

Theme 2. Energy

Teacher guide - Ages 8-10

Preparation

Review the material and watch the movies. Do some preparation on the topic. For the Outdoor Experience some materials are required. Feel free to add any resources or materials you have available to enrich the lessons. Also check the Introduction lesson Teacher guide for useful tips and suggestions for preparing and giving the lessons within a theme.

Learning goals

The students...

- learn about energy resources
- learn what fossil fuels are
- know that burning fossil fuels leads to environmental issues
- know some examples of solutions
- learn about renewable energy resources
- know the advantages and disadvantages of the different energy resources
- know what they can individually do to decrease their energy consumption and take responsibility to improve their energy saving habits
- are able to share their newfound information with friends and family.

Key Vocabulary

- energy
- energy resource
- electricity
- power station
- fossil fuels
- coal
- natural gas
- oil
- petrol
- diesel
- burning (combustion)
- CO₂ emissions
- renewable (energy) resources
- solar energy
- solar panels



- wind energy
- windmill/ turbine farms
- hydroelectric power stations
- reservoir dams
- turbine
- generator
- dynamo

Introduction

[Slides 3-5]

Start the lesson with all of the electrical appliances present in the classroom turned off (except the interactive whiteboard). (Think of lights, laptops, etc).

Ask students: *Which electrical appliances do you use daily?*

Write the answers in the word web. Are students now also discovering the electrical appliances that are used daily in the classroom? Ask students if they believe that all of these electrical appliances are required all the time.

Tell students: *This theme is about energy.* Discuss the learning goals of this theme.

Instruction

[Slides 6-10]

Issue

Watch the video.

Energy is present everywhere. Energy can't be created or destroyed, energy simply transforms, is transferred, and can be transported and stored. We obtain energy from two sources: renewable and non renewable resources.

Explain the link between electrical appliances and energy by watching the video. Ask students to briefly share their thoughts about the video. Tell: *Appliances, like phones and laptops use energy in the form of electricity. This electricity is created in power stations.*

As a class, do exercise 1. Explain: *Coal and natural gas are energy resources. They are used in power stations to create electricity. We use this electricity to power our electrical appliances. Oil is also an energy resource.*

Then complete exercises 2 and 3 as a class on the interactive whiteboard.
We use oil to create petrol and diesel fuels, which many cars use as power.
Explain: *Fossils are fossilised remains of ancient plant and animal life.*

Complete exercise 4 as a class. Note: wood is a fuel, but not a fossil fuel.



[Slides 11-13]

A Power station generates energy. They burn fossil fuels to do so.

Unfortunately, there is a problem. Burning the fossil fuels causes a large amount of CO₂-emissions.

What's the issue?

CO₂ is a naturally occurring gas. When we breathe out, we also release CO₂. CO₂-emissions also happen when we burn fossil fuels. So what is the problem? The problem is how much CO₂ is released into the atmosphere. We are burning too much fossil fuels.

Watch the video in which both of these issues are addressed.

This is causing the Earth to get even warmer causing the (enhanced) greenhouse effect. Another issue is that fossil fuels like coal and natural gas are in limited supply and are running out. There will come a time when there is no coal, no natural gas, and no oil. What do we do then? Will we still be able to charge our phones, cook food and drive our cars?

[Slides 14]

Watch the video. **Is there a solution?** *The answer is "yes". Luckily there is a solution for this issue.*

Complete exercise 5 as a class.

[Slide 15-19]

Renewable energy is a good alternative, but not totally 'free of pollution'. Think for example of the materials needed to build windmills and solar panels. In the production and transport process there certainly are CO₂ emissions.

Complete exercise 6.

Explain: *The Sun is our most important energy resource. Solar energy is the energy that is created by heat as well as solar radiation. The Sun has one great advantage: it doesn't run out! The video (ref. Slide 14) tells us that we can convert solar energy into energy using solar panels, for example on the roof of your house. Solar panels collect the energy from the Sun. Using this energy you can warm water, but it can also be converted into electricity.*

Renewable energy is our solution.

Examples of renewable energy resources are: solar energy, wind energy, and hydroelectric energy. Which of these three energy resources can be used in your country?

As a class, complete exercise 7 and 8.

Explain: *Hydroelectric dams are used more often in mountainous countries because the force of falling water is greater from greater heights and they build reservoir dams. Wind turbines are used to convert wind energy into electricity.*



[Slide 20]

Summarize: *People are using more and more energy. This has led to problems: the fossil fuels are being used up and burning the fossil fuels is causing CO₂ emissions that are too high. Thankfully there is a solution: renewable energy resources like Solar and wind energy. Another important solution is to reduce the energy we use!*

[Slides 21-22]

What can you do?

Watch the video. *The easiest way to do something that helps is by using less energy.* There are lots of things you can do! Watch the video. What kind of energy saving habits did you see in the video?

Write down the habits that students already practice at home- on the interactive whiteboard. You will use this information for the next assignment.

Suggested related themes

Theme 1 Climate change: *Greater CO₂-emissions create global warming which leads to climate change.*

Worksheet

[Slide 23]

Have students complete the worksheet. Discuss the answers students come up with. For exercises 3, 4, and 5: Emphasise that the renewable energy resources have more advantages than disadvantages, in comparison to using fossil fuels.

Practical Assignment

[Slide 24]

Have students create a poster about energy. They need to convince people to reduce their energy usage or to increase their energy saving habits. Use information from this lesson. Write words and phrases but also include a drawing.

Closing

[Slide 25]

Discuss the learning goals and make agreements on how/when they will work on their practical assignment (poster). Organise a time during which students present and discuss their posters to the class.



Outdoor Experience

[Slide 26]

Which things and appliances do you see outside that use energy (electricity) to work? Send students outside in groups with a notebook. Ask them to record all of the things and appliances that they see that need energy (electricity) to function. Possible objects include: cars, street lights, traffic lights, etc.

Extras

[Slides 27-32]

Games: Hangman and Memory

Exercise 1:

Have students choose a statement and write their opinion.

- The advantages of sun and wind energy are greater than the disadvantages.
- The fact that we are running out of fossil fuels is also my problem.

Exercise 2:

Make an energy quiz. Create question and answer cards. Write the question on the front and the answer on the back. Show and discuss a few examples of question and answer cards.

Extra video

Materials Required

For the poster: A4-paper (or larger), pens, pencils, pencil crayons or markers.

For the Outdoor Experience: notebooks or paper, and pens/pencils.

Theme 2. Energy

Answer Key - Ages 8-10

Exercise 2

- Power stations transform energy into electricity.
- Two types of energy resources that are used at power stations are: coal and natural gas.
- Another energy resource is oil. This is used to make petrol and diesel.
- These three energy resources are also called fossil fuels.



e. One problem is that burning these fossil fuels leads to large CO₂-emissions.
 Another problem is that we will run out of fossil fuels.

Exercise 3

- a. Fossil fuels will eventually run out. true
- b. Solar and wind power are a solution to the energy problem. true
- c. Solar and wind power are renewable resources. true
- d. Renewable resources only have positive effects. false

Exercise 4

Advantages	Disadvantage
free much less CO₂-emissions unlimited resource	does not produce energy when cloudy

Exercise 5

Advantages	Disadvantages
free much less CO₂-emissions unlimited resource	does not produce energy when there is no wind

What can you do?

Exercise 6

Individual answers: Turn the light off when I leave a room. Wearing a jumper/cardigan instead of turning up the heat.

