

## Greenhouse gases

Some atmospheric gases absorb and re-emit infrared energy from the atmosphere down to the Earth's surface. This process, the greenhouse effect, leads to a mean surface temperature that is 33 °C greater than it would be in its absence. If it were not for the greenhouse gas effect, Earth's average temperature would be a chilly -18 °C.

The Earth has a natural greenhouse effect due to trace amounts of water vapour (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) in the atmosphere. These gases let the solar radiation reach the Earth's surface, but they absorb infrared radiation emitted by the Earth and thereby lead to the heating of the surface of the planet. One needs to distinguish between the natural greenhouse effect and the enhanced greenhouse effect. The natural greenhouse effect is caused by the natural amounts of greenhouse gases, and is vital to life. In the absence of the natural greenhouse effect the surface of the Earth would be approximately 33 °C cooler. The enhanced greenhouse effect refers to the additional radiative forcing resulting from increased concentrations of greenhouse gases induced by human activities. The main greenhouse gases whose concentrations are rising are carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) and ozone in the lower atmosphere.