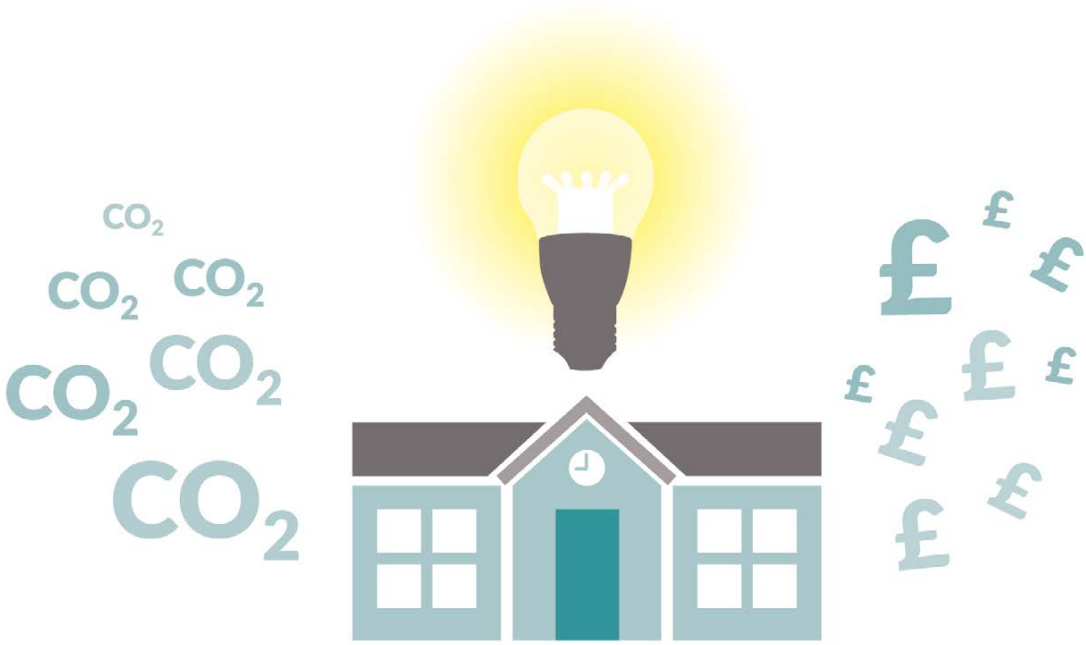
Herefordshire Council

Guide for Schools on Energy Savings and Carbon Reduction



Resource pack

Contents

Introduction

Managing the energy used in your school plays a vital role in contributing towards reducing greenhouse gas emissions and to addressing our contribution towards changes in our climate.

The UK has committed to net zero emissions by 2050. Herefordshire Council has committed to net zero emissions by 2030.

Herefordshire's maintained school's energy costs and emissions

In Herefordshire 63 out of the 97 schools are maintained (non-academy) schools.

During the financial year 2019/2020 maintained schools spent £973,288 on energy:

57 primary schools spending £578,987.

5 Secondary, 2 Special and 1 Pupil referral unit spending £394,301.

A 10% saving in energy usage could result in an approximate overall financial saving of £39,500 for maintained schools.

During the financial year 2018/19 the emissions from all of the 97 schools in Herefordshire are estimated to be 5,496 tonnes CO_2e which constituted a 1/3 of Herefordshire Council's total carbon emissions of 16,119 tonnes CO_2e as stated in Herefordshire Council's Carbon Management Plan 2020/2021 – 2025/2026.

Some of the data is estimated as it's based on historic data from the pre academy status of 34 schools.

National Schools' Energy usage and emissions

The Sustainable Development Commission's carbon footprint for the English schools estate estimated that in 2009 the sector emitted 9.4 million tonnes of carbon dioxide equivalent from using approximately 11 million kWh energy per year from their direct emissions. Modelling suggests that these figures will remain relatively constant through to 2050 due to increased hours of usage combined with energy efficiency measures. The average energy cost per pupil in English Schools is £44. Savings of 10% that can be achieved through behaviour change alone represents a possible financial saving of £40m.

Sources

www.sthc.co.uk/Documents/SDC_Towards_A_School_Carbon_Management_Plan.pdf

www.derea.ioe.ac.uk DfES Energy and Water Management Guide for Schools

Reducing your school's energy usage and therefore emissions will be a vital contribution to the target of net zero emissions for Herefordshire by 2030 being achieved.

This guide will provide you with a method and ideas for reducing your energy usage that will automatically lead to a reduction in your carbon emissions. The data collected will also enable you to calculate your Carbon Footprint from your direct emissions.

For general enquiries about energy Herefordshire Schools can contact the Sustainability and Climate Change Team by emailing **S&CC@herefordshire.gov.uk**

Carbon Footprint of a school

What is a carbon footprint?

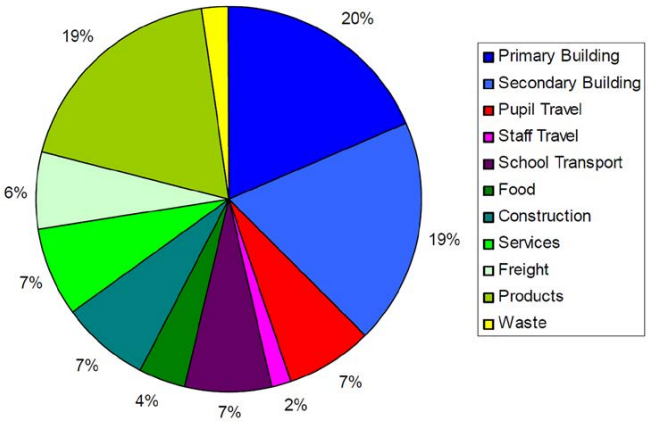
A carbon footprint is an indication of the amount of carbon dioxide and equivalent gases that are released into the atmosphere from an individual or an organisation through their use of energy. It is expressed in tonnes of carbon dioxide per year (tCO_2e/yr)

A large portion of our electrical energy is generated through burning gas and coal which are fossil fuels although this is reducing every year. When fuels are burnt they release carbon dioxide and other gases into the atmosphere and this happens when we use electricity, and gas or oil for heating.

These emissions are called direct emissions because they're caused by the organisation itself and constitute part of their carbon footprint and contribute to global warming and climate change.

A comprehensive carbon footprint requires auditing of energy used in the procurement of supplies, furniture, food and transport as well and the emissions resulting from these are termed indirect emissions. A comprehensive carbon footprint is therefore the total of direct and indirect emissions of an organisation.

The pie chart below shows a more detailed sector breakdown of schools' national carbon footprint 2009:



Source
www.sthc.co.uk/Documents/SDC_Towards_A_School_Carbon_Management_Plan.pdf

A good starting point though is to calculate the carbon footprint from your direct emissions. Instructions on how to calculate your carbon footprint from electricity and heating methods used in your school can be found on pages 22 - 25.

Energy efficiency measures leading to a reduction in emissions and cost savings

The other benefits of being more efficient in school are that savings on energy bills can then be reinvested for the benefit of the school every year, the school will be more resilient to increasing fuel costs and shortages and pupils will be equipped with vital skills for the future.

This is a practical guide intended to help schools to deliver immediate energy cost savings typically in excess of 10% of the utility bill through no cost behaviour changes.

By selecting the appropriate measures as described for your school you'll be able to calculate the expected financial and carbon savings you will achieve if implemented successfully. To further reduce energy usage financial investment will be required in measures such as improved insulation, efficient lighting, efficient boilers, triple glazing for doors and windows and purchasing of renewables.

Key Facts

- Significant savings on energy bills can be achieved through simple no-cost actions such as only using lights as necessary, turning lights off after use, turning equipment off instead of leaving it on standby.
- Reducing the heating temperature by 1°C can save up to 10% on heating costs
- Reducing the heating time by 1 hour a day (30 mins, morning and evening) can reduce heating costs by up to 10%

Summary of Measures

This guidance focuses on a few simple operational improvements which can be implemented quickly with immediate benefits, namely:

Fast Track Opportunity	Opportunity in School	Savings Opportunity
Active labelling of light switches	Many schools have excessive installed lighting and multiple light switches in rooms. Mark up light switches that are not required to be on under normal daylight.	As much as 30% of lights can sometimes be left off (up to 12% of your electricity bill!)
Switch off lighting in daylight and when room is unoccupied	Switch off lighting when not required and maximise use of natural daylight. Also check that lights are switched off at breaks etc.	Savings are dependent on existing practices and windows (up to 10% of your electricity bill)
IT equipment switch-off	The active labelling of all equipment (switches and plugs) so that all school users know what they can switch off.	Up to 5% of your electricity bill
Reducing your out of hours electrical load	School opening hours can be less than 2,000 hours per year meaning they're unoccupied for 5,000 – 6,000 hours a year. If electrical items are left on, out of hours, this causes a major waste of energy.	Savings up to 20% of your electricity bill
Checking that heating times fit with school usage hours	Reduces wasted use of fuels, emissions and costs	Reducing heating by 1 hour a day can reduce heating costs by 10%
Keeping windows and doors closed if the heating is on	If the heating system is being run ineffectively rooms can overheat and occupants open windows to reduce the temperature. Thermostatic radiator valves (TRV's) should be maintained so settings can be adjusted. Thermostats in rooms should be maintained and adjusted to the correct temperature. Recommended temperatures are listed below, e.g. classrooms 18°C	1°C can reduce or increase heating costs by 10%
Dressing appropriately for the weather	Encourage staff and pupils to wear more clothes if they're cold rather than turning the heating up.	Turning the thermostat up by 1°C can increase the heating costs by up to 10% in a year

More details about each measure are on pages 10-19 in this guide.

How to achieve energy savings and carbon reduction in your school

To ensure the success of your energy saving programme it's important to develop an action plan with realistic targets and to engage everyone in the school community. It's therefore recommended that you follow the following process:

Identify a lead person to drive the programme in the school

Set up an Action Team in the school with pupils/students playing a major part and make sure you identify and include your gatekeepers in your energy team.

Gatekeepers are people who are essential for the success of your energy saving project and will include your Headteacher, a governor, senior leadership team, schools business manager, site manager/caretaker, cleaners and kitchen staff representative.

Obtain energy bills for electricity, and gas/oil/lpg as appropriate for at least the previous financial year and calculate the carbon footprint of your school using the information on page 25.

Carry out a walk around the school using the Checklist on pages 27-29 to obtain a general overview of your school that should help in identifying actions.

Before taking any actions take electricity and gas meter readings for 10 school days, beginning and end of the day to establish daytime, overnight and weekend usage of energy and record on the template on page 32.

You'll be able to see if you've reduced energy consumption if you repeat this after implementing any actions.

Audit all electrical equipment in the school and record on the template on page 34 to give an idea of the potential for savings and to raise awareness of the amount of equipment that could be wasting energy.

Carry out an Out of Hours energy audit to find out what equipment is being left on overnight and at weekends. Record the results on page 33.

Carry out a heating audit to identify any issues with the heating system. Record the results on page 35.

Write an Action Plan, page 30, with the pupils, following the audit to decide on actions to be taken, who will be responsible and a timescale if possible. Example on page 31.

Ask each member of staff to appoint/elect an energy monitor for each class/tutor group to ensure actions are being carried out.

Write an Energy Policy to define what the school is trying to achieve and to remind everyone.

Examples can be found here:
schools.oxfordshire.gov.uk/cms/content/creating-energy-policy
eco2smartschools.org.uk/financial_module_/school-energy-policy-template/
www.edmondsley.durham.sch.uk/wp-content/uploads/sites/146/2014/07/Energy-Policy-2017.pdf

Communication

Once actions have been agreed on it's important to tell everyone what you're doing, all pupils/ students, staff, governors, parents/carers local community and wider. It'll help you to achieve the energy savings, reduction in costs and emissions as well as demonstrating good practice to the school and wider communities and influencing their behaviours to replicate the actions at home and work.

- Informing the school – arrange an assembly, delivered by pupils, to inform the whole school how much energy is being used, how much it costs, how much carbon is being emitted, what the Team are hoping to achieve and how everyone can help in reducing this. If people don't know how much the energy costs and if they're not paying for it themselves they tend not to think about it. Don't forget the cleaning, catering and visiting staff.
- Ensure the programme is on the agenda of Governors and PTA/Friends meetings as their decisions can influence the success of the programme e.g. purchasing green energy, energy efficient equipment etc.
- This information could also be included in staff memos, on a dedicated energy notice board, in newsletters and on the school website.
- Encourage parents through emails, texts and newsletters to support their children when asked to replicate the actions at home. We all have a part to play in reducing our carbon emissions and climate change.

Estimating Savings

As you work through the energy saving actions in this guidance, you'll have the chance to calculate the financial savings you could expect to achieve. These are estimates to give you a guide as to what savings you might be able to make.

Where calculations have been carried out we've assumed a charge 14p/kWh (kilowatt hour) electricity costs and 3.5 p/kWh gas. Schools will need to look on their school's utility bills to see what the school is being charged per kilowatt hour (kWh).

Breakdown of energy costs in a typical school

Energy consumption in schools can vary depending on the age of the buildings, their state of repair, occupancy hours and the amount and type of electrical equipment installed. Generally, secondary schools will have higher energy costs than primary schools. This is because secondary schools have larger buildings, more classrooms, longer hours and a larger number of students, as well as more widespread use of electrical equipment in ICT, science, sports and D&T lessons.

However, areas of energy waste are often the same regardless of school size or level. The information in the table overleaf details where the biggest savings can be made. They are divided into energy cost and energy use and comparing them could help school managers decide which areas to prioritise.

For example, note how much energy electric lighting uses – 8% – but then compare that with what it may be costing – as much as 20%. Electricity is more expensive and produces more emissions per kWh than gas.

Percentage of Energy Cost		Percentage of Energy Use	
Space heating (fossil fuel)	45%	Space heating (fossil fuel)	58%
Lighting (electricity)	20%	Lighting (electricity)	8%
Hot Water (fossil fuel)	15%	Hot Water (fossil fuel)	15%
Catering (fossil fuel)	8%	Catering (fossil fuel)	8%
Catering (electricity)	6%	Catering (electricity)	4%
Other (fossil fuel)	2%	Other (fossil fuel)	3%
Space heating (electricity)	2%	Space heating (electricity)	2%
Other (electricity)	2%	Other (electricity)	2%
Hot Water (electricity)	2%	Hot Water (electricity)	1%
Office equipment	1%	Office equipment	1%

Benchmarking

Even though energy consumption in schools varies due to the factors mentioned above it is possible to compare the energy efficiency of schools through benchmarking where data on energy usage from similar types of schools are compared to give an indication of what is achievable and the result is called a benchmark. Schools then compare their usage and costs against the benchmark. Once you've investigated your school's energy usage and costs you'll be able to see how you're performing compared with other schools.

Benchmarking can be by

- Energy usage per pupil – divide energy usage in kilowatt hours (kWh) by the number of pupils on roll. kWh can be obtained from schools' utility bills for electricity/gas/lpg as appropriate.

- Cost per m² of floor space. To calculate the cost per square metre divide the cost of energy by floor area (m²) of the school. The average spend on energy in schools for each m² of floor space is £6. https://isbl.org.uk/resource/factsheets/energy.asp

- Total Energy usage per m² of floor space from electricity and heating per year
  To calculate the energy usage per m² divide the total kWh from electricity and heating by the number of m² of floor space.

  In the UK 110kWh/m²/year is considered good practice for a primary school without a pool. Typical usage is 119kWh/m²/year. Secondary Schools in the UK without a pool the typical usage is 196kWh/m²/year.
  From Energy Consumption in non-domestic buildings – a Review of Schools May 2011
  https://ep.liu.se/ecp/057/vol3/034/ecp57vol3_034.pdf

  As an example 48 kWh/m² was the average for electricity and 106 kWh/m² for gas totalling 154 kWh/m² in Warwickshire schools for the financial year 2014/15.
  https://apps.warwickshire.gov.uk/api/documents/WCCC-599-57

- Comparing the rating on the Display Energy Certificate (DEC)

- Cost per pupil. Suggested best practice figures vary but according to Salix Finance primary schools demonstrating best practice can achieve a cost of £39 per pupil and a secondary school a cost of £60 per pupil. www.salixfinance.co.uk To calculate cost per pupil total all the energy costs for a financial year and divide by the number of pupils on roll. Information on schools energy costs and number of pupils on roll can be found on this government website : https://schools-financial-benchmarking.service.gov.uk/

- The number of pupils in a school makes a big difference to the cost per pupil so perhaps not the best benchmark to use but to give you an idea of how your school compares with others see the table below.

How does your school compare on costs of energy per pupil?

The chart below shows the range of performance for primary and secondary schools.

Range	Energy cost per pupil £	Energy cost per pupil £
	Primary	**Secondary**
Highest 10%	51.87	64.75
Highest 25%	38.98	51.05
Average	29.08	41.00
Lowest 25%	21.93	32.79
Lowest 10%	16.46	26.28

From the Institute of School Business Leadership https://isbl.org.uk/resource/factsheets/energy.aspx

One example from a primary school in Herefordshire:

Energy costs for 2019/2020 = £12,161.39 **Number of pupils 167 = £73 per pupil**
Floor area 1049 m² = £12 per m²

These figures indicate that the school's energy usage is **high** as the cost per pupil is £73 compared with the national average of £29.08 (or £39 Salix) and the cost per m² of £12 is twice the national average of £6.

A 10% reduction in energy usage could result in savings in the region of £1,200 year on year.

Energy Saving Opportunities

Whole school audit

Carry out an audit of the whole school using the Checklist provided on pages 27 to 29 to obtain an overall view of the energy usage by the school and ideas for how you can reduce this.

More details on how to implement the most important and effective actions are in the "Opportunities" below.

Record the actions you are going to take for each opportunity in the action plan template in page 30. An example of an action plan is on page 31.

Opportunity 1: How much energy is the school using on a daily basis?

How to complete your 10 day electricity audit

Before you start taking any actions to reduce energy usage in your school you need to know how much energy the school is currently using on a daily basis so you can see if your actions have any impact on this. Schools usually receive quarterly electricity and gas bills which don't provide enough detail of energy usage for the aims of this programme and it's a long time to wait to see if your actions are being successful in reducing your energy consumption. Reading meters regularly also helps to identify unusual peaks in usage that can then be more easily identified, e.g. a coffee morning, and explained or if not investigated.

An easy way to obtain this information is by taking daily meter readings for a suggested 10 school day period before you start any actions. You'll then have a base line to work from. Follow this by carrying out your chosen actions for a few weeks and then retake meter readings for another 10 school days. You'll then be able to compare energy usage from before and afterwards to see if your actions have been successful and by how much.

Reading your school electricity meter/s

To obtain meter readings ask the Business Manager/Site Manager/Secretary/ Caretaker as appropriate to find out where the meter/s are and what type of electricity meter/s the school has.

SMART meter. If it's a "SMART" or Automatic Meter Reading type (AMR) then they can help you to access the data. With a SMART meter, readings are automatically taken every half hour so the number of kilowatt hours will need to be multiplied by 2 to obtain the kW load. Your electricity supplier may also be able to help you with this if you have problems.

How to read a digital meter

- If the school doesn't have an Automatic Meter Reading (AMR) meter you'll need to read the meter which will be a digital meter with 5 numbers displayed.
- Engage pupils in this if safe to do so.
- Read the numbers from left to right ignoring the number in red.
- It's unlikely but if the meter has dials you'll need to read the dials from left to right as well. (As described on the next page.)

How to read a dial meter

- Read the first 5 dials from left to right.
- **Ignore** the dial marked 1/10 if there is one – they're usually outlined in red.
- Adjacent dials turn in opposite directions.

Write down the number that the pointer has just passed or on. So for example if the pointer is between two figures always read the lowest of the two numbers. For example if the pointer is between 5 and 6 the number you read is 5.

To read your meter/s

Choose a weekday to start and read the meter/s after everyone has gone home and again the following morning before everyone arrives for a period of 10 school days. This will enable you to calculate the daytime, overnight and weekend usage of the school. You do not need to go into school over the weekend as by reading the meter/s on a Friday at the end of the day and then first thing on a Monday morning the difference between the two readings will provide you with the weekend usage.

The timings of the readings will depend on your school, for example if you have a Breakfast Club, Afterschool Club, afterschool activities. If outside organisations hire your premises you might consider taking readings before and after to obtain an idea of how much they're consuming and either deduct from your total or encourage them to reduce their energy usage as well.

Record the readings on the template on page 32.

Repeating this after a few weeks will enable you to see if your actions have made a difference.

Finding historical energy data

Some energy suppliers can provide historical data on energy usage over several years in table and graphic form of kWh and costs per month. West Mercia Energy for example provide this information through each schools' portal on their website:
https://www.westmerciaenergy.co.uk/Home/EnergyManagementPortal

A similar activity can be carried out for gas usage but this will vary greatly between seasons.

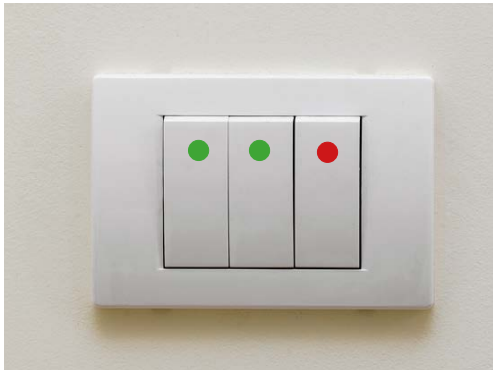
Opportunity 2: Labelling light switches

Common practice in a school is for all of the lights in a classroom/hall to be automatically switched on when entering the room without checking to see if there is sufficient natural light and whether some or all of the lights need to be switched on.

Often with new LED lighting all of the lights are on one switch but if lights are arranged in banks or rows in a room with multiple light switches it's possible to switch rows of lights on or off independently therefore only using lights as necessary, reducing energy usage, emissions and saving money. This can be achieved by carrying out the following:

1. With pupils from the Action Team identify which rooms have multiple light switches.
2. On a day when there is a lot of natural daylight, not too sunny nor too overcast proceed as follows:

- Turn off all the lights and starting furthest from the window, switch each row back on, one at a time, estimating each time if there is enough light to work with.
- When there's agreement that there is sufficient light in the room, stop switching lights on
- Consult with the class teacher for each room to get agreement on which rows of lights could normally be left switched off.
- **Circular red stickers or red crosses** to be used to mark the switches of lights to be left off once agreement has been reached so that pupils and staff will know that these lights are NOT to be switched on during normal daylight hours.
- **Green circular stickers or green ticks** could be used to mark the switches for lights that are needed for normal usage.
- **Red circles or red crosses** – Do not switch on
- **Green circles or green ticks** – Switch lights on as necessary
- This will need to be trialled to ensure all staff are happy with the system and once approved the stickers could be replaced with red and green permanent marker pen as appropriate.



- Common sense has to be used as light levels vary during the day and time of year.

Additional areas to be included in this activity:

- Light switches in corridors. Lights in corridors are often left on continuously and their use needs to be monitored with lights being switched off as daylight levels increase.
- Lights above cupboards offer little benefit therefore can usually be left off permanently
- Lights are often left on in storage cupboards and should be switched off after use
- Toilets are problem areas with lights often being left on all day

Motion sensors that can be fitted to lighting systems cause the lights to come on when movement is detected. They are a good idea in cupboards and toilets where there is no natural daylight.

Installing them in areas where there is natural daylight can result in lights coming on unnecessarily when there is sufficient natural daylight. If motion sensors are to be fitted a recommendation would be to fit them in conjunction with lux, or light level, sensors that will only activate the lights if the level of natural light is below a certain level. Ensure that your school has instructions for turning lights off during holidays.

Something else to consider when installing motion and lux sensors is that staff and pupils will not be learning the behaviour change required as the sensors are doing the work for everyone and the behaviours will not be replicated at home and in the wider community.

Arrange an assembly with pupil participation to inform everyone of what you are trying to achieve and their role in this.

Organise a poster and sticker competition for winning posters and stickers to be displayed all around the school to remind everyone constantly to only use lights as necessary and to switch off after use.

How much could be saved?

Lighting accounts for approximately 20% of a school's electricity costs therefore reducing the number of lights being used will save a proportion of the 20%.

To give you an idea of what can be saved carry out the following:

Calculate 20% of your annual electricity bill	£	A
Approximate % of lights that will be, or remain switched off	%	B
Amount of money that could be saved is A x B/100 = C	£	C

Other methods of reducing energy from lighting

- Upgrade lighting to energy efficient Light Emitting Diodes (LED). The reduction in energy usage and costs are substantial and enable a very short payback period. For example a 60W light bulb costs £17 to run for 2,000 hours whereas a 12W LED bulkhead light costs £3.40.
- Install Solar Photovoltaic Panels (Solar PV) but only after doing all you can to reduce the electricity consumed in the school

Opportunity 3: Switching off lighting when not needed

Lights are often left on in schools when there is enough natural daylight in the room and when pupils leave the classrooms. If the room is to be used afterwards it's sensible to leave the lights on but often the room is left unoccupied with all the lights left on. Modern lighting can be switched on and off as required.

Windows can be obscured by displays and blinds resulting in lights being switched on when natural daylight could be used instead. Blinds are closed when TV's and interactive boards are used and lights switched on after use rather than opening blinds.

Taking the steps below will help your school make the best use of natural daylight and reduce the use of artificial lighting saving energy, costs and emissions.

1. Each class or tutor group teacher to arrange for there to be an energy monitor for each group either by asking for volunteers or by selecting a pupil. In some cases it may have to be the teacher themselves or learning support assistants.

2. The role of the energy monitor with agreement from the teacher is to:

- Monitor the level of natural daylight in the classroom during the day and if there is sufficient daylight, to switch off unnecessary lights.
- To turn lights off if the classroom is to be left unoccupied after the lesson
- To ensure blinds are opened rather than turning lights on following the use of a projector/TV etc.
- Make sure that no posters or displays on windows prevent natural daylight entering the room.

How much could you save?

If the school doesn't already have a switching off policy you could save up to 10% of your electricity bill.

To give you an idea of what can be saved carry out the following:

Find out what the school's annual electricity bill is =	£	A
The amount of money you could save each year (B) is found by A/100 x 10 =	£	B

Opportunity 4: Out-of-hours survey

Schools should only be using a small amount of electricity overnight for items such as servers, refrigerators and freezers. Your school is probably leaving other items on overnight, weekends and holidays which can be as much as 20% of your daytime use.

Carrying out an out-of-hours survey will help you to identify these items so you can ensure they are switched off.

This can be achieved by carrying out the following:

1. Find out what your current overnight use is from your electricity meter readings carried out previously.
2. After school one day survey of all the rooms in the school without warning staff using the template on page 33 to record the items and the number of those items that have been left on that day. Look particularly at lighting, photocopiers, printers, IT equipment, electric heaters, water heaters, overhead projectors, interactive boards, kitchens, exterior lighting and don't forget the boiler room and other service areas.
3. Report your findings to everyone in the school as it will raise awareness of how much equipment the school has, that a lot of equipment is being left on and the potential savings to be made.
4. Encourage everyone to switch items off fully at the end of the day rather than leaving them them on standby.
5. Ask pupils to design posters to remind everyone to do this. At the same time launch a reward scheme so successes can be celebrated room by room, class by class in celebration assemblies and keep raising awareness with staff in staff meetings.

Opportunity 5: IT Equipment Switch-Off

Following an out of hours audit the next step is to label IT equipment to identify items that everyone can turn off when possible.

1. Working with pupils in your Team, identify all IT equipment in all areas of the school.

   Using the template on page 34 make a list of each item and numbers of each, in each room of the school. Make a note if you feel the item is being left on unnecessarily.

2. Place a coloured sticker on each item as follows:

   - **Green** for equipment which should be switched off when not in use (for example, televisions, computers, laptops, projectors and interactive whiteboards.)
   - **Orange** for equipment which should be switched off after checking that no-one is using it (for example, the teacher's computer).
   - **Red** Do not touch. For equipment which should not be switched off (for example, a freezer during term time or the main server).

3. Once the stickers have been placed on all the plugs and switches of IT equipment inform the whole school of your findings and what you have done emphasising what the different coloured stickers/shapes mean and that anything with a red sticker must NOT be turned off, anything with an orange sticker can be turned off if appropriate but anything with a green sticker can be turned off if no-one is using it.

   Tell them that **they are allowed to turn items off** if they follow this procedure and are sensible.

   Most people are shocked to discover how much electrical equipment the school owns and how much is being left on consuming energy unnecessarily.

4. Remember to celebrate your successes

   In addition consider:

   - Purchasing a timer plug for laptop trolleys to ensure they're not left on unnecessarily. The timer can be set to recharge the laptops for the required number of hours at the end of the day so they are ready for use in the morning. Continuous charging wastes energy and money, shortens the life of the laptop batteries and is a FIRE RISK.
   - Allowing a computer network manager to switch off all machines remotely after an agreed time in the evening. This will ensure that all computers are switched off.

How much do electrical items cost to run?

The table below provides an indication of the approximate costs of running individual items of IT equipment which will help to obtain co-operation from everyone. The figures are for running costs of each item while the school is open, which is on average 2,000 hours a year, 200 days for 10 hours a day.

Remember to multiply the number of items by the cost of each item to obtain annual overall running costs.

To calculate how much it costs to run an electrical item: Power rating of item in Watts /1,000 to convert to kWh x hours of use x cost per kWh/100 = cost in £.

For example:

Cost of running a 100W computer during school opening times @ 14p per kilowatt hour (kWh) =

100W/1,000 = 0.1kWh x 2,000 hours x 14p per kWh = 2,800p/100 = £28. This is for each computer.

Watts (W)
Power rating of an electrical item and can usually be found on the product sticker

Kilowatt hour (kWh)
A measure of electrical energy equivalent to a power consumption of 1,000 watts for one hour. i.e. if you use a 1,000W item for one hour you'll consume 1 kilowatt of electrical energy, if you use a 500W item for 2 hours you'll use I kWh of electrical energy.

In standby mode the energy use would be much lower but by turning off all PC's when not in use overnight, at weekends and in the holidays would save a considerable amount of energy and cost as well as reducing the risk of fire.

Monitors use approximately a third of the energy used by a computer so by turning them off when leaving desks during the day can save a considerable amount of energy. You will not lose your work as the computer is still operating.

Item of Equipment	Annual costs (£) per item for 2,000 hours usage
Desk top computer and monitor 100W	28
Laptop 50W	14
LCD Television large screen 200W	56
Smartboards/Interactive whiteboards	38
Large photocopiers 1,400W in use for e.g. 100 hours	20
Fridge 80W	22
Chest Freezer 150W	42
60 Watt Light bulb x 1	17
12W LED bulkhead light	3.40
5ft T8 fluorescent twin 124W	35
6ft LED batten 31W	9

Calculate the running costs of electrical equipment in your school by using the template on page 36.

Item	Wattage of item /1000 = kWh	Hours of use average 2,000 hours	Cost per kWh (on energy bills)	Running cost for 2,000 hrs Each item	Number of items in school	Total cost of items for year
Example: Desk top computer	100W /1000 = 0.1 kWh	0.1 kWh x 2000 = 200kWh	14p per kWh	14p x 200kWh = 2,800p / 100 = £28	100	£28 x 100 = £2,800

Opportunity 6: Heating audit

- Reducing heating times by 1 hour per day can reduce heating costs by 10%

e.g. half an hour in the morning and half an hour in the afternoon

- Reducing the heating temperature by 1°C can save 10% on heating costs

1. Carry out a heating audit of every room in your school using the template on page 35. For each room try to conduct the audit with the people who use that room the most to highlight any issues and record it with them on the template.

2. Check with the site manager/caretaker/business manager that the heating times match with the opening hours of the school so that it isn't being heated when unoccupied.

Recommended temperatures for different parts of the school are listed below:

Area	Recommended temperature in °C
Classrooms and dining areas	18
Multi-purpose halls	15-18
Gyms and sports halls	15
Medical rooms	21
Offices and staff rooms	18
Corridors and toilets	15

3. Ensure that radiator valves (TVR's) are operating so that radiators can be turned down if the room is too hot rather that opening windows and allowing the heat to escape. Open doors onto indoor corridors in addition to turning down TVR's if necessary as another method of reducing the temperature rather than opening windows.

4. Encourage everyone to adhere to these temperature guidelines and not turn the thermostat up if they're cold. Encourage them to wear more clothes instead.

5. Provide thermometers for each room so you know what the temperature is.

6. Bring children into the classroom through internal doors rather than external doors that lead directly into the classroom

7. Ensure that exterior doors are not left open if the heating is on.

8. Do not place heat emitting items such as photocopiers under thermostats as this will create a false reading and the heating will not come on when needed.

9. Do not block radiators with furniture such as desks, tables and cupboards etc as this prevents the heat from being distributed effectively and can cause the heating system to operate more than is necessary.

10. Can the heating be controlled in the room? If not report it to the site manager to investigate.

Effective control of Electrical Heating

Whilst the majority of schools are heated using fossil fuels such as gas or oil, many are electrically heated, either in part or entirely. Typically, electricity costs are around three times as much as natural gas (on a p/kWh basis) and so the effective control of any electric heating is essential if excessive operating costs are to be avoided. Similarly, the carbon emissions ($kgCO_2$/kWh), are much higher for electricity than for gas, but are decreasing with the increased use of renewable technologies such as solar PV.

The use of additional electric heaters in buildings that are already served by a central heating system is often symptomatic of wider problems with the heating system. Portable electrical heaters can upset central heating system controls and make the problem worse. Try to identify and fix the root cause of the problem rather than resorting to the use of portable electric heaters.

The good news is that even quite simple heating control adjustments can deliver significant cost and carbon savings.

Night Storage Heaters

Contain ceramic bricks which are heated up overnight using relatively cheap, off-peak electricity. The heat is then gradually released into the room during the following day. A standard electric night storage heater has two controls, an "input" setting (which regulates the overnight charge) and an "output" setting (which regulates the rate of heat release during the day). It's especially important to retain the heat in the room as once it is lost it cannot be replaced until the following day.

It's worth checking the settings of night storage heaters to ensure they match requirements and especially if they have 7-day timers to ensure the heating isn't coming on over weekends and holidays unless it's to protect against frost.

Catalogue your electric heaters and their types by using the templated provided on page 36

Direct electric heaters deliver heat as and when they are switched on.

The following are examples of direct electric heaters

Portable Oil filled radiator

Below: Portable Fan heater

Portable radiant heater

Below: Portable convector heater

Because direct electric heaters use full price "day rate" electricity, energy costs can be very high unless the heaters are closely controlled.

Financial Support for energy efficiency projects

The Actions mentioned above are no or low cost behaviour changes that can lead to a reduction of at least 10% of your energy usage and associated costs.

If your school would like to consider investing in technologies that could make the school more energy efficient there are several funding opportunities available as described below.

Marches Renewable Energy Grant Scheme (MarRE)

European Union
European Regional Development Fund

MarRE is available for schools, community/maintained and academy, in the Marches area of Herefordshire, Shropshire and Telford and Wrekin.

A European Regional Development Grant Scheme (ERDF) available until 31 December 2021. The grant allows eligible applicants including schools and higher education and further education institutions based in the Marches area of Herefordshire, Shropshire, Telford and Wrekin to apply for a 50% grant towards new installations of renewable technologies on their premises. Projects up to and including 200 kWp can be supported. Schools and colleges must be able to cover the cost of the remaining 50%.

Qualifying technologies include solar PV, aerothermal including air source heat pumps, geothermal including ground source heat pumps, hydrothermal, hydropower and biomass. New builds and existing projects are ineligible.

For more information, advice and to download an Expression of Interest form please visit www.herefordshire.gov.uk/MarRE or telephone **01432 260064**

Types of renewables

Brief notes describing each of the following types of renewable energy generating technologies can be found on page 38: Solar Photo voltaics (PV), Solar Thermal, Air source heat pump, Ground source heat pump, Wind turbine, Biomass.

Herefordshire Council school's finance interest free loans for maintained/community schools in Herefordshire

Maintained/Community Schools in Herefordshire can apply to Herefordshire Council's Schools Finance Team for an interest free loan for the full or partial cost of the energy efficiency measures or the installation of renewable technologies such as solar PV or for the 50% match funding that is required for the MarRE Grant Scheme. Applications are subject to certain criteria being met.

Contact Karen Jones email:Karen.Jones2@herefordshire.gov.uk

Salix funding for community/maintained schools (SEELS)

www.salixfinance.co.uk/loans/schools-loans

The SEELS programme is funded by the Department for Education to help schools to save money by funding energy efficiency improvements. The repayments are recycled to fund further projects in the public sector. Maintained schools have been granted blanket approval by the Secretary of State to apply to Salix for energy efficiency loans.

Salix provides funding for schools and colleges to reduce energy costs through the installation of up to 100 different energy efficiency technologies such as LED lighting, new boilers and insulation.

Installing new technologies can save you money and reduce your carbon footprint. There are no upfront costs as the funding is provided via an interest free loan which is paid back through the predicted savings on energy usage.

- Minimum loan of £5,000 which can be made up of multiple smaller projects with a minimum value of £500
- There is no maximum loan but loans over £100,000 require a business case to be written.
- The loan value must be repaid within an eight-year period. Projects exceeding this payback can be part-funded.
- The project must not exceed a maximum cost of £222 per tonne of carbon dioxide saved (calculated using their compliance tool).
- The SEELS programme is open to community schools throughout the year.

If you need any further information please contact Salix
email schoolsapplication@salixfinance.co.uk or Tel: 0203 102 6903

Salix funding for Academies

www.salixfinance.co.uk/loans/SEEF

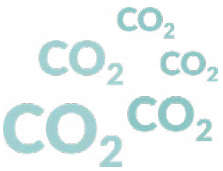
Salix, in partnership with the Department for Education (DfE) works to reduce energy usage in individual academies across England.

Academies can apply for funding for energy efficiency measures through the Salix Energy Efficiency Fund (SEEF). The application window is currently closed but financing is in rounds with applications open once a year usually in the 4th quarter of the year. See the website for details. The interest free financing is paid and repaid to the DfE and SEEF repayments returning to the DfE are recycled to fund further projects in the public sector.

DfE funding via SEEF can be accessed for over 100 different technologies including LED lighting, boilers and insulation. Installing new technologies can save you money and reduce your carbon footprint.

Minimum loans of £8,000 up to a maximum of £150,000 are available and have to be paid back within an 8 year period.

Calculating your Carbon Footprint from electricity and heating used in your school - your direct emissions



To calculate your carbon footprint from your direct emissions follow the instructions on page 25.

Energy is charged for in kilowatt hours (kWh) and the school's energy consumption over the previous year in KWh for electricity, gas, oil (which will probably be in litres) and liquid petroleum gas (lpg which will probably be in litres), if applicable, can be found on the energy bills from the utility companies. To calculate your carbon footprint you'll need to total up the kWh for electricity, gas, oil and lpg separately because they have different conversion factors for converting into kilos of carbon dioxide ($kgCO_2$) as you can see below.

You may have to estimate the amount of litres of oil or lpg used in a financial year as often the storage tanks don't have gauges on them. Schools tend to pay the bills when they arrive without monitoring the usage on a weekly/monthly basis. Monitoring can be achieved by installing a gauge in the tank that can transmit a signal to a digital display in the school office. Or by simply marking a stick at intervals of litres or 10's of litres and plunging into the tank on a regular basis. A scale would need to be worked out first based on the volume of the tank. A task for a mathematics teacher possibly.

Convert kWh electricity to kg CO_2

In order to convert electricity consumed in kilowatt hours (kWh) to kg of carbon dioxide, the energy use should be multiplied by a conversion factor. This factor changes from year to year, as the fuel mix consumed in UK power stations changes.

Conversion factors for gas and liquid petroleum gas are also provided.

The conversion factors for energy sources for 2020 valid until June 2021 are:

Energy Source	Conversion factor ($kgCO_2$/kWh)
Electricity (kWh)	0.23314
Natural Gas (kWh)	0.18387
Fuel oil (kWh)	0.26775
Fuel oil (litres)	3.18317
LPG (kWh)	0.21448
LPG (litres)	1.55537
Biomass (kWh) logs, wood chips or pellets	0.01563
Biomass (tonnes) wood chips	59.02902
Biomass (tonnes) pellets	73.13523

Taken from www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

Example:
If 1,000 kWh units of electricity was consumed then:

1000 kWh x 0.23314= 233 kg CO_2 is produced

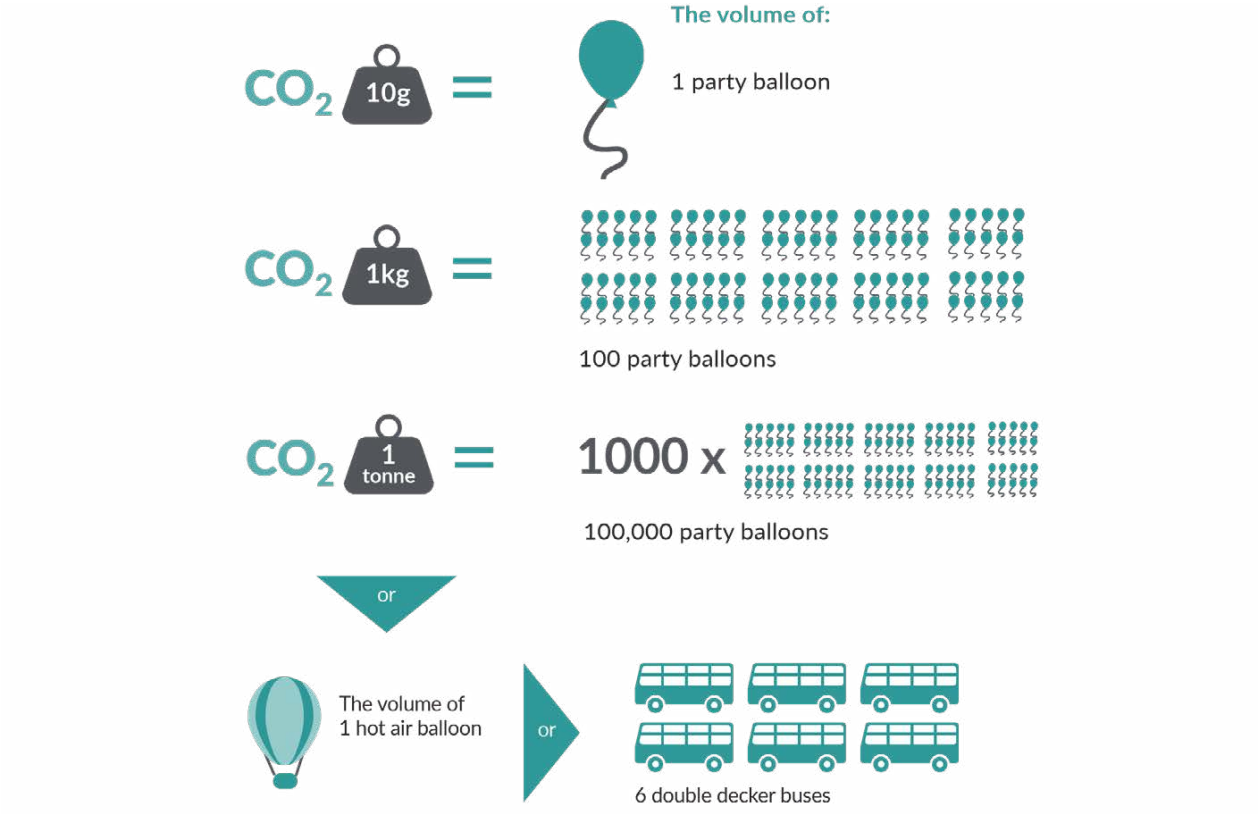
To convert this to metric tonnes divide by 1000 = 0.23314 tCO_2

How to make your CO2 savings more meaningful:

1,000g = 1kg
1000kg = 1 tonne

Schools account for a third of Herefordshire Councils' emissions and collectively this amounts to around 5,000 tonnes CO_2e from schools each year. For example during 2018/2019 schools emitted approximately 5,500 tonnes of CO_2.

Most people can't imagine what the volume of a gramme, kilogramme or tonne of CO_2 looks like so to make it more meaningful:



Herefordshire Schools account for 1/3 of Herefordshire Council's emissions = approx. 5,000 tonnes of CO_2

= 5,000 x hot air balloons or x 30,000 double decker buses

That’s 5,000 of these, every year!

To calculate your carbon footprint and the cost of the carbon produced

Use energy figures for your school's financial year from April to March

(a) Enter the number of kilowatt hours (kWh) used for each energy source from the utility bills and total them up for the financial year or obtain from your energy supplier if possible. If West Mercia Energy (WME) is your supplier your data will be featured on their website.

(b) Add the total costs of energy including standing charge etc from the energy bills or obtain from your supplier. If WME is your supplier your data will be featured on their website.

(c) Conversion factors for each fuel have been provided.

(d) To calculate the CO_2e emissions in kilogrammes (kg) from the number of kWh used multiply the figure in column (a) by the conversion factor figure in column (c)

(e) To convert the number of kg of CO_2e to metric tonnes of CO2e divide the number in column (d) by 1,000

(f) % of total kWh – divide each individual energy type total kWh (a) by the total of all energy types kWh - total of column (a), and multiply by 100

(g) Cost per tonne of carbon for individual energy types - divide the cost of each energy type per annum (b) by the number of tonnes of carbon (e).

To calculate your **carbon footprint** in tonnes of CO_2e produced, add up the metric tonnes from each fuel type in column (e).

Total cost per tonne of carbon - total column (b) and divide by the total of column (g).

	a	b	c	d	e	f	g
	Amount used in kWh	Cost per annum	Conversion factor	CO_2e in kg a*c	CO_2e in metric tonnes d\1000	% of total kWh	Cost per tonne of carbon e/b
Electricity			0.23314				
Natural gas (kWh)			0.18387				
Fuel oil (kWh)			0.26775				
Fuel oil (litres)			3.18317				
LPG (kWh)			0.21448				
LPG (litres)			1.55537				
Biomass all types (kWh)			0.01563				
Biomass chips (tonnes)			59.02902				
Biomass pellets (tonnes)			73.13523				
Total							

School's carbon footprint from your DIRECT EMISSIONS IS ..... tonnes of CO_2e

Templates and guidance

Checklist to identify actions

This checklist will help you to assess your school and identify areas needing improvement that will result in energy, carbon and monetary savings.

You'll probably need the support of the school business manager and site manager/caretaker to answer some of the questions.

Details of each classroom/area can be recorded on the audit sheets.

Room Type	Energy Saving Opportunity		Result/Answer
General information	When was the school built?		
	What type of construction is it? Stone, brick, panels, wooden?		
	What type of glazing does the school have - single, double, triple or secondary glazing or a mixture?		
	Who has responsibility for monitoring energy consumption and do they read meters regularly rather than waiting for quarterly bills? West Mercia Energy customers can access graphs of their historical energy data on their webpage of the WME website.		
	What is the average monthly electricity usage and cost?	Usage (kWh)	Cost (£)
	What is the average monthly gas usage and cost in the heating season?	Usage (kWh)	Cost (£)
	Where are the electicity and gas meters?		
	Electricity VPN (meter) number/s? If more than one meter which areas of the school does each meter cover e.g. kitchen, pre-school, main building, mobile classrooms Gas meter number/s Are meters accessible for pupils to read as long as it is safe to do so?		
	Are pupils involved in reading meters and monitoring the results?		
	If the school is heated by oil how is the consumption measured – is there a gauge or is consumption based on annual usage from bills?		
	Is information on energy shared with everyone in the school? If people know how much energy is being used and how much it costs they are more likely to get engaged with trying to reduce energy consumption. Energy data can be used for producing graphs in maths lessons for display. This also raises awareness for everyone on energy usage.		
	Lighting - As you carry out the audit of each room include information about lighting types in each room. For example Is lighting LED (Light Emitting Diodes), Fluorescent tubes? T12's T8's or T5's or a mixture of both? LED's are the most efficient followed by T5's, T8's and T12's. The site manager should be able to help with this.		
	Do you have an energy or action team?		
	Does your school have an environmental and/or energy policy?		
	Do you run activities to engage and raise awareness?		

Room Type	Energy Saving Opportunity	Result/Answer
Boiler Room Heating	What form of heating does the school have? Mains Gas, lpg, propane, oil, electricity, biomass or a mix?	
	Are boilers regularly serviced?	
	Are pipes and valves fully insulated in the boiler room? Boiler rooms are NOT supposed to be warm. Frost protection should be in place.	
	Have heating times been matched to the occupancy of the school? If the heating period is extended for an evening event make sure the timer is set to normal times afterwards.	
	What time does the heating come on in the morning? What time does the heating go off? What time does school open in the morning? What time does school close?	Am pm Am pm
	Is your hot water storage tank fully insulated?	
	What temperature is the water heated to? It must be heated to a minimum of 60°C but needn't be higher than this.	
	Are point of use electric water heaters turned off over weekends and during school holidays?	
Building exterior	Are external lights switched off during the day	
	Are controls for exterior lights checked regularly to ensure they match occupancy periods and hours of daylight?	
	Are your exterior doors and windows free from gaps which lead to heat loss and draughts?	
	Have unnecessary opening windows been permanently sealed?	
	Do door closers function properly?	
	How do children enter classrooms – directly from the outside or through a cloakroom?	
	Are windows and skylights cleaned regularly to allow maximum natural daylight in?	
Classrooms, IT suites, and libraries	During the heating season is the temperature of classrooms, libraries and IT suites 18°C?	
	Are heating emitters (radiators, convectors etc.) free from obstructions such as tables, storage and bags?	
	If you have thermostatic radiator valves, are they set to a medium setting, e.g. 3?	
	If there are thermostats in the rooms are they working and are they set at the appropriate temperature?	
	Do windows remain closed when the heating is on?	
	Is your school free from supplementary heaters (i.e. electric plug-in heaters?) The use of these indicate an inefficient heating system.	
	Are any parts of the school too hot? If so where?	
	Are any parts of the school too cold? If so where?	
	Before lights are turned on in the morning is consideration given as to whether they need to be turned on?	
	If lights are turned on in the morning – does anyone turn them off as the level of daylight increases during the day?	
	If you have multiple light switches in rooms are the ones that don't usually need to be on clearly labelled to prevent them from being used unnecessarily?	
	Are you satisfied that none of the rooms are over lit?	

Room Type	Energy Saving Opportunity	Result/Answer
Classrooms, IT suites and libraries (continued)	Check the temperature of air conditioning units if you have them; are they set to a temperature of no less than 24°C?	
	Where IT suites have air conditioning, are windows and doors always kept closed?	
	Is IT equipment such as PC's, laptops, whiteboards, projectors and TV's always switched off when not in use?	
	Have you considered installing plug-in time controls to IT equipment such as laptop charging trolleys, photocopiers?	
Hall and Theatre	Are blinds on high level windows open to allow natural daylight to enter?	
	Are lights switched off after assemblies when the hall is empty?	
	If you have multiple light switches are only necessary lights being used rather than all of them?	
	Is all specialist equipment such as spotlights, projectors etc turned off when not being used?	
Office and Reception areas	Is non-essential lighting switched off at all times, for example lights in well day-lit reception areas?	
	Are lights always switched off when these areas are unoccupied, e.g. before office staff arrive, whilst at lunch and when they leave?	
	Is IT equipment such as printers, photocopiers switched off overnight?	
	Are plug-in timers fitted to any electronic equipment such as photocopiers and printers in this area?	
	Are computer monitors switched off when not in use?	
	Have any unnecessary plug-in heaters been removed?	
Kitchen	Ovens and hobs heat kitchens therefore if there is a thermostat in the kitchen turn it down to between 16- 18°C	
	Is catering equipment switched off immediately after use, including extractor fans?	
	Where possible are fridges and freezers located in areas away from heat sources?	
	Where possible are fridges and freezers emptied and switched off during holiday periods with doors propped open? If multiple appliances are present, combine the contents so some can be switched off.	
	Are fridges and freezers defrosted regularly?	
	Is cooking equipment labelled with pre-heat times and not left on unnecessarily?	
	Is hot water set to an appropriate temperature of just above 60°C?	
Staff Room and Common room	Are lights always switched off during periods of non-occupancy?	
	Are kettles, toasters, coffee machines etc switched off at the plug overnight, weekends and holidays?	
	Are plug-in timers fitted to any electronic equipment such as photocopiers and printers in this area?	
	Have any unnecessary plug-in heaters been removed?	
	Are 'fridges emptied for the summer holidays? (And door propped open)	

Action Plan

As a result of reading this guidance and carrying out the survey for other opportunities, you will have identified the energy saving opportunities that are applicable to your school. Once you have selected the opportunities best suited to your school, you will be able to design your own action plan (below). You can use this to record the opportunities you have identified, the savings you expect to achieve, the people responsible for advancing this to the whole school and completion dates. Keep this plan updated as and when you complete the implementation of individual opportunities, and when you identify new ones. A sample Action Plan is given on the following page.

Priority	Opportunity	Estimated Savings		Person responsible	Expected Date of Completion	Education Opportunity
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

Action Plan Example

Example of how you could complete the action plan.

Priority	Opportunity	Estimated Savings		Person responsible	Expected Date of Completion	Education Opportunity
1	Lead person identified					
2	Energy Group formed adults and pupils					Student participation
3	Stakeholders identified – people who need to know what is happening and whose support is ideally needed eg SLT, staff, eco lead, students, governors, caretaker, business manager					
4	Gatekeepers identified – people who can stop the project eg Head, SLT, staff, caretaker, business manager					
5	Meter readings am and pm					Student participation if safe to do so. Usage of data in lessons
6	Lights switch on/off identification and labelling					Student participation
7	Lights – avoiding unnecessary use – appointment of energy monitors					Student from each class or tutor group
8	Audit of equipment in rooms					Student participation
9	Out of hours audit – equipment left on overnight/weekends					Possible student participation
10	Labelling of Equipment plugs					
11	Communication to whole school/college of actions to be taken and their part in it – assembly, newsletter, website					Student contributions and involvement
12	Request for ideas for energy saving					Whole school
13	1 or 2 months later – reading of meters to monitor progress					Student participation if safe. Usage of data in lessons. Reporting to others
14	Reporting results					Student participation

10 School Day Meter Readings

Your electricity meter records the number of units in kWh (kilowatt hours) of electricity you have used and you are charged for each unit. By taking readings morning and evening you can calculate daytime, overnight and weekend usage . A similar exercise could be carried out for gas meter readings.

Date of Reading	**Morning Reading** Time am	**Closing Reading** Time pm	**Reading** *Digital meter from left to right Dial meter 5 dials from left to right*					**Units (kWh)** used since last reading
eg. 30/1/20	8.00am		5	4	3	2	1	
		6.00pm	5	4	3	2	6	5 kWh (during the day)

Out of hours energy audit

Listing items left on when school is closed. Complete a table for each room

Room number or name	Item left on	How many of these items have been left on?
eg. 15	Computer and monitor	3
	Monitors only	2

School IT and appliance audit

Room number or name	Type of IT equipment and appliance	Number/type yes/no etc.
eg. Class 8	Computers (Add others items as relevant to the room)	15
	Point of use electric water heater – (can be inside a cupboard) Is it switched off over weekends and during school holidays?	

School lighting and heating audit

Room number or name	Type of lighting and number	Number/type yes/no etc.
eg. Class 8	Number of lights	15
	Type of lights LED/T5/T8/T12?	
	Number of light switches	
	Motion sensors for lights?	
	Lux sensors for lights?	
	Posters/blinds blocking windows?	
	Are lights switched off when the room is empty?	
Heating	Type of heating – gas central/oil/lpg/electric	
	How many radiators?	
	Is there a thermostat?	
	Does it work?	
	What temperature is it set at?	
	Is a heat source placed below the thermostat such as a computer or laptop charging trolley? If so remove the heat source if possible as it will affect the functioning of the thermostat.	
	Are there valves on the radiators for controlling the temperature? (TRV's)	
	Do the valves work? If not inform the site manager/caretaker	
	Type of windows- single/double or triple glazed	
	Have any of the windows got condensation inside the glazing? If so report to the site manager as this means the unit has failed.	
	Can the windows be opened for ventilation? If not how is the room ventilated?	
	Is furniture in front of radiators blocking the heat?	
	Exit from the room via an internal door such e.g. into a cloakroom or to an external door?	
	If external door is it self-closing?	
	Is the room often too hot or too cold? If so at what time of the day?	
	Which direction is the room facing –north, south, east or west?	

Electric Heater Audit

Listing all portable electric heaters in the school

Portable oil filled radiator

Portable electric convector heater

Portable fan heater

Portable radiant heater

Room number or name	Type of heater	Number of heaters
eg. Room 2, Bumblebees	Portable fan heater	1
eg, Office	Portable oil filled radiator	1

Annual running costs of electrical items

Below we have provided the annual running costs for some key items found in schools.
Count up the number of these items that the school has and multiply by the annual cost to find the total annual cost for those items.

For items not listed in the table use the calculation given in the template "Calculating the running costs of an electrical item".

Item	Wattage	Number of items	Running cost per item for 2,000 hours (£)	Total cost of items for year (£)
e.g. laptop	*50 Watts*	*100*	*14*	*1,400*
Desk top computer and monitor	100		28	
Laptop	50		14	
iPad/Tablet	10 – 20		2.80 – 5.60	
Plasma TV 42" screen	240		68	
Large photocopiers 1,400W in full use for e.g. total of 500 hours over a school year.	1,400		98	
Laser Printer (continuous)	500		140	
Fridge	150		42 or if left on continuously during holidays for 8760 hours (365 days x 24 hours) = **£184**	
Chest Freezer – large 300 – 449 litres	300		42 but often left on continuously during holidays for 8760 hours (365x24) so could be higher cost of **£368**	

Calculating the running costs of an electrical item

To calculate how much it costs to run an electrical item:

Power rating of item in Watts /1,000 to convert to kWh x hours of use x cost per kWh/100 = cost in £. Wattage (W) can be found underneath or on the back of an item. Take care when searching for this.

Example:

Cost of running a 100W computer during school opening times @ 14p per kilowatt hour (kwh)

100W/1,000 = 0.1kWh x 2,000 hours x 14p per kWh = 2,800p/100 = £28.

This is for each computer.

Some running costs have already been calculated for you in the table "Annual running costs of electrical items".

Item	Wattage of item /1000 = kWh	Hours of use average 2,000 hours	Cost per kWh (on energy bills)	Running cost for 2,000 hrs Each item	Number of items in school	Total cost of items for year
Example: Desk top computer	100W /1000 = 0.1 kWh	0.1 kWh x 2000 = 200kWh	14p per kWh	14p x 200kWh = 2,800p / 100 = £28	100	£28 x 100 = £2,800

Types of renewable energy technologies

Solar Photo voltaics (PV)

Solar PV generates renewable electricity with zero carbon emissions from sunlight. Electricity will be generated every day during the hours of daylight, albeit at a reduced rate when the sky is overcast.

Panels can be mounted on the roof of your school onto a south, southeast or southwest facing roof to help reduce your electricity bill and your carbon emissions. They can also be mounted on the ground.

Kilowatt peak (kWp) - Solar PV systems are described in terms of their size – that is, the maximum number of kilowatts of electricity that they can produce. So, for example, a 10kWp system can generate up to 10 kilowatts of power. Bear in mind though, that the panel's peak output will only be achieved in bright, sunny conditions. For most of the year the output will be much less, typically around 10% of peak output (when achieved over 8,760 hours per year).

Solar Thermal

A solar thermal system works by harnessing the sun's energy and converting it into heat which is then transferred into your home or businesses heating system as hot water or space heating.
Solar thermal panels are used in conjunction with a boiler, collector or immersion heater. The solar collector will use the sun's rays to heat a transfer fluid which is a mixture of water and glycol, to prevent the water from freezing in the winter. The heated water from the collectors is pumped to a heat exchanger inside a water cylinder. The heat from the exchanger will then heat the water inside the cylinder.

Air source heat pump

Air source heat pumps (ASHPs) absorb heat from the outside air to heat your building and hot water. They can still extract heat when air temperatures are as low as -15°C. Heat from the air is absorbed at low temperature into a fluid. This fluid passes through a compressor, increasing the temperature, and transfers that higher temperature heat to the heating and hot water circuits of the building.

There are two main types of ASHP: air-to-water and air-to-air. Choosing an air-to-water or an air-to-air system will determine the type of heat distribution system you need.

Ground source heat pump

Ground source heat pump systems are made up of a ground loop (a network of water pipes buried underground) and a heat pump at ground level.

A mixture of water and anti-freeze is pumped around the ground loop and absorbs the naturally occurring heat stored in the ground. The water mixture is compressed and goes through a heat exchanger, which extracts the heat and transfers it to the heat pump. The heat is then transferred to your building heating system. A ground source heat pump can increase the temperature from the ground to around 50°C, although the hotter you heat your water, the more electricity you'll use. You can then use this heat in a radiator, for hot water, or in an underfloor heating system.

Wind turbine

Wind turbines harness the power of the wind and use it to generate electricity. Wind turbines use large blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity is produced. The energy can be stored in batteries for use when there is no wind.

Biomass

Biomass is a renewable energy source, generated from burning wood, plants and other organic matter, such as manure or household waste. It releases CO_2 when burned, but considerably less than fossil fuels. Biomass is considered as a renewable energy source, if the plants or other organic materials being burned are replaced. It can be used to generate heat, electricity, be used in combined heat and power units and be used as liquid fuel. In domestic settings it tends to be in the form of wood-fuelled heating systems. It is important to note, though, that biomass is only considered renewable if it comes from a sustainable source, where new plants are grown in place of those used for fuel. It's also important to make sure that there are no unwanted negative impacts from producing the fuel, such as loss of valuable ecosystems.