GPG343 | Good Practice Guide

Saving energy — a Whole School Approach

CARBON TRUST

Making business sense of climate change

Whole School Approach to energy savings

By following the simple instructions in this Guide, your school could **save money** and **energy** whilst **reducing environmental impact**. Annually, it is possible for UK schools to reduce costs by around £20 million and CO_2 emissions by 300,000 tonnes with improved energy management.

Every school can save energy but to be really successful, a **Whole School Approach** is required. This encompasses everyone in the school community such as pupils, teachers, caretakers, administrative staff, cleaners, catering staff, parents and even those hiring the premises. All are energy users and should therefore be encouraged to play their part.

Engaging pupils in saving energy at school is an excellent opportunity to translate global concerns into local action. It raises awareness of the stewardship of finite resources which will be taken home and on into future workplaces.

For the Whole School Approach to be successful it must:

- Recognise that everyone has an equal contribution to make
- Encourage the school community to work together to achieve maximum results
- Empower pupils to be pro-active in promoting the wise use of energy — not just under teacher's instruction
- Enthuse parents, governors and school board members by providing roles and activities suited to their skills.

The Whole School Approach concentrates on savings obtained by good house-keeping and low/no cost measures. It demonstrates how key aspects of energy management can be integrated into the education process and curriculum.

This Guide examines ways of maintaining optimum comfort and service levels whilst minimising energy consumption. Whilst good design of school buildings and investment in fabric, equipment and controls are inherently important, they are not the focus of this Guide.

"Developing the Whole School Approach to energy in my school has achieved more than any other topic. It's covered a wide range of National Curriculum provision, helped develop attitudes that set the children up for life, whilst at the same time achieving genuine reductions in school fuel bills."

Primary School Teacher

Managing energy use saves money and also has the following additional benefits:

Improvement of environmental performance

Carbon dioxide (CO_2) and other pollutants are emitted to the atmosphere from boilers and from the power stations which generate the school's electricity. Saving energy decreases these emissions, reducing acid rain and air pollution and helping to tackle Global Climate Change.

The UK has signed up to a legally binding target to reduce six greenhouse gases (including CO_2) by 12.5%. This is based on 1990 levels and must be achieved by 2010.

Most UK Local Authorities are required to reduce CO_2 emissions by 1% a year until 2010 by improving energy efficiency in all of their buildings, including schools.

Improvement of comfort conditions

Improving energy efficiency often enhances working conditions and comfort levels for staff and pupils (e.g. by the elimination of draughts or overheating) which can increase morale and productivity.

Reduction of other costs

Saving energy often reduces maintenance costs. Equipment lasts longer if it is operated efficiently, allowing capital replacement costs to be deferred.

Education opportunities

School provides an excellent opportunity for pupils to be involved in responsible usage of energy and water, helping them to understand how everyday actions impact on the environment. It provides practical, hands-on experience and gives an insight into the goals of sustainable development.

Case study

Needham Market Middle School

An energy efficiency policy is now fully integrated into the school's ethos and planning. Energy studies are incorporated into science, geography and PSHE lessons as cross curricular activities. These have brought the children's work to life and increased motivation.

School electricity bills dropped by £800 in the first year after an energy efficiency policy was integrated into the development plan.

" You really need a committed group of staff and children from a very early stage in order to keep the momentum going and to maintain a good level of interest and commitment. It is not a quick fix! It is a slow, steady process of raising awareness among children and their families."

Sue Hull, Headteacher

Did you know?

UK Schools release up to 4 million tonnes of CO_2 a year. Just one tonne of CO_2 would fill 6 double-decker buses.

Energy team

Why have an Energy Team?

It is unlikely that your school will have a single individual with all the necessary skills to most effectively manage energy use. So, why not appoint a team of people with some understanding of the school's energy services/heating system to share responsibility? Members should regularly walk round the school and monitor/report energy waste as well as take a leading role in energy saving activities. This will increase optimum savings potential and work to encourage a sense of ownership of the problems and solutions identified.

Who should be on a team?

In primary schools, a small team is recommended which could comprise of the Headteacher, Caretaker and Bursar/Administrator.

Secondary schools might have a larger team involving the Headteacher or Deputy, Caretaker, Bursar/ Administrator, Teacher, School Governor and a pupil.

It is important to get a team with a mix of skills and responsibilities. See the insert at the back of this guide for an outline of roles for various team members.

Whole School Approach in Swansea primary schools

The School Energy Action Programme (SEAP) was formed by a local energy partnership to provide targeted energy management advice and support in schools. After an initial planning meeting, a week long campaign took place to launch a 'Whole School Approach'.

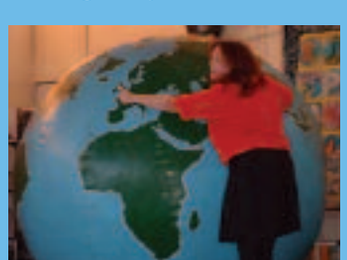
Mayals Primary School was the first to complete the programme. During their energy week:

- Dynamix, a local training company, conducted assemblies and lessons on energy use and global warming using songs, role play and visual activities to bring the subject to life
- An external speaker entranced pupils and parents with a presentation on the implications of energy use
- Pupils developed an action plan and conducted energy walk-rounds.

The school's energy management programme has already achieved significant cost savings and it is hoped this will continue with further ongoing activities, such as:

- The use of an energy notice board to keep everyone informed
- The appointment of pupils as energy monitors to identify, report and switch off unnecessary lights and equipment
- Regular energy team meetings to organise cost saving activities.

As a result of pupil involvement and feedback, Governors have already installed a new lighting system in the hall and they continue to look for saving opportunities. Furthermore, energy issues are regularly discussed at Governors meetings.



Energy Week assembly sets the scene by explaining climate change

Energy policy and action planning energy policy

Developing a policy

An energy policy forms an essential part of raising the profile of energy within a school and should:

- Make a statement of commitment
- Specify clear objectives and targets for energy consumption
- Identify responsibilities and resources
- Provide an action plan
- State the mechanisms to implement the action plan
- Highlight the policy review process.

The policy should be developed by the Energy Team in consultation with teaching and non-teaching staff and pupils, so as to involve the whole school population. Members of the Energy Team should take ownership and secure commitment from staff and pupils. They should also provide a one year plan to manage energy in school.

An example of a typical school energy policy is included as an insert in this Guide and can be used to structure your own document.

Action planning

A practical way of creating an action plan for your school would be to use the energy matrix insert at the back of this Guide. The matrix lists tasks under a number of headings. Select one or more tasks under each column in the first year and incorporate additional tasks in subsequent years. This will help to identify key areas in developing a one year plan.

Items at the bottom of each column are the easiest actions to put into place. It is important to choose tasks which are appropriate and match resources in your school, as setting unrealistic plans could undermine your school's progress.

Case study

Aberdeenshire Council have been encouraging their schools to use the energy matrix in order to improve energy management. Their first year involved 10 pilot schools and proved a huge success with notable savings. This has resulted in an increasing number of schools incorporating the matrix into their energy management programme.

Towie School was one of the first to use the matrix to plan activities and has benefited from an improved school environment and reduced energy costs.

Headteacher Sandra Brown said "It has been a meaningful learning experience, allowing pupils and staff to be involved in a real project."

Sera Fromow from Aberdeenshire Council believes that the matrix has helped the Council to prioritise maintenance and energy improvements to their school stock: "Money spent by the Local Authority on energy efficiency measures is supported by the schools' use of the matrix, which is proving crucial in enhancing energy management within our schools."

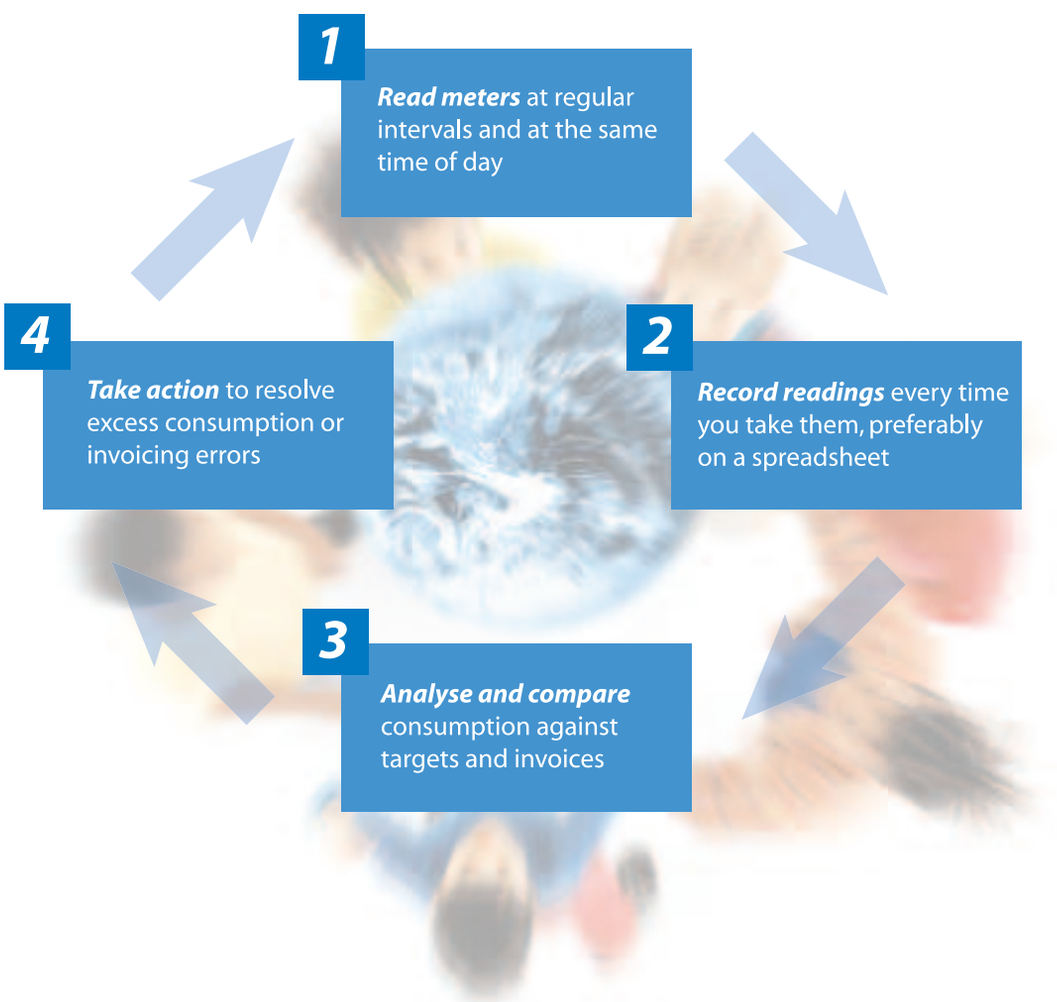
Energy meters and monitoring

Meters

In order to manage energy in a school it is vital to have the correct energy data. Some schools rely on invoices to obtain this information, but a better method is to read your own meters. Meters should be read at least monthly but larger schools may wish to take readings more frequently.

The benefits of reading your meters are:

- Obtaining reliable information for regular monitoring
- Detecting waste quickly and taking preventative action
- Comparing consumption against benchmarks to determine your potential savings
- Identifying and rectifying invoicing errors quickly
- Providing feedback to end users on savings achieved
- Using readings for teaching purposes.



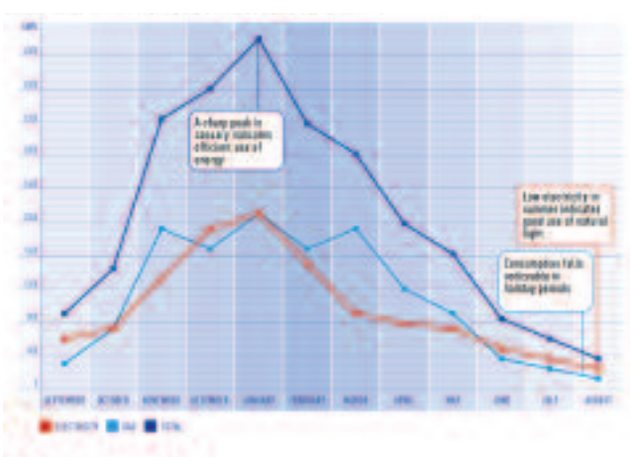
Analysis

Having read the meters, it is important to record and analyse the data. If targets have been set, it is useful to compare consumption against these and plot progress. If there is a change in consumption which cannot be easily explained then corrective action is required.

Plotting monthly energy consumption on a graph for 12 months can be useful as the analysis of the following graphs show.

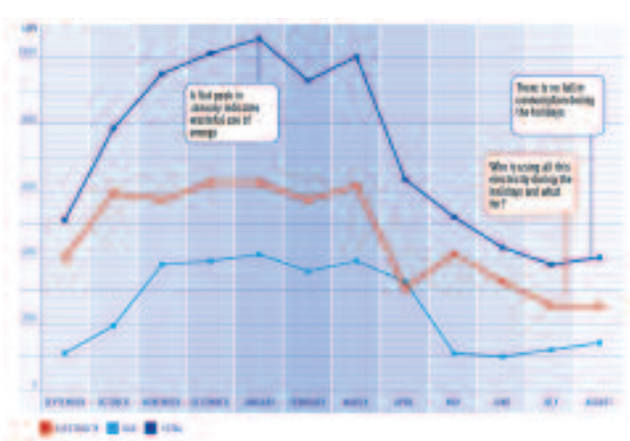
Does your graph look like this?

A School with lower than average energy use



Or like this?

A School with higher than average energy use



Blank wallcharts are available from CREATE to plot the consumption of your school.

Involving pupils

Reading meters, recording and analysing data provides an ideal opportunity for pupils to get involved in understanding energy use and data handling. If meters are inaccessible, ask the caretaker to provide meter readings for the class to use. Children can use spreadsheets, produce graphs and conduct analysis of results. These graphs can then be displayed on notice boards to raise awareness amongst staff and pupils.

Case Study

Hadley Junior School

Headteacher, Mike Jones increases pupil involvement by asking them to check graphs on a computer. He says:

" This helps the children to understand how much energy the school uses and that they can control this by their actions. It supports our efforts in helping the children care for the environment."

" The system offers schools an ideal opportunity to involve children in data collection and can lead to significant cash savings."

Benchmarking

Introduction

Benchmarking allows schools to compare their energy performance with other schools. Most are interested to know the potential for saving energy and water on their site. A fast and easy way to determine potential is to calculate the school's performance and then compare this with published benchmarks. Not only will this outline areas to concentrate on (e.g. electricity, fossil fuel, water) but it will also give an indication of potential savings for each of these resources.

Energy benchmarks

Before you start you will need to find out your school's floor area in m^2. If you do not already know, contact your local authority.

Benchmarks are calculated separately for fossil fuel and electricity so that a school can determine performance for each type of energy use. It is possible that performance may be good for electricity but poor for fossil fuel or vice versa.

The range of benchmarks is helpful in determining realistic quantified potential savings. For example, a secondary school may wish to improve current electricity performance from between 'typical' and 'poor' (say 37 kWh/m^2/annum) to 'good' practice (28 kWh/m^2/annum) in the next two years.

Benchmarks and further information on how to calculate your energy use and CO_2 emissions can be found in the insert at the back of this Guide.

Water benchmarks

Water benchmarks are also included on the insert at the back of this Guide.

Energy walk-rounds

Effective decision making requires up-to-date information on how much energy is being used and where. Monitoring can help identify how much energy can be saved. Why not conduct a walk-round to determine ways in which this can be achieved? This involves members of the school community including teachers, pupils and caretakers making a visual inspection of each room and:

- Establishing where energy is being used
- Eliminating wasteful practices and ensuring they do not recur
- Identifying opportunities for savings
- Isolating where maintenance work or repairs are needed (to reduce energy costs)
- Indicating a need for capital investment to improve energy efficiency.

A walk-round provides a great opportunity for pupils to get involved as well as demonstrating commitment to improving energy performance.

Further guidance can be found in GPG057 *Conducting an energy walk-round of a school*. Checklists from that publication are included as an insert in this Guide.

Involving pupils

- A local DIY company 'subcontracted' a class to identify the draughtiest door in the school. The class submitted a report of their investigations and the company paid for the installation of draught-proofing.
- Appoint energy monitors each term to switch off lights/equipment and close windows at break and home time. This is a useful good housekeeping method as well as an excellent way of conducting a mini walk-round several times a day.

Case study

Elworth C of E Primary School

A class was asked to track down energy wastage and suggest solutions. These special Energy Investigators were split into teams to examine areas such as *'The Sunshine Wasters'*, *'The Red Hot Drip'* and the *'Great Draught Hunt'* (briefing sheets are available from CREATE).

Having drawn up plans for their operations, the teams fanned out through the school looking for evidence, interviewing potential witnesses and recording their findings.

Each team assessed their evidence, identified major wastage, discussed how it might be stopped and made a short presentation to the class. Some ideas have been implemented and pupils continue to help by checking that their changes are effective.

Curriculum

Energy education is already embedded in the curriculum and curricular guidelines for all ages. Sometimes it is explicit, (e.g. keeping warm and energy resources) while other times it is not so obvious (e.g. sustainable development and transport). Energy education is an entitlement for all pupils, not an optional extra to be included if there is time.

Teachers already include energy in their normal schemes of work as energy concepts underpin many of the topics in Science and Geography that pupils are expected to study, even at primary level. In addition, energy impacts on aspects of History and Technology as well as providing a context and/or inspiration for work in other subjects such as English, Mathematics, Information Technology and the Arts.

Learning is enhanced if pupils can apply their knowledge by seeing practical applications of classroom theory in familiar real-world situations. The school and its energy systems provide many good examples of energy concepts that affect their comfort and facilities.

During activities involving energy issues, pupils will often ask questions about the way the school uses energy and suggest possible improvements. The Whole School Approach capitalises on this by encouraging pupils to contribute to the responsible use of energy within their school and including them as partners in the process of school energy management.

Education for Sustainable Development

Education for sustainable development is being incorporated into the philosophy of several subjects and adopted by schools as an expression of good citizenship. Energy management is a good introduction because:

- It allows pupils to translate general concerns about the environment into practical action within their schools and homes which can be started at any time of the year
- Energy consumption is already quantified so improvements in energy efficiency can be identified quickly and then celebrated by the pupils involved
- Wiser use of energy can lead to improved comfort levels together with cash savings, which can be put to educational uses
- Research has shown that where pupils are empowered to take action on energy, their attitude to other environmental issues become more positive.

CREATE have produced Energyzone — a map to help teachers plan energy topics that will meet curriculum requirements. Some ideas for projects and activities have been included as an insert at the back of this Guide.

Case study

Slains School

In March 2002, 35 pupils at Slains School, Aberdeenshire, were involved in an energy conservation project that was closely linked to the Science & Technology curriculum.

Senior staff, teachers and pupils prepared an energy policy and action plan. Pupils carried out investigations to identify waste and then set up teams to carry out simple energy checks every day. They also took regular meter readings to monitor progress. A janitor was involved in tracking housekeeping and maintenance issues relating to energy use. The pupils used the Scottish Science & Technology Network website* to help with their project work which was displayed on notice boards and included in school assemblies.

Pupils also presented their work at an energy conservation day with invited guests from BP, local newspapers and the Scottish Science & Technology Network. The day included two technology challenges.

"This initiative was an excellent opportunity to integrate a real life energy project into the Environmental Studies 5-14 Curriculum."

Sheila Carson, Headteacher, Slains School

Challenge 1 — keep boiling water hot

Four teams had 30 minutes to produce a model that would minimise heat loss from a jug of boiling water. Once completed, each model was filled with boiling water. After 30 minutes the temperature of the water was measured and the team with the hottest water were the winners.

Challenge 2 — keeping ice cool

The same four teams had to keep an ice cube from melting and they were given 30 minutes to build a 'refrigeration device'. BP awarded stationery items made from recycled materials to the winning teams.

The pupils also stressed the long-term nature of energy efficiency in their presentation to BP: 'Remember, remember, not just today but forever!'

Pupils at Slains School, Aberdeenshire, attempt to prevent an ice cube melting

*Scottish Science & Technology Network website: www.sstn.co.uk

Energy awareness campaigns

All members of the school community should be involved and have the opportunity to:

- Report problems and suggest how energy might be used more effectively
- Find out what actions are being considered or have already been carried out
- Discuss what actions can and cannot be undertaken
- Contribute to the formulation of the policy
- Participate in devising and implementing the action plan
- Take part in the periodic review of progress.

A central 'energy notice board' should be populated with posters, weekly energy consumption information and comparisons. Progress on current projects and any other relevant information to be publicised to the whole school community should also be included.

A 'drip-feed' strategy is better than a 'big bang' so it is important to maintain momentum through a two or three-year rolling programme of themes, such as:

- Doors and draughts in autumn
- Heating in winter
- Sensors and controls in spring
- Windows and lighting in summer
- Electrical appliances and hot water in any season.

Themes can be linked to projects with a definite end-point and the contribution of all participants should be recognised/rewarded in appropriate ways. Ideas for short projects have been included as an insert at the back of this Guide.

Involving pupils

- A class devised a TV news bulletin devoted to energy issues, including 'location reports' from correspondents around the world. This was performed at a special assembly to launch their school's E-Team.

Case study

Energy Week works wonders in Hampshire Schools

Teachers at Warren Park Primary School, Havant, developed an 'Eco-Plan' spanning six terms. Each term was launched with an environmental focus week addressing energy, health, recycling, school grounds, energy (again to monitor savings) and transport.

The Warren Park Plan has now been shared with neighbouring schools including Front Lawn School in Havant and The Crescent County Primary School in Eastleigh. The eco-plan involves everyone in energy saving activities at school and at home.

Nikki Beaton, at Crescent County School and Rhian Williams at Front Lawn School have developed projects to raise awareness among the whole school community of the need to reduce costs and protect the environment by saving energy. Such activities are now firmly embedded into the schools' development plans with energy issues reviewed at regular intervals.

The Crescent County Primary School's Year 2 children check out the premises for heat loss, using their personally designed draught detectors. Case Study courtesy of CREATE

Electrical equipment

In 2002, UK schools spent around £123 million on electricity which now accounts for approximately 17% of the total energy used in schools. Electricity is typically five times more expensive than gas, representing over 56% of the total energy cost. Real electrical savings are possible in all schools, often at no extra cost.

Lighting

Lighting accounts for 20-25% of total energy costs. Savings can be achieved by:

- Switching off lights when not required — it is NOT cheaper to leave them on. Appoint children as light monitors to switch off lights when/where not required (e.g. at lunchtimes)
- Ensuring lamps and fittings are regularly cleaned and maintained and replacing existing lights on failure with more efficient versions. For example, replace 'normal' lightbulbs with 'energy saving' compact fluorescent lights (CFL's) which use 70% less energy and last up to 8 times longer
- Investing money during new build or refurbishment. Seek guidance from your local authority or telephone the Carbon Trust energy helpline for free advice on 0800 58 57 94.

Computers and ICT equipment

Energy consumption for computers and ICT equipment can be very high if it is not properly controlled. Typical energy consumption figures are shown in the table below.

There are three key methods of saving energy in electrical equipment:

- Activate the 'power-down' or energy saving devices built into machines during the working day **Screensavers do not save energy and some actually increase consumption**
- Switch off machines (manually or automatically) at the end of the working day
- Purchase the most energy efficient models. For example, plasma flat screens for computers consume 20% of the energy of conventional cathode ray tube monitors.

A PC and monitor left on permanently all year will cost around £63. Switching the machine off out-of-hours and activating 'power-down' when not in use could reduce this cost to £6 per year — a 90% cost saving!

Large savings are possible by switching off equipment and lights when the school is empty.

Involving pupils

In mathematics, some pupils calculated the purchase and running costs of tungsten filament and equivalent compact fluorescent lamps (CFL) over 10,000 hours and presented their results as a graph of accumulated costs against time. They found that although initial costs were higher for the CFL, the lower running costs resulted in an overall saving.

Equipment Type	Average Power Consumption while in use (watts)	Standby energy consumption (watts)
PC (processor only)	74	6-36*
PC monitors	100	4-7*
Inkjet printer	17	9
Laser printer	280	18
Fax machine	82	7
Photocopiers	400	103

*Two sets of data correspond to 'deep sleep' and 'sleep' mode respectively

Renewable energy

What is it?

Renewable energy is the term used to cover continuous energy sources which occur naturally in the environment, e.g. energy from the sun, wind, sea, plants and flowing water. Most renewable energy technologies produce none of the gaseous pollutant emissions associated with power stations and fossil fuels (e.g. CO_2, oxides of nitrogen/sulphur and particulates).

There are two possible options for exploiting 'green energy':

1. Buying from electricity suppliers

In recent years, electricity companies have been offering 'green electricity' — electricity guaranteed to have been produced from renewable sources. There is usually a premium charged and supplies are limited. A number of local authorities purchase part of their electricity as green electricity. If your school's electricity is purchased on your behalf by a local authority, it is worth asking how much is green electricity and if there are plans for future purchasing.

2. Generating green energy at the school

There are two major issues for renewable projects in school — cost and suitability. The most suitable technologies for use in schools are:

- Solar energy — photovoltaic and solar water heating
- Wind energy
- Biomass (wood) heating.

Educational factors

Although desirable, it is not essential to have renewable energy built into schools in order to demonstrate the technology. Alternatives include:

- Purchasing desk top equipment which demonstrates renewable energy on a small scale, e.g. PV, Solar, Wind
- Visiting local schools who have a renewable energy source
- Visiting renewable energy sites (e.g. wind farms).

If your school is considering renewable energy options, it is always worth making sure that the school is as efficient as possible before installing new energy systems.

Tel 0800 58 57 94

www.thecarbontrust.co.uk/energy

An independent company set up by the Government to help the UK meet its climate change obligations through business-focused solutions to carbon emission reduction, the Carbon Trust is grant funded by the Department for Environment, Food and Rural Affairs, the Scottish Executive, the National Assembly for Wales and Invest Northern Ireland.

The Carbon Trust works with business and the public sector to cut carbon emissions and capture the commercial potential of low carbon technologies.

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Key organisations

Technical support

The Carbon Trust aims to achieve environmental and economic benefits by promoting cost-effective energy efficiency measures in industry and the public sector.

The Carbon Trust helps businesses and the public sector cut energy costs through the provision of free, impartial advice and assistance. Contact the Carbon Trust to obtain further energy saving guidance or to order further free material on 0800 58 57 94 or visit www.thecarbontrust.co.uk/energy

Department for Education and Skills (DfES) produces a series of supporting publications which are available through the 'good practice' section of the DfES 'Value for Money' website.
Visit www.dfes.gov.uk/valueformoney

Teachernet is a UK government portal website providing support to schools on managing energy use within a 'sustainable development' context. The site also has useful information on water, transport and the school environment.
Visit www.teachernet.gov.uk/wholeschool/sd/focuson

Council for Environmental Education (CEE) produces material relating to environmental education including 'Evaluating and Inspecting the Environmental Dimension — A Checklist for Schools' and 'Incorporating the Environment Dimension of Schools — A Checklist for School Inspectors'. There is a charge for these leaflets. Visit www.cee.org.uk

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Curriculum support

Centre for Research, Education and Training in Energy (CREATE)

CREATE is a national co-ordinating body, funded by government and industry. Its role is to motivate and educate people in schools, communities and businesses to use energy in a sustainable way and reduce carbon emissions.

Key services include:

- An enquiry service for teachers and pupils working on energy projects
- Conferences to share ideas and promote best practice
- EnergyWatch newsletter — sent once a term to every school in England and to other interested people on request
- The Energy Meter — a device that can be used to monitor energy use and costs of various appliances. It is useful for curriculum work and also for energy managers to raise awareness about electricity running costs.

Contact CREATE on 01942 322271, by email at info@create.org.uk or visit the website on www.create.org.uk

Groundwork provides regeneration and educational programmes. Specifically trained Groundwork personnel help groups of primary schools enhance their teaching of energy awareness and then use pupils' knowledge to improve energy management at school and in the home. Contact: 0121 236 8565 or visit www.groundwork.org.uk

Think Energy for energy related activities, discussion groups, games and resource packs on energy related curricular activities aimed at teaching 7-11 and 11-14 year olds. Visit www.think-energy.co.uk

National Wind Power provides cross curricular activities for 7-14 year olds, covering a range of renewable energy issues that are appropriate to teach through Design & Technology, Geography, ICT, Science and Citizenship.

Visit www.natwindpower.co.uk/education/index.htm

Raising awareness

Energy Chest encourages younger pupils and teachers to get involved in school energy management. Visit www.energychest.net

School Energy Wise is an EU SAVE programme funded website for teachers and young people which focuses on energy management. Includes tips on how to form an energy team and resources to help support the team in managing school energy use. Visit www.schoolsenergywise.com

Renewable energy

DTI has introductory information on all renewable energy technologies together with signposting to other more detailed support. Visit www.dti.gov.uk/renewable

Other useful websites

Eco-Schools is a European initiative to help schools become environmentally friendly in both the curriculum and the management of the school. The prestigious Eco-Schools flag is awarded to schools which meet the criteria. Visit www.eco-schools.org.uk

Energy Certification Scheme for Schools

This EST scheme is specifically designed for schools to manage energy and to get credit for their activities. The scheme provides guidance on how to set up an energy team, conducting a walkround and incorporating curricular activities into an energy efficiency programme. Visit www.est.co.uk/schools

The Stationary Office publishes guidance on energy purchasing and school design which can be purchased by contacting 0870 600 5522 or visiting www.tso.co.uk

Sample school energy policy

Note: A copy of this policy can be downloaded and modified from the buildings menu of the Carbon Trust website.

Sample energy management policy (draft)

Policy statement

[ ] School is committed to the responsible management of energy and water.

By efficient management of these resources, the school aims to:

- Minimise expenditure and environmental impact
- Maintain health and safety standards
- Maintain an acceptable comfort level for staff, pupils and other building users.

Targets

Target energy/water performance is as follows:

	Current performance 2002/03	Target performance 2003/04	% Target reduction
Electricity kWh/m^2/annum			
Gas kWh/m^2/annum			
Water m^3/pupil/annum			

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Strategy

This policy statement will be implemented through a ten point plan:

1. Responsibility

The overall responsibility lies with the Headteacher, _____ Day-to-day energy management responsibilities lie with _____ working in conjunction with the policy and direction set by the Energy Team.

Policy, strategy and targets for energy management will be the responsibility of the Energy Team which currently consists of:

Headteacher/Deputy _____

Caretaker/Site Manager _____

Bursar/Administrator _____

Teacher _____

Pupil _____

The Energy Team will meet quarterly to review progress, plan initiatives and prepare an annual energy report for submission to the Board of Governors.

Teachers will have a responsibility to set a good example to pupils who can also make a significant contribution to end-use energy efficiency.

2. Energy selection and purchase

Energy purchase is currently undertaken by _____ Council who negotiate with utility providers. will check invoices monthly against meter readings _____ for gas, electricity water.

3. Energy information

Electricity, gas and water meters will be read weekly and closely monitored against expected usage. Abnormal consumption will be investigated and corrective action taken. Each year, realistic energy reduction targets will be set and monitored regularly. Targets will be set relative to national published benchmarks.

4. Maintenance

Energy conversion plant, distribution systems and energy using equipment will be correctly maintained to avoid energy and water wastage.

5. Awareness

The school will adopt a Whole School Approach involving everyone associated with the school.

Regular awareness initiatives for staff and pupils will emphasise the cost and environmental benefits of saving energy and water and how to avoid waste. Energy saving information will be provided to catering and cleaning staff. Staff and pupils will also be provided with information on how to save energy at home.

Energy Co-ordinators will be appointed with checklists for good housekeeping initiatives.

6. Curriculum

The National Curriculum will be reviewed annually, using literature from CREATE to ensure that the energy element is built into syllabi at appropriate levels.

7. Investment in energy efficiency

The school aims to invest in energy saving schemes of less than £1,000 with paybacks of less than three years. Savings achieved by good housekeeping measures will be reinvested in energy efficiency projects.

Where available, grants will be sought to improve energy efficiency. An energy survey of the school will be updated annually with costed proposals.

The school will make use of any grant schemes available to improve its overall energy efficiency.

8. Design

Energy efficiency will be taken into account in the design of new building projects and during any refurbishment.

Energy efficiency will be considered in the purchase of all new equipment, e.g. computers, catering appliances.

9. Reporting

An annual energy performance report will be prepared by the Energy Team. This will be submitted to the Board of Governors and a summary will be incorporated into the school annual report and school development plan.

10. Policy review mechanism

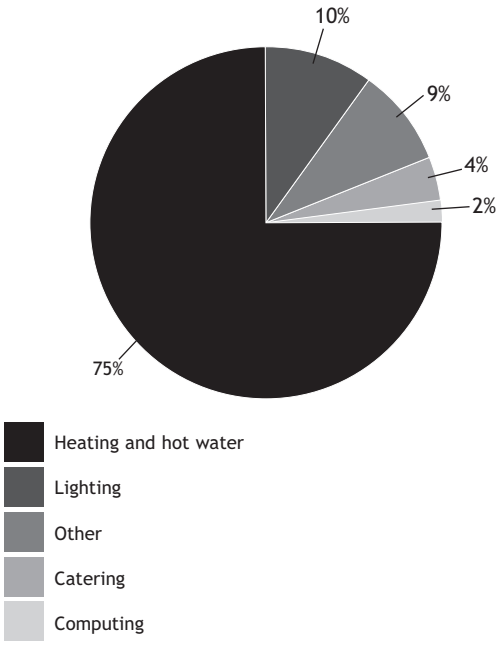
This policy will be reviewed and updated annually by the Energy Team and included in the annual report. The review will include an evaluation progress against the Energy matrix (see insert 6).

Energy consumption, costs & benchmarks for schools

In most schools, energy is supplied in two forms: fossil fuel (gas, oil, coal or LPG) and electricity. Some schools only have access to electricity or use it more extensively, e.g. for space heating and catering. For the majority of schools, however, space heating, hot water and some catering appliances are supplied by fossil fuel.

Electricity is used for lighting, electrical equipment, fans, pumps and catering. The breakdown for energy consumption is as follows:

Energy consumption for a typical UK school



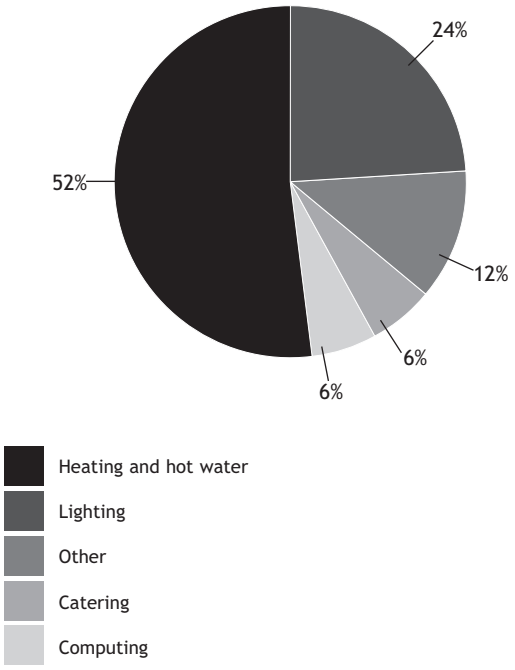
Figures taken from BRE and DfES data 2002

The majority of the energy used in schools is for heating and hot water. This could lead to a school focusing on the heating system to save money.

Electricity prices can be as high as 6p/kWh whereas fossil fuel may be as low as 1p/kWh. So while up to 80% of the energy used in a school is fossil fuel, it may only represent 40% of the cost. Electricity is an important element to control and with much of the electricity usage being within the control of end users, it lends itself well to the Whole School Approach as a first priority in reducing costs.

The pie chart below shows the cost breakdown for energy use in a typical school. Lighting is responsible for nearly 50% of electricity costs, with electrical equipment, catering and fans and pumps making up the rest.

Energy cost for a typical UK school



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Energy benchmarks

Energy benchmarks are similar to those used in measuring energy consumption in a car (e.g. miles per gallon). In schools, the benchmark is measured in kilowatt/hour (kWh) per m^2 of heated floor space per annum for fossil fuel and electricity. But, like a car's consumption, many things can affect the energy consumption of a school including the operating hours, the age of the building and how exposed it is to weather. So as with all benchmarks, these should be used with caution and only as an indicator for improvement.

Energy benchmarks (kWh/m^2) for good, typical and poorly performing schools[1]

Annual energy kWh/m^2	Primary school (no pool)		Secondary school (no pool)		Secondary school (with pool)*	
	Fossil fuel	Electricity	Fossil fuel	Electricity	Fossil fuel	Electricity
Good practice	110	25	117	28	142	29
Typical practice	157	34	160	36	187	36
Poor practice	209	47	207	45	233	41

It is possible to calculate CO_2 emissions using the following factors. This can also be done automatically using the on-line benchmarking tool for schools available through the Carbon Trust website.

Calculating carbon dioxide emissions from your energy, use CO_2 emissions by fuel type for the UK

	England, Scotland and Wales	
	kg CO_2/kWh	kg CO_2/litre
Electricity	0.43	
Natural gas	0.19	
Gas/diesel oil	0.25	2.68
Liquid petroleum gas (LPG)	0.23	1.65
Renewables	0	0

To calculate your school's carbon dioxide emissions multiply your consumption (in kWh) by the CO_2 factor (see below)

Fuel	Annual kWh		CO_2 factor		Annual kg CO_2
Natural gas	1,134,000	X	0.19	=	215,460
Electricity	266,000	X	0.43	=	114,380
Total	1,400,000				329,840

Example summary of CO_2 emissions

Water consumption in schools has also been benchmarked. Water can be very costly in schools as you are often paying twice for using it; once for the supply and once again for its disposal. By benchmarking you can get an idea of the potential savings available if good practice values were met.

Water benchmarks (m^3/pupil/annum) for good, typical and poorly performing schools[2]

Water consumption (m^3/pupil/annum)	Primary school (with pool)	Primary school (no pool)	Secondary (with pool)	Secondary (no pool)
Good practice	3.1	2.7	3.6	2.7
Typical	4.3	3.8	5.1	3.9
Poor practice	6.1	5.6	7.5	5.8

[1] DfES data on a sample of 12,420 English primary and 2,420 secondary schools for 2000-2001

[2] DfES data on a sample of English primary schools: 1,110 with a pool and 11,010 without a pool
Sample of English secondary schools: 390 with a pool and 1,820 without a pool
Source: DfES (Oct. 2002) *Energy and Water Benchmarks for Maintained Schools in England 2000-01*

*Carbon Trust interim benchmark data derived for 1999-2000

Saving energy — a Whole School Approach

Area _____

Date of inspection _____ Inspected by _____

Walk-round checklist	Make a schedule of spaces in your school and note items needing attention	
Pre-occupancy checks		
Has lighting been left on unnecessarily?		
Have PCs/screens been running overnight?		
Is any electrical equipment running unnecessarily?		
What is the room temperature? Is this excessive?		
Does the room have a thermostat? Is it set correctly? Does it work?		
Is any portable electric heating running? Should it be switched off?		
Are radiators/heaters free from obstructions?		
Have doors/windows/other areas been left open?		
Are there any other problems?		
Occupancy checks		
Has lighting been left on in unoccupied areas?		
Could daylight be used more effectively?		
Have unoccupied PCs/screens been left running?		
Is any electrical equipment running unnecessarily?		
What is the room temperature? Is this suitable?		
Does the room have a thermostat? Has it been tampered with?		
Is any portable electric heating running? Could it be switched off?		
Are radiators/heaters free from obstructions?		
Have doors/windows/other areas been left open?		
Are there any other problems?		
Post-occupancy checks		
Has lighting been left on in unoccupied areas?		
Have all PCs/screens been turned off?		
Is any electrical equipment running unnecessarily?		
What is the room temperature? Is this suitable?		
Does the room have a thermostat? Has it been tampered with?		
Is any portable electric heating running? Should it be switched off?		
Are radiators/heaters free from obstructions?		
Have doors/windows/other areas been left open?		
Are there any other problems?		

This checklist should be photocopied for each area of the school and can either be used to collect information for two separate rooms, or the same room at two separate times.

Saving energy — a Whole School Approach

Building _____ Date of checks _____ Checked by _____

Repairs and maintenance checklist	Make a schedule of spaces in your school and note items needing attention	
Heating and hot water		
Arrange for boiler to be serviced and ensure engineer checks: • *Combustion efficiency* • *Flue gas temperatures*		
Install/repair/replace controls/thermostat • *Check controls are set correctly*		
Ensure boilers are sequencing correctly		
Install/repair/replace thermostatic radiator valves		
Check TRVs are set correctly i.e. not 'max' or 'min'		
Clean air filters in fan convector heaters		
Improve draught seals on doors, windows and any other areas where warm air is escaping from the building		
Lighting		
Clean lamps and light fittings		
Clean windows and roof lights		
Replace flickering fluorescent tubes • *Where possible, replace 38 mm tubes with 26mm tubes*		
Replace tungsten bulbs with 'energy-saving' bulbs		
Clearly label all light switches and try to change the labels regularly to encourage people to notice them		
Water		
Repair leaking/dripping taps		
Repair leaking/dripping showers		
Install/repair/test urinal water controls		
Check overflows in toilets/storage cisterns		
Air extraction		
Install/repair/test kitchen extractor fan controls		
Install/repair/test toilet extractor fan controls		
Install/repair/test swimming pool hall extractor fan controls		
Swimming pools		
Repair/replace damaged swimming pool covers		
Any other issues Are there any other problems?		

This check list should be photocopied for each area of the school and can either be used to collect information for two separate rooms, or the same room at two separate times.

Roles & responsibilities

Actions are divided into 'essential' and 'desirable'. A tick means the person in a particular job function is likely to be well suited to the task. For some tasks a number of different people could be involved (e.g. energy walk-rounds). Other tasks are of a more specialist nature (e.g. energy purchasing). A tick with a grey background indicates the person who is likely to be the best choice for the task.

Who can do what?	Headteacher/ Deputy	Teacher	Governor	LA Energy Manager	Pupil	Bursar/ Administrator	Caretaker/ Site Manager	Energy Co-ordinator
Actions								
Essential								
Policy and planning	✓	✓	✓			✓		✓
Identify responsibilities/energy team	✓							
Leading role in Whole School Approach	✓	✓						
Identify curriculum opportunities		✓						✓
Raise awareness of staff and pupils	✓	✓			✓	✓	✓	✓
Active participation in no cost measures		✓			✓	✓	✓	✓
Read meters regularly							✓	✓
Record/analyse/monitor energy consumption					✓	✓		✓
Identify areas of avoidable waste		✓		✓	✓	✓	✓	✓
Review progress towards targets and benchmarks	✓		✓			✓	✓	✓
Desirable								
Conduct energy walk-rounds	✓	✓		✓	✓	✓	✓	✓
Advise on technical measures				✓			✓	✓
Advise on energy purchasing				✓				
Contribute to curriculum issues	✓	✓			✓			✓
Identify all energy using systems/equipment					✓		✓	✓
Identify controls, timers, set points							✓	✓
Maintenance of energy using equipment							✓	
Sanction appropriate investment	✓		✓			✓		
Apply for relevant grants	✓					✓		✓
Provide regular progress reports						✓		✓

✓ **Best suited for task**

✓ **Could do the task**

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Ideas for including energy within the curriculum

• LP	Categorising rooms as 'hot', 'cold' or 'comfortable' and relating these sensations to numerical values on a thermometer
• LP	Identifying, classifying and counting the numbers of appliances that use energy in a school
• LP-UP	Devising a play or pageant for a special assembly or for a performance to parents
• UP-LS	Using a lighting survey as the basis for work in Mathematics. e.g. Illuminated numbers available from CREATE
• UP-LS	Challenging pupils to design energy awareness posters and 'Save it' stickers. Carrying out experiments to determine how frequently they should be changed to maintain their impact
• UP-LS	Weekly reading and recording of electricity and gas meters. Calculating consumption for each meter and for the whole school. Comparing total consumption with previous week/month & the same period in earlier years
• US-SF	Comparing consumption with weather severity, school benchmarks, local authority and national data
• LS-SF	Investigating the sensors and controls used to regulate heating and lighting systems. Constructing simple working models to test understanding
• UP-SF	Using data-loggers to record the temperature of a room over a period, (say Thursday to Tuesday), to see if it reaches target temperature only at appropriate times
• UP-SF	Writing articles for local newspapers and radio on how the school is working to use energy more wisely
• All	Inviting a professional theatre company to present a play on energy issues
• All	Devising events for families and other members of the community where pupils present information and advice on energy efficiency in school (and at home). This can involve quizzes, games, comedies, dance, mime, music, song and art

Key: (LP) Lower primary (UP) Upper primary (LS) Lower secondary
(US) Upper secondary (SF) Sixth-form

Ideas for short projects

Stick-'em-up day	Pupils (and adults) put up descriptive post-it notes wherever they see energy being wasted
Low energy day	Just how little energy can the school use and still operate successfully?
Energy challenge	A reward if the school reduces its consumption by an agreed amount
Pay your way day	Each pupil is issued with energy tokens. They have to 'buy' energy whenever they need it by handing in tokens
Visit	Energy expert leads an activity, perhaps involving adults as well as pupils
Energy detectives	Pupils seek out places where energy is being wasted
Energy survey	Students collect and evaluate evidence to support or refute statements about the effectiveness of different aspects of energy management

Energy matrix

Energy Team	Walk-round	Monitoring	Curriculum — to include environmental impacts	Communication	Savings
1.1 Energy Team members make regular reports to the school and board of governors	2.1 Measures to improve energy performance of school buildings are planned and projects implemented	3.1 Monthly data is analysed allowing fault finding, savings and budget information to be determined	4.1 School energy use and results of walk-round are used as a basis for class discussions and project work	5.1 Energy saved expressed as money and carbon savings are broadcast to the school in a way the children can understand	6.1 Some savings are re-invested to reduce energy use further, or for buying higher efficiency equipment (e.g. computers)
1.2 Team members have defined roles and report back on these at meetings	2.2 Identify shortlist of key measures to be taken and communicate to the whole school	3.2 Comparison of monthly consumption against previous year's usage and against set targets	4.2 Energy is used as a cross-curricular theme across subjects	5.2 School runs an energy awareness campaign	6.2.1 School achieves/ maintains energy use at Best Practice levels **or**
1.3 Meets at least once per term	2.3 Results included in the school Energy Action Plan	3.3 Previous year's energy consumption data used for setting the following year's target	4.3 School makes use of available energy related curricular material or produce your own	5.3 Assemblies are used to inform whole school of progress	6.2.2 School has made energy savings over previous year's consumption
1.4 Team includes senior teaching staff, caretaker, governor, pupil monitors	2.4.1 Complete walk-round at least once per term **or**	3.4 Monthly recording of gas, electric and water from meter readings	4.4 Energy is included at each Key Stage in England and Wales (or 'Levels' in Scotland)	5.4.1 An energy notice board in a public place is kept up to date with progress **or**	6.3 School has maintained energy use at previous year's consumption level
1.5 Energy Team set up with an Energy Leader	2.4.2 Whole Energy Team complete walk-round once per year		4.5 Energy issues covered in some classes	5.4.2 Involvement in scheme is publicised to whole school	6.4 Savings made can be identified using monitored information and quantified in monetary terms