

Good Practice Case Study

Swimming Pool Energy Conservation Projects at Methodist College Belfast



Swimming pools are large energy consumers and, with rising energy costs, ensuring that the heating and ventilation systems are as energy efficient as possible is imperative. At the Methodist College Belfast swimming pool, the benefits resulting from the system's upgrade include:

- **Annual Cost Savings of £14,700 or 81%**
- **Carbon dioxide savings of over 310 tonnes/annum**
- **Payback period of about 2.1 years**

Methodist College Belfast

The College has over 150 full-time teachers and provides education for around 2000 boys and girls from the age of 4 to 19 years. During the late 1860s it was decided to build a college in Belfast, partly for the training of Methodist ministers and partly as a school for boys. Money was collected, mainly from the Irish Methodists, but also from England and America, and 15 acres of land were acquired on what were the very outskirts of the city at that time. On 28th August 1865 the foundation stone was laid by Sir William McArthur, a Londonderry businessman, before he went to England and became Lord Mayor of London. Three years later the College opened with 141 pupils. In 1891 Sir William McArthur bequeathed a large sum of money towards the foundation of the hall of residence for girl boarders.

The Project

A decentralised gas boiler was installed adjacent to the swimming pool to replace the existing steam system in April 2001. The steam system had been connected to the College central steam distribution plant, and had been used to heat both the water and the air space in the swimming pool area. In order to maximise pool water energy efficiency a motorised swimming pool cover was also installed. The system was optimised by installing controls to ensure efficient heating of the swimming pool water and the air space within the swimming pool.

This project received 100% funding from the public sector Central Energy Efficiency Fund in Northern Ireland.

Decentralised Heating

Decentralisation involves replacement of large centralised boiler plants, typically generating steam, by a number of smaller localised boiler systems. The most common centralised systems distribute medium or low pressure steam to local steam calorifiers feeding individual low pressure hot water (LPHW) systems. There are a number of potential energy savings from decentralisation. For instance, the central steam boiler plant could be significantly oversized due to changes in load patterns or building use, resulting in low overall steam boiler efficiency. In addition, and depending on the age of the system, there may be significant energy losses from steam and condensate return distribution systems. Furthermore, in order to ensure security of steam supply the steam mains is usually kept live regardless of individual LPHW system requirements.

Further benefits of decentralisation include reduced water treatment costs, reduced maintenance costs, elimination of statutory inspections and improved working conditions.



Energy and Cost Savings

Before the localised boiler and pool cover installation the annual gas energy consumption for the Methodist College swimming pool was metered at 1,916MWh, with a total annual cost of £18,100. Table 1 summarises the project benefits.

Table 1 - Project Benefits

	Predicted	Post Project Evaluation
Gas Savings	1,284 MWh	1,555 MWh
CO ₂ Savings	261 tonnes/yr	316 tonnes/yr
Capital Cost	£30,700	£30,700
Savings	£11,900	£14,700
Payback Period	2.6 yrs	2.1 yrs

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 subsequent 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 give up to 6-8 year paybacks.

Considerations for Other Sites

- When upgrading a swimming pool heating system, it is imperative that a consulting/design company with proven experience in the area is used. This will help avoid problems of over spending and reduced energy efficiency benefits.

- Adequate system control and monitoring is fundamental in ensuring energy reduction and 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.

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.

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 369 - Energy efficient operation of boilers.

Energy Efficiency Office GPCS 134 - Decentralisation of steam supply on small industrial site.

Energy Efficiency Office GPG 312 - Invest to Save

Further Project Information

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