



Effective management of energy in sports centres

Kirklees Metropolitan Council



ENERGY EFFICIENCY

BEST PRACTICE PROGRAMME

HOST ORGANISATION



'Large users of energy such as local authorities and in particular leisure centres have a responsibility to lead the public by good example and to put their own energy housekeeping in order, not only socially but financially and environmentally as well'

A handwritten signature in black ink, appearing to read 'John Harman', written in a cursive style.

COUNCILLOR SIR JOHN HARMAN
Leader, Kirklees Metropolitan Council

Cover illustration shows Huddersfield McAlpine Stadium, with Bob Shipley, Energy Management Unit (left), and Ian Kendall, operations manager (right).

INTRODUCTION

INTRODUCTION

The metropolitan borough of Kirklees has a population of just under 400 000, comprising 150 000 households. The conurbation includes the towns of Huddersfield, Dewsbury and Batley.

Kirklees has a wide range of recreation and leisure facilities, including fourteen swimming pools and sports centres, which, in total, receive about two million visits annually.

The sports centres and pools are run by the operations manager for Leisure Facilities who, in 1996, headed the authority's in-house bid in a compulsory competitive tendering (CCT) competition. In keeping with the authority's commitment to environmental issues, the invitation to tender called for high priority to be given to energy and environmental management plans and procedures.

This Case Study is written for managers of sports facilities in the public and private sector who are committed to implementing good energy management practices and energy efficiency measures. The checklist on page 5 lists some of the potential benefits to be derived from implementing practical energy saving measures.

This study describes the energy management action taken by Kirklees Metropolitan Council, where good practices and investments in technical measures are helping to reduce energy consumption and costs. This is despite increased demand and longer opening hours of sports and leisure facilities. The lessons learned are summarised with the conclusions on page 11. These will help to forge the next stage of the council's energy action plan.

ENERGY MANAGEMENT

The council has adopted a proactive stance to energy management for many years, formalised within its Local Agenda 21 strategy (see box). Through good energy management the authority plans to identify a longer-term programme with specific energy targets spelled-out for individual departments and sports centres.

Kirklees signed the Making a Corporate Commitment campaign in 1995. This committed the authority to responsible energy management and the promotion of energy efficiency throughout its operation.

The council's purchasing unit is also represented on the Yorkshire Purchasing Group, a consortium of 12 local authorities that negotiates with the public utilities to ensure the best terms for energy purchase and supply.

Although responsibility for implementing energy policy in Council buildings across the region rests with individual building managers, support is provided by the energy management unit, as part of the Council's property services consultancy.

The energy management unit's staff of eight:

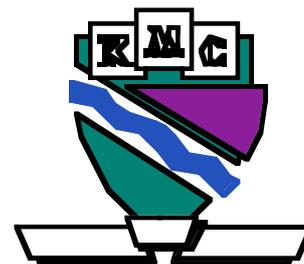
- undertake building surveys to identify investment opportunities, costs and benefits
- assess building performance, including evaluating the effectiveness of investments in energy efficient plant and services
- monitor energy consumption
- provide building managers with information, guidance and advice on a daily basis.

The energy management unit is funded under service level agreements (SLAs) by departments for which it is contracted, together with central funding by the authority. The energy unit also provides an energy help desk, giving fifteen minutes of free advice. Any requirement beyond this time becomes a feasibility study for which client departments are billed, as are ad hoc projects handled by the unit.

ENERGY POLICY

The authority's energy policy includes:

- reducing the district's carbon dioxide (CO₂) emissions to 1990 levels by the year 2000
- seeking the highest levels of energy conservation, use of energy-efficient appliances and alternative sources of energy such as biomass, energy from waste, biogas, solar and wind power
- providing adequate heating and avoiding excessive temperatures
- encouraging more energy-efficient and lower-polluting means of transport.



LOCAL AGENDA 21

In 1992 the Council adopted its own Local Agenda 21 strategy and the Friends of the Earth's Environmental Charter for Local Government. The authority also committed itself to the action areas identified by the UK Local Agenda 21 Steering Group in 1994.

The Council has also assessed its strategies, plans and programmes against the 13 local sustainability themes compiled by the Local Government Management Board (LGMB). The assessment has resulted in the authority focussing on four key sectors:

- putting 'our own house' in order – including environmental targets, green housekeeping and energy saving
- national/international agenda 21 – including applying lessons learned from UK good practice
- community agenda 21 – including running agenda 21 pilot schemes in areas of Kirklees
- business – including promoting environmental audits and green issues.

KIRKLEES' APPROACH

Some of the energy management measures implemented within Kirklees' sports centres and pools are illustrated in the checklist opposite. The checklist also provides guidance to other centre managers and owners.

Energy is the second highest expenditure within the budgets of most sports centres, although it is often overlooked until the management contract is in crisis, or people are complaining about being uncomfortable. The Kirklees approach as promoted by Ian Kendall, Operations Manager, is intended to boost the numbers of visitors by improving the quality of service and the operating efficiency of centres. This should keep costs down and reduce the impact on the wider environment.

The approach

Good housekeeping practices are the key element of the Kirklees approach, where three themes are highlighted.

- Communication raises staff awareness and increases their understanding of energy costs and consumption.
- Energy is not 'someone else's problem'; staff must accept that they are responsible for how much energy and water are used, and must participate in ensuring it is not wasted.
- Staff often need advice and training to help them understand what they must do individually to save energy.

Energy awareness is also one of the criteria used in interviews. Job descriptions for centre managers include energy appreciation. The theme of 'energy as a controllable resource' is emphasised in staff induction and training. Four staff training sessions each year focus specifically on energy management. Pool supervisors and managers also attend courses run by the Sports Council, Institute of Sport and Recreation Management (ISRM) and Institute of Leisure and Amenity Management (ILAM), as well as the Department of the Environment, Transport and the Regions (DETR) energy efficiency seminars.

Staff involvement

Staff are kept informed about energy usage and costs so that they can see the scale of the problem, and the potential for savings. Initially, staff are surprised to learn just how much it costs for the energy needed to keep each centre operating. Making them aware of these costs helps to motivate them to use energy responsibly. Each staff activity has a task sheet setting out the



'Fish tail' switches allow lights to be switched on and off by staff using a special key

responsibilities and duties of each job. These tasks include checking unused areas and switching off lights whenever it is possible and safe to do so.

Kirklees promotes a pioneering culture to encourage staff to look for energy-saving opportunities. Ideas can be generated by anyone who works in or uses the building. An 'employee of the month' scheme offers a £20 reward and certificate for ideas that lead to improvements in quality or efficiency.

Each centre also has a repairs and fault sheet, with responsibility on all staff to highlight problem areas quickly to ensure an efficient and speedy response.

Duty managers visit every part of the building every day to check conditions. These checks involve visual inspections of items like doors and windows, pool covers, and temperatures of pool water and air. They also look for fresh opportunities to increase operating efficiency and quality of service.

A programme of continuous improvement in the way centres are managed has been introduced. Staff are encouraged to question existing procedures and are asked:

- what are you currently doing?
- could you do it more efficiently?
- could it be done another way?

KIRKLEES' APPROACH

Ian Kendall's checklist

■ Use swimming pool covers	This reduces evaporation and enables savings to be made in pool heating. Equipment running time, ventilation requirements and condensation damage are all reduced. Switch off the pool hall ventilation system when the cover is applied and switch it on only after the cover is removed.	<input type="checkbox"/>
■ Turn electrical appliances on in stages	Equipment should be switched on when required rather than everything being switched on all at once.	<input type="checkbox"/>
■ Link the main ventilation system to the energy management system for automatic start-up and shut-down times (and for priority switching)	Ensures the main ventilation system operates only when it is needed. If you do not have an energy management system, use automatic time switches instead.	<input type="checkbox"/>
■ Check that controls such as thermostats are functioning correctly, and that areas in which they are situated are appropriately zoned	Ensures heating is only provided where and to the extent that it is needed. Remember to have external frost stats calibrated, as these may override other controls and bring on the heating before it is really needed to prevent frost damage.	<input type="checkbox"/>
■ Check that time switches are set correctly, and that they are reset for summertime and wintertime operation	Ensures that heating, hot water and ventilation systems operate only when they are actually required.	<input type="checkbox"/>
● Use heat recovery wherever possible by recirculating air and using run-around coils	Examples include venting sauna heat into the pool hall, using waste heat from refrigeration wherever it will be useful, and run-around coils on heater flues.	<input type="checkbox"/>
● Install door closers and draft excluders and check whether building insulation and/or glazing can be improved	Reduces draughts and improves comfort for visitors and staff. Cuts heat lost through ventilation and losses through the building fabric, and may enable lower temperature settings.	<input type="checkbox"/>
● Ensure there is a programme of planned preventative maintenance	Use schedules or checklists of items to be inspected during weekly, monthly, quarterly, half-yearly and annual checks. The centre engineer should complete boiler room log sheets weekly.	<input type="checkbox"/>
● Rely on daylight wherever possible and install energy-saving lights with appropriate controls	Use high-efficiency lamps and other diffusers in all areas, with time switches for remote area lighting, infrared detectors for lights in sports areas, and photo-electric control where daylight is available.	<input type="checkbox"/>
● Check water meter weekly – last thing at night and first thing in the morning – to identify leaks.	Detect and rectify leaks as soon as possible. Use auto-flush urinals, tap restrictors, and showers on 15-second timers.	<input type="checkbox"/>

**Funding opportunities**

'It is important to look for funding opportunities, such as grants and corporate finance, but opportunities can also be created. For example, energy-saving light bulbs cost more to buy, but save on electricity. By buying them at the start of the financial year, you can reinvest the energy saving in further energy efficiency measures. We act quickly on items which deliver immediate savings. When repairing lighting, we fit slimline fittings and low-energy lamps or tubes. We pay for items that have short-term paybacks within the financial year from our local expenditure budget. Up to £3000 for each proposal.'

IAN KENDALL – Operations Manager

THE ENERGY MANAGEMENT SYSTEM AND OTHER INITIATIVES

'Ideally, we should like to have monthly readings from each centre's meters so as to be able to compare actual consumption against expected. Individual sites have been asked to read meters and forward the figures, but this has not always been a success. Monitoring consumption is an area where there is still scope for improvement in our practices. However, we recognise and are addressing the problem.'

Bob Shipley, Energy Management Unit, Kirklees Metropolitan Council

Energy management system

Kirklees' first energy management system (EMS) was installed in 1984 when 12 sites, including Huddersfield Sports Centre, were connected to the central station. There are now some 385 outstations located at 280 of the Council's buildings.

The system's central station is based in the energy management unit at the main Council offices. Outstations are monitored via three VDUs. Outside working hours, staff with portable computers can log on to the EMS to ensure proper functioning of the system. The purpose of the centralised system is to monitor plant operation, so that faults and problems can be identified and responded to rapidly.

Staff at individual sites are trained to use the system, and receive technical support and help as problems arise. There are eight technical operatives based at the sports centres, as well as two area engineers.



Meter readings being taken to monitor consumption at Dewsbury

Funding and evaluation

Although there is no specific budget for capital investment in energy efficiency measures, all opportunities with a payback period of less than six years are assessed for central funding. Once implemented, the performance is monitored and compared against the expected savings. As an incentive, savings generated through investment are retained by the service department during the first year, but generally result in a reduction in subsequent budgets.

RED – Reduce Energy Directly

The RED initiative was introduced in July 1996 and is a scheme devised by the manager of Spenborough Pool, David Dagg. RED was chosen to convey the idea of heat, and red stickers act as reminders near energy-consuming equipment.

RED forms the basis of a staff information and awareness campaign. There are two main strands:

- informing sports centre managers about their energy consumption as a way of helping them to appreciate the patterns and trends in their energy use
- providing publicity and promotional material to enable centre managers to run staff awareness campaigns that will cut energy waste.

Energy link officers

All centres have appointed 'energy link officers' in areas such as quality, information technology, health and safety, and energy management.

The energy link officers work closely with the centre managers and spearhead the RED initiative. Their specific responsibilities involve both information and communication:

- monitoring energy consumption monthly
- collating and presenting quarterly energy consumption figures at the centres' monthly management team meetings
- publicising consumption figures among staff
- raising staff awareness and motivation
- seeking ideas and suggestions from staff and presenting them to the building's management team for discussion
- providing feedback to staff on the responses to their suggestions
- meeting the energy link officers from the other sports and leisure centres to identify examples of best practice and exchange operating experiences
- meeting representatives from the property services consultancy and two area engineers quarterly to discuss progress and to plan future initiatives.

ENERGY MANAGEMENT AND OTHER INITIATIVES

Monitoring energy under the RED initiative

A more comprehensive system for monitoring across the sports centres is planned under the RED initiative. Standard pro-formas have been prepared to assist the energy link officers in recording their use of gas, electricity, other fuels and water.

A 'comments log' provides a system of explaining reasons for unexpected levels of consumption, exceptional weather conditions, closure of the centre, combined heat and power (CHP) service failure, or some similar problem.

Once completed, the reporting forms and comments log are collated by the operations manager, who is then in a position to review energy performance and recommend corrective actions to the energy management unit.

'Building MOT'

This initiative within Kirklees takes a pro-active approach to energy efficiency. Under the service level agreement, an engineer from the energy unit visits each building connected to the EMS once a year and tests every major energy system, alternating between winter and summer. These annual 'MOTs' are helping to identify potential problems before system performance adversely affects energy efficiency.



CHP plant at Huddersfield operating as the lead boiler



Notice boards keep staff informed of the latest energy consumption figures

Combined heat and power systems

Sports and recreation centres with swimming pools have an extensive daily demand for heating and electricity all year round. They are, therefore, candidates for combined heat and power (CHP) systems. CHP systems generate heat and electricity in a single process which, because both are required, can result in a fuel conversion efficiency of over 80%. This compares favourably with conventional power stations which provide electricity at the point of use at an efficiency of

around 30%. Although fossil fuel consumption increases, this is more than compensated for by savings in electricity costs.

CHP units are usually sized to match the base heating load so they operate for the maximum amount of time. They are sequenced as the lead boiler with one or more conventional boilers providing additional heating during peaks in demand.

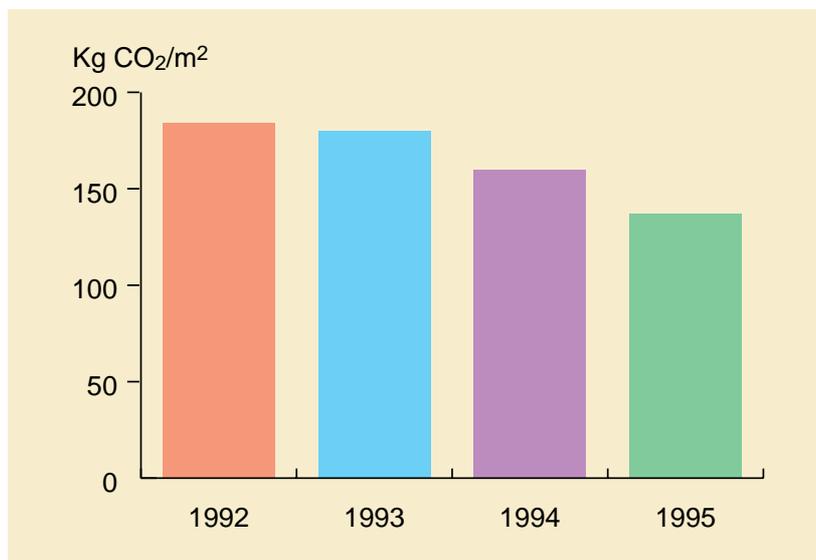
CENTRE PROFILES

Profiles of Kirklees' sports centres and some of the energy efficiency measures implemented are briefly summarised on the following pages.

HUDDERSFIELD SPORTS CENTRE

The largest of Kirklees' sports centres is in Huddersfield, where there are three pools as well as extensive sports facilities. During the last ten years a number of energy management improvements have been introduced, including timed flow shower controls, power factor correction, pool filter refurbishment, and automatic entrance doors. The graph of CO₂ emissions from 1992 to 1995

shows a steady reduction year by year. CO₂ has been used as the most appropriate measure here due to the CHP plant, which raises gas consumption but reduces the electricity purchased from the grid. Overall consumption in 1994 and 1995 is in the 'good' category when compared with national benchmarks (see Energy Consumption Guide 51). Details are on the back page.



Annual emissions of carbon dioxide from Huddersfield Sports Centre



Adrian Bishop, Manager of the Huddersfield Sports Centre

HUDDERSFIELD SPORTS CENTRE

constructed:	1971
floor area:	8882 m ²
main pool:	25 m x 12.5 m
teaching pool:	12 m x 6 m
diving pool:	12 m x 12 m
two-court sports hall	
indoor bowling hall	
climbing wall	
fitness suite	
sauna	
two bars and cafe	
100 staff (approximately)	
number of visits in 1994/5	
(excluding schools):	413 234

Energy use in 1994/5

electricity purchased:	550 500 kWh
electricity per unit floor area:	62 kWh/m ²
gas consumption:	4 150 632 kWh
gas per unit floor area:	467 kWh/m ²

Comments: The CHP unit increases the fossil fuel consumption at the site, but reduces its imported electricity consumption. The overall effect is a significant reduction in total energy costs.

CENTRE PROFILES

In 1986, lighting in the main sports hall and pool was replaced by high-pressure sodium lamps. This action immediately halved lighting consumption. The pool has rooflights and the artificial lighting is operated by a daylight sensor.

Elsewhere, slimline fluorescent tubes are being introduced as replacements for conventional tubes. Most recently, the energy management unit surveyed the remaining lighting systems occupying the smaller spaces, and a bid is being submitted for installing low-energy lamps throughout.

A CHP system was installed in 1992, costing £85 000 but with a payback of less than three years. The CHP system operates as the lead boiler, in tandem with two conventional gas-fired boilers.

There are numerous ventilation systems in the building, all of which have independent controls. In the dry areas, air is recirculated, and the feasibility of recirculating the dry side air to the

wet side is under consideration. An EMS was installed in 1984 to control all the main heating, hot water and ventilation services. The system was upgraded in 1993.

In the pool, sampling water is recirculated, rather than being put to drain.

Electricity and gas consumption are monitored daily, and a historical database of consumption is being built up to enable comparisons with targets.



Pool covers are simple but effective

SPENBOROUGH POOL

Spenborough Pool was constructed in 1969, partly of brick-and-block and partly using pre-cast concrete panels. Energy efficiency improvements were carried out in three phases between 1986 and 1989, and comprised:

- new suspended insulated ceilings
- new modular boilers with heat recovery/recycling capabilities
- new heating distribution pipework and thermostatically controlled radiator valves
- insulation to the ventilation system, and improvements to the system to recycle air and recover heat from warm air in the pool area
- insulating the walls, plant and the pool water systems
- installing energy-efficient lighting.

In addition, a CHP unit was installed in 1987, and upgraded in 1995. The CHP engine is used as the lead boiler, and is backed up by the modular

boilers. There is much new pipework and both new and existing pipes have been carefully lagged. A heat recovery system has been installed around the boiler flue.

Spenborough Pool obtained funding in 1995 from the authority's environmental budget to install a rainwater collection system. There was an old storage tank located in the plant room which was brought into reuse. Annual water consumption savings of 10% are anticipated.



Heat recovery jacket around the boiler flue

CENTRE PROFILES

COLNE VALLEY LEISURE CENTRE

Detailed readings and analysis enable an accurate picture of usage to be built up so that, for example, electricity consumption can be measured and reflected in the hire charge. Monitoring of water consumption identified high consumption at the dry side even when the centre was closed. It was found to be due to urinal cisterns flushing. Reducing the waste saved hundreds of pounds per year.

Other measures introduced include:

- early shut-down of heating plant before the centre closes
- time switches to control external lighting
- push-button showers
- infra-red urinal flush controls that allow flushing only after detecting a number of users
- installation of lower-rated night pump to reduce cost of pool water recirculation.

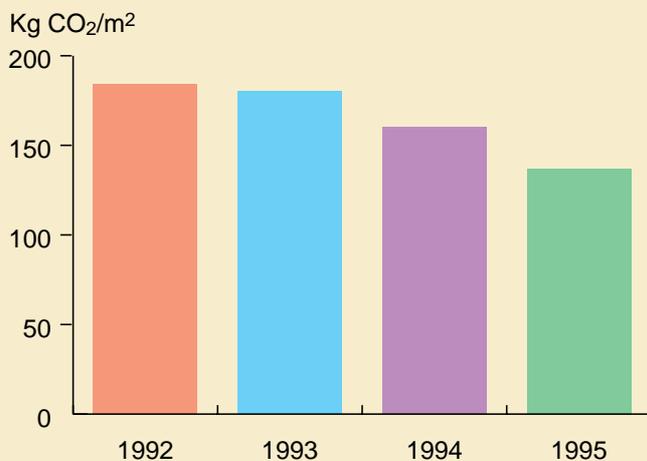
Good housekeeping measures include:

- vending machines and bar refrigeration switched off overnight when not in use
- a new arrangement of sports hall lighting that enables individual courts to be lit independently
- labelling of pool hall lighting switches and the switching-off of one bank of lights at the shallow end when daylight is available, saving £200 per year.

SCISSET BATHS AND FITNESS CENTRE

At Scisset Baths, the pool area is lit by high-pressure sodium lamps which, like the ventilation system, are controlled manually by the pool supervisor.

Lane lighting in the suspended ceiling at Scisset Baths allow daylight to enter the pool hall from rooflights in the original roof above



Annual emission of carbon dioxide from Dewsbury Sports Centre

DEWSBURY SPORTS CENTRE

Dewsbury Sports Centre comprises a swimming pool, sports hall and other accommodation. A CHP system was installed in 1994 operating as the lead boiler, and the boiler flue utilises a heat recovery system. Monitored CO₂ emission levels over the period 1992 to 1995 have shown consistent reductions.

CENTRE PROFILES



Lights near windows are off when daylight is adequate at Colne Valley Leisure Centre

BATLEY BATHS

Batley Baths, constructed in 1893, has been extensively refurbished during the last 15 years. In 1983, 18 solar roof panels were installed for pre-heating water, and they continue to give good service. The main pool hall is lit by high-pressure sodium lamps. These are controlled manually by centre staff. Batley Baths has a large roof void, and in 1995 a system of recirculating the warm air into the main pool hall was successfully introduced.

**CONCLUSIONS**

Kirklees MBC has demonstrated a realistic and practical approach to energy management. By establishing a policy and enshrining this within its Local Agenda 21 strategy, the authority has formalised energy and environmental management as part of the council's culture. The Huddersfield sports centre is acting as a model for other centres, having consistently demonstrated reductions in levels of CO₂, and efficient CHP plant that has reduced total energy costs.

The key measures that the authority has identified to influence the next phase of the strategy are to:

- set realistic energy targets
- ensure that the targets are measurable
- ensure they reflect the increasing demand for leisure facilities
- provide further incentives to centres achieving energy targets
- identify further no-cost and low-cost energy saving measures
- use CCT as an opportunity to increasingly drive energy policies
- examine further opportunities for funding energy saving measures.

FURTHER INFORMATION AND ADVICE

DETR ENERGY EFFICIENCY BEST PRACTICE PROGRAMME PUBLICATIONS

The following Best Practice programme publications are available from BRECSU Enquiries Bureau. Contact details are given below.

Good Practice Guides

- 129 Good housekeeping in dry sports centres
- 130 Good housekeeping in swimming pools – a guide for centre managers
- 137 Energy efficiency in sports and recreation buildings: effective plant maintenance. A guide for sports centre managers and maintenance staff
- 144 Energy efficiency in sports and recreation buildings: technology overview. A guide for owners and managers
- 146 Energy efficiency in sports and recreation buildings: managing energy. A guide for sports centre managers
- 211 Drawing a winner. Energy efficient design of sports centres

Good Practice Case Studies

- 43 Energy efficiency in sports and recreation buildings: condensing gas boilers
- 74 Energy efficiency in sports and recreation buildings: potential benefits of boiler replacement
- 76 Energy efficiency in sports and recreation buildings: swimming pool covers. Eastern Leisure Centre, Cardiff City Council
- 280 Energy efficiency in sports and recreation buildings. CHP – the ‘capital purchase’ option
- 281 Energy efficiency in sports and recreation buildings. CHP – the ‘supplier financed’ option

Energy Consumption Guide

- 51 Energy efficiency in sports and recreation buildings: a guide for owners and energy managers

Fuel Efficiency Booklet

- 1 Energy audits for buildings

Energy Efficiency in Buildings

- 7 Introduction to energy efficiency in sports and recreation centres

The following Best Practice publications are available from ETSU Enquiries Bureau. Contact details are given below.

Good Practice Guide

- 2 Guidance notes for reducing energy consumption of electric motors and drives

Good Practice Case Study

- 219 Two-speed motors on ventilation fans

Other sources

The Sports Council

16 Upper Woburn Place, London WC1H 0QP.

Tel 0171 388 1277. Fax 1071 383 5740

- Sports Council Guidance Note. Sports halls heating and ventilation (SC 382)
- Sports Council Guidance Note. Sports halls lighting (SC 383)
- Sports Council Guidance Note. Swimming pools building services (SC 387)

For more details of the environmental programme at Kirklees MBC, contact:

Ian Kendall, tel/fax 01484 223650.

The Government's Energy Efficiency Best Practice programme provides impartial, authoritative information on energy efficiency techniques and technologies in industry and buildings. This information is disseminated through publications, videos and software, together with seminars, workshops and other events. Publications within the Best Practice programme are shown opposite.

Visit the website at www.energy-efficiency.gov.uk
Call the Environment and Energy Helpline on **0800 585794**

For further specific information on:

Buildings-related projects contact:
Enquiries Bureau

BRECSU

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Garston, Watford WD25 9XX
Tel 01923 664258
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E-mail brecsuenq@bre.co.uk

Industrial projects contact:

Energy Efficiency Enquiries Bureau

ETSU

Harwell, Oxfordshire
OX11 0RA
Tel 01235 436747
Fax 01235 433066
E-mail etsuenq@aeat.co.uk

Energy Consumption Guides: compare energy use in specific processes, operations, plant and building types.

Good Practice: promotes proven energy-efficient techniques through Guides and Case Studies.

New Practice: monitors first commercial applications of new energy efficiency measures.

Future Practice: reports on joint R&D ventures into new energy efficiency measures.

General Information: describes concepts and approaches yet to be fully established as good practice.

Fuel Efficiency Booklets: give detailed information on specific technologies and techniques.

Introduction to Energy Efficiency: helps new energy managers understand the use and costs of heating, lighting, etc.