coleraine and Belfast - and is the largest university in Ireland. It has an established reputation for quality in teaching and learning, and makes a vital contribution to the economic and social development of the region. The Belfast campus, built in the 1950s, is traditionally considered the home of the School of Art and Design. The campus is situated near the city centre.

Through its environmental policy, and as part of its contribution to sustainability, the University is committed to using only the most environmentally friendly equipment. The University has been pro-active in the reduction of energy consumption for over 10 years, which has resulted in a 20% reduction in energy consumption since 1993/4. Projects such as this, funded through the Northern Ireland public sector Central Energy Efficiency Fund, have played a major part in the success of the University's strategy.

The Project

Trend Building Management System (BMS) controls were installed at the Belfast Campus buildings to replace the original 1950s control system. The project involved the integration of the oil-fired boiler controls into the BMS in order to improve the control of the provision of heat and hot water. Simultaneously, the original oil-fired boilers were replaced with natural gas steel sectional boilers on a like-for-like basis to benefit from lower fuel costs and reduced CO₂ emissions. The controls upgrade included external temperature compensation and optimum start-stop controls. This project received 100% funding from the Central Energy Efficiency Fund and was installed and commissioned in June 1998.

Background to Building Management Systems

Building Management Systems (BMS) are computer based systems which control and monitor building services automatically. These services include heating, air conditioning, ventilation, boilers and lighting and the data collected can be used to develop quantitative energy consumption improvement targets. There are two main types of BMS, centralised and distributed intelligence. Centralised systems control all the connected services from a single computer interface. Distributed intelligence systems use local intelligent outstations (each controlling part or the whole of a building or service) that feed data to a central unit for collection and analysis.

Energy savings of up to 25% could be possible compared to independent control of individual services. Other benefits include increased adaptability and occupant comfort, and better building fabric protection. The level of savings and benefits depends primarily on the extent of the control system installation. A fully integrated system that controls energy management systems, security, disaster prevention, office automation and telecommunications systems from one centralised unit would be up to 50% more expensive but could produce a higher level of savings.

A number of factors need to be addressed before a BMS is installed. These include suitability of existing equipment and buildings, the correct operation and maintenance of equipment and staff involvement, commitment and training.

Energy and Cost Savings

Before the control systems upgrade to a BMS the annual heating energy consumption for the Ulster University Belfast Campus was metered at 4,360MWh of oil, with a total annual cost of £57,600. Table 1 summarises the project benefits.

Table 1 - Project Benefits

	Predicted	Post Project Evaluation
Heating Energy Savings	435 MWh	343 MWh
CO ₂ Savings	124 tonnes/yr	96 tonnes/yr
Capital Cost	£16,000	£16,000
Savings	£5,750	£4,540
Payback Period	2.8 yrs	3.5 yrs

Considerations for Other Sites

- The major redevelopment of the Belfast campus has resulted in the controls installed under this program being replaced. The installation had achieved payback prior to removal.
- The BMS specified should be flexible enough to accommodate expansion such as the installation of new temperature sensors. Furthermore, provision should be made (if applicable) for future integration with other systems.
- Training for all staff using the system should be included in the contract with the supply/installation company. Staff should then be encouraged to experiment with the system in order to feel confident in their knowledge of the system and to make full and efficient use of all the BMS capabilities.
- Specialist advice should be sought when replacing oil boilers with their natural gas equivalents. This would avoid problems such as condensation in the flue, and reduce the risk of corrosion.

Project Conclusions

The installation and commissioning of the system were satisfactory. The system's overall operation and benefits from reduced energy consumption and ease of use have impressed staff at the site.

The option of remote monitoring and control was particularly beneficial as the Estates Officer and Control Technician are both based at the University's Jordanstown campus.

Supporting Information

For further information on the Central Energy Efficiency Fund see website: www.psecni.gov.uk

Publications from the Carbon Trust

FEB 10 - Controls and Energy Savings

GIR 40 - Heating Systems and their Control

GPG 326 - Good Practice Guide to Energy Metering

GPG 376 - A Strategic Approach to Energy and Environmental Management

For details of the Carbon Trust's services and free publications, call the helpline on 0800 85 20 05 or visit the website www.thecarbontrust.co.uk

Other Publications

Energy Efficiency Office GPG 312 - Invest to Save

Further Project Information

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