

Good Practice Case Study

Installation of Swimming Pool Covers at the Queen's University Physical Education Centre Belfast



Swimming pools are large energy consumers and, with rising energy costs, ensuring that the pool water evaporation rate is as low as possible is imperative. At the Queen's University Belfast Physical Education Centre, the benefits resulting from the installation of automatic pool covers include:

- **Annual Cost Savings of over £10,000 or 23%**
- **Carbon dioxide savings of over 218 tonnes/annum**
- **A payback period of about 2.2 years**

Queen's University Belfast

Queen's University Belfast is the ninth oldest university in the United Kingdom and was founded as Queen's College in 1845. The estate comprises over 250 buildings, of which over 100 are listed as being of special architectural interest. There are also playing fields and grounds extending to over 100 acres. The majority of the buildings are located in the main campus area of south Belfast. The buildings range from the original Victorian Lanyon Building of 1845 through to the modern purpose-built properties constructed in the last decade. A major capital investment programme is under way, including plans for a £45 million new library to be completed in 2009.

The hub of Sport & Recreation Services at Queen's is the Physical Education Centre (PEC) in Botanic Park. Opened in 1971, this facility boasts an impressive range of sporting facilities, services and programmes to meet the needs of first time casual users, top-class athletes and life-long regulars. The PEC provides both an administrative and management base for Queen's Sport, and plays host to most of the University's indoor sporting clubs.

The Project

This project involved the installation of two automatic swimming pool covers, one for the 312m² swimming pool and the other for the 156m² diving pool at the Physical Education Centre (PEC) at Queen's University Belfast. Control strategies were modified to allow for the pool cover operation.

This project received 100% funding from the Northern Ireland public sector Central Energy

Efficiency Fund in April 1999 and was installed and commissioned in June 2000.

Swimming Pool Covers

The majority of swimming pools are not used for at least 8 hours every night, but many of these maintain heating and ventilation regimes suitable for daytime occupancy and usage. By installing a well-fitting pool cover it is estimated that night-time energy usage can be reduced by as much as 90%, giving an overall saving of about 25%.

High pool water evaporation rates occur in the absence of a pool cover, necessitating a high ventilation rate in the pool hall in order to keep the overall relative humidity (RH) to approximately 65%; this is essential to prevent condensation and consequent damage to the building fabric. Furthermore, high evaporation rates increase the pool water heating load. Well fitting pool covers are essential to reducing pool water evaporation and thus energy costs.

The rate of evaporation of water depends on the difference between the water temperature and surrounding air temperature, the RH of the pool hall, the pool surface area and the pool occupancy and usage patterns as well as the rate of air movement over the surface of the pool. It is particularly important that the poolhall air temperature is at least 1C above the pool water temperature at all times.

To achieve the correct temperature and RH regime within the pool hall, sensitive and responsive controls must be installed on the water heating and ventilation systems, and must be coupled to pool cover operation. Manual pool covers give 1-2 year paybacks, but are difficult to use and may fall into disuse. Motorised pool covers are more common, are quicker and easier to use, and give 3-4 year paybacks. Fully automatic pool covers operate at the touch of a button, but result in paybacks of 6-8 years.

Energy and Cost Savings

Before the localised boiler and pool cover installation the annual energy consumption for the Physical Education Centre swimming pools was metered at 2,873MWh of gas and 602MWh of Heavy Fuel Oil, with a total annual cost of £35,000. Table 1 summarises the project benefits.

Table 1 - Project Benefits

	Predicted	Post Project Evaluation
Natural Gas Savings	604 MWh	661 MWh
Heavy Fuel Oil Savings	126 MWh	139 MWh
CO ₂ Savings	205 tonnes/yr	218 tonnes/yr
Capital Cost	£22,000	£22,200
Savings	£7,300	£10,090
Payback Period	3.0 yrs	2.2 yrs

Considerations for Other Sites

- The installation had a new design arrangement for the motor and gearbox, which was smoother, quicker and quieter than the standard fitting. Unfortunately, this failed twice on the large pool cover. The installer reverted to the original design.
- Adequate system control and monitoring is fundamental in ensuring energy reduction, and this must be coupled to the operation of the pool cover.
- When choosing a pool cover, considerations should include; ease of use, staff training; and the cover's storage requirements. In addition it would be prudent to ask the pool cover supplier to provide evidence of similar previous successful installations.
- Choosing the highest quality cover, with the maximum life span, could cost up to 30% more but with a pay back period difference of the order of months, and it would add as little as 4% to the overall project cost.

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. Finally it should be noted that pool cover material has improved greatly since the introduction of the system in the 1980s

Supporting Information

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

Publications from the Carbon Trust

GPCS 76: Energy Efficiency in sport and recreation buildings

GPG 55 Good housekeeping in school swimming pools

GPG 56: Saving energy in school swimming pools

GPG228: Water related energy savings

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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