Lesson 2 - Theme 1. Climate Change

Teacher guide - Ages 8-10

Preparation

Review the lesson material and watch the videos before the lesson. Do some preparation on the topic. For the Outdoor Experience some materials are required (see Materials section below). Feel free to add any resources or materials you have available to enrich the lesson.

Learning Goals

The students …

- learn what climate change is.
- know the cause of climate change.
- know the consequences of global warming.
- will become acquainted with solutions to counteract climate change
- will know what they can do to help the climate (take responsibility)
- want to share information with others.

Key Vocabulary

- the environment
- the climate
- the climate change
- the gases (CO2, methane, water vapour)
- the greenhouse effect
- the temperature rise
- Reduce
- carbon dioxide emission

Introduction

[Slide 3-4]
Start with exercise 1, in which students' prior knowledge is activated. After this, discuss the learning goals of the lesson.

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Instruction

[Slide 5-8]

Issue

Discuss the question "What is climate?" *Climate is the average weather in a certain area, measured over a longer period of time.*

Do the students know what climate change is? Ask whether they are familiar with the term and let them explain in their own words what climate change is. Do students know the difference between weather and climate change? Get them to think about the difference and potentially discuss this with a neighbour.

*Climate change means the actual change in climate. Climate change is actually normal and natural. For as long as the Earth has existed, the climate has changed. Nowadays the temperature rises gradually. All kinds of things influence the climate: temperature, clouds, the sun. But also the greenhouse gases that surround the earth like *Co2, methane and water vapour*. Greenhouse gases hold the heat in the atmosphere and that causes the temperature on earth to rise. But people are also responsible for emitting these gases, for example by burning oil, natural gas, and coal. There has also been an increase of methane, caused in part by agricultural activities like rice paddies and cows. And that is where it goes wrong. Because people emit too many gases it gets warmer, too warm actually.*

As the temperature on earth increases, it changes our climate. This causes many changes: rising sea levels, more extreme weather (more heat waves, more intense rainfall).

Explain that this has to do with the greenhouse effect. Tell: Where does the name greenhouse gas come from? Show an illustration of a greenhouse.

[Slide 9-13]

Ask why the plants are in the greenhouse.

There are gases in the atmosphere that ensure that warmth stays on earth. The rays of the sun shine on earth, through the gases. A portion of the sun's rays are converted into warmth. The greenhouse gases ensure that the rays of the sun are not immediately reflected back into the universe, but they hold on to a portion of their warmth. This is called the *(natural) greenhouse effect*. The name greenhouse comes from greenhouses like the one you see in the picture. The glass or plastic roof of the greenhouse holds warmth (just like the greenhouse gases do) to increase the temperature inside the greenhouse. As a result the plants grow faster.

There is also a kind of greenhouse around the earth (made from a layer of all of the greenhouse gases). All the gases together form a kind of blanket around the earth keeping it warm. We need greenhouse gases to be able to live on earth (otherwise it would be far too cold to live on earth), but because of human activity there is a quick increase in greenhouse gases. That causes the global temperature to rise and it is becoming too warm: ***the enhanced greenhouse effect.***

[Slide 14-17]

Complete exercise 2 together and discuss it.

Explain: *People are responsible for the surplus in greenhouse gases, especially carbon dioxide.*

Watch the video. Ask your students: *Is it harmful that the global temperature rises? Why is it harmful?*

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Complete exercise 3 on the interactive whiteboard together and discuss it.
Explain: *All those changes together are called climate change. And climate change causes a lot of problems for humans and the environment.*
Complete exercise 4 on the interactive whiteboard together and discuss it.
On earth since 1900 it has become an average of 1 degree warmer.

A solution
[Slide 18-19]
What can we do to help 'fight' climatechange?
Explain the following solutions:
- *Emit less carbon dioxide* (later on you will discuss how)
- *Plant more trees*
Do the students know how trees and plants can help?

Plants and trees need water (H2O), carbon dioxide (C02), and light to survive. Plants and trees collect their CO_2 from the air around them. With help from light and (ground)water, trees turn CO_2 into oxygen and biomass (like wood, leaves, and roots). This process takes place in green leaves. The more leaves a tree has, the more oxygen a tree produces. Trees take in extra CO_2 as they are growing.
By cutting down forests the CO_2 that was naturally contained in those trees is released back into the environment. (For more information, take a look into resources on photosynthesis.)

[Slide 20 -22]
To help the climate we all have to try to reduce the carbon dioxide emission.
Carbon footprint: When you use fossil fuels, like heating oil to keep your house warm or gasoline for your family's car, these things create carbon dioxide. Your carbon footprint is the total amount of CO2 you create. A big carbon footprint is bad for the planet.
Ask: *Is it possible to have no carbon dioxide emission at all? That would mean no more driving cars, flights, using electronic appliances, etc.*
Together you will reach the conclusion that a complete stop of carbon dioxide emission is not possible. The solution is to reduce carbon dioxide emission to a minimum. Also there are ways of compensating the emission of carbon dioxide. Compensate means 'make up'. This could help, but the best route is to reduce CO2 emissions; by taking the bike instead of the car for example. Complete exercise 5 together and discuss it.

What can you do?
[Slide 23 - 25]
Watch the video together about the impact of greenhouse gases. Tell the students that they now know a lot about climate change and that they can also help to make a change. For example they can share this information, but they can also change things in their lives (together with their parents). Complete exercises 6 and 7 on the interactive whiteboard together and discuss them. Ask what the students can do themselves or what they already do.

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Suggested related themes

Theme 8 about trees relates to the solutions against climate change.

Worksheet

[Slide 26]
Complete the worksheet. Discuss the exercises on the worksheet. When the students worked together on exercise 2, the groups can present their answers. Exercise 3 shows that some people deny the probleem. How do the students feel about this? What can be done against this? In exercise 4, you can discuss your own measures. Is there an electronic appliance in the classroom or at school that is not used regularly or not used at all?

Practical Assignment

[Slide 27]
Make a collage about climate change. With the collage you can tell others more about this subject.

Closing

[Slide 28]
Discuss the learning goals and make an appointment with the students about how and when they can continue their practical assignment (making a collage). Organise a moment where they can be presented/shown.

Outdoor experience

[Slide 29]
Follow the weather forecast for a week. You can ask your students to use [this weather report]* to write down their observations. At the end of the week they can compare and discuss their observations. Then they can also present their own weather forecast on slide 29.

Extra

[Slide 30]
Exercise 1
Let the students react to statements.
- I could take shorter showers/take the bike/turn off the lights, but if my neighbours don't do it, there's no use.
- To save the climate, we should all become vegetarians.

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Exercise 2
Make a shower diary. Take note of how long your showers are for a week. In the next week, try to take shorter showers. Write all the times down in your diary. Try to calculate how much water you save. You can also challenge your family and friends to join you in keeping a shower diary.

Extra films and songs (in the interactive whiteboard lesson).

Material

For the photo collage: cardboard, A4-paper, pens, , magazines, pencils, glue, scissors and adhesive tape.

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Answer Key - Ages 8-10

Exercise 1

a. more heatwaves
b. melting land ice and sea ice
c. more heavy storms
d. rising sea levels
e. more heavy rainfall

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