

Energy-efficient refurbishment of schools

– the achievements of Bolton Council



ENERGY EFFICIENCY

BEST PRACTICE PROGRAMME

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1 INTRODUCTION

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This Case Study profiles how a local authority has:

- successfully obtained funding under the New Deal for Schools
- obtained funding under the Energy Saving Trust's *SCHOOLENERGY* programme
- proactively managed its portfolio of school buildings by developing comprehensive asset management plans; this has resulted in the successful implementation of a number of energy-saving measures

WHO IS THIS CASE STUDY FOR?

This Case Study is intended primarily for local authority officers in property departments, education departments and energy units. It aims to illustrate how local authorities can improve the energy efficiency of their school building stock.

The benefits of doing so include:

- saving money on the cost of energy
- minimising environmental impact
- improving comfort and lighting
- raising the quality of education.

The Case Study features Bolton Council, and describes the improvements the Council has made to five of its school buildings. It summarises Bolton's positive approach to property management and to energy management, and reports on how Bolton has been successful in obtaining additional funding for its investment programme from two sources. These are:

- New Deal for Schools (NDS), operated by the Department for Education and Employment (DfEE)
- *SCHOOLENERGY*, an Energy Saving Trust (EST) programme funded by the Department of the Environment, Transport and the Regions (DETR), and British Gas.

Details of both programmes are given in the Case Study.

WHY BOLTON?

Bolton Council has taken a number of actions to manage its stock of school buildings effectively.

- It is building up a computer-based asset register of all its premises, including schools, as a first step towards effective asset management planning.
- It supports an energy management unit.
- It has prepared its own Local Agenda 21 which identifies energy efficiency as one of its key areas for action.
- It has an energy policy and an energy action plan.
- It operates an energy conservation fund that allows energy users to invest in energy conservation measures.
- It uses proprietary energy accounting system software for monitoring consumption and cost in all its operational buildings.
- It has installed a central energy management system (EMS) to control heating, hot water and air handling in its high-energy consumers and is gradually adding its operational buildings to the system as funds allow.

As well as obtaining funding under the NDS and the *SCHOOLENERGY* programme to improve the energy efficiency of its schools, Bolton participated in piloting Next STEP seminars, which are a follow-up to the successful School Turnkey Energy Programme (STEP). The aim is to introduce school energy managers, caretakers and site managers to advanced energy management methods.

THE NATIONAL PICTURE

There are approximately 34 000 schools in the UK. Of these, 24 000 are primary, 5000 are secondary, while the remaining 5000 include special schools and nurseries. The majority are maintained and funded through the local authorities, and account for a quarter of public sector energy costs, worth nearly £400 million per year. The CO₂ emissions associated with this level of consumption are estimated to be 6 million tonnes per year. Good management practices, together with cost-effective energy efficiency measures of the type featured in this Case Study, could reduce the total by as much as 20%.

INTRODUCTION

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'I'm delighted that the efficiency steps we are taking in upgrading heating and lighting in Bolton schools are being featured as a model of good practice though, of course, our efficiency drive is across all our Council services.'

'The schools' scheme is a typical example of the type of good housekeeping projects we are implementing. By adopting new technology and ways of working and investing in the right areas under the Government's New Deal for Schools, the Council will be getting much better value for its money while also helping the environment. We are very pleased to have been chosen as one of the pioneers in this field and to share our experience and expertise with others.'

Councillor Bob Howarth, Leader of Bolton Council

LIST OF ACRONYMS

AMP	Asset management plan
CIPFA	Chartered Institute of Public Finance and Accountancy
CREATE	Centre for Research, Education and Training in Energy
DETR	Department of the Environment, Transport and the Regions
DfEE	Department for Education and Employment
EDI	Electronic data interchange
EMS	Energy management system
EST	Energy Saving Trust
IPF	Institute of Public Finance Ltd
NDS	New Deal for Schools
PFI	Private Finance Initiative
STEP	School Turnkey Energy Programme

CARBON DIOXIDE EMISSIONS

Each kWh of energy delivered to a building incurs atmospheric emissions of the major greenhouse gas carbon dioxide (CO₂) from the extraction, processing and delivery of each fuel, and its consumption on site. The following table illustrates the total CO₂ emissions associated with each fuel expressed as kg of CO₂ per kWh of energy consumed. This is also sometimes expressed as kg of carbon (kgC) per kWh (shown in the third column).

Fuel	kgCO ₂ /kWh	kgC/kWh
Natural gas	0.20	0.055
Oil	0.29	0.079
Coal	0.34	0.093
Electricity (average)	0.52	0.142

2 CHURCH ROAD COUNTY PRIMARY SCHOOL

'Heating costs are projected to reduce to about 60% of what they were.'

Church Road County Primary School is a two-storey building dating from 1909. Its architects provided a light, spacious and airy interior using high ceilings and tall windows. The programme for the official opening recorded in detail the quality of environment it was to provide:

'The windows are large and numerous. The rooms are lofty to ensure a sufficient air space, and for a further supply of air wrought-iron hoppers have been fitted in the windows and cast-iron ventilating grates... For the escape of vitiated air all the fanlights have been made to open and some of these have been fitted with endless cords... The heating is by low-pressure hot water and the lighting by electricity.'

The original coal-fired boiler was converted to oil in the 1960s. Under the first round of the NDS, Bolton applied to replace the boiler and to upgrade the heating and hot water plant.

This bid was successful and the boiler was replaced in March 1998 by a 280 kW modular gas boiler, together with new zone valves, and a separate hot water generator with a 300 litre capacity. The three zones are the ground floor, first floor and the nursery annex. Because of the time of year when the system was installed, zoning was limited to pipework alterations which could be carried out in the boiler room.

Both heating and hot water plant were added to the Council's EMS and are controlled and monitored centrally by staff in the Council's Energy Unit.

The direct cost of the boiler and associated equipment was £43 800 excluding fees. Of this, the zone valves and EMS connection cost £5000. A new gas main had to be laid at a cost of £1400.



Figure 1 Church Road Primary School



Figure 2 The new modular boiler at Church Road

The headteacher, Mr Gough, is very enthusiastic about his new heating system, 'First of all it works! It really has made a difference. The old boiler was unreliable and didn't cope with heating the building in cold weather; on a Monday morning it would be midday before the school was warm.

Then the oil tank had to be topped up every three weeks, which meant ordering oil and arranging delivery. The new boiler is absolutely marvellous. It has the power to heat the school quickly and we don't need to think about the heating any more.'

The new gas boiler has not been in use long enough for energy savings to be measured precisely, but costs are projected to reduce to about 60% of what they were. The expected savings are due to the increased efficiency of hot water production, as much as to space heating.

In addition to the new boiler equipment, Church Road School has also had a new lighting system installed on the staircases, using fluorescent fittings, and complete with emergency lighting.

In the 1998 condition survey, substantial electrical engineering improvements were considered necessary, at DfEE priority level 2. Improvements to upgrade lighting controls were identified at priority level 3.

Under later NDS rounds, ie NDS-3 and NDS-4, the school would have been encouraged to submit the lighting controls work together with the electrical improvements as complementary work on the grounds of energy efficiency.

CHURCH ROAD: KEY FACTS

Internal floor area	2000 square metres
Number of junior pupils	480
Nursery floor area	90 square metres
Number of nursery pupils	56 half-time places
Number of teachers	21
Number of other staff	30
Annual electricity costs	£3500
Annual oil costs (prior to new gas boiler)	£3000
Annual water and sewerage costs	£1500
Estimated annual saving	£1200
Estimated CO2 saving	38 tonnes per year

3 WITHINS SCHOOL

Withins School is a large mixed comprehensive school for pupils aged 11 to 16. It was formerly two separate schools on the same site. A sports centre is also linked to the school.

Funding from the first round of the NDS has been used to make major improvements to the efficiency of lighting at the school. Initially new lighting fittings were installed at a cost of £31 500 using NDS funding. Automatic lighting controls were fitted at a cost of £5144, of which £2572 was refunded by the EST under the *SCHOOLENERGY* programme.

Under later rounds of NDS, schools were encouraged to submit such complementary work as part of the bid, despite the increased costs.

About half the school has had the lighting replaced by new fluorescent fittings with efficient

T8 lamps and prismatic diffusers, all controlled by occupancy sensors with manual override. Typically the sensors specified are fully adjustable infrared presence detectors with integral photocells and relays. The time delay before they switch off can be adjusted between 4 minutes and 32 minutes. Figure 4 shows a pair of sensors and the new lamps they control in one of the school art rooms. Another, larger, art room, where there is side lighting only, uses two separate occupancy sensors linked to a dual relay in order to control four circuits – two circuits near the windows and two on the inner wall.

As figure 5 shows, consumption has been brought under control since 1995, and is on a downward trend. This has been achieved despite the increasing use of information technology (IT).

In the view of Stuart MacIvor, the Deputy Head, other benefits have also followed, 'Before, some of



Figure 3 Withins School

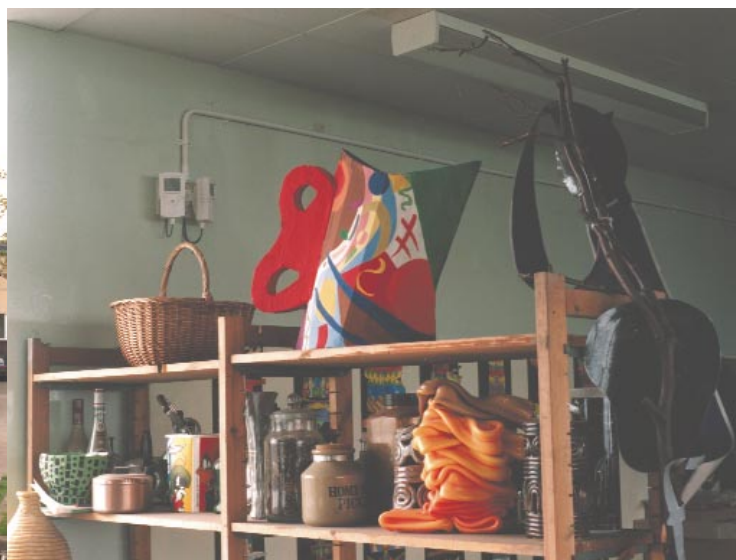


Figure 4 A pair of occupancy sensors in an art room

the classrooms had the lights on all day. The children's awareness of energy has been heightened, not just at a theoretical level, but in a practical sense that has had an impact on their attitude. There has also been a considerable saving of our time. There is nothing worse, just as you are leaving last thing at night, than noticing that there is still a light left on.'

Brett Worsley, the Site Manager, agrees, 'This is a big school and going round switching off the lights used to take me some time. These detectors are saving my time – as well as saving energy.'

In addition, the heating and hot water system at Withins School is connected to Bolton's EMS. The heating is divided into three separate zones, and both boiler plant and zones are controlled remotely. The linked sports centre at the school has its own boiler plant and is also connected to the EMS.

'Electricity consumption has been brought under control and is on a downward trend.'

WITHINS SCHOOL: KEY FACTS

Internal floor area	8800 square metres
Age range of pupils	11-16 years
Number of pupils	1100
Annual oil costs (1998)	£25 200
Annual electricity costs (1998)	£24 800
Annual water and sewerage costs (1998)	£2600
Estimated annual saving	£720
Estimated CO ₂ saving	7.5 tonnes per year

VALUE OF CONDITION SURVEY

Following the 1998 condition survey, the need for new boiler plant was identified at DfEE priority level 2, with an estimated cost of £120 000.

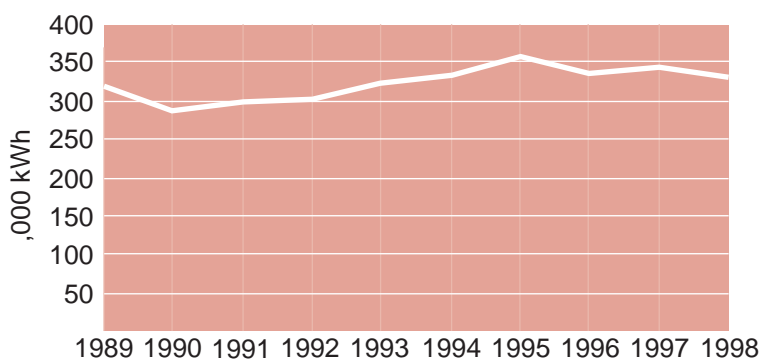


Figure 5 Daytime electricity use 1989-1998, showing the downward trend since 1995

4 SHARPLES COUNTY SECONDARY SCHOOL

Sharples County Secondary School is a large mixed comprehensive school for pupils aged 11 to 16. Parts of the building are used for evening classes.

An extensive programme of relighting was undertaken in 1997 using funding received under the first round of the NDS (NDS-1). Energy-efficient T8 lamps and prismatic diffusers were installed at a cost of £34 000. In later NDS rounds, schools were encouraged to install the more expensive high-frequency luminaires on energy efficiency grounds.

Figure 7 shows some of the new light fittings in the library. These are switched manually by library staff. The switching arrangement allows the row of lamps near the windows to be switched off independently of the other lights when daylighting from the windows is adequate.

In addition to the new lighting, part of the school was reroofed using funding from NDS.

Heating and hot water systems were improved in 1998 with funding from the EST. The school was connected to the Council's EMS, and a rebate of £4000 was obtained on a total cost of £11 600. At the same time, Bolton spent a further £9500 from its education budget to install zone valves, dividing the building into 10 heating zones which can be controlled individually by the EMS.

The Deputy Head, Tom Chatburn, is enthusiastic about the improvements to both lighting and heating, 'The new lighting has made a terrific difference, especially in the school theatre. We've got exams in there at present, and it's much brighter for the pupils. We also have a night school provision, and there used to be complaints that it was so dim. Now there is no comparison, it's superb.' He is aware of the expected financial savings, and is looking forward to the benefits that will accrue to the school.

Geoff Kay, the Chief Caretaker, is equally aware of the improvements to the heating, 'There were some teething troubles, but they were sorted out by the engineers resiting sensors. Now the building is warmer, and there are no cold areas as there used to be.'

Figure 8 shows how the new lighting controls cut



Figure 6 Sharples School

consumption in 1998, stemming the inexorable rise in electricity use during the 1990s, which is mainly the result of increased IT usage.

Following the 1998 Condition Survey, the need for new boiler plant was identified at DfEE priority level 2. The estimated cost is £130 000.

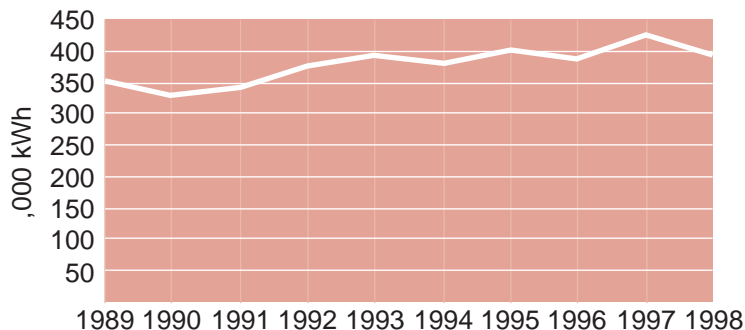


Figure 8 Daytime electricity use 1989-1998

SHARPLES SCHOOL: KEY FACTS

Internal floor area	6400 square metres
Age range of pupils	11-16 years
Number of pupils	968
Annual gas costs (1998)	£22 400
Annual electricity costs (1998)	£25 200
Annual water and sewerage costs (1998)	£5800
Annual saving (lighting)	£1450
CO2 saving (lighting)	15 tonnes per year
Annual saving (heating)	£3850
CO2 saving (heating)	87 tonnes per year



Figure 7 New lighting in the library

The new lighting has made a terrific difference – it's much brighter for the pupils!

5 SUNNING HILL COUNTY PRIMARY SCHOOL

Sunning Hill County Primary School has 390 pupils aged from 4 to 11, and is also used as a youth centre. Built of brick in the Victorian era, the school has high ceilings and tall, leaky windows.

Past works at the school to conserve energy have included the introduction of suspended ceilings. Not only do these reduce the volume of air that needs to be warmed, but they also improve room acoustics. They help to cut redecoration costs and obviate the need for scaffolding. Top-floor windows on the south façade, having suffered over the years from direct sunlight and become ill fitting, had also been replaced.



Figure 9 Sunning Hill Primary School, showing the new windows on the south façade



Figure 10 Suspended ceilings and new windows reduce heat losses at Sunning Hill Primary School

In the second round of NDS (NDS-2), funding was sought and obtained to replace the remainder of the south-facing windows. Double-glazed PVC windows were supplied and fitted by Bolton's Direct Labour Organisation. About two-thirds of the school's windows have now been renewed.

Headteacher Paul Read has no doubt about the benefits, 'It's made a tremendous difference to the temperature – it's a lot warmer. I'm hoping it will make a difference to the heating costs, although the temperature of the building has to be regulated to meet the heating needs of rooms with the old windows, so we may not see the cost reduction yet.' In fact, the classrooms on the colder north façade have yet to have their windows replaced, and the heating requirements of these classrooms largely determine the heating load.

The 1998 condition survey identified an urgent need – at DfEE priority level 1 – to replace the 1960's boiler with new gas-fired boiler plant, at an estimated cost of £50 000. This was included in Bolton's third round (NDS-3) bid. Substantial electrical engineering improvements were identified under DfEE priority level 2, including upgrading lighting controls.

SUNNING HILL PRIMARY SCHOOL: THE FACTS

Internal floor area	2600 square metres
Age range of pupils	4-11 years
Number of pupils	390
Annual electricity costs	£7000
Annual oil costs	£3200
Annual gas costs	£600
Annual water and sewerage costs	£2000

It is difficult to estimate the savings, as some of the benefits are being taken as improvements in comfort.

6 ST MATTHEW'S CHURCH OF ENGLAND PRIMARY SCHOOL

St Matthew's is a modern primary school built in 1971, and planned with four wings arranged around a central hall. The roof covering reached the end of its useful life in the mid-1990s and the whole school was entirely reroofed in 1998, with NDS funding.

The roof already had fibreglass insulation, which was retained, but the opportunity was taken to add a further layer of 50 mm thick expanded polystyrene above the roof decking. This extra layer helps to keep the roof structure warmer and is considered to represent good practice in the UK climate. The roof was re-covered with three-layer built-up felt.

As with some of the other case studies featured, the savings are difficult to estimate since part of the benefit is an improvement in comfort.

Headteacher Barbara Haworth said, 'I have to admit it is warmer since the roof was done.'

ST MATTHEW'S SCHOOL: KEY FACTS

Internal floor area	1200 square metres
Number of junior pupils	250
Number of nursery pupils	52 half-time places
Number of teachers	11
Number of other staff	16
Annual electricity costs	£2200
Annual gas costs	£2300
Annual water and sewerage costs	£1400
Estimated annual saving	£260
Estimated CO2 saving	6 tonnes per year

'The double glazed units have made a tremendous difference to the temperature – it's a lot warmer!'



Figure 11 St Matthew's Primary School



Figure 12 The new insulated roof at St Matthew's Primary School

7 BOLTON'S BIDS UNDER NEW DEAL FOR SCHOOLS

DEPARTMENT FOR EDUCATION AND EMPLOYMENT PRIORITY LEVELS

Priority 1

Urgent work that will:

- prevent immediate closure of premises
- address an immediate high risk to the health and safety of occupants
- remedy a serious breach of legislation.

Priority 2

Essential work required within two years that will:

- prevent serious deterioration of the fabric or services
- address a medium risk to the health and safety of occupants
- remedy a less serious breach of legislation.

Priority 3

Necessary work required within five years that will:

- prevent deterioration of the fabric or services
- address a low risk to the health and safety of occupants
- remedy a minor breach of legislation.

Priority 4

Desirable work required within five years that will:

- prevent possible deterioration of the fabric or services.

The NDS funding programme (described in detail on the next page) has enabled Bolton to introduce a planned programme for boiler replacement, where previously it was on a breakdown basis.

Bolton's approach is to identify their least efficient boilers and those that are giving poor performance in terms of pollution and achieved comfort levels, and are at serious risk of total failure within 12 months.

Boiler replacement works generally include:

- new atmospheric gas-fired modular boilers and associated flue
- new independent gas-fired hot water generator
- total replacement of all services pipework within the boilerhouse
- new duplicate heating and hot water system circulating pumps
- application of insulation to all heating/hot water system pipework within the boilerhouse
- a new control panel linked to the central EMS, and associated electrical works
- new motorised zone-control valves and/or thermostatic valves, where appropriate.

Other energy-related works undertaken with NDS funding include roof repairs with the addition of insulation wherever possible, new lighting installations and improved controls, and renewal of windows with double glazing.

NDS-1

Bolton's successful NDS-1 bid included replacement boiler plant at eight primary schools. The bid was for £230 000, all of which was approved. The Council added a further £85 000 giving a total expenditure of £315 000. The resultant annual savings are estimated at £28 000, giving a simple payback of about 11 years.

New energy-efficient lighting, using low-energy fittings and modern controls, was installed at 12 schools. The NDS bid was for £298 000 and the Council added a further £52 600. The resultant annual savings are estimated at £25 500, giving a simple payback of over 13 years. Bolton also bid for £180 200 for roof repairs, including the addition of insulation where practical, at 10 schools. The NDS-1 bid was for £180 200 and

the Council contributed a further £31 800. The annual savings are estimated at £25 000.

NDS-2

Under NDS-2, Bolton received £1.53 million, covering a wide variety of works at over 50 schools. Energy efficiency measures included boiler equipment replacement at three secondary schools totalling £185 000, roofing repairs at nine schools worth £200 000, and repairs to doors and windows at 20 schools costing £557 000.

NDS-3

Energy efficiency related works within Bolton's NDS-3 bid included boiler replacement at 12 schools at DfEE priority level 1. The projected cost of these was £921 000, of which £851 000 was sought from NDS, with the remainder paid by the Authority. Priority 2 work included £2.69 million for boiler replacements.

But Bolton had an even higher priority for which it was seeking funds. The Deane School was both under-subscribed and in need of complete refurbishment. Bolton wished to carry out the improvement works and then move Woodside Senior School into part of the premises, although retaining separate identities for the two schools. The total cost is estimated at £5 million, and Bolton was successful in bidding for £3.3 million from the DfEE under NDS-3. However, no other funding was given to Bolton under NDS-3. Refurbishment works at The Deane include energy efficiency measures

Bolton Council is responsible for 450 operational buildings, including 112 primary schools and 16 secondary schools. The Council is committed to a corporate property management strategy whose objectives are to promote social, economic and environmental well-being.

Bolton's Local Agenda 21 identifies energy efficiency as one of its key areas. A detailed energy action plan identifies 29 energy objectives that range from establishing a baseline of current energy consumption within Bolton to providing advice and promoting good practice.

8 PROPERTY AND ENERGY MANAGEMENT

In its own operational buildings, the Council is committed to:

- including energy efficiency schemes within Council resource bids
- giving prominence to energy efficiency when commissioning new build or refurbishment
- developing a property register including energy use, together with a building equipment register
- operating a planned maintenance and boiler replacement programme, and extending the present on-line EMS, with a target of 15% reduction in consumption over 10 years
- reviewing energy usage in all Council operational buildings, including schools.

BOLTON'S ENERGY POLICY

The Council's energy policy has four objectives:

- to encourage energy efficiency as a means of conserving natural resources and protecting the environment
- to maintain good standards of comfort and amenity in conformance with relevant legislation
- to reduce energy consumption to the minimum consistent with those standards
- to make energy available to users at the lowest price possible within relevant legislation.

The Council operates an energy conservation fund, managed by its Energy Unit, which allows energy users to invest in energy conservation measures. Most of the resulting savings are returned to the fund over a payback period, but some are passed to energy users to act as an incentive to maintain savings year on year.

BOLTON'S ENERGY UNIT

The formal task of the Energy Unit is to implement the Council's energy policy. There are three staff. The Unit's main responsibilities are:

- negotiating contracts for the supply of fuel and power
- central monitoring of energy consumption, and the processing and payment of fuel bills
- operation of the centralised EMS.

The expenditure controlled by the Unit per year is:

- electricity – £2.1 million
- gas – £1.2 million
- other costs, including water – £0.8 million.

The Unit is funded entirely from the Council's revenue budget. In addition to the direct costs for the Unit of about £100 000 per year, the Council also pays around £20 000 per year in service and maintenance costs for the proprietary EMS.

ENERGY MANAGEMENT SYSTEM

The EMS was first installed in the late 1980s. Currently 68 of the Council's operational buildings, including 42 schools, are controlled centrally. More are added in priority order as resources allow, including every school whose boiler plant is replaced. The system is typically used to control the heating, hot water, and air handling plant. Larger premises, including the larger schools, are zoned. The basic time and temperature settings are established centrally. Exceptional uses, such as out-of-hours meetings, are notified to the Unit by schools and the necessary adjustments are made. Each connected school has local override.

ENERGY ACCOUNTING SYSTEM

Complementing its central EMS, the Energy Unit uses a proprietary energy accounting system for monitoring consumption and cost in each of the Council's operational buildings. At present, most consumption and cost figures are entered into the system manually from utility invoices, although in the larger premises – including the authority's 16 secondary schools – monthly readings are received by electronic data interchange (EDI).

The main uses made of the system are:

- checking that utility readings are correct
- identifying anomalies and irregularities in consumption figures – for immediate remedial action
- preparing league tables to identify top and bottom performers for longer-term investigation.



Figure 13 Computer interface for the energy management system – showing heating zones at Sharples School

9 BOLTON'S ASSET REGISTER AND CONDITION SURVEYS

As an integral part of Bolton's corporate property strategy, the Council has invested in a computerised asset management system. At its core, this contains an asset register of all the Council's land and property ownership and interests. Linked to the register are various modules which include the Council's Property Terrier, Condition Surveys, Programme of Works, and Capital Accounting, together with information from spending departments on annual running costs, day-to-day maintenance, energy consumption and costs, and so on.

In early 1998, the Council recognised that in order to bid under NDS, accurate information would be needed about the school building stock, and that additional staff would be required. A principal building surveyor was appointed, whose initial task was to co-ordinate and manage school surveys, recording and storing the results using the Condition Survey module of the asset management system.



Figure 14 Recording survey information on site at Withins School

Eighty surveys of county and controlled schools, including nurseries and special schools, were undertaken in less than six months by in-house staff and by the supplier of the surveying software under contract. They were carried out in accordance with the 'Building Surveyors Brief: Benchmark Standards for Condition Surveys', issued by the Institute of Public Finance Ltd (IPF), the commercial arm of the Chartered Institute of Public Finance and Accountancy (CIPFA).

The condition survey is a visual inspection that covers the fabric of the building, the services and external works. As each element (eg roof, walls and windows) of each separate block of the building is inspected, a hand-held computer is used to record:

- an identifier for the block and all of its elements
- the type and condition of each attribute of a particular element (eg the condition of a felt flat roof)
- the year in which repairs will be necessary
- the priority for defects in accordance with a pre-defined schedule for priorities
- the quantity and cost of repair or replacement
- general remarks about the work.

In addition, all internal spaces are surveyed and their type, use and floor area are recorded.

The hand-held computer is subsequently connected to a desktop PC and the survey information is downloaded for analysis. In this way the survey results are added to the condition survey database of the authority's schools.

Using pre-prepared unit costings, a total cost for necessary repair works can quickly be compiled. Additionally, because the surveyor records when repairs will be required, a profile of annual expenditure year by year is prepared.

IPF established its condition survey methods before the DfEE guidance on priority levels was established, and its categorisation of priorities differs from those of the DfEE. IPF were able to provide Bolton with a conversion filter which combines its Benchmark Standard priority schedule with the DfEE recommendations. Bolton can, therefore, report both in accordance with the DfEE requirements, and also using the IPF categorisation.



Figure 15 Downloading survey data from the hand-held computer to the desktop PC for analysis

As well as the basic information on the conditions noted during a visual inspection of each school, additional information has been obtained from Bolton's maintenance officers about the operation of plant and services, about hazardous material such as asbestos, and about health and safety concerns such as legionella. This is stored electronically with the condition survey for each school.

Condition survey reports are passed to the schools for comment. At this stage, they may be able to provide extra information that did not emerge from the survey.

The asset register has the facility to hold scanned images. Bolton has exploited this to store digital photographs of schools taken on-site during the condition surveys, particularly of areas requiring repair. Building plans, where available, have also been scanned in and stored.

As a result of its actions Bolton has available a detailed report for each of 80 schools, showing:

- a site plan
- diagrammatic building plans with every space numbered, plus a table of room areas
- a detailed condition survey of repairs in priority categories 1 to 4, listed by attribute and priority, and including costs and a brief description
- supplementary information identified consequent to the survey
- a summary table listing the cost of repairs falling within each of the four DfEE priority levels.

APPENDIX 1 THE NEW DEAL FOR SCHOOLS

‘All substantial building improvements supported under the New Deal for Schools should improve the energy efficiency and environmental performance of school buildings.’

The New Deal for Schools (NDS) was announced by the Government in July 1997, following the Comprehensive Spending Review. £1.085 billion of additional specific grant was made available over a five-year period to address the maintenance backlog in school buildings, with the aim of raising educational standards.

In the first round, NDS-1, bids were invited from local authorities in September 1997, and £83 million was allocated. Much of this was used for urgent repairs to heating systems and sanitary facilities.

In the second round, NDS-2, in April 1998, there was a longer lead-in time for bidding and more considered applications were submitted by local authorities; £257 million was allocated.

Estimates prepared by the Department for Education and Employment (DfEE) suggest that when other ‘partnership’ funding is taken into account, including school budgets, local authority capital receipts, sponsorship and local fund-raising, the total investment in school building improvements arising from the first two rounds of NDS (NDS-1 and NDS-2) is some £425 million. Both rounds also supported a number of pilot Public/Private Partnership schemes which had the potential to add a further £200 million, mainly to be supported by Private Finance Initiative (PFI) credits.

Over 6000 schools benefited from the first two rounds, and the programme was widely welcomed in both authorities and schools.

Prior to the third round, NDS-3, a thorough consultation process was undertaken by means of a consultation paper and 15 regional workshops, with the aim of improving the bidding and allocation process. Priorities for the third round were to support proposals that would raise educational standards by addressing the most serious building defects. About £300 million was made available.

In preparing their applications for funds, local authorities must demonstrate that:

- proposed capital work makes the greatest contribution to raising educational standards
- assessments of schools’ needs are based on informed judgments about their condition
- school governing bodies have been consulted
- the scope for partnership funding has been explored.

Extensive advice was given to local authorities about the types of building improvements that were eligible. Within this advice, energy savings and environmental improvements were specifically identified.

'The New Deal for Schools initiative provides the opportunity to improve the energy efficiency and environmental performance of school buildings. Such work should be carried out as integral parts of refurbishment projects but funding may also be applied for as stand-alone schemes. When energy and water-saving measures are implemented, their costs can often be recouped through savings over relatively short payback periods. Thereafter, schools and LEAs reap the benefits of reduced running costs.'

The following performance indicators will be used to prioritise work:

- the reduction in carbon dioxide emissions per square meter or per pupil per year
- the overall environmental impact of a project.

Environmental improvements should be cost-effective. For many schemes, simple payback or discounted cash flow calculations are sufficient to show this.'

ASSET MANAGEMENT PLANS

A key feature of the NDS programme was that money should be allocated fairly between schools on the basis of need, and that the process should be transparent. Asset management plans (AMPs) were identified as a way to provide an agreed basis for making decisions on spending priorities. Guidance on their preparation was issued by DfEE in 1999 (see References).

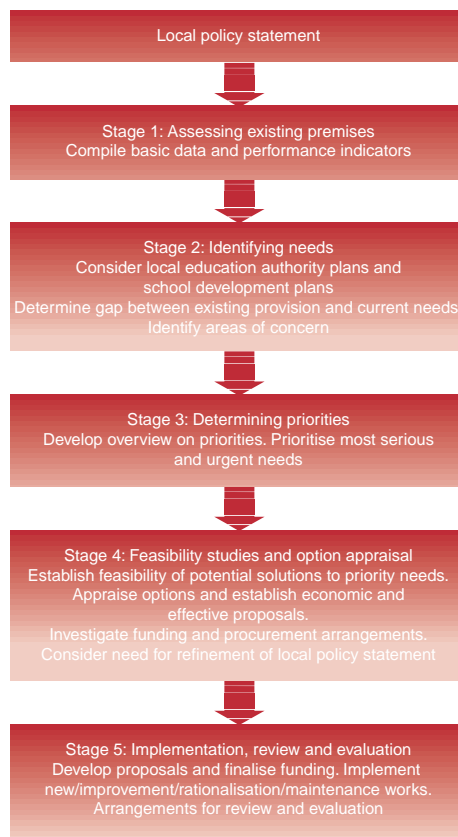


Figure 16 The main stages in developing an asset management plan

APPENDIX 2 SCHOOLENERGY AND NEXT STEP

The SCHOOLENERGY programme is funded by the Department of the Environment, Transport and the Regions (DETR), and British Gas. It is managed by CREATE, the Centre for Research, Education and Training in Energy, on behalf of the Energy Saving Trust (EST). Its aims are to promote good practice in energy management in schools, and to raise awareness of energy efficiency both within schools and in the wider community. The 'Whole School Approach' to energy is encouraged, as set out in Introduction to Energy Efficiency 'Building Energy Efficiency in Schools – a guide to the Whole School Approach' (see References).

In exchange for embedding energy management within their overall management, schools are offered a contribution towards the cost of installing energy efficiency measures. Up to 50% of the capital outlay may be reimbursed, subject to minimum and maximum limits, which in 1999 were £500 and £3500 respectively.

To qualify, schools must:

- arrange an energy survey to identify the most appropriate measures for saving energy – this may be done by a local authority energy manager, or some other suitably qualified person
- develop an energy policy with a three-year action plan which demonstrates commitment to the Whole School Approach
- identify support funding from the local authority, a third party or the school budget
- ensure that all contractors consider participating in the 'Welfare to Work' scheme sponsored by the DfEE entitled 'New Deal for Young People' provide evidence of continuous monitoring and targeting of energy use
- reinvest part of the fuel bill savings in further energy efficiency measures
- provide regular fuel bill data in an agreed format.

BOLTON AND NEXT STEP

Bolton participated in piloting Next STEP (funded by the DETR under the Energy Efficiency Best Practice programme), which is a follow up to the successful School Turnkey Energy Programme (STEP) seminars run by BRECSU. The aim is to introduce school energy managers, caretakers and site managers to advanced energy management methods. Training material was prepared and presented by BRECSU and a one-day pilot course was run in Bolton with school governors and head teachers. The course introduced delegates to:

- monitoring and targeting, through an exercise in calculating performance indices
- a 'virtual' energy walkround of a school to identify and quantify energy waste arising from poorly controlled and inefficient lighting and heating systems
- application in practice of the Whole School Approach (see References), which encourages everyone in the school to take some form of responsibility for energy use
- completion of the School Energy Matrix, a self-assessment tool which is part of the Whole School Approach and helps schools to identify strengths and weaknesses in current energy management practices
- development of an energy action plan for introducing energy improvements.

Following the pilot, BRECSU and CREATE are collaborating to deliver Next STEP seminars nationwide. Both STEP and Next STEP are funded by the DETR and are available to local authorities at no charge. Contact BRECSU Enquiries Bureau for further details (contact details are on the back cover).

NATIONAL ACHIEVEMENTS OF SCHOOLENERGY

The savings arising from energy efficiency measures installed in the 194 schools supported in the first year (1996/7) have been monitored by the schools themselves. Figure 17 shows that a total of 29 million kWh were saved in one year, which resulted in a reduction in the emission to the atmosphere of nearly 9000 tonnes of CO₂.

In the first three years, a total of 671 schools benefited from the programme, as shown in figure 18. The total investment in these schools in energy efficiency measures arising from the programme is £5 million. This is made up of the expenditure by schools and local authorities together with the rebates themselves.

In these 671 schools, lifetime energy savings – assuming a 12-year life for the measures – have been calculated at 1000 gigawatt hours. This is equivalent to a reduction in CO₂ emissions of 250 000 tonnes over that period.

BOLTON'S SCHOOLENERGY BIDS

Ten schools in Bolton have benefited from the SCHOOLENERGY programme. In six cases the funding was used as a contribution to the schools' connection to the EMS. In three cases it was used for lighting controls. One school had both items installed at the same time and received funding from the programme. The total cost of the works undertaken was £79 960 and the rebates from the SCHOOLENERGY programme totalled £31 180.

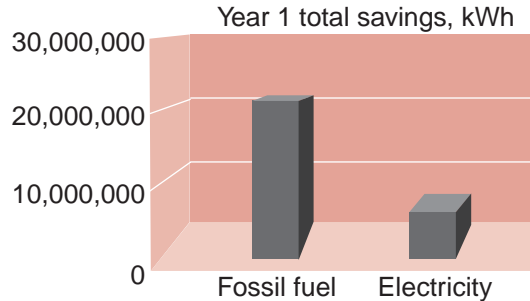


Figure 17 National energy savings achieved in the first year of the SCHOOLENERGY programme

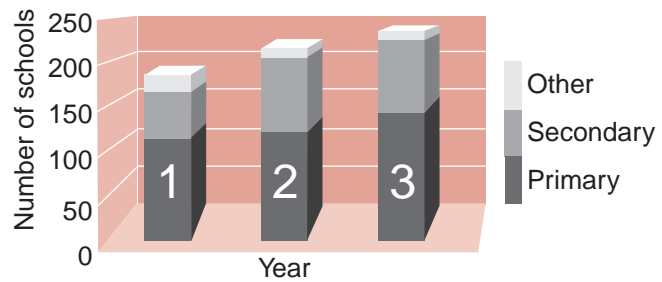


Figure 18 Numbers of schools supported nationally by SCHOOLENERGY in its first three years

FURTHER INFORMATION

USEFUL ADDRESSES

CREATE (Centre for Research Education and Training in Energy)
 Kenley House, 25 Bridgeman Terrace
 Wigan WN1 1TD
 Tel 01942 322271. Fax 01942 322273.
 E-mail info@create.org.uk
 Websites www.create.org.uk
www.schoolenergy.org.uk

Chartered Institute of Public Finance and Accountancy (CIPFA)
 NLA Tower, 12-16 Addiscombe Road
 Croydon CR0 0XT
 Tel 0181 667 1144. Fax 0181 681 8058

Institute of Public Finance Ltd (IPF)
 The Quadrant, Chester West, Sealand Road Chester
 CH1 4QR
 Tel 01244 399699. Fax 01244 399 601

Energy Saving Trust (EST)
 21 Dartmouth Street, London SW1H 9BP
 Tel 0171 222 0101. Fax 0171 654 2444
 Website www.est.org.uk

Department for Education and Employment (DfEE)
 Architects Building Branch, Level 7, Caxton House
 6-12 Tothill Street, London SW1H 9NF
 Tel 0171 273 6237. Fax 0171 273 6762
 Website www.dfec.gov.uk/schbldgs

DEPARTMENT FOR EDUCATION AND EMPLOYMENT PUBLICATIONS

Building Bulletin 73 'A guide to energy efficiency refurbishment: maintenance and renewal in educational buildings'. The Stationery Office, 1991 (ISBN 0-11-270772-6)

Building Bulletin 83, 'Schools' Environmental Assessment Method (SEAM)'. The Stationery Office, 1996 (ISBN 0-11-270920-6)

Building Bulletin 87, 'Guidelines for Environmental Design in Schools'. The Stationery Office, 1997 (ISBN 0-11-271013-1)

'Purchasing Energy, Managing School Facilities Guide 5'. The Stationery Office, 1998 (ISBN 0-11-271036-0)

Building Bulletin 90, 'Lighting Design for Schools'. The Stationery Office, 1999 (ISBN 0-11-271041-7)

DfEE Consultation Paper, 'Schools Capital Strategy'. DfEE, 1999 from DfEE Publications Centre (address below)

DfEE Guidance on Asset Management Plans:
 Section 1: Framework
 Section 2: Property Information Systems and School Premises Data Section 3
 Section 3: Condition Assessment
 Section 4: Sufficiency and Suitability Assessment

Available from:
 DfEE Publications Centre, PO Box 5050, Sudbury,
 Suffolk CO10 6QZ.
 Tel 0845 602 2260. Fax 0845 603 3360

BRE PUBLICATIONS

The School Toolkit, a guide for reducing costs and environmental impact

Available from CRC Ltd, 151 Rosebery Avenue,
London EC1R 4QX.
Tel 020 7505 6622. Fax 020 7505 6606

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

- 56 Saving energy in school swimming pools.
A guide to refurbishment and new pool design for headteachers, governors and local authorities

- 173 Energy efficient design of new buildings and extensions – for schools and colleges
- 176 Small-scale combined heat and power for buildings
- 233 Energy efficient refurbishment of schools

Good Practice Case Studies

- 38 Energy efficiency in schools. Condensing gas boilers
- 73 Energy efficiency in schools: potential benefits of boiler replacement
- 94 Energy efficiency in schools. Building Energy Management Systems
- 95 Energy efficiency in schools – local controls for heating and lighting
- 185 'Out-of-hours' use of schools

Energy Consumption Guide

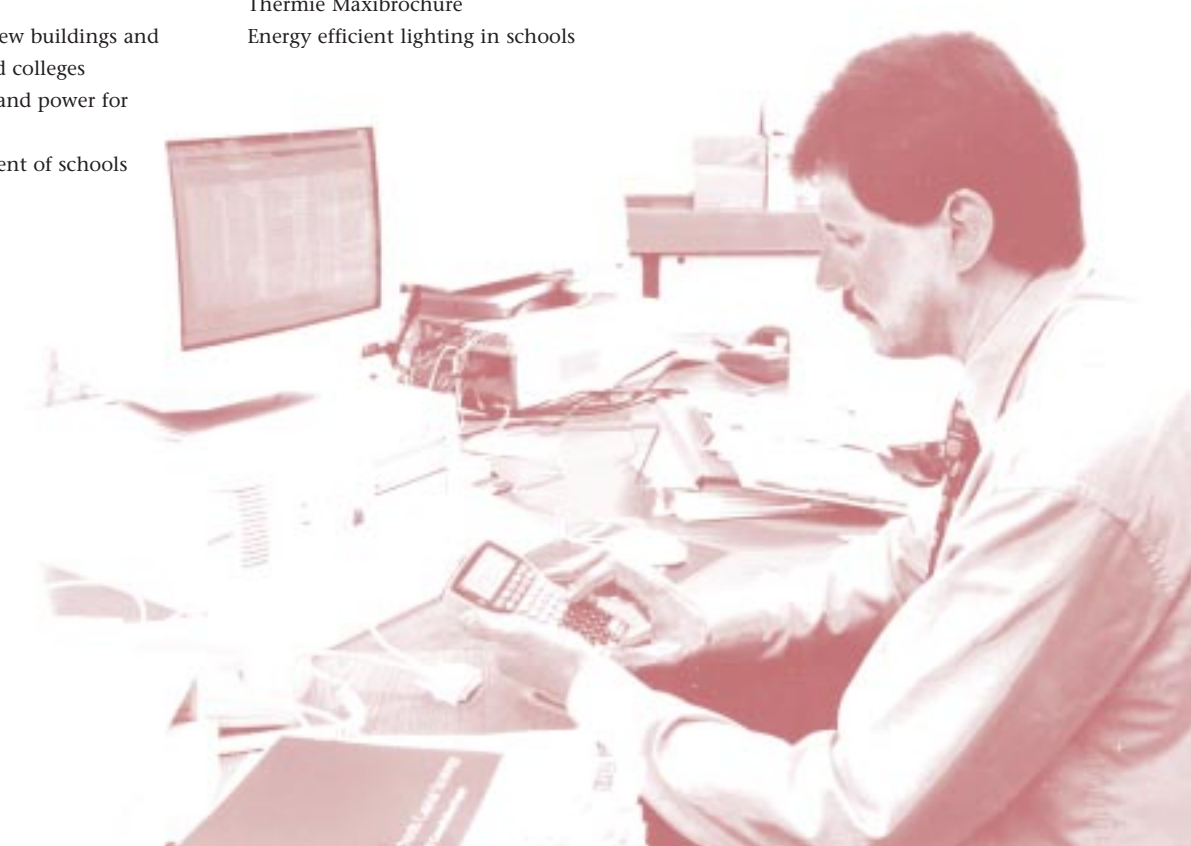
- 73 Saving energy in schools. A guide for headteachers, governors, premises managers and school energy managers

Introduction to Energy Efficiency

- 1 Building energy efficiency in schools. A guide to a Whole School Approach

Thermie Maxibrochure

Energy efficient lighting in schools



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

BRE
Garston, Watford WD25 9XX
Tel 01923 664258
Fax 01923 664787
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.