# Understanding global warming – Greenhouse gases

The greenhouse effect involves many naturally occurring gases whose concentrations have been and are still being increased by humans. The gases absorb the thermal radiation from the Earth's surface and intensify atmospheric counter-radiation, which is bounced back to Earth.
Since the Industrial Revolution, emissions of certain greenhouse gases have greatly increased and are intensifying the greenhouse effect, which leads to continual global warming. Greenhouse gas emissions are responsible for man-made (anthropogenic) climate change.

## Assignment 1: Various greenhouse gases

a) Research the properties of the four major greenhouse gases and write down your results as key points. All results will be combined into one list as a class afterwards.
You will find potentially useful research links in the link list.
Your research should include the following properties:

- **Formation and use**: What processes result in the formation of greenhouse gases and in which products are the gases used?
- **Global warming potential**: How great is the "global warming potential" of the various gases? (If you are unfamiliar with the term, research it and write down the meaning.)
- **Lifetime**: How long do the greenhouse gases remain after entering the atmosphere?

In addition, the following values can be researched: (Tip: You can find related data on the U.S. Environmental Protection Agency website.)

- **Global concentration and contribution to the greenhouse effect in % in 2020**

b) Compare the global warming potential of methane, laughing gas, and chlorofluorocarbons with the global warming potential of $CO_2$. What do you conclude?

## Assignment 2: Lifetime

Answer the question "Why will global warming remain constant for centuries and millennia even if no more greenhouse gases are emitted?" based on the gases' respective lifetimes.

## Assignment 3: Chlorofluorocarbons and the ozone layer

Explain what chlorofluorocarbons (CFCs) have to do with the hole in the ozone layer and with global warming.