

# What is the Greenhouse Effect?

## After 150 Years of Industrialization, Climate Change is Inevitable

The “greenhouse effect” often gets a bad rap because of its association with global warming, but the truth is we couldn’t live without it.

## What Causes the Greenhouse Effect?

Life on earth depends on energy from the sun. About 30 percent of the sunlight that beams toward Earth is deflected by the outer atmosphere and scattered back into space. The rest reaches the planet’s surface and is reflected upward again as a type of slow-moving energy called infrared radiation.

As it rises, infrared radiation is absorbed by “greenhouse gases” such as water vapor, carbon dioxide, ozone and methane, which slows its escape from the atmosphere.

Although greenhouse gases make up only about 1 percent of the Earth’s atmosphere, they regulate our climate by trapping heat and holding it in a kind of warm-air blanket that surrounds the planet.

This phenomenon is what scientists call the “greenhouse effect.” Without it, scientists estimate that the average temperature on Earth would be colder by approximately 30 degrees Celsius (54 degrees Fahrenheit), far too cold to sustain our current ecosystem.

## How Do Humans Contribute to the Greenhouse Effect?

While the greenhouse effect is an essential environmental prerequisite for life on Earth, there really can be too much of a good thing.

The problems begin when human activities distort and accelerate the natural process by creating *more* greenhouse gases in the atmosphere than are necessary to warm the planet to an ideal temperature.

- **Burning natural gas, coal and oil** —including gasoline for automobile engines—raises the level of carbon dioxide in the atmosphere.
- **Some farming practices and land-use changes** increase the levels of methane and nitrous oxide.
- **Many factories produce long-lasting industrial gases** that do not occur naturally, yet contribute significantly to the enhanced greenhouse effect and “global warming” that is currently under way.
- **Deforestation** also contributes to global warming. Trees use carbon dioxide and give off oxygen in its place, which helps to create the optimal balance of gases in the atmosphere. As more forests are logged for timber or cut down to make way for farming, however, there are fewer trees to perform this critical function.
- **Population growth** is another factor in global warming, because as more people use fossil fuels for heat, transportation and manufacturing the level of greenhouse gases continues to increase. As more farming occurs to feed millions of new people, more greenhouse gases enter the atmosphere.
- **Ultimately**, more greenhouse gases means more infrared radiation trapped and held, which gradually increases the temperature of the Earth’s surface and the air in the lower atmosphere.

## **The Average Global Temperature is Increasing Quickly**

Today, the increase in the Earth's temperature is increasing with unprecedented speed. To understand just how quickly global warming is accelerating, consider this:

During the *entire 20th century*, the average global temperature increased by about 0.6 degrees Celsius (slightly more than 1 degree Fahrenheit).

Using computer climate models, scientists estimate that *by the year 2100* the average global temperature will increase by 1.4 degrees to 5.8 degrees Celsius (approximately 2.5 degrees to 10.5 degrees Fahrenheit).

## **Not All Scientists Agree**

While the majority of mainstream scientists agree that global warming is a serious problem that is growing steadily worse, there are some who disagree. John Christy, a professor and director of the Earth System Science Center at the University of Alabama in Huntsville is a respected climatologist who argues that global warming isn't worth worrying about.

Christy reached that opinion after analyzing millions of measurements from weather satellites in an effort to find a global temperature trend. He found no sign of global warming in the satellite data, and now believes that predictions of global warming by as much as 10 degrees Fahrenheit by the end of the 21st century are incorrect.

## ***What are the effects of global warming and the greenhouse effect?***

Scientists agree that even a small increase in the global temperature would lead to significant climate and weather changes, affecting cloud cover, precipitation, wind patterns, the frequency and severity of storms, and the duration of seasons.

- Rising temperatures would raise sea levels as well, reducing supplies of fresh water as flooding occurs along coastlines worldwide and salt water reaches inland.
- Many of the world's endangered species would become extinct as rising temperatures changed their habitat.
- Millions of people also would be affected, especially poor people who live in precarious locations or depend on the land for a subsistence living.
- Certain vector-borne diseases carried by animals or insects, such as malaria, would become more widespread as warmer conditions expanded their range.

## **Carbon Dioxide Emissions are the Biggest Problem**

Currently, carbon dioxide accounts for more than 60 percent of the enhanced greenhouse effect caused by the increase of greenhouse gases, and the level of carbon dioxide in the atmosphere is increasing by more than 10 percent every 20 years.

If emissions of carbon dioxide continue to grow at current rates, then the level of the gas in the atmosphere will likely double, or possibly even triple, from pre-industrial levels during the 21st century.

## **Climate Changes are Inevitable**

According to the United Nations, some climate change is already inevitable because of emissions that have occurred since the dawn of the Industrial Age.

While the Earth's climate does not respond quickly to external changes, many scientists believe that global warming already has significant momentum due to 150 years of industrialization in many countries around the world. As a result, global warming will continue to affect life on Earth for hundreds of years, even if greenhouse gas emissions are reduced and the increase in atmospheric levels halted.

## **What is Being Done to Reduce Global Warming?**

To lessen those long-term effects, many nations, communities and individuals are taking action now to reduce greenhouse gas emissions and slow global warming by reducing dependence on fossil fuels, increasing the use of renewable energy, expanding forests, and making lifestyle choices that help to sustain the environment.

Whether they will be able to recruit enough people to join them, and whether their combined efforts will be enough to head off the most serious effects of global warming, are open questions that can only be answered by future developments.