

## Understanding The Greenhouse Effect

The greenhouse effect causes climate change. This is an understood and uncontroversial scientific fact.

When sunlight warms the Earth's surface, the Earth absorbs this energy and then emits it as infrared radiation (a form of radiation that provides heat). Greenhouse gases in the atmosphere, such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and water vapor (H<sub>2</sub>O), absorb some of this infrared radiation. These gases then re-radiate energy in all directions, with some escaping into space and some returning to the Earth, effectively trapping energy and warming the planet.

Without some atmospheric greenhouse gases, the Earth would be too cold to support life. However, human activities like burning fossil fuels and deforestation have increased the concentrations of these gases. This is increasing the greenhouse effect and causing global temperatures to rise.



The greenhouse effect has been thoroughly verified through both laboratory experiments and atmospheric observations.

A simple science experiment can demonstrate the greenhouse effect. If you place one container filled with air and another filled with carbon dioxide under a heat lamp, the container with carbon dioxide will become hotter than the one with air. This is because carbon dioxide absorbs and re-radiates infrared radiation, trapping more heat inside the container.

The greenhouse effect can also be demonstrated through more complex experimentation. Atmospheric spectrometers (light-measuring instruments) provide evidence of the greenhouse effect by measuring how gases in the atmosphere absorb and emit heat.

These instruments, mounted on satellites and used in ground-based stations, can analyse light before and after it has passed through the atmosphere. Through this, scientists can detect which wavelengths of light are absorbed by the atmosphere, providing them with a good understanding of its insulating effects.



**Sources:**

[The Physics of Climate Change by Lawrence M. Krauss](https://science.nasa.gov/climate-change/faq/what-is-the-greenhouse-effect/)  
<https://science.nasa.gov/climate-change/faq/what-is-the-greenhouse-effect/>



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