



# Energy mix lesson plan



## Lesson title

Energy mix

## Key stage

Key stage 3

## Subjects

- ▶ **England:** Science, English, Geography, Citizenship
- ▶ **Scotland:** Sciences, Literacy and English, Social studies, Technologies, Health and wellbeing
- ▶ **Wales:** Science, English, Geography, Personal and social education
- ▶ **Northern Ireland:** Science and Technology, Language and Literacy, Environment and Society: Geography, Learning for Life and Work: Local and Global Citizenship

## Lesson objectives

You might like to build this lesson into a unit of work or incorporate it into a wider curriculum project. Choose one or more of the following activities, depending on the age and ability of the pupils in your class. Through completing these activities, students will:

- ▶ learn that fuels are substances which burn to release energy
- ▶ be introduced to the concept of energy in the context of fuels as convenient and therefore valuable sources

- ▶ study how electricity is generated, with reference to environmental impacts
- ▶ consider the nature and origin of fossil fuels, renewable and nuclear sources of energy and how their use has implications for the environment
- ▶ consider factors involved in making a fair comparison between different fuels
- ▶ learn about the need for fuel conservation
- ▶ use secondary sources of information as the basis for creative thought about an energy device or resource
- ▶ find information using contents, index, glossary, key words, hotlinks
- ▶ examine conflicting evidence and arrive at a considered viewpoint
- ▶ plan and develop ideas and lines of thinking into continuous text

## Resources and preparation

- ▶ Open or bookmark the Pod's 'Power the UK' energy mix activity so that you can play it with the class: [www.jointhepod.org/energymixgame](http://www.jointhepod.org/energymixgame)
- ▶ Read the energy 'fact files' from the energy mix resource pack. These contain background information about a variety of energy sources, and summarise some pros and cons of each. It may be useful if you have them to refer to during the lesson.
- ▶ If you are planning on organising a formal debate, you could read the debate guidelines in the Pod's energy mix resource pack.

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## Eco-schools

Remember, to qualify for an Eco-Schools Award, you need to show that environmental issues have been covered in curriculum work. Curriculum links are included at the end of this lesson plan.

## Introduction

Ask pupils “*What fuels can you name and what do we use them for?*”. Lead the discussion towards the general statement that *when fuels burn they make things happen*. Introduce the definition of ‘energy’ as what burning fuels release to make things happen.

Ask for examples of different fuels that we use in the UK - oil, coal and gas; nuclear; wind; water; the Sun. Elicit ideas about where mains electricity comes from. Trace the supply back to power stations.

List the ways in which we obtain energy from fuels: oil, coal and gas power stations; nuclear power stations; wind turbines; hydroelectric power plants; solar panels. The energy these sources produce is distributed around the UK as electricity using a network called the National Grid.

Ask pupils if they know what the ‘energy mix’ is.

**The energy mix is the combination of sources used to provide sufficient energy to meet demand, at any given time and place.**

## Activities

### Activity 1: discussion

Brainstorm (on the whiteboard) reasons why getting the energy mix right is important. Ask students to choose the three most compelling reasons on the board and write them down. These reasons should reflect the importance of a supply that is **secure** (reliable), **sustainable** and **affordable**.

### Activity 2: research

Present the data for the current energy mix for electricity generation in the UK.

UK electricity: percentage supplied by fuel type

Fuel Type	2009 % of total supply
Coal	27.8
Oil	1.1
Gas	45.5
Nuclear	17.6

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Hydro	1.1
Wind	2.6
Other Fuels	3.5
Net Imports	0.8

Source: UK Energy in Brief 2010 – DECC

What do students think about the balance between fossil fuels, nuclear and renewable sources?

Ask the students to use secondary sources to compare various forms of energy resource using the following criteria:

- Security: reliability, consistency and reliance on other countries
- Sustainability: will a source run out? Does it harm the environment?
- Affordability: can everyone afford it? Will the price rise?

This may be done in groups, with each group reporting back its findings. Research should include both renewable and non-renewable resources, as well as the more complex issue of nuclear waste. (Alongside online sources, the fact files in the Pod's energy mix resource pack could be useful here. More capable pupils could also use the teachers' energy mix information pack.)

Encourage students to carefully consider the purpose, strengths and limitations of any sources of information they use. Who are they aimed at? Are they impartial, or do they have an agenda?

Students should present a considered viewpoint based on information from secondary sources, e.g. *identify the problems of pollution associated with electricity generation by fossil fuels and the environmental impact of renewable and nuclear energy sources.*

## Activity 3: experiment

Go to the webpage [www.jointhepod.org/energymixgame](http://www.jointhepod.org/energymixgame). Based on their research of the various energy sources, the students' should use the 'Power the UK' simulation to formulate their own energy mix for the UK. Can they power the UK reliably, affordably and sustainably, while keeping carbon emissions low?

## Activity 4: communication

The students will write a short article about the importance of getting the energy mix right. Following these steps will help them to form a persuasive argument:

- In pairs or individually they should think of three reasons why the UK should improve its energy mix.
- They should list five ways in which the UK could improve its energy mix in the future. They should prioritise their points in order of importance. For each point, they should think of a counter-argument and then, in turn, an argument against the counter-argument.
- Ask students what the benefits to the UK will be if we improve our energy mix in the future.

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The reasons for changing the mix can form their opening; the arguments about how the mix could be improved can be the main body of the article; and the benefits to the UK will make a good conclusion. Students should acknowledge the sources of information they use, as appropriate.

Ask the students to compose an eye-catching title and an appealing first sentence which will attract the attention of someone reading the school magazine or website.

## Taking this further

### Debate

You could hold a class debate to discuss the relative merits and issues for each source. A debate is a great way to encourage discussion in your classroom. The resource pack for the Pod's energy mix activity contains ideas and guidelines for running a successful debate with your class.

Pupils can research the energy sources using the 'energy fact files' contained in the resource pack, which can be downloaded from the Pod website.

The activities in this lesson can contribute towards the Pod's 'Energy Mix' activity, where your class can research, debate and communicate ideas about the UK's energy mix. See the Pod's energy mix activity resource pack for more information about running this activity.

### The future

Discuss a question about the future use of fuel, *e.g. As these fuels are non-renewable, will there be enough fuel in the future?* Discuss what could be done and how pupils can contribute to conserving fuel supplies. Focus on what that could mean for students' lifestyles, *e.g. walking to school, wearing warmer clothes, going to bed at dusk*. Ask pupils to prepare a leaflet to explain the issues to younger pupils at the school.

## Plenary

Ask the students to summarise why having a diverse energy mix is important, both now and in the future. How do they think the energy mix may change in the future? Reinforce the importance of a secure, affordable and sustainable energy mix.

## Teaching the curriculum

The Pod's lesson plans have been designed to support teaching of the curricula for England, Scotland, Wales and Northern Ireland. A list of which subjects this lesson can be used to teach, along with brief summaries of how curriculum objectives are met, is included below.

Full mapping of how the Pod's lesson plans meet the curriculum objectives of England, Scotland, Wales and Northern Ireland can be found on the Pod website here:

[www.jointhepod.org/teachers/curriculum/curriculum-guide](http://www.jointhepod.org/teachers/curriculum/curriculum-guide)

### England

#### Science

Students research how the UK's energy is generated. They debate the benefits and disadvantages of both renewable and non-renewable energy sources.

#### English

Students discuss and research how the UK's energy is generated. They write an article about the importance of getting the energy mix right. They could hold a formal debate about energy sources.

#### Geography

Students identify the possible consequences of energy generation to the environment and make informed suggestions about ways to manage the impact.

#### Citizenship

Students research and discuss energy sources, and write an article about sustainable energy generation for the school magazine or website.

### Scotland

#### Science

Students research how the UK's energy is generated. They debate the benefits and disadvantages of both renewable and non-renewable energy sources.

#### Literacy and English

Students discuss and research how the UK's energy is generated. They write an article about the importance of getting the energy mix right. They could hold a formal debate about energy sources.

#### Social studies

Students identify the possible consequences of energy generation to the environment and make informed suggestions about ways to manage the impact.

#### Technologies

Students research the implications and ethical issues arising from energy generating technologies.

#### Health and wellbeing

Pupils contribute their views, time and talents to bring about positive change in the school by writing an article about sustainable energy generation for the school magazine or website.

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## Wales

### Science

Students research how the UK's energy is generated. They debate the benefits and disadvantages of both renewable and non-renewable energy sources.

### English

Students discuss and research how the UK's energy is generated. They write an article about the importance of getting the energy mix right. They could hold a formal debate about energy sources.

### Geography

Students identify the possible consequences of energy generation to the environment and make informed suggestions about ways to manage the impact.

### Personal and social education

Students research and discuss energy sources, and write an article about sustainable energy generation for the school magazine or website.

## Northern Ireland

### Science and Technology: Science

Students research how the UK's energy is generated. They debate the benefits and disadvantages of both renewable and non-renewable energy sources.

### Language and Literacy: English with Media Education

Students discuss and research how the UK's energy is generated. They write an article about the importance of getting the energy mix right. They could hold a formal debate about energy sources.

### Environment and Society: Geography

Students identify the possible consequences of various energy generation methods to the environment and make informed suggestions about ways to manage the impact.

### Learning for Life and Work: Local and Global Citizenship

Students investigate the issue of energy generation. They actively participate in improving their school and the local community by writing an article about sustainable energy generation for the school magazine or website.