



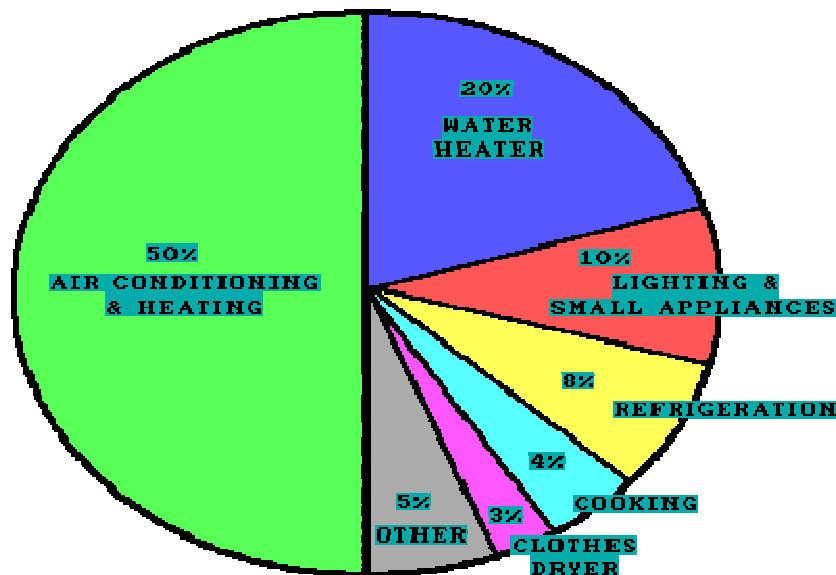
## ELECTRICITY COUNTS!

### Goal(s):

- To calculate energy requirements of electrical appliances.
- To understand kWh and how to calculate them.
- To take action to reduce electricity consumption.

### General description of the activity:

We all use electric appliances every day. The pie chart below shows the average electricity consumption of households in the UK.



Using appliances with moderation can help reduce the energy consumption and thus also CO<sub>2</sub> emissions. By using the Aids below, the children find out how much electricity their family consumes. This can usefully involve parents as a homework exercise. The pupils could also do a special presentation to parents on their findings, including tips on how to reduce a carbon footprint.

The pupils can work in pairs or small groups to work out their electricity



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consumption.

Please look at the 'variations' below. These expand upon the basic activities and encourage much useful creative thought, discussion and extension activities.

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### Required materials:

- Calculators

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### Required pupil skills:

Understanding of kWh, use of calculator

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### How does this activity fit into the curriculum:

This activity is well suited for lessons in Science, Mathematics and Literacy.

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### Safety issues:

If the pupils are to examine electrical appliances, they need adult supervision and the appliances should be switched off.

<b>Individual steps of the activity:</b>	<b>Required time:</b>
1. Get the pupils to make a list of all electrical appliances they can think of. Let the pupils guess which ones use the most electricity. Help them appreciate the link between electricity consumption and environmental consequences such as global warming (assuming that a major share of the electricity is produced by fossil fuels and not renewables). 2. Introduce the concept of kilo-Watt-hours (kWh) and how to calculate the kWh consumption (see Aid 1). 3. The pupils can look up appliances on the internet and find out their energy needs. Explain the A-G scale showing how economical appliances are (for more information on this topic, please see the 'Energy Label Detective' activity).	1-3 lessons
4. As a homework assignment let the pupils list the electrical appliances in their house (using the table in Aid 2), along with their wattage (if possible) and for how long they are used. The pupils may ask their parents about the use of appliances that the pupils do not use themselves and together with the parents estimate the hours of use. In case it is not possible to find the wattage plate on a given appliance then use the figures shown in Aid 2.	Homework assignment
5. Back in the class the pupils calculate the cost of their electricity consumption. This can be done individually or as class average.	1 lesson



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| 6. Discuss possible ways of reducing consumption. It is important that the pupils understand that some low wattage items may use a lot of electricity if they are left on a long time and that items with a high wattage may not use much if they are not on for very long. |              |
| 7. The pupils present their findings in groups to other children and their parents.   | An afternoon |

### Suggestions for combination with other AL activities:

"Energy label detectives" – Investigation of the difference between the energy consumption of the best and worst available product in the shops

"Race of the pots" – How to heat a pot energy efficiently. Under what conditions does the pot heat its contents fastest? How much energy is consumed?

"Standby power in my home" – Investigation of the standby power consumption at home.

### Variations:

Carbon footprint: Get the pupils to calculate their family's carbon footprint by using an on-line calculator such as [www.carbonfootprint.com](http://www.carbonfootprint.com).

Testing knowledge online: Younger pupils can look at the 'Happy House' activity on: [http://www.ltscotland.org.uk/climatechange/frame\\_panel/full\\_screen.htm](http://www.ltscotland.org.uk/climatechange/frame_panel/full_screen.htm)

Get really creative: Ask the pupils to imagine life without electricity. Try one day without electricity. What did our forefathers do before electricity was discovered? Even looking 100 years ago can be an eye-opener for children. Make a large timeline showing approximately when certain electrical appliances were introduced. Start with the light-bulb.

What do you do in a day that uses electricity? Let the pupils make a log of what they themselves use in a day.

Drawing and writing: Encourage discussion and creative writing/drawing to show what future appliances may be like e.g. the 'house robot'. How much electricity will be used then, less or more?

Introduction of a competitive element: Challenge! Can you save 500 Watt in a week? Get the pupils to plan how to do this and then use their 'pester power' to get their parents to help.

### Available aids:

Aid 1 – How to calculate the cost of running appliances

Aid 2 – Register and calculate your consumption costs



### How to calculate the cost of using appliances

The consumption of electricity by electric appliances is measured in a unit termed 'kilo-Watt-hours' (kWh).

You can work out how much it costs to run something by looking at its wattage plate. The plate gives you its installed power in Watts or kiloWatts.

$$1 \text{ kiloWatt} = 1,000 \text{ Watts}$$

To work out how many units of electricity you have used, multiply the wattage of the appliance by the number of hours used:

$$\text{Power (kiloWatts)} \times \text{Time (hours)} = \text{Energy used (kiloWatt hours)}$$

For example, a 100 Watt light bulb used for 10 hours =  $100\text{W} \times 10 \text{ hours use} = 1 \text{ kWh}$ . Then multiply that by the price of a unit of electricity which is about 7 pence per kWh in the UK:

$$\text{Energy used (kWh)} \times \text{Electricity price (pence / kWh)} = \text{Cost (pence)}$$

Remember, that consumption depends a lot on how long you leave appliances on!







**Search words:**

<b>Energy end-use</b>	<b>General topic</b>	<b>Educational subject</b>	<b>Age level</b>
Transport	General sustainable development	<b>Language</b>	6-8 years
Space heating & cooling	Renewable energy	<b>Mathematics</b>	<b>9-10 years</b>
Hot & cold water	<b>Energy efficiency (saving)</b>	<b>Science</b>	<b>11-12 years</b>
Lighting	CO <sub>2</sub> wise transport	<b>Citizenship</b>	
<b>Electric appliances</b>			