Chemistry

Fossil fuels

Learning objectives

- The students find out more about fossil fuels and the damage they do to the environment.
- In the project stage, students produce a report detailing information about an alternative energy source.

Warmer

1 Divide the class into teams of six. Read these questions aloud and tell students to answer them in their teams:

1 *Did the fossil fuels we use today begin forming before or after the age of dinosaurs?*
2 *What percentage of energy comes from fossil fuels around the world?*
3 *What does natural gas smell of?*
4 *How much coal is needed to run a 100-watt light bulb 24 hours a day for a year?*
a *325 kg* **b** *a tonne (1000 kg)* **c** *10 kg*
5 *Which country is the biggest oil-producing country in the world?*

Answers

1 before **2** 81% **3** It has no smell **4** a **5** Russia

2 Check answers. The winning team is the one with the most points. If it is a tie, ask the following tiebreaker question. The first team to answer correctly is the winner.

Which country produces the most renewable energy as a percentage of their total energy use? (Denmark, 45%)

1 Put students into pairs to discuss the questions. Then give them just 30 seconds to check their answers in the text. Check answers.

Answers

Coal, oil and natural gas are examples of fossil fuels. When they burn, they create carbon dioxide, which contributes to the greenhouse effect and climate change. Their use also destroys the natural environment through acid rain, damage to plant and animal life, and oil spills.

2 Encourage students to cover the box and try to complete the sentences without looking at it. They can then look back at the box to help them complete any remaining sentences. Allow students to compare their ideas with a partner before checking as a class.

Fast finishers

Ask fast finishers to think of three reasons why fossil fuels are still much more common than renewable energy. Elicit some ideas after checking answers to exercise 2. Possible answers may include public opposition to wind farms, the cost of solar panels, and that fossil fuels are ready-made fuels.

Answers

1 fossil fuels **2** energy **3** carbon **4** carbon dioxide
5 climate change **6** pollution

3 Put students into groups of four, and tell each student to choose a different question. Once they have thought about their explanation, they should share it with their group. After a few minutes, elicit some ideas from the class.

Mixed ability

Encourage weaker students to read the last section of the text again, before doing exercise 3. Stronger students can answer the questions without referring back to the text.

Extension activity

Tell students to make posters about the different fuels mentioned in the text. They should include information on how the fuel is produced/used and what the advantages and disadvantages of each fuel are. Ask each group to present their poster to the class.

Answers

1 Digging and drilling can destroy the landscape.
2 Chemicals react with water in the air, leading to acid rain, which damages soil.
3 Burning fossil fuels creates toxic chemicals which are dangerous for our health.
4 If there is an oil spill, birds and animals are harmed.

4 ▶ **2.17** Tell students that they are going to listen to a programme on alternative forms of energy. Before they listen, write these words on the board: *wood, sun, turbine, farm, panel, roof, offshore, methane, heat, river, ocean, liquid, waves* and ask students to group them into these categories: *hydroelectric power, solar power, biofuel, wind power*. Play the recording and check answers.

Answers

1 b **2** d **3** a **4** c

Audioscript

John: Hello, this is John McGregor and welcome to *Science Forum*. Today, Emily Page and I are talking about alternative forms of energy. At present, about eighty-one per cent of the world's energy comes from hydrocarbons such as coal, oil and natural gas. As we all know, the use of fossil fuels is not good for us or for the environment.

Emily: Exactly, John. And what's more, we know that fossil fuels will run out one day, so there's an important question to be answered: what alternative sources of energy might replace them in the future? At the moment, there are four types of alternative energy that are becoming more common.

John: Yes, for example, the most common alternative energy nowadays is solar power. This is power that we get from the sun. It has the advantage of being clean, since it doesn't create any pollution, and of course it won't run out. To use the sun's energy, we put solar panels on the roofs of buildings or out in the countryside. These panels use sunlight to heat water or generate electricity that we can use.

Emily: Another typical alternative energy is wind power – that is, energy we get from the wind. Like solar energy, it's both clean and renewable. To generate power, we use machines called turbines that turn in the wind. There are small turbines that provide energy for single homes, and large turbines that we may see in the countryside, at wind farms. In some countries, like the UK, there are also offshore wind farms in the sea, near the coast.

John: Along the same lines, a third source of clean, renewable energy is hydroelectric power. It's produced by underwater turbines in large rivers. The moving water turns the turbines to create electricity. Hydroelectric turbines can also be used in the ocean. They use the movement of waves to generate power.

Emily: And finally, a fourth source of energy that is becoming more common these days is biofuel, which comes from a variety of plant products. They include solid materials, such as wood, as well as liquid fuels, like biodiesel for cars. We can also use plant products to make biogas, like methane, to heat our homes and other buildings.

John: Which of these four alternative forms of energy seem most useful to you? Call in now, and give us your opinion.

5 2.17 Ask students to read the sentences and to work with a partner to predict which ones are true and which ones are false. Play the recording again and then check answers. Tell students to correct the false sentences.

Answers

1 False. It comes from hydrocarbons. **2** True **3** True
4 False. They can also be installed in the ocean. **5** True

Cooler

Tell students that there are many gyms where the energy is provided by the people using the gym. The machines they use generate the energy the gym needs. Put students into small groups to think of other ways that everyday items could be used to generate renewable energy, e.g. using laptop heat. Ask each group to nominate a spokesperson to tell the class about their ideas.

Project

This project can be done in class if you have internet access or set as homework. Tell students to complete the research in small groups and to give a presentation in the following class, using either PowerPoint or a poster. Encourage the rest of the class to ask questions after each group has finished.