

Kirklees Active Leisure: Energy Efficiency Measures



Key features

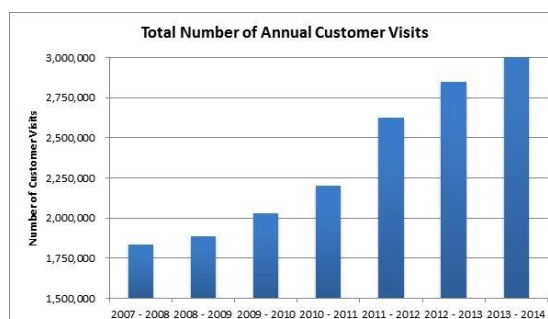
- Kirklees Active Leisure (KAL) has been actively managing its energy since 2009
- KAL has reduced its CO₂ emissions by 25% between 2009 and 2014, while continuing to grow its activities and the number of customers making use of the facilities.
- Support from the KAL Board of Trustees has allowed for investment in multiple successful projects.
- Success of projects means that significant further investment in energy efficiency is planned.
- Examples of successful projects include:

Project	Capital costs (£)	Actual Savings (£/yr)	Payback (years)
Induction lamps in sports hall at Dewsbury Sports Centre	£11,700	£7,500	1.6
Induction lamps in pool hall at Batley Sports and Tennis Centre	£6,300	£1,900	3.3
Induction lamps in pool hall at Stadium Health and Fitness Complex	£4,500	£1,600	2.8
Replacement of Combined Heat and Power (CHP) unit at Stadium Health and Fitness Complex	£63,000	£24,000	2.6
Electronic commutated motor (ECM) fans at Deighton Sports Arena	£4,463	£6,800	0.66
ECM fans at Scissett Baths and Fitness Centre	£13,800	£4,000	3.5

KAL – background

Kirklees Active Leisure (KAL) is the charitable trust which manages 14 leisure facilities and swimming pools on behalf of Kirklees Council. KAL began its energy reduction programme in 2009 and has been working since to reduce the carbon footprint and greenhouse gas emissions of its facilities.

In 2008/09 KAL sites emitted 5,885 tonnes CO₂. This fell to 4,437 tonnes CO₂ in 2013/14, a reduction of around 25%. Over the same time period (2009-2014), customer visits to KAL sites have increased from 2 to 3 million, an increase of 50%. In addition, two of the current KAL sites were only taken on in 2014 – Leeds Road Playing Fields and Bradley Park Golf Club.



The projects

KAL has been exploring several approaches in which to become more efficient in the ways gas and electricity are used in their leisure facilities and have carried out several projects which have involved the installation of more efficient equipment or providing better control of electricity and gas use. Such projects

have been made possible through the support of the Board of Trustees, who have invested in the energy efficiency improvements across KAL. To date, approximately £340,000 has been invested, with a further £250,000 planned for forthcoming projects across all KAL sites. KAL initially targeted sites with a high electric and gas consumption, as identified from the daily monitoring of energy that is carried out. This monitoring also allows KAL to accurately calculate savings and to relay these savings back to the KAL Trustees, gaining buy-in and support for future projects.

Induction lighting

KAL have installed induction lighting in sports halls and swimming pool areas. Induction lighting has a lamp life of around 100,000 hours (a predicted life of around 10 years), making it ideal for areas where it is difficult to gain access for maintenance, such as the pools and sports halls on KAL sites. This results in reduced maintenance costs and disruption for users of the facilities. Induction lighting is also capable of withstanding high operating temperature, such as those found in pool areas. The cost of the fittings was lower than comparable output LED fittings.

Other benefits of the induction lighting is that it gives off 90 lumens per watt, which is comparable with LED's for high ceilings, and the quality of the light is more like day light than the lamps replaced. In some of the sports halls, induction lighting replaced sodium vapour lights. These lights took some time to come to full light outputs, so it had not been previously possible to install occupancy sensors or light level control, so lights were run continuously during opening hours. It has now been possible to install such controls with the induction lighting, resulting in further energy savings.

Examples of specific projects include:

- Sports Hall at Dewsbury Sports Centre:** 43 400W high pressure sodium lights replaced with 200W induction lamps at a cost of £11,700. Occupancy and light level sensors also installed. Savings are conservatively estimated at £7,500 per annum on electricity, giving a payback of less than 19 months.

Induction lamps – Dewsbury sports hall
 Cost: £11,700
 Savings: £7,500/year
 Payback: 1.6 years



The Pool hall at Batley Sports and Tennis Centre. Left: 200kW induction lamps (natural daylight colour, with good light dispersion). Right: Old 400kW lamps (tinted colour, poorer light dispersion).

- Pool hall at Batley Sports and Tennis Centre:** 400kW lamps were replaced with 200kW induction lamps. The new lamps provide natural daylight colour and better light dispersion than the old sodium vapour lights. Energy use in the pool area halved after installation and payback was approximately 3 years.

Pool hall – Batley Sports and Tennis Centre
 Cost: £6,300
 Savings: £1,900/year
 Payback: 3.3 years

- **Swimming pool at the Stadium Health and Fitness Club:** 25 400W high pressure sodium lights replaced with 200W induction lamps at a cost of £4,500. Estimated savings are £1,600 per annum on electricity, giving a payback of 2.8 years.

Induction lamps – Stadium pool hall
 Cost: £4,500
 Savings: £1,600/year
 Payback: 2.8 years

Combined heat and power units

KAL has five Combined Heat and Power (CHP) units, which are ideal for use in leisure facilities and swimming pools, where there is heat demand throughout the year and sites are operated seven days a week.

In 2009 KAL had three CHP units, which were not running correctly, and two units that were not operating at all. All units have now been overhauled by a local CHP company and are running efficiently. KAL has ensured that the CHPs for the leisure centres are correctly sized for the summer heat load and have the correct heat to power ratio to maximise CHP electrical outputs (this is around 1.5:1 for the sports centres). The CHP units are integrated into the boiler system and are maintained and actively managed and run through open CHP control protocols.

The five CHP units save KAL £150,000 per annum, after CHP maintenance is taken into account. At Dewsbury Sports Centre alone, electricity costs are reduced by approximately £4,000 a month through running the CHP, while increases in gas costs are only a fraction of this. The payback on the overhaul of this unit was 4.5 months.



CHP unit at Dewsbury Sports Centre

CHP Unit – Stadium Health
 Cost: £63,000
 Savings: £24,000/year
 Payback: 2.6 years

The old CHP unit at the Stadium Health and Fitness Club, which had not run efficiently throughout its life, failed in 2012 and was replaced with a new 70kW CHP engine and open protocol control system. Capital cost of the project was £63,000. After maintenance, savings are £24,000 per annum giving a payback on capital of 2.6 years.

Electronic commutated motors

Electronic commutated motors (ECM), attached to plug fans, have been installed in air handling units across KAL sites, replacing older fans and motors. Existing fans were 5kW, while new ECM fans are 4.3kW. The ECMs are inherently variable speeds and can be run at any speed (normal motors with variable speed drives can only be run at 45% of full speed). The ECMs have all been installed with relevant controls (either humidity or CO₂), which allows the speed to be varied on this basis. Payback on all projects has been between 8 and 19 months. Examples of specific projects include:

- **Deighton Sports Arena** is a dry sports centre with a single air handling unit. ECM fans were installed in the supply and extract ducts and a CO₂ sensor was fitted in the extract duct. The cost of the installation was £4,463. Controls were set to

ECM fans – Deighton Sports Arena
 Cost: £4,463
 Savings: £6,800/year
 Payback: 0.66 years

maintain a CO₂ level of 800ppm. This reduced electric consumption by 33%, saving £4,800 per annum. In addition, the control settings mean the fans are running slower and recuperators run more efficiently, resulting in less wasted heat. This has resulted in a reduction of 25% in gas consumption, saving £2,000 per year. Payback on the project was 8 months.

- Scissett Baths and Fitness Centre:** Fixed speed motors in the pool air handling unit and the changing village were replaced with ECM fans and humidity control at a capital cost of £13,800. The humidity control is set at 50% and the project has resulted in savings of 19% for electricity, 20% for gas and around £4,000 per annum. Payback for the project is around 3.5 years.

ECM fans – Scissett Baths and Fitness Centre

Cost: £13,800

Savings: £4,000/year

Payback: 3.5 years

Other improvements

LED lighting has been fitted in other areas throughout the leisure facilities. In many cases, LED tubes (at 40W per panel) have replaced 6ft fluorescent tubes (at 80W per panel), and payback on these replacements is typically in the region of 3 to 4 years. In a number of instances KAL have also been able to reduce the number of light fittings in particular rooms or areas, due to the superior light output of the LEDs.

Hydrovar variable speed drives have been fitted to existing pool heating pumps. These allow the 3kW motors to run at around 0.9kW, as is now happening in the pool at Dewsbury. The cost of these jobs has been in the region of £3,000, with saving of approximately £1,500 per year; a payback of around 2 years (e.g. in the pool at Dewsbury).



Technologies

Combined heat and power (CHP) integrates the production of usable heat and power (electricity), in one single, efficient process. A CHP unit will generate electricity while also capturing the heat that is produced during the electricity generation process.

Electronic commutated motors (ECMs) are direct-current (DC) motors that have been developed for use in Heating, Ventilating and Air Conditioning (HVAC), as an alternative to alternating current (AC) motors. They function using a built-in inverter and a magnet rotor. Due to their design, they can offer a greater range of operability choices, less noise and greater efficiency in air-flow systems than many AC motors. ECMs are also relatively low maintenance.

Induction lamps use an electric or magnetic field instead of internal electrodes to generate light. The elimination of the internal electrodes has the advantages of extending lamp life and improvement in light-generating and collection efficiency.

LED (light-emitting diode) lights use a semiconductor device that emits visible light when an electric current passes through it and are more efficient and environmentally-friendly than incandescent bulbs.

A **variable speed drive** is a piece of equipment that regulates the speed and rotational force, or torque output, of an electric motor.

Further information

Further information on KAL's Energy and Environment Policy can be found at:

<http://www.kirkleesactive.co.uk/about-us/environment>