

What is Global Warming?

Global Warming is the increase of Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation, which trap heat that would otherwise escape from Earth. This is a type of *greenhouse effect*.

Global Warming Causes

Global warming is primarily a problem of too much carbon dioxide (CO₂) in the atmosphere—which acts as a blanket, trapping heat and warming the planet. As we burn fossil fuels like coal, oil and natural gas for energy or cut down and burn forests to create pastures and plantations, carbon accumulates and overloads our atmosphere. Certain waste management and agricultural practices aggravate the problem by releasing other potent global warming gases, such as methane and nitrous oxide. See the pie chart for a breakdown of heat-trapping global warming emissions by economic sector.

Global Warming Is Urgent and Can Be Addressed

CO₂ survives in the atmosphere for a long time—up to many centuries—so its heat-trapping effects are compounded over time. Of the many heat-trapping gases, CO₂ puts us at the greatest risk of irreversible changes if it continues to accumulate unabated in the atmosphere—as it is likely to do if the global economy remains dependent on fossil fuels for its energy needs. To put this in perspective, the carbon we put in the atmosphere today will literally determine not only our climate future but that of future generations as well.

Substantial scientific evidence indicates that an increase in the global average temperature of more than 3.6 degrees Fahrenheit (°F) (or 2 degrees Celsius [°C]) above pre-industrial levels poses severe risks to natural systems and to human health and well-being. The good news is that, because we as humans caused global warming, we can also do something about it. To avoid this level of warming, large emitters such as the United States need to greatly reduce heat-trapping gas emissions by mid century. Delay in taking such action means the prospect of much steeper cuts later if there is any hope of staying below the 3.6°F (2°C) temperature goal. Delayed action is also likely to make it more difficult and costly to not only make these reductions, but also address the climate consequences that occur in the meantime.

The Consequences of a Warming World

Over the last century, global average temperature has increased by more than 1°F (0.7°C). The 2001-2010 decade is the warmest since 1880—the earliest year for which comprehensive global temperature records were available. In fact, nine of the warmest years on record have occurred in just the last 10 years. This warming has been accompanied by a decrease in very cold days and nights and an increase in extremely hot days and warm nights. The continental United States, for

example, has seen record daily highs twice as often as record daily lows from 2000 to 2009. While the record shows that some parts of the world are warming faster than others, the long-term global upward trend is unambiguous.

Of course, land and ocean temperature is only one way to measure the effects of climate change. A warming world also has the potential to change rainfall and snow patterns, increase droughts and severe storms, reduce lake ice cover, melt glaciers, increase sea levels, and change plant and animal behavior.

Regional Actions Add Up to Global Solutions

We encourage you to visit the solutions section of this web feature to find out how you can take action to slow the pace of climate change and help minimize the harmful consequences described in the hot spots!

Any action to reduce or eliminate the release of heat-trapping gases to the atmosphere helps slow the rate of warming and, likely, the pace and severity of change at any given hot spot. Local sources of carbon emissions vary from region to region, suggesting that solutions are often decided at the community level. The Climate Hot Map points to regional examples of climate-friendly energy, transportation, or adaptation choices. Some regions, however, must rely upon global solutions such as international agreements to reduce the carbon overload in the atmosphere that threatens them. Small islands, for example, are a paltry source of carbon emissions and yet are disproportionately affected by the consequences of global carbon overload as accelerated sea level rise threatens the very existence of low-lying islands.

Individual, regional, and national actions can all add up to global solutions, slowing and eventually halting the upward climb of CO₂ concentrations in the atmosphere.

Global Warming Impacts

Many of the following "harbingers" and "fingerprints" are now well under way:

Rising Seas--- inundation of fresh water marshlands (the everglades), low-lying cities, and islands with seawater.

Changes in rainfall patterns --- droughts and fires in some areas, flooding in other areas. See the section above on the recent droughts, for example!

Increased likelihood of extreme events--- such as flooding, hurricanes, etc.

Melting of the ice caps --- loss of habitat near the poles. Polar bears are now thought to be greatly endangered by the shortening of their feeding season due to dwindling ice packs.

Melting glaciers - significant melting of old glaciers is already observed.

Widespread vanishing of animal populations --- following widespread habitat loss.

Spread of disease --- migration of diseases such as malaria to new, now warmer, regions.

Bleaching of Coral Reefs due to warming seas and acidification due to carbonic acid formation --- *One third* of coral reefs now appear to have been severely damaged by warming seas.

Loss of Plankton due to warming seas --- The enormous (900 mile long) Aleution island ecosystems of orcas (killer whales), sea lions, sea otters, sea urchins, kelp beds, and fish populations, appears to have collapsed due to loss of plankton, leading to loss of sea lions, leading orcas to eat too many sea otters, leading to urchin explosions, leading to loss of kelp beds and their associated fish populations.

Solutions to Global Warming

There is no single solution to global warming, which is primarily a problem of too much heat-trapping carbon dioxide (CO₂), methane and nitrous oxide in the atmosphere. The technologies and approaches outlined below are all needed to bring down the emissions of these gases by at least 80 percent by mid-century. To see how they are best deployed in each region of the world, use the menu at left.

- **Boosting energy efficiency:** The energy used to power, heat, and cool our homes, businesses, and industries is the single largest contributor to global warming. Energy efficiency technologies allow us to use less energy to get the same—or higher—level of production, service, and comfort. This approach has vast potential to save both energy and money, and can be deployed quickly.
- **Greening transportation:** The transportation sector's emissions have increased at a faster rate than any other energy-using sector over the past decade. A variety of solutions are at hand, including improving efficiency (miles per gallon) in all modes of transport, switching to low-carbon fuels, and reducing vehicle miles traveled through smart growth and more efficient mass transportation systems.
- **Revvig up renewables:** Renewable energy sources such as solar, wind, geothermal and bioenergy are available around the world. Multiple studies have shown that renewable energy has the technical potential to meet the vast majority of our energy needs. Renewable technologies can be deployed quickly, are increasingly cost-effective, and create jobs while reducing pollution.
- **Phasing out fossil fuel electricity:** Dramatically reducing our use of fossil fuels—especially carbon-intensive coal—is essential to tackle climate change. There are many ways to begin this process. Key action steps include: not building any new coal-burning power plants, initiating a phased shutdown of coal plants starting with the oldest and dirtiest, and capturing and storing carbon emissions from power plants. While it may sound like science fiction, the technology exists to store carbon emissions underground.

The technology has not been deployed on a large scale or proven to be safe and permanent, but it has been demonstrated in other contexts such as oil and natural gas recovery. Demonstration projects to test the viability and costs of this technology for power plant emissions are worth pursuing.

- **Managing forests and agriculture:** Taken together, tropical deforestation and emissions from agriculture represent nearly 30 percent of the world's heat-trapping emissions. We can fight global warming by reducing emissions from deforestation and forest degradation and by making our food production practices more sustainable.
- **Exploring nuclear:** Because nuclear power results in few global warming emissions, an increased share of nuclear power in the energy mix could help reduce global warming—but nuclear technology poses serious threats to our security and, as the accident at the Fukushima Daiichi plant in Japan illustrates to our health and the environment as well. The question remains: can the safety, proliferation, waste disposal, and cost barriers of nuclear power be overcome?
- **Developing and deploying new low-carbon and zero-carbon technologies:** Research into and development of the next generation of low-carbon technologies will be critical to deep mid-century reductions in global emissions. Current research on battery technology, new materials for solar cells, harnessing energy from novel sources like bacteria and algae, and other innovative areas could provide important breakthroughs.
- **Ensuring sustainable development:** The countries of the world—from the most to the least developed—vary dramatically in their contributions to the problem of climate change and in their responsibilities and capacities to confront it. A successful global compact on climate change must include financial assistance from richer countries to poorer countries to help make the transition to low-carbon development pathways and to help adapt to the impacts of climate change.

Adapting to changes already underway: As the Climate Hot Map demonstrates, the impacts of a warming world are already being felt by people around the globe. If climate change continues unchecked, these impacts are almost certain to get worse. From sea level rise to heat waves, from extreme weather to disease outbreaks, each unique challenge requires locally-suitable solutions to prepare for and respond to the impacts of global warming. Unfortunately, those who will be hit hardest and first by the impacts of a changing climate are likely to be the poor and vulnerable, especially those in the least developed countries. Developed countries must take a leadership role in providing financial and technical help for adaptation.

References

- www.google.com
- www.wikipedia.com
- www.studymafia.org
- www.pptplanet.com
- www.pdfclass.com