

ENERGY EFFICIENCY

CONSUMPTION CONTROL



Fife Council has found a way of reducing electricity consumption in a number of locally run schools with high consumption patterns.

Fife Council is the third largest local authority in Scotland but for most people the area is better known for the golf courses of St Andrews or the naval base at Rosyth. Since the Industrial Revolution till the late 1970s, though, it was also a major coal mining area fuelling industry up and down the country.

In the 1960s coal was the most important fuel for electricity generation and, with prices controlled by the Central Electricity Generating Board, power was relatively cheap. It is therefore no surprise that clean, cheap electricity was chosen as the preferred space heating for many of the buildings in the Fife area, including many authority run schools.

Of course the days of cheap electricity have long since passed and gas fired central heating systems (so-called 'wet' systems) are much more popular today. But many electric heating systems remain even though they constitute an increasingly expensive option.

In an attempt to address rising energy costs, Fife undertook a review in early 2006. "The Council identified a number of high electricity consumers within its building stock," recalls energy officer Forbes Reid. "Most of these were primary schools and we began a programme to optimise heating through more efficient controls. One of the key elements was to install energy management systems in each school which could be remotely monitored as well as locally adjusted."

In the systems used in the schools, the heating distribution boards are connected to electrical contactors. "We divided each school into different heating zones where a single contactor controls the power to the zone's heaters," explains Forbes Reid. "A temperature sensor was installed in each zone. In addition, a further sensor was fitted to the exterior of each building to track outside air temperature."

The electricity tariffs negotiated by Fife Council include peak and off-peak periods. In

order to keep costs as low as possible, cheap rate electricity is used between 11.00pm and 7.30am to charge the heating systems so that the optimum temperature can be maintained during the hours the school is in use.

This means that the controller has to measure outside temperature, compare it with the internal conditions and calculate how many hours of charge are needed prior to the changeover to peak rate at 7.30 am. If the temperature drops below the required level during the day, this is detected by the temperature sensors and that zone receives a heating boost.

Local or remote

However, the system also has to be sufficiently flexible to be able to meet the heating needs for special occasions. So at each site, any zone can be overridden for a time calculated in half hourly increments. The settings can be adjusted locally at the school or remotely from the council's Energy Management Department due to the networking of the controllers.

Electricity is also used for heating water. With legionella such a major concern in public places, the controller can be set to run for reduced periods during holidays to eliminate the risk. During holiday periods, space heating is also scaled back or controlled off, although it can be brought on stream if needed for in-service days or special events.

The controllers are all networked to a single central location where an integrated

management strategy has been implemented and all the buildings are monitored. "Initially we focussed on reducing consumption in the schools in the programme," says Forbes Reid. "But this system also gives us the capability to monitor consumption over time and to make comparisons between different buildings. This helps us target further action."

Ethernet connection

The energy management system chosen was supplied by Ambiflex, the Cheshire based manufacturer of building management systems. A combination of its MF620 and MF820 controllers have now been installed at 37 sites. These are networked using the company's Ambilink software via an ethernet connection.

Most central heating systems today are 'wet' systems consisting of radiators fed by hot water from a central boiler. The underfloor and storage heating activated by contactors used in Fife are less common. However, the Ambiflex controllers are sufficiently versatile that the company could reconfigure them for the electrical heating systems in the Fife schools. In fact, the willingness of the equipment suppliers to respond quickly and effectively to the council's requests was one factor which particularly impressed.

Fife Council has carried out an assessment of the initial effectiveness of the project. The consumption to March 2005 and to March 2006 was 16,793,111kWh and 17,099,974kWh respectively, giving an average pre Ambiflex consumption of 16,946,543kWh. The consumption to the end of March 2007 was 15,269,657kWh showing a saving of 1,676,886kWh. This represents a 10 per cent reduction. Taking an average cost of 7p per kWh for all the sites, this amounts to a cost saving of £117,382 over the year and a payback of 1.57 years.

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