Understanding Climate Change

The Science

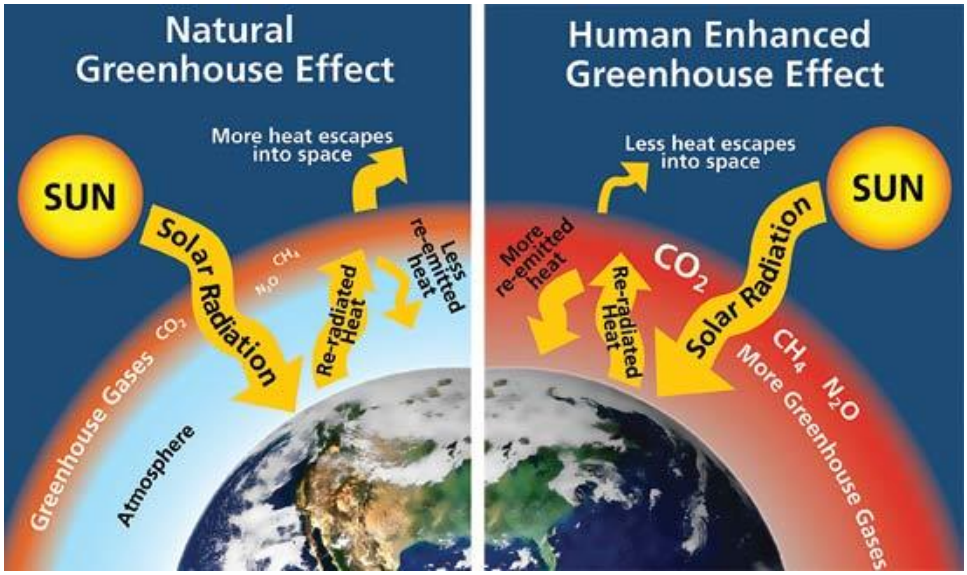
Scientific evidence paints a clear picture: Climate change is happening, it is caused in large part by human activity, and it will have many serious and potentially damaging effects in the decades ahead. Greenhouse gas emissions from cars, power plants and other man-made sources—rather than natural variations in climate—are the primary cause. These emissions include carbon dioxide — the main greenhouse gas — which has reached a concentration level in our atmosphere that the Earth hasn't seen for more than 400,000 years. These greenhouse gases act like a blanket, trapping the sun's warmth near the earth's surface, and affecting the planet's climate system.

The Greenhouse Effect

The picture below shows the greenhouse effect. Light from the sun passes through the atmosphere and is absorbed by the Earth's surface, warming it. Greenhouse gases, like carbon dioxide, act like a blanket, trapping heat near the surface and raising the temperature. It is a natural process that warms the planet. But human activities are increasing the amount of greenhouse gases and trapping more heat.

Greenhouse gases stay in the atmosphere for a long time. Although plants and the ocean absorb carbon dioxide, they can't keep up with all the extra carbon dioxide that people have been releasing. So the amount of carbon dioxide in the atmosphere has been increasing over time.

The Greenhouse Effect Explained



Where do greenhouse gases come from?

Up until about 150 years ago, human activity did not produce many greenhouse gases. That changed as forests were cleared to make way for cities and farms, and as important inventions and industrial innovations, like the widespread use of electricity and cars, transformed the way we live.

These inventions and innovations demand energy. Burning fossil fuels — coal, oil, and natural gas — has become an important source of that energy. Burning fossil fuels releases carbon dioxide and other greenhouse gases into the atmosphere.

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Today in the United States, electricity and transportation (cars, trucks and planes) are responsible for almost 60 percent of carbon dioxide emissions. The rest comes from agriculture, industry, such as factories that make products we use, and from energy we use in our homes and businesses.

Greenhouse Gases

The three most common types of greenhouse gases are:

- Carbon Dioxide (CO_2): Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and as a result of other chemical reactions such as making cement. Carbon dioxide is removed from the atmosphere and stored when it is absorbed by plants as part of the biological carbon cycle. It makes up 82 percent of U.S. greenhouse emissions.
- Methane (CH_4): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also come from livestock and other agricultural practices and by the decay of organic waste in landfills. It makes up 10 percent of U.S. greenhouse emissions.
- Nitrous Oxide (N_2O): Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. It makes up 5 percent of U.S. greenhouse emissions.

Impacts of a Changing Climate

Rising global temperatures threaten human health, increase the risk of some types of extreme weather, and damage ecosystems. And as the oceans warm and polar ice caps melt, sea levels are rising, endangering coastal areas. These impacts are already being felt today, and groups like the poor, elderly, and those living in conflict areas are especially vulnerable.

Impacts of climate change include:

- Heat waves..
- Heavy Precipitation
- Sea-Level Rise. Sea level has risen about 8 inches due to the melting of glaciers and ice sheets. The warming of seas and oceans is also making coastal storms more damaging. Scientists predict sea levels in the United States could rise 1 to 4 feet
- Threats to habitats and animals. As temperatures warm, many plants and animals are migrating to higher elevations or away from the equator. Some animals may have difficulty moving or adapting to new habitats.
- Ocean acidification. Extra carbon dioxide in the atmosphere is absorbed by the oceans, making them more acidic. This can make it difficult for corals and microorganisms that form shells to survive, disrupting the food supply for other sea animals.
- Wildfires. These are large fires that burn vast amounts of forests and brush. When they are not controlled, wildfires can destroy homes and be deadly. The number of large wildfires and the length of the wildfire season have been increasing in recent decades.
- Drought. Global warming will increase the risk of drought in some regions. Also, warmer temperatures can increase water demand and evaporation, stressing water supplies.

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There are two things we need to do:

The first is to reduce the greenhouse gas emissions responsible for climate change. By choosing cleaner ways to power our homes, offices, and cars, and being more efficient and less wasteful, we can produce fewer greenhouse gas emissions.

Everyone can play a part in a clean energy future, including government, businesses, and you. There are lot of things you can do to help, like turning off the lights when you leave a room to reduce the electricity you use, taking shorter showers to reduce the water you use (and the energy it takes to process, move, and heat it), planting a tree to absorb carbon dioxide, or recycling to reduce waste. For example, recycling aluminum is 90-95 percent more energy efficient than producing aluminum from raw materials.

The second is to prepare for life in a changing climate. We need to make sure our buildings, roads, businesses and all the services they use can withstand the climate changes that we can't avoid.