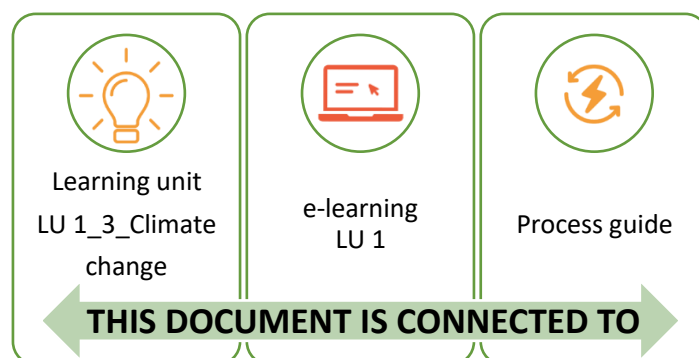




## Role play 1.3

### Greenhouse effect



**akaryon**<sup>0</sup>  
WERTTOOLS • UMWELT • FÖRDERUNGEN



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## Role play 1.3

### Greenhouse effect

The greenhouse effect is not so easy to understand. With the little **Role Play 3.1\_Greenhouse effect** the pupils should get an idea how it works. Only when you know how it works, then you can do something about it.

### Introduction

**TARGET GROUP:** students aged 10-13.

**PLACE:** The School Unit

#### THEORETICAL FRAMEWORK

The teacher presents the students with a scenario. Its subject is the greenhouse effect and the problems we face at the moment with our climate. The roles are briefly defined and described. The students choose the role they will impersonate. The teacher does not play any role but works as an animator.

#### OBJECTIVE

During the role play the students will understand how the greenhouse effect works and what problems we humans create through our current actions, like e.g. using so much energy and resources.

#### PROCEDURE

- Teacher's preparation
- What is needed?
- Preparation of the students
- Definition and description of roles – Students choose their roles
- Game implementation
- Concluding assessment

#### DURATION

The teacher has to prepare a few materials and needs to study the description of the role play. This will take about 30 to 45 minutes.  
The role play will need 15 to 30 minutes.

#### CONNECTION OF ROLE PLAY WITH THE SOLARTOWN LEARNING UNITS:

**This role play is connected with the Learning Unit 1.3\_Climate Change**





## Preparation

### TEACHERS' PREPARATION

Before starting the role play the teacher should prepare some information about the greenhouse effect and how it works. Of course, the class should be informed, that they are going to implement a role play.

### WHAT IS NEEDED?

The teacher records the needs for the implementation of the role play, which are generally the following:

- Free space without tables and chairs to carry out the roleplay
- Role play cards and signs with sun symbols, cloud symbols and science symbols, possibly with a band to hang around the neck (see below).
- Picture of the sun and the earth (see below).

### PREPARATION OF THE STUDENTS

- Presentation of the idea of the role play to the students.
- Presentation of the materials and roles
- Definition and description of roles
- Students choose their roles (the teacher decides only if many children want to do the same)

## Implementation of the Role play Greenhouse effect

The students are divided into 4 groups:

- up to 5 students play **sunrays**
- 3 - 5 students play "**natural CO<sub>2</sub>**", like the carbon dioxide from breathing...
- 5 - 10 other children (depending on the size of the room) are the "**artificial CO<sub>2</sub>**", from aircrafts, cars, coal-fired power station, factories ...
- The remaining children are **scientists** with the task of closely observing what is happening and answering the questions.

The teacher leads through the role play by asking questions and explanations. The **scientist-pupils** in particular are asked and involved in all questions!

The image of the earth and that of the sun are placed on the two opposite sides of the room. The pupils stand on one side of the room. We look at the picture of the earth and explain the atmosphere around our globe.

The pupils playing the sunrays go to the picture of the sun and wait there.





## ROLEPLAY 1.3: GREENHOUSE EFFECT

Teacher: All around our earth there is a shell or a layer: the atmosphere. What is in the atmosphere?

→ Oxygen (21%), nitrogen (78%), water (clouds), and trace gases (including carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), ozone (O<sub>3</sub>), and other.

Teacher: This role play is about the greenhouse effect. So, we do not need to talk about all the gases in the atmosphere, except for the greenhouse gases. We will now find out, what these greenhouse gases do. CO<sub>2</sub> is the most important greenhouse gas.

First, we need the pupils who play the “**natural CO<sub>2</sub>**”. Where does CO<sub>2</sub> naturally come from?

→ From Breathing, volcanic activity, decomposition of organic material

The “**natural CO<sub>2</sub>**”-pupils are placed in a half circle in front of picture of the earth - like an atmosphere.



### PART 1 OF THE ROLE PLAY: NATURAL GREENHOUSE EFFECT

The **sunray-pupils** come to the earth as short-wave (slim, thin) sunrays, they easily pass between the **CO<sub>2</sub>-pupils**, because they are so short-wave and thin. The **sunray-pupils** walk from the sun to the earth and pass the “**natural CO<sub>2</sub>**”.

On earth, they transform into heat rays, **heat rays** are long-wave and wide. The **sunray-pupils** spread their arms out to the side.

The **heat rays** (sunray-pupils) are reflected from earth similarly to a mirror, but now they are long-wave (wide, thick).

Teacher: I ask the **science-pupils** now: Can the heat rays go back to space? Can they pass between the **CO<sub>2</sub>-pupils**?

→ Yes, some can, but not all!

Teacher: It is good, that we have the natural greenhouse gases. It is warmer on Earth now than it was before. Because of the natural greenhouse effect, life on Earth is possible and we have an average temperature of 15°C. Otherwise the average temperature on Earth would be -18°.





## PART 2 OF THE ROLE PLAY: ARTIFICIAL GREENHOUSE EFFECT

The "**natural greenhouse gases**" are now "joined" by man-made exhaust gases – the pupils playing the "**artificial CO<sub>2</sub>**".

But before they can join the "**natural CO<sub>2</sub>**", they have to answer a question:

Teacher: Where does the "artificial CO<sub>2</sub>" come from?

→ Cars, planes, coal-fired power stations, fires, etc.

Each student who knows an answer joins the others in the "atmosphere". Of course, the scientists can help!



Now the whole game is played again. The **sunrays** start from the sun and can easily pass the greenhouse gases as short-wave rays. On earth, they transform into long-wave **heat rays**, and on their way back into space only a few rays get through - almost all of them are trapped. What happens?

It's getting warmer on Earth...

## CONCLUDING ASSESSMENT

After completing the role play, we can discuss the effects of the greenhouse effect and climate change - maybe with the help of an illustration on the blackboard:

- Increase in extreme weather phenomena
- Rain instead of snow in winter
- Increase in the number of hot days in summer
- Plants and animals become extinct because they are not adapted to the warm climate or cannot find food anymore
- Glaciers melt
- Sea levels rise
- Some islands may sink...

**Finally, we search for good ideas on how we can protect the climate!**





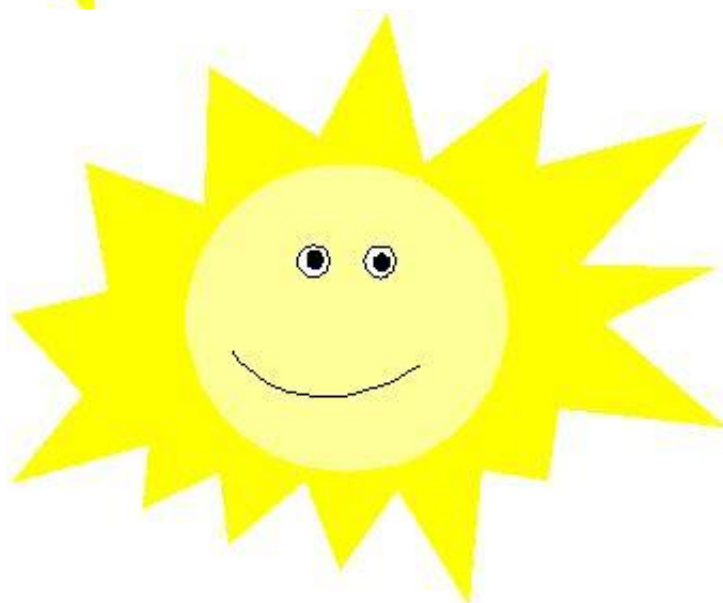
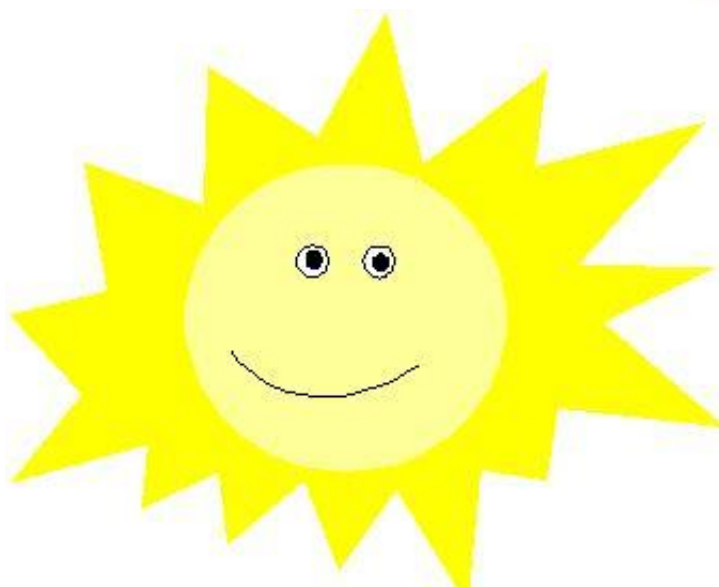
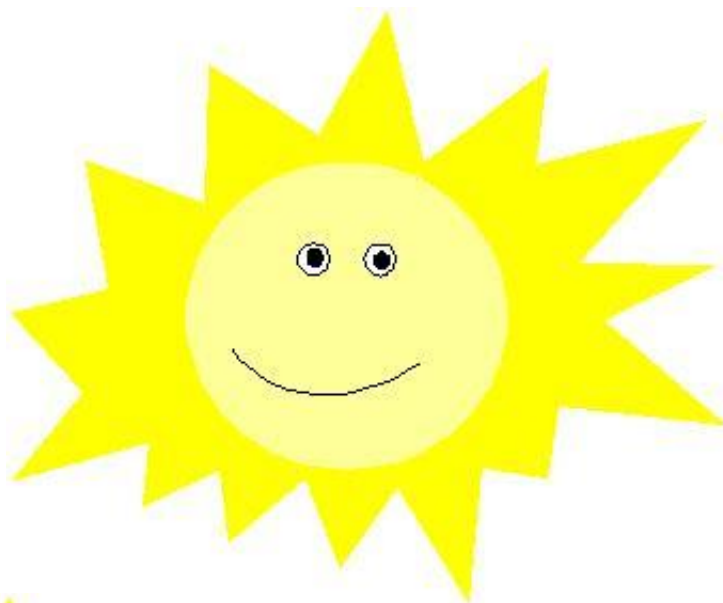


## Role play labels

### SUNBEAMS

#### ROLEPLAY 1.3: LABELS

Cut the labels, make a hole in the upper middle and thread a ribbon through it. This way the pupils can wear the sign around their neck.

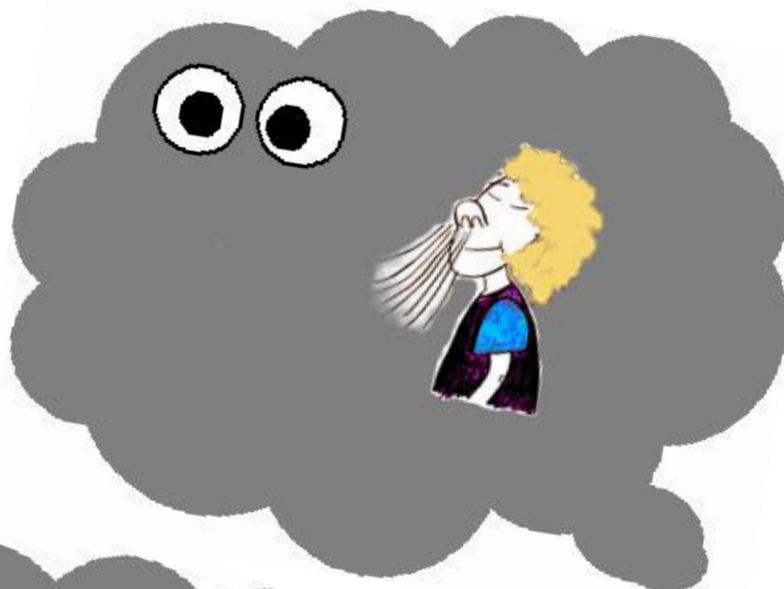




NATURAL CO<sub>2</sub>



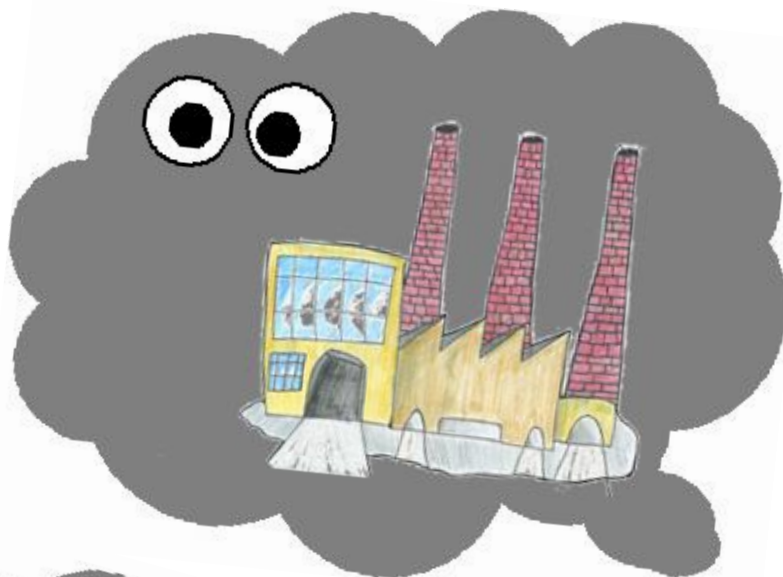
## ROLE PLAY 1.3: LABELS





ARTIFICIAL CO<sub>2</sub>

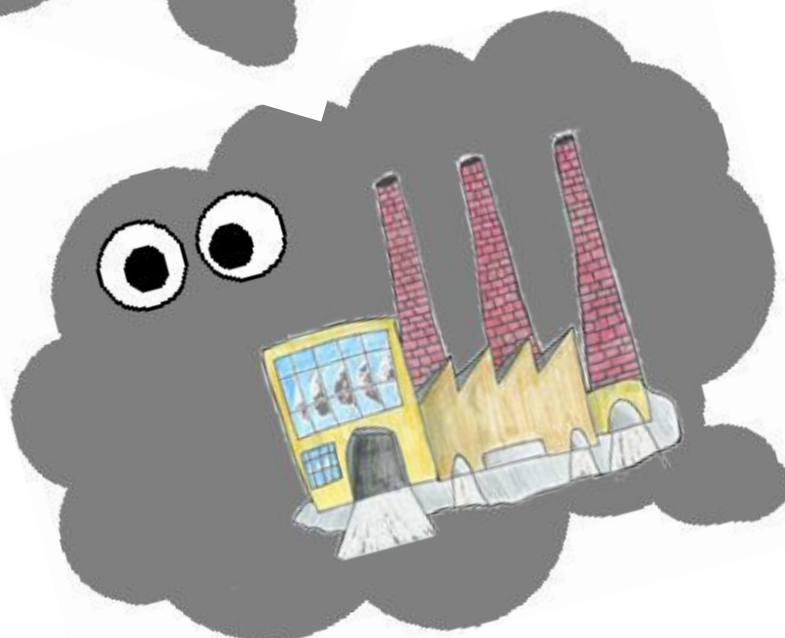
## ROLEPLAY 1.3: LABELS







## ROLE PLAY 1.3: LABELS





SCIENTISTS

## ROLEPLAY 1.3: LABELS





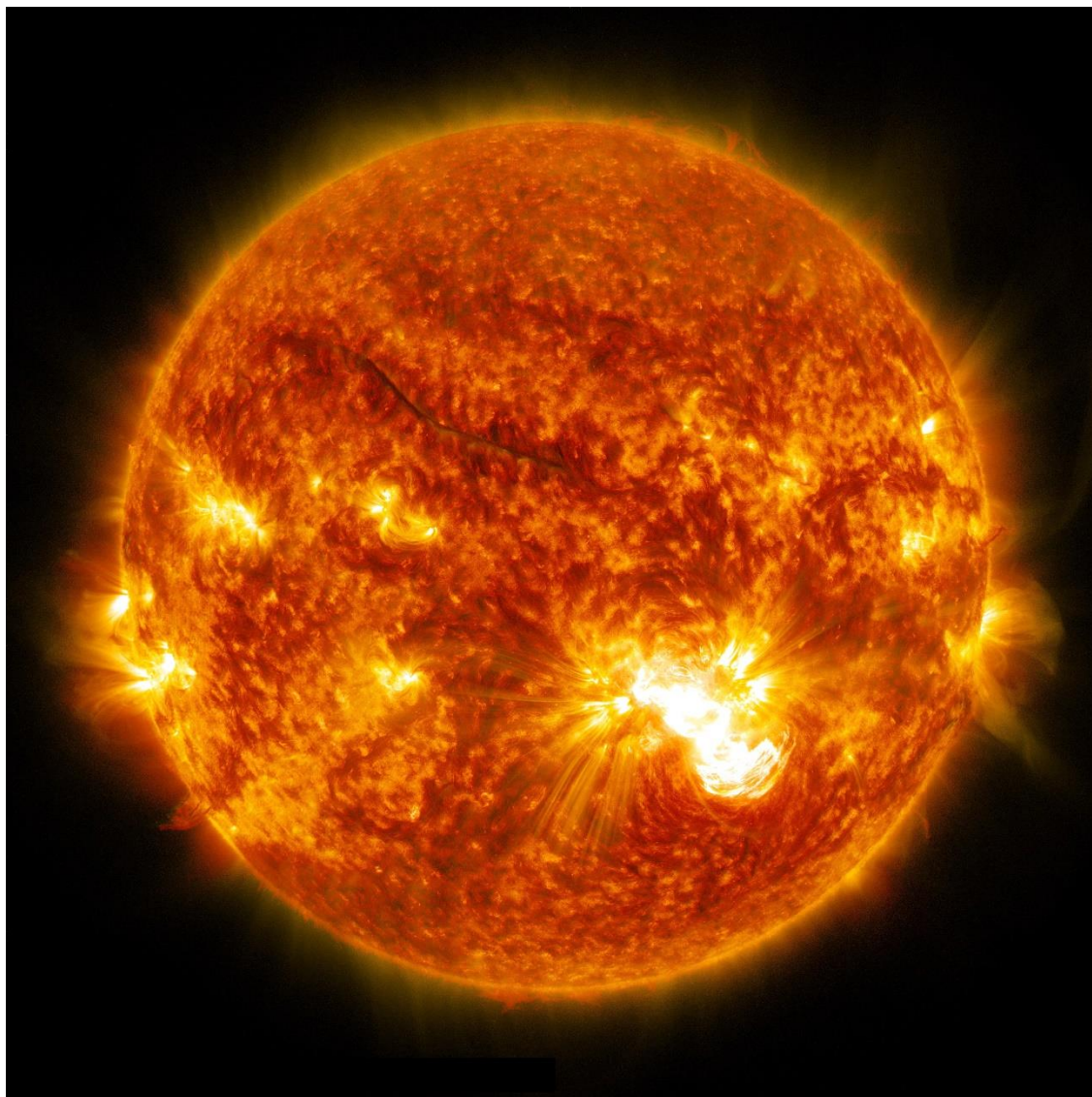
## ROLE PLAY 1.3: LABELS





SUN

## ROLEPLAY 1.3: PICTURES



**SOURCE:**

- <https://www.nasa.gov>







EARTH



## ROLE PLAY 1.3: PICTURES

**SOURCE:**

- <https://www.nasa.gov>







## Role play cards:



### ROLE PLAY 1.3: ROLE PLAY CARDS

#### ***Card 1: Sun ray***

**Part 1:** You are a sun ray, you come to the earth as a **short-wave (slim, thin) ray of light** - walk from the sun to the earth. You easily pass the atmosphere of the earth with the “natural CO<sub>2</sub>” in it and reach earth's surface, because you are so short-wave and thin. On earth, you transform into a **heat ray**! Heat rays are long-wave and wide. Spread your arms out to the side.

The heat rays are reflected from earth similarly to a mirror, so try to leave the earth. Some of you might be “caught” by the natural CO<sub>2</sub>, but most of you can reach the outer space.

With the natural greenhouse gasses the planet gets a little bit warmer, but not too much.

**Part 2:** Before you walk from the sun to the earth a second time, the artificial, man-made greenhouse gases join the natural CO<sub>2</sub>. Again, you start from the sun and can easily pass the greenhouse gases as **short-wave rays**. On earth, you transform into long-wave **heat rays**, and almost all of you remain trapped:  
It's getting warmer on Earth...





## ROLE PLAY 1.3: ROLE PLAY CARDS

### **Card 2: Natural CO<sub>2</sub>**

You are natural CO<sub>2</sub> coming from breathing (animals and humans) and volcanic eruptions. You exist in earth's atmosphere since living beings started to breathe. You let the sunrays through, but you build a natural barrier for the heat rays reflected back from the surface of the planet. Some you might hold a heat ray, but the most heat rays can pass.



### **Card 3: Artificial CO<sub>2</sub>**

You are artificial CO<sub>2</sub> and have been released into the atmosphere by human activities. Where could you have come from?

You join the natural CO<sub>2</sub> in the atmosphere of the earth. You let the sunrays through, but you build a dense barrier for the heat rays reflected back from the surface of the planet.

### **Card 4: Scientist**

You are a scientist, who wants to find out, why our planet's is getting warmer and warmer.

You are closely observing what is happening in the planet's atmosphere and try to explain it.





## Contacts:

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