

Theme 1. Climate Change

Teacher guide - Ages 8-10

Preparation

Review the material and watch the videos. 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. 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 what climate change is.
- know the causes of climate change.
- know the causes and consequences of global warming.
- learn about solutions to counteract climate change
- know what they can do to help the climate (take responsibility)
- are able to share information with others.

Key Vocabulary

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



Introduction

[Slides 3-4]

Start with exercise 1, a word web in which students' prior knowledge is activated. After this, discuss the learning goals of this theme.

Instruction

[Slide 5]

Issue

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. Discuss the question "What is climate?" *Climate is the average weather in a certain area, measured over a longer period of time.* Do students know the difference between weather and climate? Get them to think about the difference and potentially discuss this with a neighbour.

[Slides 6-7]

*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**.*

[Slide 8]

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. 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).

[Slides 9]

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. Light that enters the greenhouse is absorbed by plants and is converted into heat. The glass or plastic roof of the greenhouse holds warmth (just like the greenhouse gases do) to increase the



temperature inside the greenhouse.

[Slides 10-14]

*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**.*

Complete exercise 2 together and discuss it. (Note: burning candles are not 'bad' as long as you choose the right/sustainable ones.)

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

[Slide 15-17]

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

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.* Note: also depending on where you live.

Complete exercise 4 on the interactive whiteboard together and discuss it.

Since 1900, the Earth has become an average of 1 degree warmer. Note: It's important to limit global warming to well below 2 degrees Celsius (to 1,5 degrees Celsius).

A solution

[Slides 18-19]

What can we do to help 'fight' climate change?

Explain the following solutions:

- *Emit less carbon dioxide (and other greenhouse gases)* (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 (CO₂) and (sun)light to survive. Plants and trees collect their CO₂ from the air around them. They produce sugar (glucose) and oxygen in a process called photosynthesis, by using sunlight, water and carbon dioxide. Trees take in extra CO₂ as they are growing. By cutting down forests the CO₂ that was naturally contained in those trees is released back into the environment. (For more information, take a look into resources on photosynthesis.)

[Slides 20 -22]

To help the climate we all have to try to reduce carbon dioxide emission.

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?

[Slides 23 - 26]

Watch the videos together about the impact of greenhouse gases and the carbon footprint.

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.

Complete exercises 6 and 7 together and discuss them.

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). Ask what the students can do themselves or what they already do.

Suggested related themes

Theme 8 about trees relates to the solutions against climate change. Theme 2 about energy and Theme 7 about air, relate to subjects as CO₂ (emissions) and other gases.

Worksheet

[Slide 27]

Complete the worksheet. Discuss the exercises on the worksheet. When the students worked together on exercise 2, the groups could present their answers. Exercise 3 shows that some people deny the problem. How do the students feel about 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? In exercise 5 students can exchange their ideas.

Practical Assignment

[Slide 28]

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



Closing

[Slide 29]

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

[Slides 30-32]

Do an experiment to measure the greenhouse effect using two (digital) thermometers and a glass container, like a jar. Go through the steps of the experiment. Discuss what you observe. What do you think will happen to the temperature when the thermometer is in the sealed glass jar in the Sun? What happens in the shade?

Extras

[Slides 33-37]

Game: Hangman

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.

Exercise 2

Make a shower diary. Take note of how long your showers are for a week. 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 film

Materials Required

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

For the outdoor experience: 2 digital thermometers, timer or stopwatch, 1 glass jar with lid.



Theme 1. Climate change

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

Exercise 2

- a. Example:
Climate Change is normal. But the Earth warms up too much, because of too much greenhouse gases in the atmosphere. This influences our climate in a negative way.
- b. Example:
Drought, flood, some animal species become extinct.
- c. Example:
Less flying by plane, take a walk or use your bike (not the car), eat less meat.

