

Teacher notes for activity: Thinking about electricity

Resources for this activity

- Powerpoint slides to support activity, including printable activity frames (vocabulary matching exercise), available on www.ashdenawards.org/schools/activities.
- 5-minute Ashden Awards films, available on www.ashdenawards.org/schools/films:
 - **Seaton Primary School, UK:** generating renewable electricity from a photovoltaic array and wind turbine, and solar water-heating for the swimming pool.
 - **Cassop Primary School, UK:** using wind and solar electricity, and wood-fuelled heating, and integrating the understanding gained into the curriculum and ethos of the school.
 - **Practical Action, Peru:** using micro-hydro plants to supply electricity to homes and small businesses in remote villages in the Andes.
 - **Shidhulai Swanirvar Sangstha, Bangladesh:** using solar electricity on boats to bring education and information to water-side families.
 - **SEEDS, Sri Lanka:** providing financial services so that people can buy solar-powered lighting systems.
 - **Ecotricity, UK:** increasing the supply of wind-powered electricity using small wind-farms on industrial sites.
- Lump of coal, magnifying glass.

Curriculum areas and topics

- Main activity: Science, Geography, English, Education for sustainable development (ESD).
- Further activities: Science, Mathematics, PE, Dance, Geography, Design and Technology, Citizenship, ESD, Art and design, English.
- Links to topics: Light, Electricity, Improving the local environment, Homes.

Suitability

- Key Stage One and Lower Key Stage Two – age approximately 5 to 9 years.
- Main activity needs one or two lessons.
- The detailed objectives and approach can be adapted for use with different age groups.

Grouping

- Whole class input.
- Mixed ability pairs/groups for the word matching exercise as this is a spoken and sorting activity and pupils of different abilities will be able to support and stimulate each other during discussion.

Background

This is a detailed activity, designed to prompt children to think about where electricity comes from and to introduce some new terms to them. Pupils will learn about non-renewable and renewable types of energy and to make some simple distinctions between them. With play and drama used as scaffolds, the activity should be accessible to Key Stage One children and could also be used with lower Key Stage Two children.

Prior knowledge

Pupils need to have an understanding of what energy is and how it is used in our everyday lives. All four activities in the 'Making a difference – in my thinking' section of the website will support this prior knowledge: Powerpoint and Teacher notes are available on www.ashdenawards.org/schools/activities.. Pupils also need to have an understanding of how electricity is used at home and in school.

The vocabulary for this activity is challenging and you might want to use the vocabulary matching exercise in Slide 12 first (if pupils have considerable prior knowledge), or as a consolidation activity.

Purpose of the activity

- To know that we can produce electricity in different ways.
- To begin to understand that the way we obtain electricity can affect our environment.

How to use the resources

Powerpoint slides

Slide 1 – Introduce the learning objectives, and recap with pupils what electricity is and what we need it for.

Slide 2 – Introduce the new vocabulary 'generate' and 'fossil fuels'. There is an opportunity to assess prior knowledge with two questions about ways in which electricity might be produced, and what fossil fuels might be. Encourage pupils to offer ideas and use the pictures as prompts to come up with the words 'gas' 'oil' and 'coal' (pupils can guess the words first before they appear on the screen). Note that another term for oil is petroleum.

Slide 3 – This is a very simplified story to read aloud. It can be done with some pupils acting out what happens. You could ask first if anyone has any idea how coal/gas/oil is made or where it is found. It is important for pupils to realise that electricity is just one way in which energy from fossil fuels is used in schools and our homes – oil, gas and coal can also be used directly for heating.

Slide 4 – Does anyone know what happens to coal, gas or oil when it is used to make or produce electricity? There are some new words used here – furnace, turbine, pollution and 'global warming'. It is likely that pupils will have heard of at least one of these terms, but will not really know what they mean. (Slide 10 is a glossary with simple explanations to help describe these new words and concepts. Introducing these terms early on and using them in relevant contexts will help pupils to develop an understanding). The main message here is

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that power stations are where these fuels are burned, to release the energy and convert it into electricity. An unwanted side-effect is that whenever fossil fuels are burned, gases are released into the air (atmosphere) and these cause pollution.

Slide 5 – Another important idea is that coal, oil and gas take millions of years to form. It is not really practical to have samples of oil and gas in the classroom, but lumps of coal can be handled (with disposable plastic gloves) and this can reinforce the idea that coal is the result of millions of years of change. Pupils may also comment on other properties and this activity can be extended, giving pupils the chance to look at a sample through magnifying glasses, draw it and talk about it.

Slide 6 – This slide very briefly introduces nuclear energy. Pupils may be amazed at the idea that through splitting atoms enough energy can be released to generate electricity for homes and factories. This will also be a difficult concept for them to grasp. It is important that they are introduced to the terms ‘nuclear energy’ and ‘dangerous waste’.

Slide 7 – This slide introduces the idea of ‘renewable energy’ and pupils may recognise some of the technologies shown. It is important to tell pupils that these are not the only ways to produce electricity from renewable sources, but they are some of the most well known. Can they guess where the energy comes from to generate electricity? The clues are in the words and pictures.

Once they have identified the idea of getting energy from ‘wind’ ‘water’ and ‘sun’ this could be extended. Ask the pupils where the wind and water get their energy from and relate it back to the sun. Nearly all our energy comes from the sun (a small percentage of energy comes from inside the earth - geothermal energy - and this can be introduced if you think pupils can cope with this additional idea). The main point here is that there are practical ways of making electricity without causing pollution or releasing gases into the air that cause global warming.

Slide 8 – Introduce the film about Cassop Primary school or Seaton Primary School. First ask the pupils if they can guess from looking at the pictures shown how Cassop or Seaton might get some of its electricity, then watch the film. Do pupils know where the electricity used to run their own school comes from? Do they think it comes from renewable or non-renewable sources?

Slide 9 – Ask pupils to identify whether the pictures at the bottom of this slide show renewable or non-renewable sources of energy. Starting from the left hand side of the slide, each picture will then respond to a click of the mouse and ‘fly’ into the correct box. (Slide 11 contains a printable version of this slide which can be used for pupils to cut, colour and stick first before showing them the answers).

Slide 10 – Glossary of terms.

Slide 11 – This is a printable version of the renewables/non-renewables sorting activity.

Slide 12 – This is a printable version of the Glossary, with terms muddled up. Pupils need to work in groups to sort them out. This could form the basis of a separate English session.

Films

Watch and discuss one or more of the 5-minute Ashden Awards films, which show the generation of electricity from different renewable sources, in different countries. Details are given on page 1.

Further activities

- 1) Set up the home corner as an electric showroom. Have a variety of household and other electrical appliances for pupils to examine (consider health and safety of course). Label appliances clearly with their power usage so that pupils can compare what uses the most.
Science, Mathematics

- 2) Act out the making of fossil fuels in a dance activity. Some pupils can be plants growing tall with the energy from the sun then dying back to the ground with their stores of energy locked inside them. Use a drum or other percussion to simulate crushing from the weight of soils and mud over millions of years and get pupils to flatten themselves or curl up into tight balls as they are 'squashed'.

Act out drilling for oil, crawling underground in search of coal, slithering along to simulate pipelines and driving tankers and lorries to deliver fuel to power stations.

How can pupils show the energy being released once they have been burned? How can they show carbon dioxide rising into the atmosphere and spreading out around the world?

Use the rotating shapes of wind turbines to create a dance based on slow and fast 'wind' speeds. This can be done by groups of pupils dancing in clusters, ensuring that they complement each other's movements but maintain a safe distance.

PE, Dance, Citizenship

- 3) Design and make handheld windmills and/or streamers and test them in various parts of the school grounds. What is the best location for a wind turbine and why?
Science, Geography, Design and technology

- 4) Find out the perceptions of other pupils and adults about renewable energy sources. Design a simple questionnaire or ask them to vote for their favourite technology.
English, Mathematics, Geography, Science, ESD

- 5) Where would you put a PV panel in your school? Which is the sunniest place and how could you test this?
Science, Mathematics, Geography

- 6) Measure the temperature in the same area with and without a jam jar to show the temperature rise inside a greenhouse (a simple model of the 'greenhouse effect').
Science, Mathematics

7) How much electricity does your school use each week? How can you find out? How can you try to use less? This could lead in to appointing classroom energy monitors or setting up a school energy team, which are covered in the activity 'Making an action plan for change': the Powerpoint and Teacher notes are available on

www.ashdenawards.org/schools/activities.

Science, Mathematics, Citizenship, ESD

8) Research a type of renewable technology and design a poster to advertise it. What are the benefits? What are the drawbacks?

Art and design, Geography, Science, ESD

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