

# *Global Warming*

**Global warming** is the rise in the average temperature of Earth's atmosphere and oceans since the late 19th century and its projected continuation.

## **Aren't temperature changes natural?**

The average global temperature and concentrations of carbon dioxide (one of the major greenhouse gases) have fluctuated on a cycle of hundreds of thousands of years as the Earth's position relative to the sun has varied. As a result, ice ages have come and gone.

However, for thousands of years now, emissions of GHGs to the atmosphere have been balanced out by GHGs that are naturally absorbed. As a result, GHG concentrations and temperature have been fairly stable. This stability has allowed human civilization to develop within a consistent climate.

Occasionally, other factors briefly influence global temperatures. Volcanic eruptions, for example, emit particles that temporarily cool the Earth's surface. But these have no lasting effect beyond a few years. Other cycles, such as El Niño, also work on fairly short and predictable cycles.

Now, humans have increased the amount of carbon dioxide in the atmosphere by more than a third since the industrial revolution. Changes this large have historically taken thousands of years, but are now happening over the course of decades.

## **Effects of Global Warming:**

- Ice is melting worldwide, especially at the Earth's poles. This includes mountain glaciers, ice sheets covering West Antarctica and Greenland, and Arctic sea ice.
- Researcher Bill Fraser has tracked the decline of the Adélie penguins on Antarctica, where their numbers have fallen from 32,000 breeding pairs to 11,000 in 30 years.
- Sea level rise became faster over the last century.
- Some butterflies, foxes, and alpine plants have moved farther north or to higher, cooler areas.
- Precipitation (rain and snowfall) has increased across the globe, on average.
- Spruce bark beetles have boomed in Alaska thanks to 20 years of warm summers. The insects have chewed up 4 million acres of spruce trees.

## What Can We Do?

Researchers Stephen Pacala and Robert Socolow at Princeton University have suggested one approach that they call "stabilization wedges." This means reducing GHG emissions from a variety of sources with technologies available in the next few decades, rather than relying on an enormous change in a single area. They suggest 7 wedges that could each reduce emissions, and all of them together could hold emissions at approximately current levels for the next 50 years, putting us on a potential path to stabilize around 500 ppm.

There are many possible wedges, including improvements to energy efficiency and vehicle fuel economy (so less energy has to be produced), and increases in wind and solar power, hydrogen produced from renewable sources, biofuels (produced from crops), natural gas, and nuclear power. There is also the potential to capture the carbon dioxide emitted from fossil fuels and store it underground—a process called "carbon sequestration."

In addition to reducing the gases we emit to the atmosphere, we can also increase the amount of gases we take out of the atmosphere. Plants and trees absorb CO<sub>2</sub> as they grow, "sequestering" carbon naturally. Increasing forestlands and making changes to the way we farm could increase the amount of carbon we're storing.

Some of these technologies have drawbacks, and different communities will make different decisions about how to power their lives, but the good news is that there are a variety of options to put us on a path toward a stable climate.

Source from: <http://environment.nationalgeographic.com/environment/global-warming/>