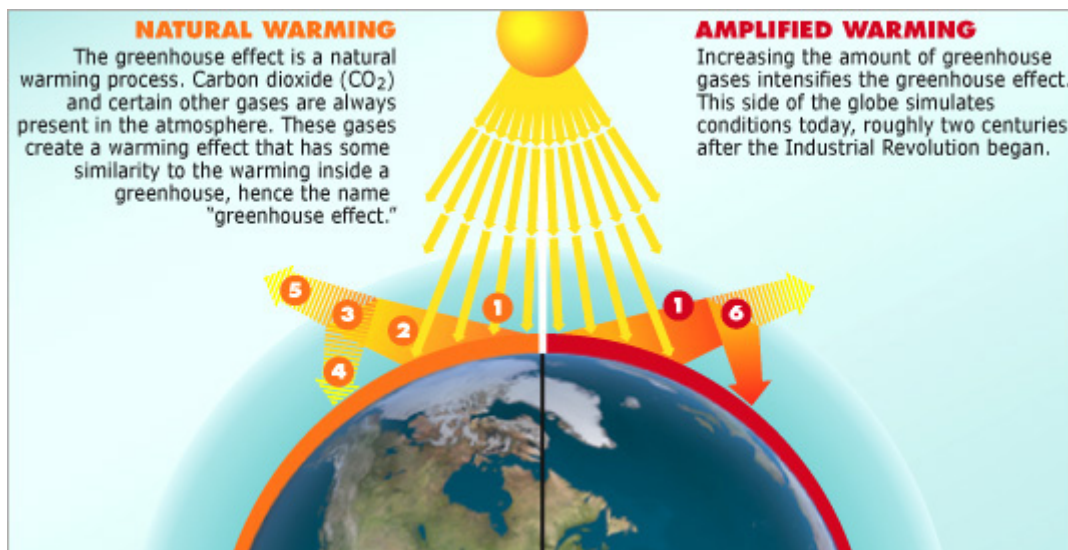


## THE GREENHOUSE EFFECT

### Natural and Amplified Warming

#### Natural Warming

The greenhouse effect is a natural warming process. Carbon dioxide (CO<sub>2</sub>) and certain other gases are always present in the atmosphere. These gases create a warming effect that has some similarity to the warming inside a greenhouse, hence the name “greenhouse effect.”



- 1 Sunlight brings energy into the climate system; most of it is absorbed by the oceans and land.

#### THE GREENHOUSE EFFECT:

- 2 Heat (infrared energy) radiates outward from the warmed surface of the Earth.
- 3 Some of the infrared energy is absorbed by greenhouse gases in the atmosphere, which re-emit the energy in all directions.
- 4 Some of the infrared energy further warms the Earth.
- 5 Some of the infrared energy is emitted into space.

#### AMPLIFIED GREENHOUSE EFFECT:

- 6 Higher concentrations of CO<sub>2</sub> and other "greenhouse" gases trap more infrared energy in the atmosphere than occurs naturally. The additional heat further warms the atmosphere and Earth's surface.

#### Amplified Warming

Increasing the amount of greenhouse gases intensifies the greenhouse effect. Higher concentrations of CO<sub>2</sub> and other greenhouse gases trap more infrared energy in the atmosphere than occurs naturally. The additional heat further warms the atmosphere and Earth's surface.

## Overview - Introduction to Global Climate Change

The National Academies make recommendations to decision makers using available scientific evidence. Today you and your team members will formulate your own recommendations on climate change. You will find a great deal of scientific information in this exhibition to help you.

Each team of students will gather detailed information from one of the stations in the *Global Climate Change* exhibition. Later you will share the information with your colleagues in the other groups. Your visit will conclude with a discussion of the bigger question:

***"What evidence can be used to make decisions related to climate change?"***

The class will discuss the types of decisions that are being made about climate change, the evidence being used to make those decisions, as well as the uncertainty associated with the evidence. Everyone in the class will work through the stations on *The Greenhouse Effect* and *Climate Change Hits Home*. Gather specific information on each of these for the group discussion.

### ***The Greenhouse Effect***

Use the attached greenhouse effect diagram to answer the questions below.

1. What is responsible for trapping some of the infrared (or heat) energy from the sun as it leaves the Earth?
  
  
  
  
  
  
  
  
  
  
2. What three steps are needed to produce a warming effect in the earth's atmosphere? Summarize the greenhouse effect below.
  - a.
  
  
  
  
  
  - b.
  
  
  
  
  
  - c.
  
  
  
  
  
  
  
  
  
  
3. An increase in which greenhouse gas is most responsible for amplified warming of the Earth?
  
  
  
  
  
  
  
  
  
  
4. Look closely at the attached diagram of the greenhouse effect. Which side, the natural warming or the amplified warming, would you expect to be warmer? Why?
  
  
  
  
  
  
  
  
  
  
5. Study the pictures of the South Cascade Glacier. Describe what has happened to the glacier since 1928.

*Climate Change Hits Home (Sea Level Rise)*

6. Try each of the "Sea Level Rise" scenarios for the Chesapeake Bay and describe what happens to the wetlands as sea levels increase.
  
  
  
  
  
  
  
  
  
  
7. Describe two ways in which global warming could cause the sea levels to rise.
  - a.
  
  
  
  
  
  - b.
  
  
  
  
  
  
  
  
  
  
8. Name two areas in the United States that could be most affected by rising sea levels?
  - a.
  
  
  
  
  
  - b.
  
  
  
  
  
  
  
  
  
  
9. Using the Human Impacts globe to the right of the Sea Level Rise exhibit, describe two specific problems for other countries that could result from rising sea levels?
  - a.
  
  
  
  
  
  - b.

*It's a Global Problem*

10. Using the Global Impacts globes, describe two major impacts that you think would affect your life the most.
  - a.
  
  
  
  
  
  - b.