

WHAT'S YOUR SHOE SIZE?

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APPENDICES - available at www.newhamsustainableschools.com

Energy Management Tools for Energy Leads & Energy Group

- Energy Management Checklists
- Energy Management Planner
- Meter Register Template
- Energy Dashboard Instructions (Systems-link & British Gas 360)
- Details on Display Energy Certificates
- Example Energy Policies
- Eco-schools FAQs, Environmental Review & Action Plan templates

Energy Lesson Plans & Resources

- Energy Awareness Questionnaires (all key stages)
- Whole-class Energy Projects (multi subject)
- Eco Schools Energy Lesson Plans (all key stages)
- Energy / Subject Area links
- Using your school's online real-time data - lesson plan
- Examples of innovative STEM projects

WHAT'S YOUR SHOE SIZE?

1) WHY IS OUR FOOTPRINT IMPORTANT?

DID YOU KNOW...

UK schools release up to four million tonnes of CO₂ a year?

ONE tonne of CO₂ would fill SIX double decker buses



SAVING THE PLANET

In the UK, most of our electricity comes from the dirty process of burning coal, oil and gas. Using less energy means burning less of these fuels, which cuts down on pollution. That protects the environment, and our health.

When power plants burn oil, gas or coal, energy is not the only thing they produce. They also create pollution - lots of it. Power plants are one of the biggest sources of carbon dioxide, a greenhouse gas that's causing our planet to get warmer. If you're thinking, "that will give me a longer summer holiday!", think again. Rising temperatures are bad news. They could cause flooding, heat waves and droughts - not to mention the spread of disease. Some of these effects have already started.

Emissions from power plants also cause acid rain, which damages eco-systems worldwide, killing plants and fish whilst destroying homes and livelihoods. And they cause much of the ugly smog that floats over our cities, making it hard to breathe. Smoke from power plants also contains harmful substances which make people sick. Smog and toxins are especially troublesome for the ever-increasing number of people with asthma and other breathing problems.

Fossil fuels also cause environmental problems even before they're burned for energy. Drilling and mining destroy wildlife habitat, and they release wastes that travel through the air and into water. The machinery that extracts coal, oil and gas also causes pollution. So does the process of shipping these fuels to power plants

SAVING MONEY

This doesn't take much arguing!



After staff costs have been covered your energy bill will be one of your biggest annual spends. Primaries can spend over £20,000 per year, and for secondaries this can be up to and over £100,000. Every school will be dreaming of the ways it could better spend this rather than continuing to fund big energy providers. More staffing, improved resources, better equipment?

Most schools waste huge amounts of energy but this also means they offer many opportunities to save money too.

NURTURING THE NEXT GENERATION

The world is changing. The scientific community is very clear that whatever our actions from now on, the process of significant climate change has begun and will continue to increase over the next generations. In addition the fuels we have become dependent on are running out. Many of the products we have produced over the past 100 years will not decompose for millennia.

Our children and future generations are entering a landscape that will demand big changes in types of employment, energy sources and materials, and a whole new array of skills. The skills that they develop through practical energy



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management are starting this process. They are eager to engage and learn how to be the difference. It is now our responsibility to help them.

As schools we are in a position to teach pupils to care for the world responsibly if it is to endure. Instilling pupils with the knowledge of how to live in a way that is sustainable saves both resources and money whilst teaching them that they can each be important and caring members of society.

We can teach children why it is important to conserve energy, explaining the difference between renewable and non-renewable energy sources, and demonstrating ways to cut back on energy use. Placing this learning in a real situation where THEY can see the difference they have made will help them understand, remember and reuse what they have learned.

LEARNING OPPORTUNITIES



economics.

Activity around energy management draws on a huge range of curriculum areas. By involving pupils directly you can use the school as a living laboratory and bring energy issues to life.

Measuring and reviewing energy use can feed into mathematics, technology and the sciences. The practical identification and addressing of energy losses requires scientific understanding of theories like heat movement, as well as the design and technology opportunities offered by creating the solutions. Extending out into the wider themes of how and why this is important are great opportunities for a number of topics within history, geography and

Energy saving requires everyone to be involved and committed. How this is achieved will build PSHE and Citizenship skills including leadership, team work, rights and responsibilities - and even health education, behaviour changes and personal choice. There is a growing library of resources for each subject area.

SO FOOTPRINT MATTERS! BUT WHAT CAN BE DONE?

Through good and consistent energy management, schools can reduce energy usage by **up to 40% per year** by taking simple steps to reduce energy use and carbon emissions.

Nationally 1,600,000 tonnes could be saved. That's nearly ten billion double decker buses of CO₂!

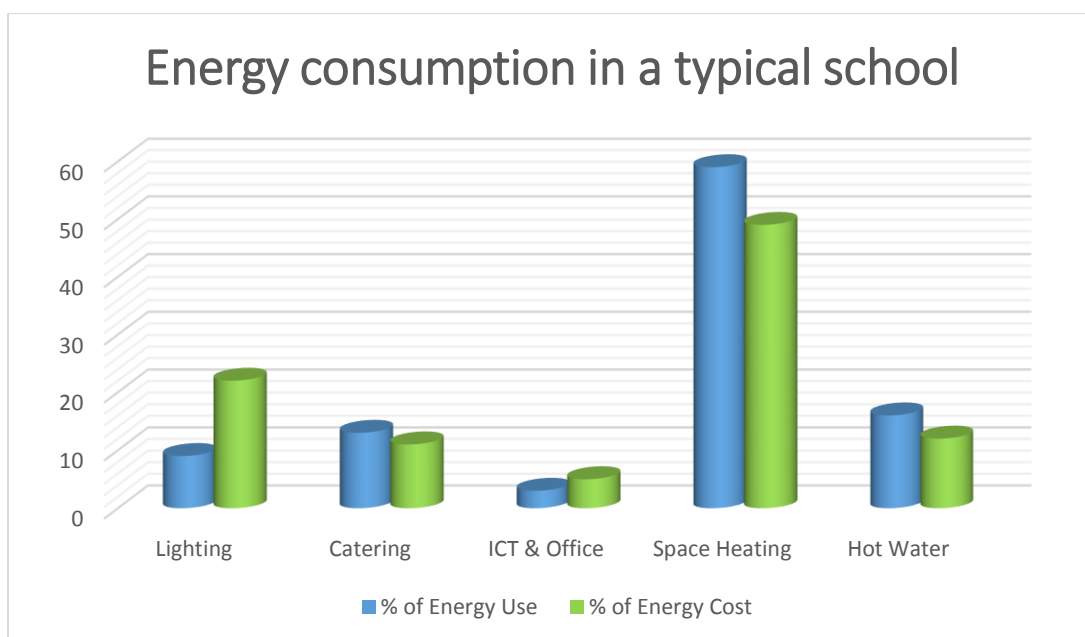
How much **money** would you save by reducing your bills by 40%?

WHAT ARE THE PRIORITIES - HEATING, LIGHTING OR EQUIPMENT?

The graph below illustrates the core users of energy in school but also the difference in cost between predominantly fossil fuels and electricity users.

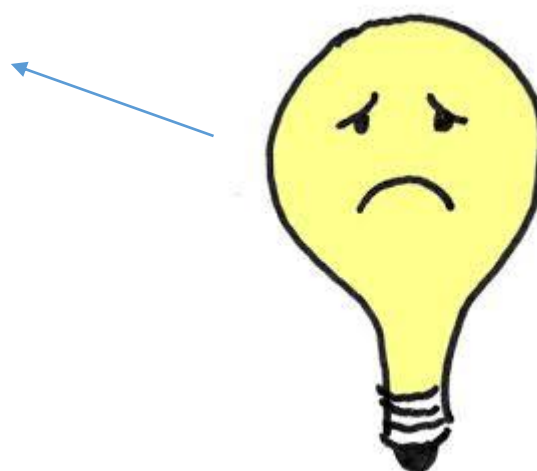
Savings in cost are more considerable from electric users - mainly lighting and ICT - but the sheer amount of energy used from fossil fuels in heating (59%) and hot water (16%) shows massive opportunities for carbon and money savings.

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Looking at the amount of CO2 emitted from the different fuels gives another perspective.

Energy source	Kg CO2e per kWh
Grid electricity	0.54522
Natural gas	0.18523
LPG	0.21445
Gas oil	0.27533
Fuel oil	0.26592
Burning oil	0.24683
Diesel	0.25301
Petrol	0.24176
Industrial coal	0.32227
Wood pellets	0.03895



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2) JUST GIVE ME THE BASICS SO I CAN START SAVING!

WHAT?

Reducing energy consumption and thereby cost and CO2 emissions.

WHY?

To save money, to enhance the curriculum with on-the-job learning, to nurture “green” skills as demanded by the changing workplace - and to save the planet!!

HOW?

This is the most effective model for significant and consistent savings:



Here are some **Quick Wins** - there are many more in Target Areas section

- ☆ **Use your online usage data to spot problems:** details in appendices
- ☆ **Maintain and insulate:** pipes, walls, roofs, boilers, hot water taps
- ☆ **Turn equipment off when it's not being used:** labelling, timers, sleep programmes, and switch off routines all work
- ☆ **Do a lighting audit:** look at changing bulbs, and label switches with how often they need to be turned on
- ☆ **Use the sun's energy:** let the sun into rooms to keep the heat down and reduce the need for artificial light
- ☆ **Don't let windows waste energy:** keep shut when heating (or air coils being used and cut draughts with early maintenance and sealing unused windows
- ☆ **Introduce Agreed School Temperatures:** Classrooms and offices 18°, corridors and sports areas 15°, nursery 21°. Use cardboard thermometers to monitor
- ☆ **Buy efficient products:** look for efficiency labels on all products not just electrical; think about whether new equipment would be better than inefficient existing equipment
- ☆ **Reduce catering usage:** keep fridges in cool areas, have a switch off protocol, reduce heat loss
- ☆ **See our Target Areas section** for further details in all these areas

Set a whole-school target - an achievable one is 10% of energy bills in first year

Involve everyone and communicate successes

Good Luck!



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3) STEPS TOWARDS ENERGY REDUCTION

This section looks at the steps towards reducing energy usage and spend - but it makes lots of sense for the Energy Group to be part of (or grow) into an Eco-Group, able to address recycling, biodiversity, saving water etc. See appendices for more details of Eco-Schools.



IDENTIFY A LEAD

Nominate an **Energy Lead**. For many schools this is the business manager as they have a good overview of the energy usage and billing but also of the workings of the whole school! In smaller schools this job may be done by the head teacher or deputy head. Specialist knowledge of energy management is not needed; commitment and enthusiasm are more important than technical expertise

It is helpful to also have a **Heating Lead**, responsible for the day to day monitoring of building temperature and accessing meter reads where these are not automated.

The lead/s should not be responsible for all the work!!! But without a named individual as lead it is very difficult to keep track on progress.

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SET UP AN ENERGY GROUP

Energy management impacts everyone in school but everyone has a role in saving money and energy. The more areas of school involved in the planning - the more savings you will make.

Suggested members of an Energy Group:

A **governor** - whole-school vision, oversight, and often transferable skills

A **pupil Eco-Group** - the heart of any behaviour change

Teaching staff / TAs - turning energy saving into learning opportunities

Kitchen and cleaning staff - primary users of high-cost equipment

Site manager - access to, understanding of, and expertise in use of the school site

School business manager / bursar / office staff - prime users, managing the purse and seeing all!

And a special mention for **parents**.

Parents can bring transferable skills, enthusiasm, and time. Once your campaigning is underway, transferring energy-saving tips from school to home will make a real difference to energy poverty amongst your families.



MEASURING YOUR FOOTPRINT & SPOTTING YOUR WEAK AREAS

This falls into three areas:

- Using school energy data
- Benchmarking against similar schools
- Auditing behaviour

USING ENERGY DATA

At least for the first time, collating your energy data will need to be done by the site manager, business manager / bursar and energy lead working together. This will enable you to collate all the required information in one place and cross reference

information available through billing, meter reads and online (Systems-Link and BG360 in most schools). Once this has been set up, it becomes more straightforward to keep updated and more stakeholders can be involved.

- An example meter register is in the appendices

Systems-Link will store all ongoing meter reads (manual and automated), meter details and invoice details, allowing you to analyse usage easily. Much of this information has already been entered on your school dashboard by the LB Newham Energy Unit.



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Manual Meter Reading

It is important to log any readings into the LBN Systems-Link dashboard for your school. This provides you with a place to keep all meter reads together over a number of readings.

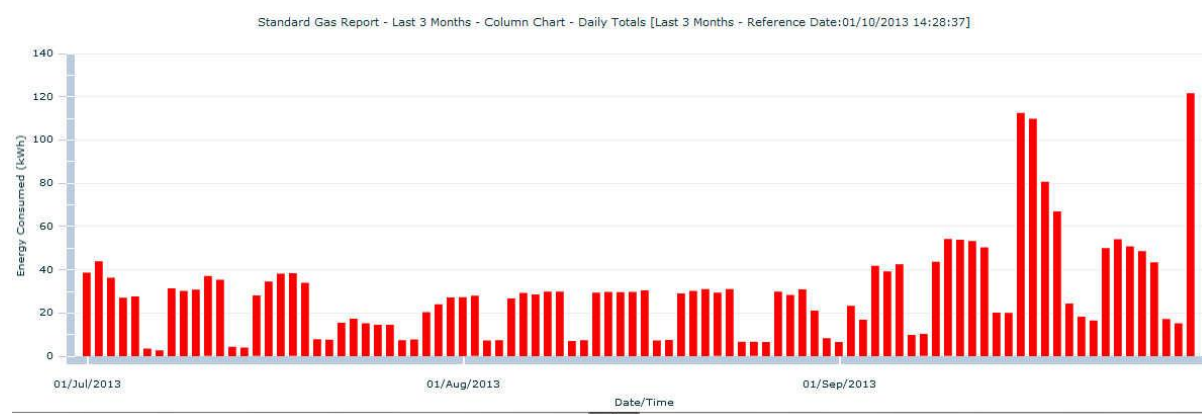
It is also very useful for the school and LBN Energy Unit to be able to refer back to logged readings when dealing with billing issues with suppliers!!

- Instructions for Systems-Link are in the appendices along with simple guidance on reading meters.

Automated Meter Readers (AMRs)

Schools purchasing their energy through LB Newham (KCC/LASER) will have access to their half-hourly gas usage data through the British Gas 360 online tool. Your school may also have access to electric AMRs as they are rolled out to all schools. Check with your FM providers or LBN Energy.

- Instructions for British Gas 360 are in the appendices



BG360 can give you a massive amount of information on how and where and when energy is being used in the school. It can lead to savings resulting from:

- ✓ Identifying timer issues
- ✓ Spotting faulty or underperforming equipment
- ✓ Recognising large spend areas
- ✓ Accurately charging renters

As it provides current energy usage online in graph formats, BG360 is also useful in lessons and for measuring the success of individual energy saving activities.

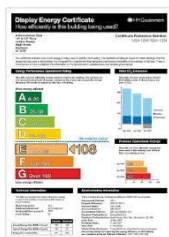
- Lesson Plans for using BG360 data are in the Curriculum Section

BENCHMARKING AGAINST SIMILAR SCHOOLS

Once you have your usage data how do you find out if you are spending too much?

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Benchmarking for energy usage is expressed in terms of annual consumption divided by the floor area and/or number of pupils and then compared to schools of a similar type - kWh/m² or kWh/pupil per year. If possible, electricity consumption benchmarking should be kept separate from fossil fuel consumption as cost and environmental impact are different.



The benchmark for school carbon performance is production of carbon dioxide associated with energy consumption divided by the floor area of the school (KgC/m²).

The single most effective way to look at how your school is performing against similar buildings is your Display Energy Certificate.

- Details on how to read a DEC are in the appendices
- Further benchmarking tools are in the appendices

AUDITING OUR BEHAVIOUR

Energy Walk

A walk around the school is needed to establish where energy is being wasted. This can be undertaken by pupils alongside the energy lead. The walk will focus on lighting, heating, equipment needs and use of windows and doors.

- See Appendices for example walk rounds.

It is useful to have several walks at different times of day including during lesson time, break time, after school and weekends.

School Temperature

It is helpful to establish current temperatures throughout the site to spot troublesome spots. Cardboard thermometers are cheaply available and so can be kept in rooms and zones across the school. A full audit of temperatures across the school provides several key outcomes:

- Checking that heating systems / thermostats are working effectively across the site
- Identifying over-hot and over-cold problem areas
- Building an accurate picture of temperatures - as everyone experiences temperature differently

Many schools are now introducing agreed school temperatures - using the Carbon Trust agreed comfortable temperature for classrooms/offices, corridors/sports, and sick room/nursery areas. Everyone in school is then clear about the agreed temperatures.

Individuals trying to personalise temperature cause constant adjusting of heating. This often becomes a significant burden on energy costs as heat is wasted through opening doors and windows or through regular over-riding of thermostats and use of small heaters.

It is worth noting that turning a thermostat up WILL NOT speed up heating but WILL result in overheating for long periods.

Look to use cardboard thermometers to monitor this regularly. It is better that everyone becomes accustomed to school temperature and dresses accordingly. This can also nip in the bud regular moans about temperature, as you have a clear way of defining what is needed and achieved.

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MAKE A PLAN

Now you have all the information about your school energy performance, don't be disheartened! Energy management is an ongoing task but most schools are able to make a number of significant savings immediately. A 10% saving in the first year of action is typical and in the longer term savings of up to 40% are possible with hard work!

BUT none of this is possible without a clear plan of action that can be shared and owned.

- Example energy plans are in the appendices

When writing your plan look to cover:

- Billing and metering savings
- Plant and control savings - heating controls / lighting
- Building fabric - windows / insulation
- No-cost savings and campaigns
- Equipment switch off
- Lighting review
- Agreed temperatures

- Ideas for all these areas can be found in the **Target Areas** section



SETTING TIME-FRAMES AND TARGETS

As with all things in life we need deadlines, targets and rewards!

Be realistic about what can be achieved by when.

Break your plan into:

Immediate actions - e.g. agreed school temperatures / switch off campaign

Medium-term actions - e.g. replacing all light bulbs/tubes

Long-term planning - e.g. insulation rolling install / PV or solar panels

Have a nominated **lead**, **outcome** and **deadline** for every action.

Identify a **BIG HAIRY TARGET** which everyone is working towards. This could be the TOTAL amount of money or carbon you want to save. For many schools a saving of 10% of the annual energy bill is a reasonable and attainable target within the first year; by **QUANTIFYING** this for your school, everyone can see how much is being spent now and what will have been achieved. Systems-Link records saved carbon in terms of "trips around the world", but thousands of pounds saved are just as compelling!

Establishing Good Habits

As soon as possible set in place a regular timetable of

- Reading meters and adding to Systems-Link
- Reviewing actual usage against billing
- Pupil Eco-Group walkabouts, and monitors checking all is switched off that should be
- Temperature checking - cardboard thermometers in classes can involve pupils in this

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INVOLVE EVERYONE

Big and long-lasting savings come in schools where **EVERYONE** is involved, with staff, pupils and governing bodies co-operating to save energy together.

It is a team effort but there must be positive leadership. If senior management are not enthusiastic or prepared to take the first steps, other staff are less likely to play their part. Staff and pupils must know what they are trying to achieve and be given real, tangible credit for their efforts.

Agreeing an energy policy ASAP will allow senior management and governors to demonstrate their commitment to core actions like agreed school temperatures from day one of your campaigning.

A good **energy policy** will reaffirm everyone's responsibilities and provide a long term vision.

- Example energy policies are in the appendices
- Actions and commitments that can be asked of different groups are included in the **Roles** section

Some simple ideas for raising awareness amongst staff and pupils:

- ☆ **Present findings and your plan** - using assemblies / notice boards/ energy bulletins
- ☆ **Encourage everyone to sign-up** to achieving the BIG HAIRY TARGET
- ☆ **Launch a campaign** - hold termly events to raise awareness and encourage continued engagement/ design a mascot/ display 'switch-off' stickers and posters around the site
- ☆ **Write a newsletter** to share the work of the Energy Group
- ☆ **Meet regularly** to discuss campaign/ monitoring/ targets/ presentations
- ☆ **Regularly report progress** on the BIG HAIRY TARGET in assembly - the pupil group could lead this
- ☆ **Hold competitions** between classes, teams or areas - contact companies that produce energy saving equipment for prizes/ visits
- ☆ **Embed energy behaviour change into the school ethos** - explain that the school is striving for a different attitude to how electricity is used and wasted and why!



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MEASURE & CELEBRATE SUCCESSES

This is the area most often forgotten but it is what motivates us to keep going and to not fall back into costly behaviours.

Measuring success

Hopefully you will have set a BIG HAIRY TARGET but you will also have lots of smaller outcomes that can be measured for success.

Here are just a few things you can measure to assess your positive outcomes:

- ❖ Number of lights/PCs left on at the end of each day
- ❖ Heating costs over a week or month
- ❖ Average temperature across the school
- ❖ Number of energy saving bulbs/tubes
- ❖ Number of radiators backed by foil



BUT DON'T FORGET TO DO THE BASELINE FIRST OR YOU WILL HAVE NO IDEA WHAT YOU SAVED!

Some success will come quickly - for example savings from spotting night-time boiler misfires. Other successes will take a little longer to record such as reducing temperature by degrees.

Celebrating Success

Above we mentioned ways that you can ensure celebration is an ongoing motivation for your work - through newsletters, noticeboards, reward assemblies and competitions.

In the beginning, set a review timeline so that you have a fixed point in the year when you will compare achievements against your BIG HAIRY TARGET. This might work best at the financial year end as it will help with collation of your finance figures but will also fit neatly at the end of the expensive winter months.

Look for external accreditation via Eco-Schools

Completing the actions we have described will allow your school to self-accredit as a bronze award Eco-School. Maintain the Eco-Group and its work and you will quickly proceed to the silver award and then the prestigious green flag.



Registering for Eco-Schools and setting up an eco-committee is an invaluable start, but the most energy-efficient schools are those where everybody plays a part. Similarly, the most effective eco-committees or action teams are those with input from classroom, kitchen and site staff alongside pupils, senior management and governors

- Further details for Eco-Schools are in the appendices

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4) ROLES AND RESPONSIBILITIES

To make real energy savings across the school, everyone can play a role and take responsibility for what they can change. The **Steps** section explains how this can be achieved, but it is useful to see just what each person or group can help with.

ENERGY GROUPS / SCHOOL COUNCILS

Pupil-led activities make the biggest change happen.

This is true both within the school, and beyond it to households and communities. Without pupil leadership and whole-class engagement, many of the ways of saving energy and money outlined above become much, much harder. There are many ways to involve students in energy management and all levels of school can participate. The Eco-Schools website is full of useful ideas and inspiring case studies.

In Newham we toured the **Carbon Footprint Detective Agency**, a partnership and play developed with Immediate Theatre. The CFDA encourages pupils to become "detectives" in hunting out the energy wastage in their school.

- Many Energy Group resources are found in the appendices

Energy Group resources can be used to help set up your pupil energy group, and for your school walk around. We also have **CFDA badges** for all your energy group members, just contact Newham Sustainable Schools.

Possible Pupil Commitments:

- ✓ Identify and report actual energy performance to the school and wider community
- ✓ Identify targets for future energy performance and report on progress
- ✓ Train other staff and pupils to become energy champions for the school
- ✓ Encourage energy saving suggestions from all staff and pupils
- ✓ Take day-to-day responsibility for ensuring minimal energy and water waste and encourage all school users to do the same

TEACHERS AND TEACHING ASSISTANTS

Energy efficiency can be brought into the curriculum for just about any subject. Some are straightforward - e.g. statistical analysis of energy usage figures in Mathematics, looking at energy sources and climate change in Geography, using Art classes to design energy-saving publicity materials. Others require a little more lateral thinking, but all are achievable.

Energy, either on its own or as part of a wider sustainability topic, can also make a great off-curriculum project, adding value to pupils' education and the school's energy saving work.

Curriculum Opportunities

Think how the energy saving campaign can be used to aid learning:

Maths - Using Automatic Meter Reading (AMR) data

Science - climate change/ energy production and consumption/ carbon emissions

Economic - how energy reduction saves money, looking at a carbon tax

Art/Design - design campaign material

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Media - plan and implement the campaign

Literature - hold debates around the energy campaign

- See the **Curriculum** section for lesson ideas for all key stages.

Classroom Changes

Teachers and teaching assistants can also help drive energy saving in practical ways, by ensuring heating and energy usage in their classroom is minimised, and working with pupils on energy-saving initiatives.

BUSINESS MANAGERS, SITE MANAGERS AND OPERATIONAL STAFF

School Business Managers are often active in Energy Groups, as they are the ones paying the bills which can be reduced! They are also in a position to make the business case for investment in materials (insulation, timers, push taps) which will pay for themselves by enabling energy savings and/or behaviour change.

A busy working office has the potential to consume large quantities of energy through lighting, heating and office equipment such as printers, PCs and especially photocopiers.

- See **Target Areas** for the costs attached to specific equipment

Office Staff are able to help the cause by committing to:

- ✓ Ensuring all equipment is turned completely off at the end of the day
- ✓ Efficient use of photocopiers (the largest consuming electrical equipment) by photocopying in blocks where possible
- ✓ Encouraging visitors to keep doors shut and heat in
- ✓ Replacing equipment with energy efficient models

A responsible **Site Manager** can work with the Energy Group to ensure that the building is best equipped to be sustainable.

They can commit to:

- ✓ ensuring that heating is available when and only when the building is in use;
- ✓ ensuring leaking pipes and cracked windows are spotted and fixed;
- ✓ working with cleaning and kitchen staff to use resources and equipment as efficiently as possible

Site Managers are often the first to recognise the benefits to their own work in a school which functions sustainably and so are keen to be a part of energy improvements.

Catering and Cleaning Staff

As the main users of equipment with high energy usage, kitchen and cleaning staff can have a crucial role in saving energy. With the support of senior management, they can help in a number of ways:

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- ✓ Ensuring all equipment is turned off at the end of sessions
- ✓ Reducing heat loss as much as possible
- ✓ Using equipment in the most energy-efficient way
- ✓ Maintaining equipment and ensuring replacements are energy efficient models

SENIOR MANAGEMENT

However wonderful and committed an Energy Group is, it needs a supportive, understanding and enthusiastic senior management team to ensure the success of a whole-school approach. Action plans developed by the Energy Group can then be fed into school management at all levels. Time, resources and support should be made available to develop energy savings which are themselves sustainable and which feed into sustainable forward planning, within and beyond the curriculum.

Senior Management can sign up to:

- ✓ Lead on establishing and delivering the school energy policy
- ✓ Promote the energy action plan wherever possible
- ✓ Commit management resources to implementing the plan
- ✓ Visibly support the actions within the plan, for example agreed school temperatures and lighting reviews
- ✓ Work with the energy lead and governors on long-term opportunities for energy reduction or generation.

GOVERNORS AND PARENTS

Governors are sometimes the surprise heroes of a school's journey to sustainability. Of all the roles in school theirs is about long-term planning, getting the best deal for every pupil, and striving for a school that instils sustainable values and ethos.

An informed governing body will be able to challenge and support senior management on the school's energy-saving journey. Governors are required to have an oversight on finance, curriculum, behaviour and learning. With this broad overview they are in a strong position to support and develop energy and carbon reduction in the long term.

The governing body will also have a mix of skills and experiences that you can draw on. They may undertake energy management roles in their "day jobs". They might have access to resources and experts. Some of them will be community governors with links to local organisations which could help the school with advice and/or practical materials.

As with Governors, **parents** are a huge untapped resource often with transferrable skills and industry contacts. A successful energy saving programme will inevitably reach beyond the school to households, as pupils model the energy saving practices they have learned and discussed in the home and the community. There is scope to involve parents as volunteers in many areas of sustainability, including but certainly not limited to energy saving.

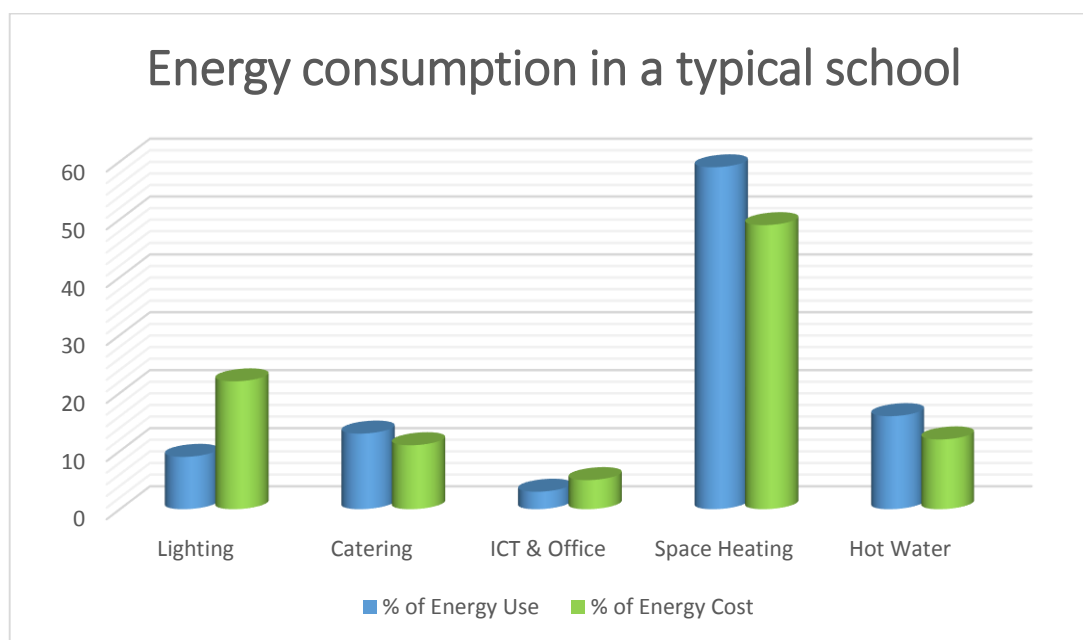
ENERGY LEAD

And finally, but crucially the **energy lead** can lead energy management by:

- ✓ Identifying and implementing all cost-effective energy efficiency measures
- ✓ Feeding success and reports to governors, SMT/SLT and the whole school
- ✓ Reviewing and revising targets on a regular basis
- ✓ Championing the incorporation of carbon saving and sustainability into the curriculum

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5) TARGET AREAS



We start with the big beast of school energy consumption - heating (taking up an average 58% of energy usage and 45% of energy cost). Any savings you can make here will have a big impact.

HEATING & HOT WATER

Controlling usage is the key. Often excessive peaks in usage occur because someone made a short-term adjustment and forgot about it. Energy management is all about three things:

- Finding out your usage issues
- Making changes
- Ensuring they can be maintained

In the majority of schools quick and substantial savings come from a more precise understanding of where heating is poorly performing or controls are not functioning as they should. Your school's own energy data can be used to ensure that it is heated only when and as much as is needed. Usage will vary in any week dependent on what space requires heating but you can simply and strategically manage this.

The average school saves over 10% on heating bills as an immediate result of analysing usage data. This immediate saving can be greatly increased through simple changes to how equipment is used.

Loving your boiler

It is possible to cut heating costs by up to 30% by implementing some simple boiler-related energy saving measures. All modern boilers are capable of achieving an efficiency of at least 80% by taking simple actions to impact their performance.

- Carry out regular boiler maintenance - not just repair

Over time mechanical components become worn which can affect combustion efficiency. Therefore burners and their controls need to be checked at regular intervals and adjusted or replaced as necessary. Boilers have to be certificated once a year (twice a year for oil-

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fired boilers). Having them serviced at the same time can make the boiler 10% more efficient.

- Minimize heat losses

Keep boiler insulation in good condition. All pipework, valves, flanges and fittings in the boiler-house should be adequately insulated and valve mats/covers should be replaced after maintenance work.

- Have a register / checklist for regular boiler checks

Detail records of work done, the person responsible, and when they were completed. This will ensure that tasks are carried out at the correct frequency and will highlight ongoing problems. Especially useful if you are lobbying for central funds for a more efficient boiler!

- Consider boiler replacement

In the longer term, if a boiler is more than 15 years old, or if it is showing signs of inefficient operation, it may need replacing. Capacity/size requirements, boiler compatibility, and financial and environmental impact must all be considered in the process. Your school site, buildings and usage may have changed considerably since the previous boiler was installed. Payback can usually be expected within a few months of installation.

Heating and Hot Water Controls

Who in school understands how the heating is controlled?

It is good to have more than one person in school understanding the heating system but the biggest barrier to controlling heating is that it being adjusted by too many people all at once, all with differing views on what is the right temperature for each area. At a senior level, agree a standard temperature for each area. On a daily basis this can then be maintained by one person.

Is the building connected to a remote energy management system (BEMS)?

Most LB Newham schools are connected to the Allan Martin system via OneSource. Find out how it works and who controls it. The more knowledge you have, the more savings you can make.

Take regular thermometer and hot water temperature readings across the school to double check the readings of the heating controls.

This can easily be linked to curriculum topics.

Consider replacing old or unreliable controls.

Modern controls can adapt to the actual time required to heat your school and can compensate for weather conditions.

Double-check timers after clock change from BST to GMT.

If the heating is on at the wrong times, you could be paying for an extra hour of heating or an extra hour of compensation heating made up from portable heaters.

Reducing heat loss through hot water (and your water bill!)

- Fit percussion taps which turn off automatically
- Deal with drips and leaks promptly

WHAT'S YOUR SHOE SIZE?

- Insulate hot water storage tanks and their distribution pipework
- Make sure the most efficient heat source is used for heating water
- Rationalise the system to reduce long distribution pipes
- Provide cleaning staff with point-of-use water heaters during holidays

Spotting overheating and operation faults using your usage data

All Newham schools who purchase through LASAR (KCC) now have access to their half hourly gas usage data (see section 3c for details on how to access).

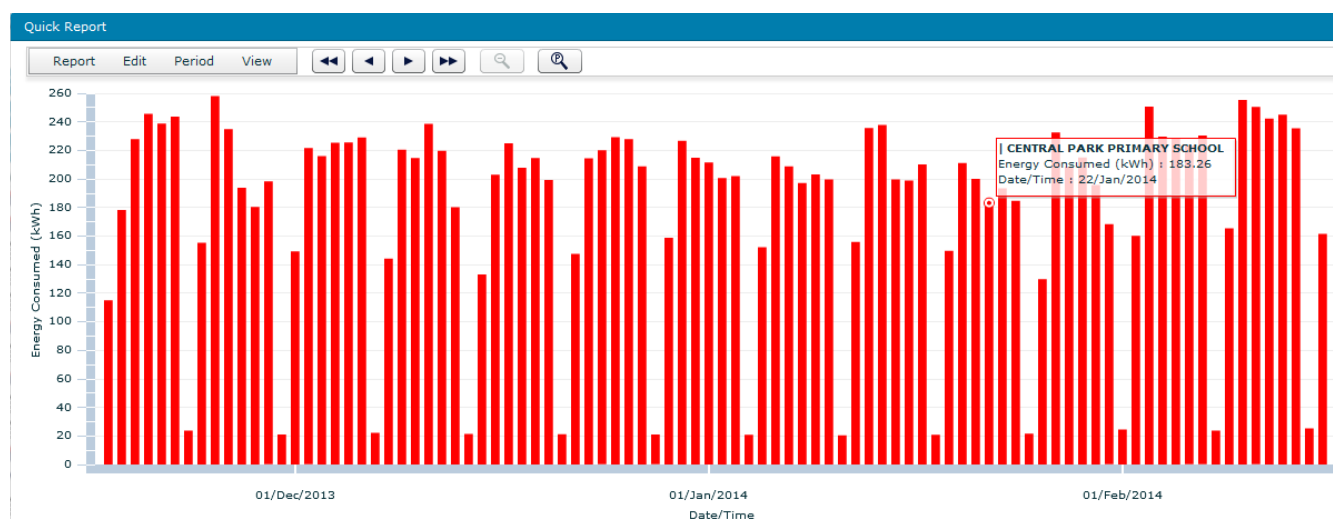
It has been estimated that schools are spending an unnecessary 10% on their gas bills just through faults in timer equipment, heating triggering too early or for too long and from unchallenged billing mistakes.

Have a regular programme for monitoring your data.

When reviewing readings use a monthly report (giving you actual usage on each day over a month) and a 24 hour report (giving you overnight activities and timings that heating is turned on and off).

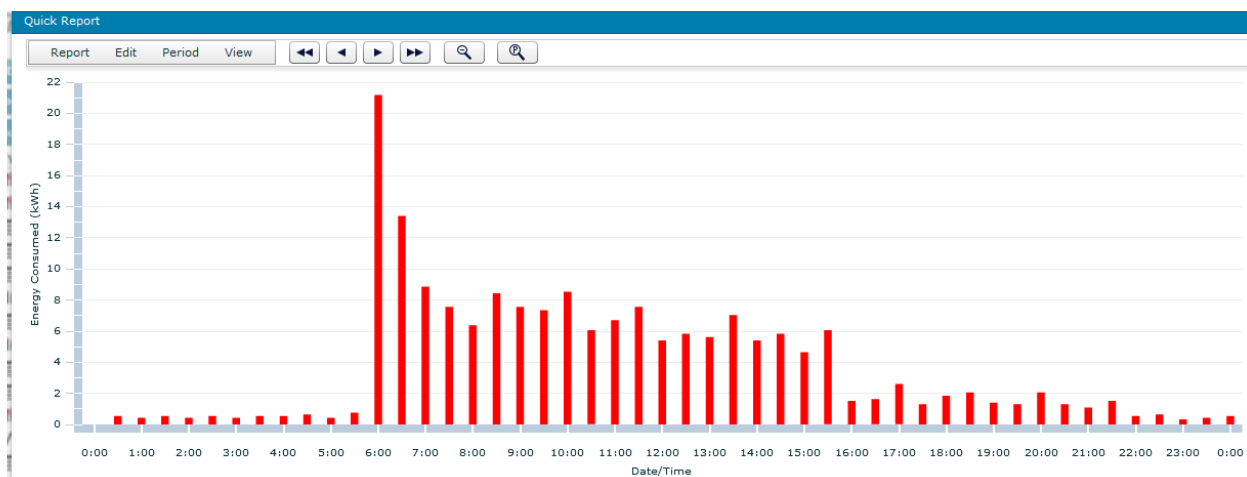
- Details for accessing your online usage data and storing readings are in the appendices

Example 3 monthly report:



Example 24 hour report:

WHAT'S YOUR SHOE SIZE?



When looking at YOUR data ask the following;

- Is the heating on outside of school / hiring hours?
Pay particular attention to half terms, evenings and weekends. Do you use the actual gas usage to calculate hiring costs?
- Is the heating staying on too long?
Use classroom thermometers (cheap cardboard ones are available [here](#)) to see how long it actually takes to heat the school to a required temperatures. This is a good activity for pupils as part of Energy Group or within lessons.
- Is it coming on too early on a morning?
As above, measure how long it actually takes to reach required temperatures rather than relying on how it feels. You may be surprised!
- Are there times the whole school is heated when only one or two rooms being used?
There can be a similar issue for lighting. If staff are staying late - can there be a policy to keep only certain areas "open"? This is common practice in business premises and it could release more funds available for teaching resources!
- Are there unexpected spikes of gas usage during the night?
This is a very common occurrence with a very high cost. Heating comes on and off through the night for no reason and everyone remains unaware it is happening.
The most common cause is mis-programmed timer equipment. This can happen very easily as equipment becomes more and more digital. There may also be faulty timer or firing equipment. Check any timing controls you have first, and then contact OneSource or your facilities managers to rule out equipment failure or failure of the BEMS.
- Does the gas usage drop to zero when heating is off - if not, what is still using gas?
On your data sheet it is easy to spot the peaks and troughs when heating comes on and off and assume all is ok - but don't forget to look for the smaller detail. As with a dripping tap, your gas spend can be trickling away every day.

Air Conditioning

Air conditioning can use a huge amount of energy. In fact, air conditioning can increase a building's energy consumption and associated carbon emissions by up to 100% - but with increasing use of IT

WHAT'S YOUR SHOE SIZE?

equipment some a/c is present in most buildings. Luckily, there are some simple, low-cost ways to save energy and make your air conditioning system more efficient.

How is your air conditioning controlled?

As with heating systems, air conditioning is at risk of being controlled by too many people at once causing different areas to be too hot and too cold - often at the same time. The process of cooling air requires a very high energy levels; use and stick to agreed school temperatures.

Train staff on how to operate air conditioning units and heating controls. A simple laminated sheet explaining in-room controls and agreed school temperatures can reduce costs (and frustrations!) considerably. Ensure remote controls are stored in accessible and obvious places.

Know your air conditioning equipment

What needs cleaning or maintenance and when? Louvres (movable slats to guide the cool or heated air) are a feature on most air conditioning units and, if appropriate, staff should be able to operate these to maintain a comfortable temperature.

Has the air conditioning been tested recently and how often is actually needed?

Make sure your air conditioning doesn't operate below 24°C. Also, make sure that you don't have the heating and cooling systems competing with each other - it's a waste of money. The best way to do this is to keep a temperature gap (known as a 'deadband') between your heating and air conditioning control temperatures. 21 to 24 degrees is standard.

And remember, leaving ICT equipment on will cost you double - for running the equipment itself and for dealing with the additional heat it is producing.

Working Together - changing attitudes & behaviour to heating

Upfront savings can be made from addressing equipment and control issues, but long-term savings can only come from changes to how much the heating is used.

A whole-school approach to monitoring and reducing heating usage has been proven to reduce annual fuel costs by 10-20% - not to mention the learning opportunities in areas including climate change, global dimension, and financial responsibilities.

- See the **Roles** section for more information

Encourage feedback from staff and pupils

Ask where hot or cold trouble spots are and try to address them. Involved staff and pupils are far more likely to remain positive and make the effort on a daily basis. As with your home heating, good habits can save money.

Use thermometers rather than people to decide whether an area is warm enough

It is far cheaper, and better for the planet, for people who feel the cold to wear extra layers than to overheat everyone.

Thermostats should be set centrally where possible and be tamper-proof

Staff (or pupils!) turning them up does not speed up heating but does lead to wasted energy and overheating, particularly in schools with complex systems which need to remain in balance.

Agree school temperatures. Recommended temperatures in schools are:

WHAT'S YOUR SHOE SIZE?

- classrooms 18°C;
- corridors / general areas and areas of physical exercise (e.g. gyms) 15°C;
- areas of low physical exercise (i.e. sick room), with special needs or very young children 21°C.

For every 1°C of extra heat, your heating bill increases by around 8%.

The Energy Group students can design eye-catching laminated posters to put inside the door of each classroom / space that remind everyone:

- How much money or carbon the school is trying to save
- The agreed temperature for that classroom / space
- A checklist specific to leaving that room, for example:
 - ☆ All lights off?
 - ☆ (Specific equipment) off?
 - ☆ Windows closed?
 - ☆ Radiator clear?

LIGHTING

Can't change the lighting you have without a costly rewire and installing new lighting?

Perhaps you can...

Low-cost changes

Install PIR (passive infrared motion sensors) wherever possible

By dimming or switching off lighting when there is nobody in a room, occupancy sensors can reduce electricity use by 30%.

Rewire lighting controls for small groups of lights, or even individual lights

The more control you can have over the light you use, the less likely you are to waste energy. So consider fitting dimmer switches, automatic presence or sunlight detector sensors.

Change bulbs and tubes

What types of fluorescent tubes do you currently use? T12 (36mm), T8 (25mm) or T5 (19mm)? The best are T5, which generally come with high frequency ballast in new fittings.

Installing new high frequency fluorescent lighting eliminates flicker and hum, extends lamp life and can often reduce consumption by around 25%.

Replace standard light bulbs with more efficient compact fluorescent bulbs. They have a longer life, lower maintenance costs and use up to 75% less energy.

Dimmable LED luminaires can now save massive amounts of energy. Light fittings can often be replaced with new LED versions with no rewiring needed.

- A table explaining lighting options is included in the appendices

Use task lighting rather than light the whole area

Task lighting is a good way to minimise the amount of electric light being used, by lighting just the working area to a higher level and providing background lighting at a lower level for the rest of the space. The use of task lighting can also reduce glare on computer screens making it more comfortable for users.



WHAT'S YOUR SHOE SIZE?

Consider turning off external lighting

Exterior lighting should be limited to the hours of darkness. It may not be necessary to have lights on continuously throughout the night. Consider fitting lighting controls to limit hours of use and have daylight sensors.

Simple Maintenance

Without these simple housekeeping measures, light levels can reduce by 30% in 2-3 years

- Clean lamps and fittings
- Check and replace old and dim lamps
- Ensure controls are in good working order
- Clean occupancy sensors
- Regularly clean windows and skylights

Good Habits - Working Together

Switching off even one light saves money, and across a school campus savings can be quick and dramatic. This is an ideal activity to be pupil-led. It gives pupils a chance to “mark” the performance of staff and to measure savings before and after campaigns.

An Eco-Committee and/or classroom monitor system can ensure that lighting usage is confined to what is absolutely necessary.

It is possible to cut lighting costs by up to 30% by implementing energy saving measures. Lighting a typical room overnight wastes enough energy to heat water for 100 cups of tea.

Turn off fluorescent lights when not needed

Don't believe the myths! Fluorescent tubes use only a few seconds worth of power to start up. It is always better to switch them off when leaving a room or when not needed.

Have you put things in front of windows? Do you regularly leave blinds closed or half across?

It's not just about cutting down on lighting. We all need to see sunlight and outdoors to feel positive and healthy. It's a medical fact!

Last Out? Light Off!

Pupil eco-monitors can help with double-checking a room as it is left, undertaking regular walks to turn off missed lights and spotting regular offenders!!

A lot of energy is wasted when unnecessary lights are left on during breaks and out of hours. How often is the school lit up on an evening when only a small area is being used? As with heating consider an after-hours policy for only working in set spaces.

Does the switching pattern suit the room?

Most classrooms do not need all fitted lights on during normal daylight; some need no lights on. Identify the minimum appropriate level of lighting and mark light switches accordingly.

A good way to develop a best lighting plan for each room, which everyone understands:

Test each room on an “average” day. Switch off all the lights and turn on row by row, starting from the wall furthest from natural light.

WHAT'S YOUR SHOE SIZE?

Agree as a class at what point lighting is “right”. This could mean individual pupils recognising they need more than average light and therefore taking a seat by a window.

Put green, amber and red dots on switches to indicate which lights are always, sometimes and never needed.

With these labels on light switches across the school, everyone knows what to use first.

CLASS AND OFFICE EQUIPMENT

A single computer and monitor left on 24 hours a day could cost around £45 a year. How many do you have in your school?

Equipment type	Average power consumption while in use (watts)	Standby energy consumption (watts)
PC (processor only)	74	6 (deep sleep) / 36 sleep
PC monitor	100	4 / 7
Inkjet printer	17	9
Laser printer	280	18
Fax machine	82	7
Photocopier	400	103

Carbon Trust

Fitted controls

Automated power-down tools are vital for the high numbers of PCs and equipment in school

There are both software options to fully power-down computers when left idle, and socket additions to fully shut down any equipment left on standby for too long. Instant payback!

Think about timer controls

A single photocopier costs £53 per year more left on standby overnight than turned off fully. A timer socket would cut this immediately, and seven-day timers would save even more.

Ensure heat-generating machinery (e.g. photocopiers) are situated in a cool area away from radiators

They all come fitted with cooling mechanisms, but that is burning through your fuel bill. Far quieter and cheaper to give the cooling fans a day off!

Turn off non-essential appliances overnight and when not in use

The bare minimum of electrical equipment actually needs to be left on overnight - computer mainframe, answering machine, alarm system, freezers and some fridges. A list of these can be kept and reviewed regularly. Using labels on plugs to show this can help.

Good Habits - Working Together

WHAT'S YOUR SHOE SIZE?

The TURN OFF message is a powerful component of any whole school campaign to reduce energy use. The more everyone understand the actual cost of leaving equipment on the more likely they are to turn it off. The Carbon Trust has excellent posters and information to help this.

We can all forget to turn off equipment, but if everyone forgets then 1p becomes 50p, and then over a week £2.50, and by the time a year has passed hundreds of pounds are being “forgotten”.

There are all sorts of innovative and simple ways of “encouraging” us when we forget!

- Eco-Group members love the role of policing teachers, awarding smiley faces or filling out report cards
- Labels or posters next to equipment can tell everyone the actual cost of leaving it on (and maybe include what this money COULD have been spent on!).
- Eco-Groups can promote key messages in assemblies, newsletters, and the school intranet.
- Save up photocopying until you have a batch

The office photocopier is likely to be your biggest energy consumer. Maximise standby savings by encouraging staff to copy in batches where possible, to allow the machine to spend more time in standby than idling.

- Kill the blue lights

Encourage a fixed routine for classes and staff to scan for monitor lights shining at the end of a lesson or a school day. Every light left shining is sucking your budget for doing more interesting things!

- Check the room

An eye-catching checklist on every door can highlight room-specific equipment

Longer term

Ensure that all new electrical equipment is “A” rated for energy consumption

An energy star compliant printer uses at least 60% less electricity and most will automatically enter a lower power setting after a period of inactivity.

Consider voltage optimisation

The voltage of supply that comes into your building can be anywhere between 216.2V and 253V depending on local conditions. New equipment is designed to function best at 230V, while older equipment has greater variations. A voltage optimiser will sit at the point of supply to the building and will control this ebb and flow of voltage.

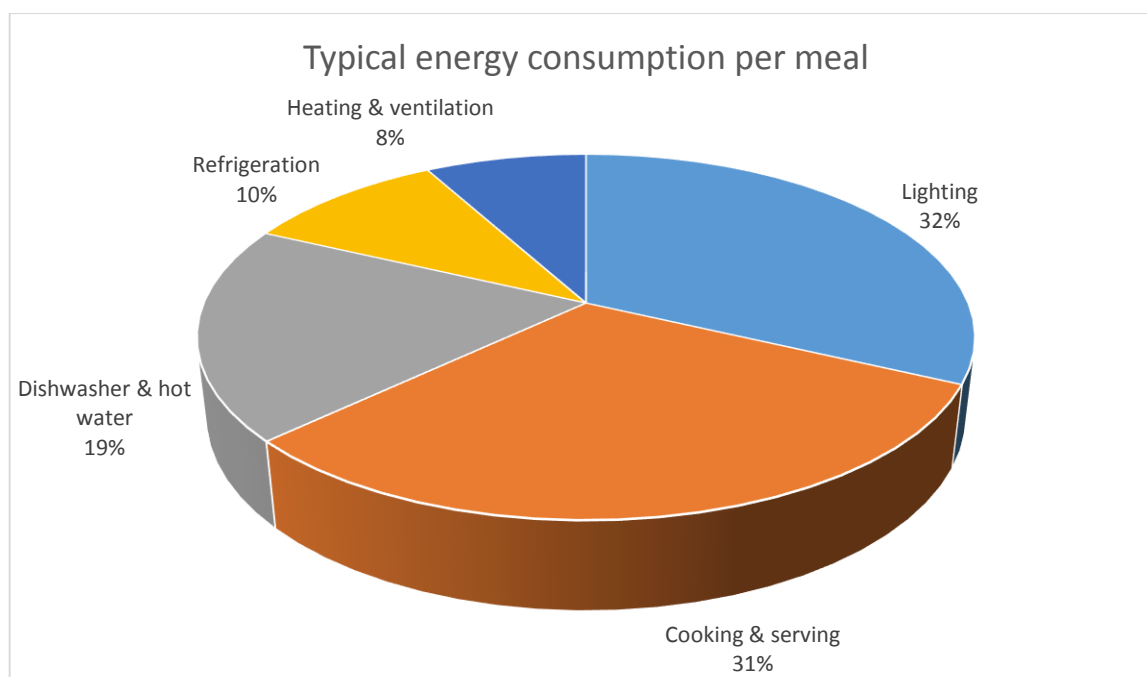
But why is this important?

Overvoltage at a basic level is purchasing energy that is not used - like an overflowing cup.

Also, over- or under-powering equipment significantly affects both its performance and lifespan.

CATERING

WHAT'S YOUR SHOE SIZE?



Carbon Trust

Could you consider sub-metering for the kitchen areas?

Cost savings can be identified and investments justified. This could be of particular use when catering is provided by a separate company who are not part of the wider school energy-saving commitment.

Catering - Cooking/Serving

Large quantities of energy are consumed in the kitchen, of which often only a small proportion is actually utilised in cooking the food. In many cases, most of the cooking equipment energy is wasted into the surroundings. Significant savings can be made by following the relatively minor changes in organisation and control as detailed in the steps below.

Label warm up times on cooking equipment

To avoid cooking equipment being on longer than necessary you should label all cooking equipment (ovens, fryers, grills etc.) with the required warm-up time. This information should be available in the equipment operating manual or if not it may require some practical tests. Preheating should not normally require more than 15 minutes for large ovens and less than 10 minutes for many convection ovens, fryers and grills.

Use equipment to maximise capacity

Try to plan cooking schedules so that ovens, fryers, grills etc are full or near full when operational as this will reduce the time the equipment needs to be on to cook the same volume of food.

Avoid opening oven doors

Use the viewing panel to inspect food whenever possible so that door opening and therefore heat loss is minimised. This will reduce the power consumption of the oven and minimise cooking times.

Use appropriate size utensils

WHAT'S YOUR SHOE SIZE?

Pots and pans should be chosen with the appropriate base size for the heating ring. Baking tray sizes should be chosen to maximise cooking space within the oven.

Keep lids on pans

Make sure that only the required amount of water is put in saucepans and kettles, and use lids and covers to retain heat.

Ensure simmer controls are used where possible

Turn down hob rings to simmer food and do not move pans off centre of ring. Rapid boiling does not cook food any quicker, but will use additional energy and heat up the kitchen.

Avoid prolonged warming

Hot storage of cooked food should be kept to a minimum. Avoid cooking food too early, both to reduce unnecessary equipment usage and ensure a good quality product.

Only use serving equipment as required

Hot plates, warming cupboards and heating lamps are very energy intensive (heating lamp 500w). Only switch on when needed and turn off as soon as possible.

Refrigeration

Compared with the high power ratings of cooking equipment, the installed capacity of refrigerators and freezers is relatively small. However, because cold storage equipment is in continuous use it creates significant energy costs.

Fully use refrigerated space

Stack food so that it maximises the use of the chilled space available without preventing airflow around the cabinet. When stock is low, transfer the contents to other units and switch empty cabinets off.

Minimise door openings

Open fridge and freezer doors as little as possible. Try to place all food for one sitting into one or more service refrigerators so that temperatures in main storage units can be maintained, thus reducing energy consumption.

Ensure correct temperatures are maintained

Set refrigeration temperatures according to the produce stored and periodically check that these temperatures are maintained. Refrigeration temperatures set too low increase running costs by 2-4% per degree. Overcooling also increases the probability of equipment failure.

Defrost frozen food in refrigerators

Plan so that frozen food is defrosted in refrigerators as this will reduce load on fridges (remember this will take longer than at room temperature). With careful planning you may also avoid having to defrost food in microwaves.

Do not place hot/warm food in fridges/freezers

Wait for food to cool down before placing it in refrigeration cabinets otherwise it will increase energy consumption. Don't make the fridge's life harder!

Defrost regularly

Keep fridges and freezers ice-free and follow appropriate defrosting regimes according to the manufacturers' recommendations (every two months as a minimum).

WHAT'S YOUR SHOE SIZE?

Manage display fridges/vending machines

Where display fridges are used in the serving area ensure that either night blinds are used or units are emptied of perishables and switched off during non-serving hours. Also consider the use of seven day plug-in timers for display fridges, water coolers and vending machines containing non-perishable items. Third-party machinery (e.g. vending machines, water coolers) can be put on a seven-day timer by agreement with the supplier

Remembering that in some cases, the energy used to run these items continuously is more than the revenue the school may be getting from the supplier

Regular cleaning for optimum performance

Carry out regular cleaning and maintenance checks, in particular check that seals on cabinet doors are clean and undamaged, the inside of the cabinets are clean and ice-free and condenser coils are clean and unobstructed.

Properly locate fridges and freezers

Refrigerated storage should be positioned (as far as possible in unheated areas which are well ventilated and away from heat sources such as ovens and grills etc. Each refrigerated cabinet should have sufficient air-gap around it to allow air to circulate (especially around the back where the cooling elements are, up to 6 inches) and staff should be instructed not to block it, for example by placing trays over ventilation panels.

Dishwashing and hot water use

Washing equipment used in catering facilities can consume substantial amounts of energy.

Maximise dishwasher loads

Fully load dishwashers before running the wash cycle and ensure items are correctly stacked to make maximum use of space.

Use appropriate wash program

Make sure the wash program is suitable for the utensils being washed and the level of soiling (time and temperature). Use economy settings where possible.

Consider use of sanitising liquids

Using low temperature sanitising liquids enables use of lower temperature settings on your dishwasher. Ensure dosing of detergents and rinse aid is measured effectively.

Heat water with gas

You will have substantial hot water use. If this water is heated by electricity, investigate switching to heating with gas, as this will cut costs and associated carbon emissions.

Avoid unnecessary hot water storage

Check hot water heating timers for kitchen and make sure that the water is not being heated after the kitchen has finished use for day

Do not wash under running water

Avoid washing utensils or produce under running water this will increase your utilities bill and carbon emissions (especially if the water is heated).

Report leaks and dripping taps

If you notice water leaks or dripping taps, report the problem to your site manager.

Regular cleaning for optimum performance

WHAT'S YOUR SHOE SIZE?

Carry out regular cleaning and maintenance checks to ensure the equipment is working to its maximum capacity.

Consider installing air-to-water heat recovery equipment

School kitchens expel large quantities of heat but over 50% of this lost heat can be recovered. Air-to-water equipment turns this lost heat into a hot water source.

Catering - Heating, Ventilation and Lighting

Good kitchen ventilation and lighting is a very important part of ensuring a comfortable and safe working environment, but will also contribute to a large proportion of the kitchen's energy consumption.

Minimise use of ventilation

To prevent odours and contaminants from the kitchen permeating into adjoining areas, such as dining rooms, kitchens will usually have extract canopies and/or fans which draw large quantities of air out of the kitchen. This air is quite often replaced from adjoining areas which are heated and this can lead to large quantities of this heated air being wasted. To avoid this, care should be taken that ventilation systems are used only when required and that when they are switched on the following two points are also considered.

Ensure control settings reflect demand

Ensure extract canopies and associated supply systems are only fully operational when the equipment beneath them is being used, i.e. during cooking or dishwashing. Ventilation does not usually need to operate at full capacity all the time, so make use of any controls that will adjust the speed of supply and extract fans to reflect the requirements of the space at different service times, such as when prep work or cleaning-up is being carried out.

Do not use cooking equipment to heat the room

Ovens, burners etc should not be used to heat the kitchen area, if the room is too cold at the beginning of the day speak to your site manager about adjusting the heating system.

Is the extract hood correctly positioned?

Check that all your major heat, steam, grease or other pollutant producing equipment is suitably positioned beneath the extract canopy otherwise the system will be a lot less efficient at removing these contaminants, which will impact both upon the quality of the working environment and also the energy consumption of the ventilation system.

Regular cleaning for optimum performance

Kitchen extract hoods and grease filters should be cleaned at regular intervals as efficiency can reduce by up to 50% in systems that are not maintained properly. Follow the manufacturer's guidelines on cleaning ensure a suitable planned preventative maintenance/cleaning regime is in place for all system components to maintain maximum efficiency and prevent breakdowns.

Remove unnecessary lights

Take a look around your catering facility and check whether any lights can be permanently removed (for example, if they are above extract hoods, fridges, vending machines and only lighting the top of the equipment).

Switch off policy

WHAT'S YOUR SHOE SIZE?

Is someone nominated to check all catering & heating equipment is turned off at the end of every lunch period? Unused large catering equipment can very quickly consume all your reserves.

Include the kitchen area in any school switch-off campaigns. Agree with staff to switch off lights when they are not required (i.e. When there is sufficient daylight or when an area is unoccupied). In particular this is likely to apply to any storage areas, the servery and eating areas.

Regular cleaning for optimum performance

Due to the nature of kitchen environments lights can quickly become dirty, and should be regularly cleaned to ensure maximum light output.

Replace energy-eating equipment quickly

School kitchens are high activity spaces. Inefficient kitchen equipment will be using unnecessary energy day after day. Replacing inefficient equipment for “A” energy-rated can have surprisingly quick payback periods - especially for dishwashers, fridges and freezers.

SWIMMING POOLS

If you have a swimming pool, contact us for specialist advice on energy saving for this high energy use facility

BUILDING FABRIC

Every school is different. BUT around two-thirds of the heat from a typical school is lost through the building fabric (walls, floors and ceilings).

You may not be able to change a problem area this week, month or year, but you can gradually improve the energy performance of your building fabric and you can calculate what actions will bring the best savings and how quickly. It is also possible to benchmark your energy usage against schools of a similar size, design and age. (See section 3a)

So, the first step to reducing your energy use is understanding the unique strengths and weak areas of your school building fabric, and then having a plan of how to address them over a period of years.

Have you thought about borrowing / renting / purchasing a thermal imager that could show where heat loss is greatest?

This is a great STEM learning opportunity - see the appendices section for how one school made big changes from just one afternoon of heat exploring.

Regular Housekeeping Schedule

Conduct a regular walk around using a checklist (see **Resources**) to check conditions of window panes and frames, skylights, roofs, skirting and eaves.

Keep an eye out for damp. Not only will it destroy the building structure but it also reduces insulating properties.

Deal quickly with gaps and snags in the building fabric

Insulation

WHAT'S YOUR SHOE SIZE?

Effective insulation and draughtproofing is essential to reduce heat loss from buildings, as well as limiting noise and airborne pollution. Most buildings have scope for improvement. Good insulation is best fitted during the construction or refurbishment of a building when it is more cost effective and less disruptive. However, additions at any point ARE ALWAYS energy saving.

What percentage of roof spaces are insulated and how deep is the insulation?

Having a rolling programme of insulating can make a big difference for a small annual outlay. Prioritise the coldest areas.

Are your walls and roofs well-maintained?

Insulation can only do so much! A repair "stitch in time" saves a huge energy bill!

Is the temperature generally consistent throughout the building?

Identify where the fluctuations are and what could be causing them. It is often cheaper to deal with an issue straightaway, for example a particularly draughty doorway or boiler with no reflective backing to wall, than it is to bear the heat loss day in, day out.

Look at roof lines on a snowy or frosty day!

You will quickly spot the uninsulated spots where snow is not settling.

Draughts

Operable windows in generally good condition can be draught-stripped to reduce heat loss.

Do the penny test - If a penny coin can slide between a window and its frame, draught-proofing will be cost effective and improve comfort.

Keep doors closed between heated and unheated areas

All external doors should be kept closed when heating or cooling systems are in operation. Consider fitting automatic closers to external doors and to internal doors that separate areas with different heating or cooling requirements. This is a relatively inexpensive measure which can usually be carried out by on-site maintenance staff.

Consider adding a lobby to cut down on heat loss.

Installing a draught lobby at frequently used entrances can reduce heating costs and draughts. Where possible, the two sets of doors should have automatic control.

Do door closers work properly?

Are doorways blocked by furniture or doorstops?

This again comes down to helping staff understand the way your whole school building works as a machine. What can seem an obvious action in one place or condition, for example holding a door or window open, can actually be counterproductive by confusing sensitive cooling/heating sensors or be taking the most expensive of options.

Are windows closed as a default position? Are superfluous windows sealed closed?

Thermal imaging can emphasise just how much of your building heat disappears out of windows.

Radiators

Are radiators zoned and/or independent of each other?

Ensure radiators are unobstructed

WHAT'S YOUR SHOE SIZE?

This will increase circulation of heat. Radiators, fans and ducts should be clear of furniture and other obstructions.

Fit thermostatic radiator valves

If your radiators are on full without any form of regulation, you could be overheating a room and increasing your heating bill.

Could radiator efficiency be improved?

For example, by placing reflective material behind them, moving them to different part of the room, updating them to more fuel efficient models.

Are single radiators and electric heaters turned off and checked regularly?

This is particularly an issue in isolated areas (mobile classrooms, kitchens, changing rooms) and regularly used spaces for which no one person takes responsibility (halls, libraries, dining rooms)

Closing blinds and curtains at night - all year

In summer months this measure can reduce heat in rooms receiving direct evening sunlight; in winter it keeps more residual heat in the room.

More radical thoughts...

Do you have pitched roofs that could hold solar (heating water) or photo-voltaic (producing electricity) panels?

Solar panels can be up-cycled from old radiators and old fridge parts - see appendices and involve your D&T department.

Could heat (e.g. from the kitchen) be recovered to heat the rest of the building or the hot water tank?

Could you install wind energy generating systems and/or heat pumps?

As well as saving money they can be very useful in curriculum work and for publicising the school's sustainability and energy-efficiency values.

WHAT'S YOUR SHOE SIZE?

6) CURRICULUM OPPORTUNITIES

By enabling pupils to use their learning to impact their immediate environment, the school becomes a living laboratory and curriculum topics are brought to life.

Energy issues can be taught through a range of curriculum subjects including:

- Science
- Technology
- Mathematics
- History
- Geography
- Citizenship
- English.

You can also cover energy issues in non-statutory studies such as economic and industrial understanding, and health education.

Curriculum topics can range through:

- Measuring, monitoring and analysing energy use
- Data management
- Campaigning, leadership and behaviour change
- Energy use - rights and responsibilities
- Energy saving innovations
- Energy saving and financial management
- Closed-circle technologies
- Renewable energies
- Building design and adaptation

Switch Off Fortnight

As a taster activity why not sign up for the annual switch off fortnight in November.

www.jointhepod.org/campaigns/switch-off-fortnight/

HERE ARE JUST A FEW CURRICULUM IDEAS...

CLASS AUDITS - MATHS, SCIENCE AND BUSINESS SKILLS

After collating energy usage data from across the school, pupils can analyse performance using a range of scientific theories and then recommend potential actions to reduce cost, usage and CO2 emissions. This can be extended to problem-solving and the development of project management and STEM skills to reduce energy loss.

DESIGNING EXPERIMENTS

Pupils can design experiments to investigate specific impacts of energy saving; for example the insulating effect of double glazing: first, design simple experiments to investigate draughts around windows and doors; then consider airflow in more detail e.g. by using fume cupboards as an air flow problem.

RECORDING ENERGY USE

Pupils can act as energy monitors, taking meter readings (available online and offline). Real time meter readings can provide a range of curriculum opportunities but make sure that meters are read correctly. It is best if pupils can take readings themselves but be aware of health and safety issues

WHAT'S YOUR SHOE SIZE?

if the meters are located in inaccessible or dangerous locations. Each meter should be read at the same time each day or each week. On Fridays at the end of school activities is a good time. A second check first thing on Monday morning gives weekend consumption.

- A meter register template is in the appendices
- Details to access online readings and details are in the appendices to this document (Systems-Link and BG360)

ANALYSING ENERGY USE

Monitoring patterns of consumption is a simple way of introducing the use of graphs into the curriculum. Real time meter readings are an excellent source of data for analysis.

Pupils can:

- Compare patterns of use. Today's pattern of energy use should be very similar to the same time last year and not that different from yesterday. You can also look at data for the school week, weekend, month, term, or school year. Significant differences can be investigated;
 - Determine the general trend in energy consumption - is it up or down this term / year?
 - Try to relate changes in energy use to changes in weather, occupancy, community use or other factors;
 - Identify where equipment may be operating out of sync;
 - Benchmark consumption by working out the floor area of the school or the total number of people on the site;
 - Estimate progress towards your energy saving objectives.
- Lesson plans using your real-time school data are in the appendices

PROBLEM SOLVING

The tricky part for all schools is that once all the data is gathered and core issues have been identified, how do we improve the energy performance of the building? Some issues will be behaviour related and require protocols and campaigns but others will be concerning the construction and use of the building. Students can seek to apply scientific theories, such as air flow and convection, to find achievable solutions and adaptations that balance environmental impact, cost, payback and viability.

- See Using STEM in the appendices for an interesting case-study

PROJECT MANAGEMENT AND EVALUATION

Transferable to many roles and industries, project management is a core skill that can impact on students' employability, but also their approach to their studies.

Introduce a single issue to be addressed within a clear framework of:

identify need - research - plan action - SMART delivery - review and evaluation

Students can work together to use simple PM tools and methods such as action plans, budgeting, questionnaires and role distribution to deliver a project.

BEFORE BEGINNING ANY WORK ON SCHOOL ENERGY ISSUES IT IS USEFUL TO GET A SENSE OF PRIOR PUPIL ENERGY AWARENESS.

- Short energy awareness questionnaires are included in the appendices

ENERGY LESSON PLANS & RESOURCES IN THE APPENDICES

Energy awareness questionnaires (all key stages)

WHAT'S YOUR SHOE SIZE?

Whole-class energy projects (multi subject)
Eco-Schools energy lesson plans (all key stages)
Energy / subject area links
Using your school's online real-time data - lesson plan
Examples of innovative STEM projects

ENERGY REDUCTION RESOURCES IN THE APPENDICES

Energy checklists
Eco-Schools FAQs, environmental review and action plan templates
Meter register template
Understanding your Display Energy Certificate

ENERGY LESSON PLANS AND RESOURCES AVAILABLE ONLINE

Many other sites exist; this is just a small selection!

The first place to try is Eco-Schools England, who have a broad range of lessons that link to curriculum but also to achieving the Eco-Schools Awards.

<http://www.eco-schools.org.uk>

Our lesson ideas are intended to inspire teachers to deliver the curriculum in thought provoking ways that encourage students of all ages to engage with the concepts of living and working in tomorrow's world.

Our lesson ideas will help you set out on a learning adventure with your students. We cannot predict what you will discover but we look forward to you joining us on your journey.

All the lesson ideas are flexible and can be adapted by you to suit your needs. They are not intended to act as formal lesson plans.

Make sure you apply for an Eco-Schools award to recognise the achievements of your students and the school.

Can't find what you're looking for? We have developed some more teaching resources based around global citizenship and community cohesion in partnership with the Love Where You Live campaign.

<http://www.generationgreen.co.uk/teachers>

Generation Green is an education programme run by British Gas for Key Stage 1 to Key Stage 3 pupils and teachers, providing free of charge classroom resources, educational experiences and sustainable energy technologies to more than 13,000 schools across the UK

<http://www.ourplanet.org.uk/teacher-resources-search.asp>

STEM Lesson Plans addressing renewable energy

<http://www.atlasschools.org/the-toolkit/>

The Atlas Schools toolkit helps schools to measure their carbon footprint and understand how different activities of the school affect carbon emissions. It also helps schools to identify actions that it can take to reduce its environmental impact and save money and helps schools track their carbon footprint over time

<http://www.ncb.org.uk/osow>

NCB and the Institute for Development Studies worked with children's charities to understand and connect sustainability to their core purpose. The project culminated in guidance for children's organisations on becoming Climate Smart.

WHAT'S YOUR SHOE SIZE?

http://www.foe.co.uk/sites/default/files/downloads/lesson_plan_energy_and_cli1.pdf

Energy and Climate Change with Friends of the Earth - covering Citizenship Key Stage 3: Unit 18: Developing your school grounds; and Unit 21: People and the environment; Geography Key Stage 3 Unit 14: Can the earth cope?; Science Key Stage 3 Unit 7I: Energy resources; Unit 9G: Environmental chemistry; and Unit 9I: Energy and electricity

<http://en.seacs.eu/energy-house-kit-secondary-primary-schools/>

The School Energy House Kit lesson plans were developed to teach pupils about personal energy use and climate change and to involve them in planning and implementing a low energy lifestyle at home and at school. The central feature of the programme is to design and produce a model home (the Energy House), demonstrating features of energy good practice, to be used as a tool to inform and engage others

<http://www.eonenergy.com/about-eon/energyexperience>

The E.ON Energy Experience has been created to help teachers to teach young people about energy. The resources will help young people to understand about the different sources of energy we use, the relative merits of each, the options for energy production going forward and what their choices will mean locally, nationally and globally.

www.jointhepod.org

Curriculum-linked resources for 4-14 year olds across Science, Geography, Maths and a range of other subjects. A range of resources linked to Eco-Schools for any teacher or pupil trying to make their school greener and more sustainable.

www.powerdown.actionaid.org.uk/

PowerDown is an award-winning multimedia resource for geography, citizenship and science which takes learners on a journey to: Learn (find out about climate change and how it is already affecting young people around the world); Investigate (focus on how energy use at home and at school is linked to climate change); Act (take real steps to be part of the solution to climate change). Then, a "climate heroes" section introduces people around the world who are adapting to climate change.

www.co-operative.coop/green-schools-revolution/

Being green isn't just about recycling or turning down your thermostat. With Green Schools Revolution's wide range of inspiring resources, your pupils will learn about the magic of bees, how to reduce water consumption and the facts on Fairtrade farming. They'll get into debates about the pros and cons of nuclear power and even learn about the ingredients of a healthy breakfast

www.sustainable-schools-alliance.org.uk/doorway-resources/energy-water/

Run a Green Day event to inspire pupils and colleagues in your school to learn about climate change and how it relates to the buildings and spaces around them. This activity kit provides ideas, activities and resources for holding a Green Day in your school, and making it a more sustainable place in which to work, play and learn. It is designed to work in both primary and secondary schools for key stages 1, 2 and 3.

WHAT'S YOUR SHOE SIZE?

7) WE WANT TO BE A FULLY SUSTAINABLE SCHOOL

"A sustainable future is one in which a healthy environment, economic prosperity and social justice are pursued simultaneously to ensure the well-being and quality of life of present and future generations.

Education is crucial to attaining that future."

Learning for a Sustainable Future - Teacher Centre

Sustainability can be broken down into three CAREs.

How do we:

- Care for the world?;
- Care for the community?;
- Care for ourselves?

In school settings the Sustainable School Framework looks at these under '8 doorways', while Eco-Schools sees these as 9 themes. Either model is effective and recognised as impactful by Ofsted. Both provide a large range of teaching and planning resources.

www.eco-schools.org.uk

www.sustainable-schools-alliance.org.uk

SUSTAINABILITY THEMES

Under each theme being sustainable is about what happens in the classroom, on the school campus and with the local community.

SUSTAINABLE SCHOOLS FRAMEWORK	ECO SCHOOLS MODEL
Food and drink	Energy
Energy AND water	Water
Travel AND traffic	Biodiversity
Purchasing AND waste	School grounds
Building AND grounds	Healthy living
Inclusion AND participation	Transport
Local well-being	Litter
Global dimension	Waste
	Global citizenship

WHAT'S YOUR SHOE SIZE?

WHY AIM TO BE A SUSTAINABLE SCHOOL?

You probably already do some activities and thinking under each of the different themes.

However, lasting sustainability comes from coherent approach that covers all areas WHILST reducing workload, increasing connections and improving staff and pupil well-being.

Sound good?! Don't just take our word for it.

The Impact and Benefits of becoming a Sustainable School

A growing body of evidence shows that taking a sustainable schools approach helps you to meet your existing school priorities, whether that's exam results, sparking young people's interest in learning, improving pupils' well-being and behaviour, saving money through reducing energy costs, or promoting healthy lifestyles.

This evidence was very well summarised by the **Department for Education** in their publication "*Evidence for the Impact of Sustainable Schools*". Most recent information from the Department of Education places the responsibility to perform sustainably squarely on school and locality led action.

Ofsted agrees. In their research they have found that *"learning about sustainability captures the interest of children and young people because they can see its relevance to their own lives."* Head teachers have found that *"education for sustainability has been an important factor in improving teaching and learning more generally."* Further to this, *"some school leaders identified links between particular pupils' involvement in sustainable activities and improvement in their attitudes and behaviour generally."*

"Some years ago I would not have highlighted [Education for Sustainable Development] to Ofsted for fear they would consider it a distraction from core business. Now ... I am confident that our work in this area has made a direct difference to pupils' achievement, behaviour and health and I'm therefore proud to discuss it with inspectors. ... Without doubt sustainable development has helped our children to develop a greater sense of care towards each other, the natural environment and the wider community... preparing [them] for the future."

Head teacher

"I hope I think about things as much as I ask my children to think about them. I hope I question as much as they do, because seeing the world through the eyes of the children who are growing into it, and giving them the opportunity to develop critical skills to deal with the way that the world is changing, is the most important thing an educator can do."

Primary school teacher

"The children benefit from the calm and quiet time working in the garden and being close to nature. They develop a reflective disposition which helps them to reflect on their behaviour both outside and inside the classrooms. Parents and visitors always comment on how good the garden looks and the children are very proud of it."

Head Teacher, Primary School

KEY AREAS THAT ARE IMPACTED BY SUSTAINABLE SCHOOLS

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1. **School budgets** - Simple, sustainable resource efficiency and energy saving can make savings of £10-20,000 per annum
2. **Learning** - pupils enjoy learning about sustainability issues as they are directly relevant to their current and future lives, and their job prospects. They can make connections between what happens in the classroom and a bigger picture, and see themselves as successful learners.
3. **Wellbeing** - pupils channel negative energies through gardening and outdoor activities, which make them better able to focus and deal with difficult situations in the classroom. They can also improve their speaking and listening and other transferable skills.
4. **Community cohesion** - benefits are passed on to parents and the wider community.
5. **Attainment** - schools with a whole-school approach to sustainability (involving governors, bursars, school leaders, curriculum coordinators, pupils and parents) achieve well in other areas.
6. **Recognition** - 'green issues' can really enhance an Ofsted visit and show all the added value activities in school and the benefits to wellbeing and learning of its pupils. Ofsted regularly comment in inspection reports on the wider benefits to a school of outdoor learning and being sustainable.

The increasing importance of Sustainable Schools into the future -

- There is a demanding global need for more education and skills in this area to raise awareness, build sustainable technologies and change behaviours. Preparing our children for the jobs and roles of the future.
- Through Building Schools for the Future and other capital programmes, we have a legacy of some fantastic new school buildings - but it's crucial to develop the behaviour change and awareness to go alongside that, using the building fabric and grounds as resources for learning.
- The Newham family of schools is one of the most important examples of co-operative leadership across the country. We have the opportunity to ensure we have a sustainable core to all we do. To truly "be the change we want to see in the world"
- The work adds value to many other work streams - teaching and learning, pupil wellbeing and school ethos, active citizenship, promoting British values, healthy lifestyles, parental involvement, and behaviour.
- Through more sustainable behaviours schools can save a lot of money and limited global resources - through simple education about low or no cost measures.

SUSTAINABLE SCHOOLS AND SCHOOL IMPROVEMENT

Ofsted has found that, in the most successful schools, sustainability was an integral element of a well-planned curriculum alongside special events and activities, and was experienced both within and outside the classroom. In these schools, Ofsted found instances of enhanced attitudes to learning, better behaviour and attendance, and improved standards.

Education for sustainability had been an important factor in improving teaching and learning more generally. This was confirmed through lesson observations in a range of subjects across the sample of schools visited.

- School leaders identified links between particular pupils' involvement in sustainable activities and improvement in their attitudes and behaviour generally.

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- Pupils responded particularly well to education for sustainability when it gave them the opportunity to take part in practical activities within and outside the classroom and enabled them to research, plan and implement projects that made a clear difference to the school and the local community.
- A common characteristic of the lessons observed, across the full range of National Curriculum subjects seen during the survey, was the high level of engagement of the pupils in work they perceived as relevant to their lives and future well-being.
- The schools demonstrated how greater awareness of the need for sustainability can lead to reduced financial costs and better management of resources and estate.
- The knowledge and understanding that the pupils gained at school contributed to their leading more sustainable lives at home which, in turn, led their families to re-examine their lifestyles and use of resources.

Case study

One of the primary schools visited had been given a notice to improve by Ofsted because it was failing to provide a satisfactory standard of education for its pupils.

While recognising the need to raise standards in English, mathematics and science, the headteacher was keen to ensure that all pupils in Key Stage 2 continued to study a range of topics on sustainability. Scrutiny of their work during the survey showed that many of the pupils were making good progress in these lessons because they found the topics interesting and the opportunity to take part in practical activities stimulated their learning.

The school made significant improvements and, in just over a year, it had progressed to being a good school. Its most recent inspection report refers specifically to the links between the improvements made and the 'exciting' curriculum of which sustainability was an 'outstanding feature'

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SUSTAINABLE SCHOOLS - FACTS, FIGURES AND POTENTIAL SAVINGS

Reduced carbon

The [Fair Earth Share](#) is the maximum amount of CO₂ that scientists have calculated each person can use before our planet becomes unsustainable. This is about 2.5 tonnes per person per year, requiring a huge reduction from the 10 tonnes currently produced by the average person in Britain.

Effective energy management at school level combined with new meter reader technologies can identify huge overspends. For example, through Energy Use Analysis, Hallsville School saved £20,000 of their annual energy costs 2011/12. That is 11 tonnes or 66 double decker busloads of CO₂.

Reduced energy and water use

The Carbon Trust states that schools can reduce the amount of energy they use by 20% through simple, low cost measures. A typical Newham primary school spends around £4000 per month on electricity, so a 20% reduction equates to £800 saved per month, or £9,600 per year.

The impact of new technologies (such as voltage optimisation), capital programmes and renewables bring additional financial, ecological, and educational benefits

Water is a scarce resource and costs are rising rapidly. Equipping a school with water conservation devices can halve its water use, delivering savings in the region of £500-1,000 per year.

Sustainable purchasing

42% of carbon emissions from the schools sector come from procurement. This is nearly one per cent of total carbon emissions in the UK.

These emissions are produced by companies that supply goods and services to schools, for example a school food provider. This could include: emissions related to their use of energy to run their buildings and produce their food products; emissions associated with transporting their products to school sites; and emissions from waste produced by schools.

Simple procurement tools can reduce the carbon impact of the day-to-day buying choices and decisions made by each school whilst saving school funds. Many medium-scale investments can have payback within 2-3 months; for example replacing paper towels with 'bio-dryers' at £3,000 (initial outlay but negligible electricity cost) generates a saving of £4000 per year on fuel bills, reduces carbon liabilities, and saves paper resources and waste disposal costs.

Sustainable school travel

Emissions from school travel and transport increased by 59% between 1990 and 2006; journeys to school, and private car use for those journeys, increased considerably. School travel planning has gone a long way to addressing this; they key is to make these changes sustainable.

Reduced waste

Schools in England throw away the equivalent weight of 185 double decker buses of waste every school day. A lot of rubbish ends up in landfill sites, meaning we lose valuable resources.

The majority of waste in schools is recyclable. However, primary schools currently only recycle 13% of their waste, and secondary schools 20%. A large proportion of waste from schools is food, paper



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and card (75% by weight from primary schools and 70% by weight from secondary schools). It is generally more expensive to dispose of waste in landfill sites than it is to recycle.

Simple no or low cost changes that can be made immediately can save £1500 per year.

Sustainable school food and catering services

Food waste production can be reduced by as much as 20% in many schools, often with little or no capital investment. Many small and large steps can have a positive and significant effect on the sustainability of the school food system.

Many of these steps will also have a positive effect on school budgets, as in most cases efficiency and sustainability can be pursued at the same time. Schools working together can have a huge impact on the use of locally sourced foods, levels of waste recycling, and the energy efficiency of kitchen and dining equipment.

Global dimension in schools

Sustainable development isn't just about the environment - and it isn't something we can achieve in isolation. The air we breathe, the food we eat and the clothes we wear link us to people, environments and economies all over the world. Schools, through curriculum, campus and community, can help pupils to make sense of the complexity of our world and their place in it.

For example, what is our carbon debt to developing countries and how do we repay it? Simple projects such as Carbon Partners tying international linking with sustainability can make global justice real for our young adults.

Engaging with biodiversity

Biodiversity is life. Scientists use the word to describe the links and variety between all living things on the planet; humans, nature, wildlife, plants and animals are all inter-connected. We all rely on biodiversity for our survival, because of the way our planet provides for us.

Economic growth and social progress can result in the neglect of the essential need to consider and care for the environment. Yet the conservation and sustainable use of biodiversity is critical for both the global economy and for the basic resources needed to support our planet's growing population.

By engaging with biodiversity, schools can improve their own performance, while equipping pupils with the skills, understanding, and confidence to adapt to these changes and to succeed in the future. At the same time, they will also be benefiting biodiversity - in the school grounds, local community, and all around the world.

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BUT WHERE TO BEGIN?

Sustainability is about the whole school. Its ethos, long-term planning, finances, learning commitments, relationships ...

The governing body is the place to start.

6 BIG QUESTIONS FOR GOVERNORS

1. How can your school embed the care agenda highlighted by Sustainable Schools - care for ourselves, care for others, and care for the environment - as a distinctive characteristic or feature of the school?
2. How can your school involve all the school's stakeholders in its decisions, balancing short-term interests with longer-term goals while considering the needs of the environment, future generations, and other communities?
3. How can your school use the Sustainable Schools doorways - and the real-life learning opportunities that they offer - to enhance pupils' enjoyment and progress, and contribute to pupils' achievement and standards?
4. How can your school develop individuals with the knowledge, values, skills and self-confidence they need to make positive contributions to their family, their community, their job, the environment, and the wider world?
5. How can your school's curriculum best address the statutory requirements for teaching sustainable development while contributing to each pupil's enjoyment of learning, and their need to keep learning sustainable behaviours over their lifetime?
6. What style of school leadership and management does the school need to promote lasting school improvement through a joined-up approach that integrates best value, best practice and sustainability?