

SCoRE



Practical Energy Saving for Eco-Schools



September 2011

Eco Schools – Practical Energy Savings

Introduction

This is a practical guide specifically intended to help schools who are advancing through Eco-Schools to deliver immediate energy cost savings.

Implementing measures from this guide will provide immediate cash savings typically in excess of 10% of your utility bill; these savings can then be re-invested for the benefit of your school every year. Managing the energy used in your school also plays a vital role in contributing towards reducing greenhouse gas emissions and to addressing our contribution towards changes in our climate.

The outputs of the guidance will help you to provide the evidence required for the energy module of Eco-Schools, which is a compulsory topic when applying for a Green Flag award and is highly recommended for Bronze and Silver. 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.	Savings are dependent on your specific school lighting and windows. 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	Many schools have the benefit of large window space enabling natural daylight to enter rooms. Switch off lighting when not required. 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.	Savings are dependent on existing practices (up to 5% of your electricity bill)
Reducing your out-of hours electrical load	Schools are often unoccupied for 5,000 – 6,000 hours a year. Open hours can sometimes be less than 2,000 hours per year. If electrical items are left on out of hours, then this can be the major cause of energy waste.	Savings dependent upon existing practices (up to 20% of your electricity bill)
Permanently sealing superfluous opening windows	Many schools have old windows, particularly metal framed windows. If the windows cause draughts then this is uncomfortable and increases heating costs. Check that all opening windows are needed in each room. In particular, inaccessible high level windows can be sealed up permanently.	Savings dependent on school window type (up to 15% of your heating bill and improved comfort)

Whilst these measures are straightforward and can be implemented at little or no cost, they will require detailed consideration of the issues at hand. They will only be successful

if you follow the Eco-Schools framework, set up an Action Team, and involve the whole school. All of these opportunities will work better if the pupils are involved. Please see:

- 'A whole school approach – management guide CTV037' which can be downloaded free of charge from the Carbon Trust's website at: www.carbontrust.co.uk
- Point 1 of the Eco-Schools seven element framework which can be found at: <http://www.eco-schools.org.uk/getting-started/>

Estimating Savings

As you work through the energy saving actions in this guidance, you will have the chance to calculate the financial savings you could expect to achieve. These estimates are an initial assessment and are based on experience of implementing these measures. In addition, when calculating the amount of CO₂ saved, we have assumed 3p/kWh gas and 9p/kWh electricity costs.

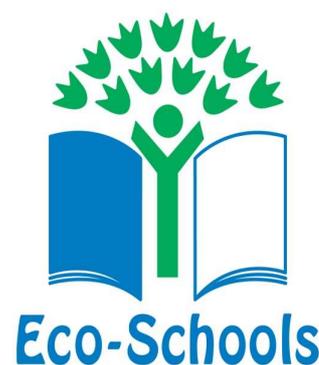
Communication

With each of the opportunities explained in this guidance, it is important to communicate the techniques used to ensure that the whole school works together to embed the behaviour and to achieve the results that are possible. This can be done through an assembly, memos to teachers, energy information board/display, competitions or your school newsletter. By doing so you will ensure that everyone has the best possible understanding of what you hope to achieve and how you are going to do it. It is important to involve all school users. Don't forget cleaning, catering, visiting staff, parents and evening classes.

What is Eco-Schools?

Eco-Schools aims to provide a framework which schools can follow to embed sustainable practices into everyday life. The international programme focuses on nine environmental themes such as water, transport and waste, and once certain criteria have been met, a Bronze, Silver, or Green Flag status is awarded.

Within Eco-Schools, schools are expected to set up a framework to involve governors, teachers, pupils, support staff and parents to lead action on Eco-Schools topics, and to recognise the important educational opportunity to provide practical hands-on experience to pupils on the environment, responsibility and resource management.



What are the benefits of Eco-Schools?

Eco-Schools enables schools to set out a formal approach to addressing environmental issues. This raises awareness amongst both staff and pupils, provides the opportunity to

develop a creative learning environment by linking to the curriculum, sets an example to the wider community and improves the school environment.

Energy is now a compulsory topic of Eco-Schools and by focusing on this theme and reducing the energy used in your school, practical whole school savings can be achieved. This can equate to a considerable amount of money, typically in excess of 10% of your utility bill. The following sections will enable you to focus on creating evidence to show the savings you have made in your school by focusing on the energy strand of Eco-Schools.

For more information on the programme, please visit www.eco-schools.org.uk

Reducing Energy through Practical, Fast Track, Whole School Savings

By following the Eco-Schools framework, your school will have set up an Action Team, conducted an Environmental Review, drawn up an Action Plan, and designed your Eco-Code. The next step is to progress a project related to energy in order to make substantial savings, record results and monitor progress. This will help you in working towards an Eco-Schools award.



If you would like to work towards your Green Flag award, you should share this good practice with other schools, and report progress to the wider community. This could be done via newsletters, by holding an open day, or by organising visits to other schools by your Action Team. Keep a record of these events by taking photos and recording dates and venue information.

Practical Opportunity 1 – Active Labelling of Light Switches

In many schools, classrooms can have excessive installed lighting. This is often arranged such that individual rows of light fittings can be switched separately. Follow the steps below to identify those rows which do not need to be switched on under normal daylight, and to implement a programme to ensure they remain switched off.

1. With your Action Team, identify which rooms in the school have multiple light switches which allow rows or banks of fittings to be controlled independently.
2. Choose a day with average levels of daylight (i.e. overcast day/not too sunny) and carry out the following procedures in each room.
3. Switch off all the lights and then, starting furthest from the window, switch each row back on one at a time. Each time consider whether there is an adequate amount of light to work effectively at desk level. (Note: in some classrooms, it is lighting installed close and adjacent to an internal wall that is best left off).
4. When you feel there is an acceptable amount of light in the room, stop switching.
5. In consultation with the class teachers in these rooms, discuss your findings and get their agreement as to which rows of lights could normally be left switched off. If teachers are uncertain about progressing this, try switching off one set of lights nearer the window and see if the pupils notice in the next class.
6. Once identified, mark up the respective switches with red stickers in order to indicate to the staff and pupils that these marked switches are not to be used unless necessary (i.e. at night, on a very overcast day, or if a pupil needs more lights on).
7. You could also use green stickers for lights/switches that should be used as needed.
 - Red Dots** – Do not touch and do not use (override this as necessary at teachers' discretion)
 - Green Dots** – Switch and use lights as required
8. Some schools have used different shapes with the colours to assist those that may be colour blind.



9. Once this has been trialled successfully and all staff are happy with the marked switches, the Action Team should replace the stickers by marking with indelible red pen.



How Much Have You Saved?

Lighting accounts for approximately 40% of a school's electricity bill; therefore, you are saving a proportion of 40%. You can calculate your approximate savings by following these steps:

Calculate 40% of your annual electricity bill:

What is the approximate percentage of lights you have labelled to remain off?

The amount of money you will save each year is calculated by $A*B/100 =$

The annual CO₂ you will save will be around 1 tonne of CO₂ per £165 saved: $C/165 =$

£	A
%	B
£	C
tCO ₂	D

Practical Opportunity 2 – Switch off lighting when not required

Many schools have the benefit of large window space enabling adequate natural daylight to enter rooms. Despite this, lights are often left on when not required and window space may be obstructed with posters and displays of pupils' work, which reduces the amount of daylight. The steps below will help you to make best use of natural daylight, reducing your reliance on artificial lighting.



1. Nominate a pupil per classroom to act as the lighting monitor; this can be done by the Action Team or by individual teachers. A new monitor can be nominated each day or each week. As classes often move around in secondary schools, it may be that the teacher acts as the lighting monitor in this situation.
2. Task the lighting monitors to keep an eye on the level of daylight throughout the school day; if there is an adequate amount of daylight to work comfortably at desk level, the lighting monitor should switch off the lights.
3. In conjunction with the teacher, the lighting monitor should also ensure the appropriate use of blinds. For example, vertical blinds can be altered to direct sunlight away from PC screens and whiteboards whilst still allowing diffuse daylight to enter the room. Try to avoid the situation where blinds are closed and lights are on.
4. The lighting monitor should ensure that lights are switched off when the room becomes unoccupied, and that others are encouraged to do the same.
5. Also ensure that windows are clear from posters and pupils' work, which blocks natural daylight.



How Much Have You Saved?

If you do not already have a good switch off routine, switching off lighting when there is an adequate amount of natural daylight or when the room is unoccupied can save you up to 10% of your electricity bill. You can calculate your approximate savings by following these steps:

What is your annual electricity bill?

The amount of money you will save each year is calculated by: $A/100 \times 10 =$

The annual CO₂ you will save will be around 1 tonne of CO₂ per £165 saved: $B/165 =$

£	A
£	B
tCO ₂	C

Practical Opportunity 3 – IT Equipment Switch-Off

The following table indicates the approximate costs to run individual items of IT equipment. It is based on measurements taken during Carbon Trust surveys, and assumes equipment is left on through the day and on standby out of hours. The table also shows the saving you can achieve by switching these items off completely when not required.

Item of Equipment	Annual Running cost £	Annual Saving £ (if switched off when not required)
Interactive White Board Projector	57	7
Speakers & Interactive White Board	10	5
Laptop	13	1
PC & Monitor	30	5
Photocopier	122	53
Printer	29	4

1. With your Action Team, identify all IT equipment throughout the school. List each item, including its location. Record if it is felt that the equipment is sometimes left running unnecessarily.
2. Allocate each item a colour using a traffic light coding system: (shapes can also be used to assist those that may be colour blind).
 - **Green** indicates equipment which should be switched off when not in use (for example, PCs, projectors and interactive whiteboards).
 - **Amber** highlights equipment which should be switched off after ensuring that no-one is using it (for example, the main office computer).
 - **Red** Do not touch. Equipment which should not be switched off (for example, a server or a fridge).
3. Place a coloured sticker onto the on/off switches and plugs of each item of IT equipment and communicate to all school users that they should look to switch off equipment unless it is marked red.



How Much Have You Saved?

You can calculate your approximate savings by completing the following table:

Item of Equipment	Annual Savings (A) (£ per item)	Number left on in your school (B)	Total Annual Saving (£) (A*B)
Interactive White Board Projector	7		
Speakers & Interactive White Board	5		
Laptop	1		
PC & Monitor	5		
Photocopier	53		
Printer	4		
TOTAL	-	-	

The annual CO₂ you will save will be around 1 tonne of CO₂ per £165 saved.
 Total annual savings/165 =

tCO₂

Practical Opportunity 4 – Out-of-hours survey

Your school should only use a small amount of electricity overnight for items such as fridges, freezers and servers. It is likely though that your school is leaving other items on overnight. An out-of-hours survey will help you identify these items so they can be switched off.



1. Check your current overnight use -

- If you have a 'smart' electricity meter (sometimes called AMR) at your school and have access to the data, you can identify the overnight use directly from the daily consumption profiles. (Note that if your AMR data is presented in kWh per 30 minutes, you will need to multiply the reading by 2 to get your kW load).
- If you do not have AMR, read your electricity meter (which is in kWh) after everyone has gone home, and then read it again ten minutes later. Record these readings on page 11 and calculate your overnight electrical load.
- If you have a modern digital electricity meter, you should use an alternative method. Press the button to display the current kWh reading. Watch the meter until the first digit changes and start timing from this point (this indicates the start of using 1kWh) until the digit changes again (indicating the completion of the use of 1kWh). Record these readings on page 11 and calculate your overnight electrical load.

2. Undertake a detailed survey of all school rooms -

- Don't forget the boiler room, services rooms and outside. Identify electrical items left on unnecessarily, looking particularly at exterior lighting, IT equipment, electric hot water heaters, pumps and other plant room equipment.
- Make a list for each room of the electrical equipment (Appendix 1 has a suggested template) and apply a coloured sticker to the switch of each device. A traffic light coding system should be used for the stickers as follows:
 - **Green** indicates equipment should be switched off when not in use (e.g. PCs, lighting).
 - **Amber** indicates equipment should be switched off after ensuring no-one is using it.
 - **Red** Do not touch. Equipment should not be switched off (e.g. fridges, freezers and network servers).

Note: shapes can be used with the colours to assist those that may be colour blind.

3. Switch off all equipment labelled with a green or amber sticker.

4. Measure your reduced energy use –

After switching off all unnecessary electricity users, it is good to check the savings:

- If you have AMR, check the overnight readings for the next day and record them on page 11. (Remember to multiply by 2 if your AMR data is presented in kWh per 30 minutes).
- If you do not have AMR, read your electricity meter, out-of-hours at a ten minute interval and record this on page 11.
- If you have a modern digital electricity meter you can also use the 1 kWh method previously described in step 1.

5. Calculate your savings using the template on page 12.

6. Repeat these checks regularly to check your overnight load does not start to rise above the 'best practice' level you measured above.

7. Make extra checks when you close up for the school holidays – leaving equipment on over the holidays will use a lot of unnecessary electricity.

Meter Reading Template:

Date:	
Meter number:	
Carried out by:	

STEP 1 - Check your current overnight use:

Option 1 - Reading from AMR:

Overnight electrical kW load kW (A)

(Note: Your AMR data is generally presented in kWh per 30 minutes, therefore you will need to multiply by 2 to get kW power left on.)

Option 2 - Reading your meter at 10 minute intervals:

Meter Reading 1		kWh (B)
Meter Reading 2 (10 minutes)		kWh (C)
kW left on overnight (C-B)*6		kW (D)

Option 3 - Reading from modern digital meters:

Time at digit change (kWh first digit)		Time (E)
Time at digit change again		Time (F)
Time elapsed between readings (1kWh used)		Minutes (G)
kW left on overnight (60/G)		kW (H)

STEP 4 - Measure your reduced energy use - after survey and switch off

Option 1 - Reading from AMR:

New overnight electrical kW load		kW (I)
kW Saved (A-I)		kW (J)

(Multiply I by 2 if your AMR data is presented in kWh per 30 minutes)

Option 2 - Reading your meter at 10 minute intervals:

Meter Reading 1		kWh (K)
Meter Reading 2		kWh (L)
New kW left on overnight (L-K)*6		kW (M)
kW Saved (D-M)		kW (N)

Option 3 - Reading from modern digital meters:

Time at digit change (kWh first digit)		Time (O)
Time at digit change again		Time (P)
Time elapsed between readings (1 kWh used)		Minutes (Q)
New kW left on overnight (60/G)		kW (R)
kW Saved (H-R)		kW (S)



How Much Have You Saved?

You can calculate your approximate savings by following these steps:

For every kW you reduce your electrical baseload by, you will save approximately £350 per year. $350 * \text{kW saved}$ (this may be J, N, or S, depending on the method you used above) =

The estimated annual CO₂ you will save is 1tonne of CO₂ per £165 saved: $T/165 =$

£	T
tCO ₂	U

Practical Opportunity 5 – Permanently Sealing Superfluous Windows

This opportunity will apply to many older schools which have windows that are in a poor condition. Frames may be distorted or corroded which leads to them becoming draughty. This will cause your classrooms to become cold due to draughts throughout the winter.

In many schools, classrooms have an excessive number of opening windows, particularly older metal framed windows. High level windows can also be difficult to open and close and hence can be left ajar wasting energy and causing a security risk.

It is often possible for some of the windows to be permanently sealed to reduce heat losses and save on heating fuel costs. It is important to still leave some low level opening windows for summer ventilation. In taller rooms such as sports halls, it is wise to maintain some high level opening windows to assist airflow and dissipate heat in the summer.



1. With your Action Team, survey the windows throughout the school to establish which are leaky, leading to cold down-draughts.
2. Determine which can be permanently sealed. You must ensure that there are still enough operable windows to provide adequate ventilation for the summer.
3. Mark these windows (a green sticker for operable windows and red for sealed windows), to allow people to see what choices have been made.
4. When everyone is happy with the chosen windows, apply silicone sealant to those windows which are to be permanently sealed. This can be purchased from any DIY store at a cost of less than £5 per tube which should be enough to seal 10m of window gap. Mark the windows or wire the latch to show they have been actively sealed up.
5. Once the windows are sealed, the heat retention and comfort of your school will be improved, and this will also reduce decoration costs.

Please recognise that the windows are part of the property asset and hence it will be valuable to consult with your local authority property/estates department prior to sealing the windows.

Please note that the cost of this method is for materials only, as it should be practical for the Site Manager to implement the recommendation. However, they

must adopt safe working practices especially when sealing windows at a high level. It is also advisable to provide a risk assessment to ensure that all aspects of health and safety have been considered and addressed.

How Much Have You Saved?



You can calculate your approximate savings by following these steps:

Sealing draughty windows can reduce heating energy use by 10%, providing the opportunity is applicable to the whole building. If it is only applicable to certain areas, then 10% of the cost of heating that room will be saved.

What is the annual cost of your heating fuel bill?

£	A
%	B
£	C
tCO ₂	D

Approximately what percentage of the school floor area, have you managed to seal windows in?

The amount of money you could save each year is calculated by: $(A/100*B)*0.1 =$

The estimated annual CO₂ you will save is 1 tonne of CO₂ per £165 saved: $C/165 =$

Other Opportunities

The checklist below will help you consider the fast track opportunities in the previous sections as well as further areas where you can save money, energy and carbon. Use this check list to assess your school. Questions that you answer 'no' to may require further investigation and action.

Room Type	Energy Saving Opportunity	Yes/No
Building exterior	Are external lights switched off during the day?	
	Are the controls for exterior lights checked regularly to ensure that 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?	
	Are windows and skylights cleaned regularly?	
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?	
	Do windows remain closed whilst the heating is on?	
	Is your school free from supplementary heaters (i.e. electric plug-in heaters)?	
	When there is a good amount of natural daylight, are lights turned off?	
	If you have multiple light switches in one room, are the ones which don't usually need to be on clearly labelled to prevent them from being used unnecessarily?	
	Are you satisfied that none of your rooms are over lit?	
	Check the temperature of air conditioning units; 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?	
	If thermostatic radiator valves are installed in the IT suite, are they set to a medium setting, e.g. no more than 3?	
	Is IT equipment such as PCs, laptops, whiteboards and projectors always switched off when not in use?	
Have you considered installing plug-in time controls to IT equipment such as photocopiers?		

Room Type	Item to survey	Yes/No
Staff Room and Common Room	If you have a dishwasher, is it only switched on when it is full?	
	Are the lights always switched off during periods of non-occupancy?	
	Have light switches been actively labelled to ensure that only those lights that are necessary are used?	
	Do you have water coolers in these rooms, are they necessary?	
	Are plug-in timers fitted to any electronic equipment such as photocopiers and printers in this area?	
Office and Reception Areas	Is non essential lighting switched off at all times, for example, lights in well day-lit reception areas?	
	Where there is excess lighting, have you removed these unnecessary tubes?	
	Are lights always switched off when these areas are unoccupied, for example, before office staff arrive, whilst at lunch, and when they leave?	
	Is IT equipment such as photocopiers and printers switched off overnight?	
	Are printers set to print double sided at all times?	
	Are PC screens switched off when not in use (even for short periods of time)?	
	Have you rationalised the amount of IT equipment within these areas? Only a sufficient number of printers and photocopiers should be present.	
Hall and Theatre	Have any unnecessary plug-in heaters in these areas been removed?	
	Are blinds on high level windows open to allow natural light to enter?	
	If you have multiple light switches, are the ones which don't usually need to be on clearly labelled to prevent them from being used unnecessarily?	
	Have any excess tubes been removed?	
Kitchen	Is all specialist equipment such as production/theatre lighting and sound systems only switched on when required, rather than being switched on at the start of every school day?	
	Is cooking equipment labelled with pre-heat times and not left on unnecessarily?	
	Do you ensure that, during the winter, catering equipment is not used to heat the room?	
	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 switched off during holiday periods? If multiple appliances are present, combine the contents so some can be switched off.		

Room Type	Item to survey	Yes/No
<p>Kitchen</p>	Catering is labour intensive and staff will be active. If you are able to alter the temperature here, is it set to a suitable temperature of between 16-18°C?	
	Is hot water set to an appropriate temperature of just above 60°C?	
	Are fridges and freezers defrosted regularly?	
	Have you considered having a picnic day during the summer so that catering costs can be reduced?	
	Are kitchen fans and ventilation switched off when no cooking is taking place?	
<p>General</p>	Is there someone who has responsibility for monitoring energy consumption?	
	Do you have an energy or action team?	
	Does your school have an environmental or an energy policy?	
	Do you run activities to engage and raise awareness?	
	Are energy meters read regularly?	
	Are pupils involved in reading the meters and monitoring the results?	
	Have all old fashioned tungsten bulbs been replaced with modern energy saving alternatives?	
	Are pipes and valves fully insulated in the boiler room?	
	Is your hot water storage tank fully insulated?	
	Have heating times been matched to the occupancy of the school?	
Have you looked to minimise the use of air conditioning?		

Practical Whole School Savings – 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 which best suit 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. This will be useful when submitting evidence for your Eco-Schools award.

Priority	Opportunity	Estimated annual savings		Person Responsible	Expected Date of Completion	Actual Date of Completion	Education Opportunity (Pupil Involvement)
		(£)	CO ₂ (tonnes)				
1							
2							
3							
4							
5							
6							
7							
TOTALS							

