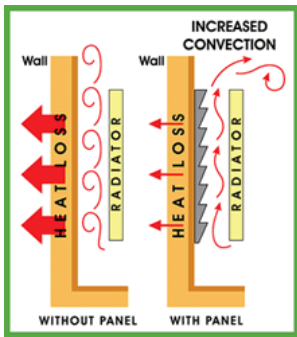
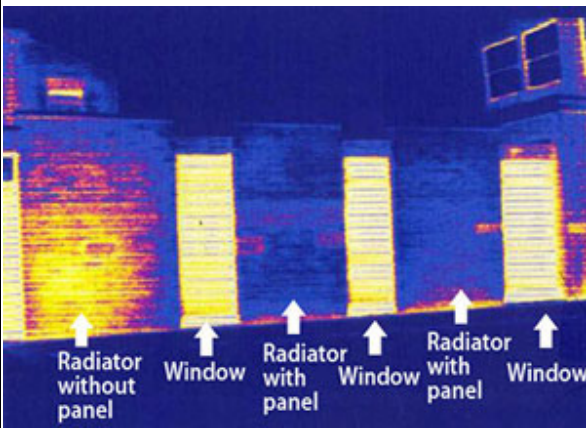


LESSON 17 : SAVING HEAT ENERGY IN YOUR SCHOOL

<p>OBJECTIVE</p>	<p>To investigate where radiators are used in school and how many reflective panels would be needed to reflect heat energy back into the room. To calculate the potential savings of using reflector panels in classrooms.</p> <p>Links KS3: Mathematics; Science</p>
<p>BACKGROUND</p>	<p>Radiators are commonly used to heat rooms, but they are usually attached to walls. As a result only half of the radiator faces towards the room and the heat must travel a long way to reach the other side. A lot of heat is also absorbed and lost into the wall behind the radiator.</p> <p>A good way of reducing the amount of heat energy lost is to use reflective panels. These direct the heat back into the room and keep the radiator warmer for longer so the boiler does not have to fire up so often and so less energy and fuel is used by the school to keep it warm.</p> <div>  </div> <div>  </div> <p>This is a thermal image taken from outside the building. The yellow columns are windows. The red/orange block between the windows on the left is a wall with a radiator without radiator reflector panels fitted. The two blue blocks to the right of this are walls with radiators and with radiator reflector panels fitted. You can see that the parts of the wall with the radiator reflector panels are not allowing heat energy to escape from the building.</p> <p>Saving energy will save money. Fitting reflector panels can save up to 20% on the heating costs.</p> <p>Calculating the cost of fitting reflector panels and the cost of your heating bill can help you evaluate the potential savings your school could make.</p>

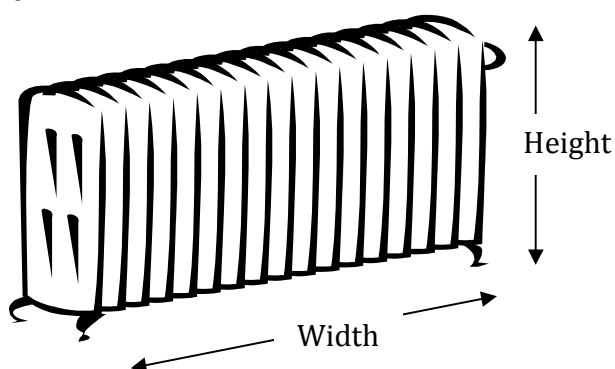
CONTINUED ON NEW SHEET...

SAVING ENERGY IN YOUR SCHOOL CONTINUED...

PROCESS

Perform an advanced energy audit use the table below and record your results. As part of the audit check the following:

- Visit every room in school to check if there is a radiator.
- Measure each radiator in cm.



- Calculate how many reflective panels would be needed behind each radiator and then the total in the school. Based on each panel being 45 cm wide x 58 cm high.
Divide the width of each radiator by 45cm and round up to the next whole number.
If the radiator is 60cm – 118 cm high, multiply the number of panels by 2.
If the radiator is over 118 cm high multiply the number of panels by 3.
- Calculate the total cost for the reflective panels (each panel costs £1.80).
- Find out the total heating cost for the school. Ask your business manager/bursar. Now calculate 20% of that cost.
- To find out the potential savings for the school compare the cost of the reflective panels and the 20% savings.

Is the cost of the panels more than the savings or are the savings more than the cost of the panels?
How many years will it take to payback. (You can calculate this by dividing the total cost of the panels by the heating cost per year.) If the school were to make only a 10% energy saving, what is the saving and how long does it take to pay back the investment?

CONTINUED ON NEW SHEET...

SAVING ENERGY IN YOUR SCHOOL CONTINUED...

LESSON SUCCESS

- Working in groups, pupils will calculate the number of reflector panels needed in each classroom.
- Pupils will make recommendations about the number of reflector panels required in total and if they are cost effective (will there be a cost saving? And if so, how long will the payback time be).

DEVELOPMENT

Test the theory. Before using reflector panels, check the heating costs for the school – if this can be shown on a monthly or regular basis even better. Following the installation of the reflector panels record or view the heating costs for the school. Have the costs reduced? Note: the weather will have a major effect on the heating costs, if it not used in the same pattern as previous months. As a result this may skew your findings.

What are your actual savings? If they are less than 20%, what could the reasons be? Note: Radiators on outside walls which are not insulated will lose the most heat and therefore the savings on these will be greatest where panels have been used.

Investigate the most suited materials used to reflect heat energy or absorb heat energy. Set up an experiment using a selection of materials that may or may not reflect heat energy. Use a static heat source, such as a light bulb a set (and safe) distance from the sample material and a temperature probe or thermal imaging device beyond the material. Which material allows heat energy to be transmitted through the material? Which would be most suited to be used as a reflector panel. Would a number of combined materials be even better?

REFLECTOR PANELS

If your school would like to buy reflector panels, Eco-Schools has negotiated a price of £1.80 a panel for HEATKEEPER. Order forms are available on the Eco-Schools website, or email poweryourfuture@winchenergy.com

Radiator energy audit – Reflector panels (HEATKEEPER)				
Room name/number:	Radiator 1	Radiator 2	Radiator 3	Radiator 4
Size of radiator cm x cm width x height				
How many reflector panels will be needed per radiator? Divide the width of each radiator by 45cm and round up to the next whole number Each reflector is 45cm x 58cm				
How many reflector panels in total will be needed in this room? (radiator 1 + radiator 2 + radiator 3)				

Radiator energy audit – Reflector panels (HEATKEEPER)				
Room name/number:	Radiator 1	Radiator 2	Radiator 3	Radiator 4
Size of radiator cm x cm width x height				
How many reflector panels will be needed per radiator? Divide the width of each radiator by 45cm and round up to the next whole number Each reflector is 45cm x 58cm				
How many reflector panels in total will be needed in this room? (radiator 1 + radiator 2 + radiator 3)				

Whole school review of the radiator energy audit - Reflector panels (HEATKEEPER)	
<p>Total number of panels needed for the whole school</p> <p>(Add the panels needed for each room)</p>	
<p>Total cost for the panels</p> <p>(each panel costs £1.80)</p>	
<p>Heating costs for the school per year</p> <p>(Check the heating bills for the school year)</p>	
<p>20% of the above heating cost</p> <p>(This will show the potential cost savings after installing the reflector panels)</p>	
<p>Payback time of the panels in years</p> <p>(Divide the total cost of the panels by the heating cost per year)</p>	