



Global Warming: Its Causes, Concerns & Some Emerging Issues

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ABSTRACT: Global warming has come across as a monumental factor of discussion among different countries. Wide-scale use of non-renewable energy resources has exponentially increased the levels of pollution. This has disturbed environmental stability and started increasing the global temperature (the surface temperature has raised by almost 0.5°C in the last 25 years. This has resulted in the rising rate of melting of the ice cap on mountains and thus the rise in oceanic levels. This also has a direct influence on rains and weather fluctuations. At this rate, while global warming may not cause much harm to the existent populace, it will surely be a menace for the coming generations. The rampant escalation of heat waves and retreat of glaciers are just small if not insignificant expressions of global warming. Over the last 15 years, many G30 summits have been

held on the matter. Most countries have adopted potent Renewable Energy Targets for the next 20 years and are planning to go partially or wholly off the grid. The establishment of renewable energy sources like sun, wind and water and processing of greenhouse gases are worthy solutions.

The present paper discusses the causes and concerns of global warming and how it can be curbed. It also provides a startling way out through the apparent holocaust the world is facing, say, in the next century. This paper makes one thing clear that we cannot just depend on what our respective Governments are doing for the motion; we have to take proactive steps towards rendering stability to the environment through energy-conscious systematization at home.



KEYWORDS: Global Warming, Climate Change, Greenhouse Gases, Renewable Energy.

INTRODUCTION: Global warming and climate change are terms for the observed century-scale rise in the average temperature of the Earth's climate system and its related effects. Multiple lines of scientific evidence show that the climate system is warming. Although the increase of near-surface atmospheric temperature is the measure of global warming often reported in the popular press, most of the additional energy stored in the climate system since 1970 has gone into the oceans. The rest has melted ice and warmed the continents and atmosphere. Many of the observed changes since the 1950s are unprecedented over tens to thousands of years.

Scientific understanding of global warming is increasing. The United Nations Intergovernmental Panel on Climate Change (IPCC) reported in 2014, that "It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century."

Human activities have led to carbon dioxide concentrations above levels not seen in hundreds of thousands of years.

Cause of global warming: Almost 100% of the observed temperature increase over the last 50 years has been due to the increase in the atmosphere of greenhouse gas concentrations like water vapour, carbon dioxide (CO₂), methane and ozone. Greenhouse gases are those gases that contribute to the greenhouse effect (see below). The largest contributing source of greenhouse gas is the burning of fossil fuels leading to the emission of carbon dioxide.

The greenhouse effect: When sunlight reaches Earth's surface some is absorbed and warms the earth and most of the rest is radiated back to the atmosphere at a longer wavelength than the sun light. Some of these longer wavelengths are absorbed by greenhouse gases in the atmosphere before they are lost to space. The absorption of this longwave radiant energy warms the atmosphere. These greenhouse gases act like a mirror and reflect back to the Earth some of the heat energy which would otherwise be lost to space. The reflecting

back of heat energy by the atmosphere is called the "greenhouse effect".

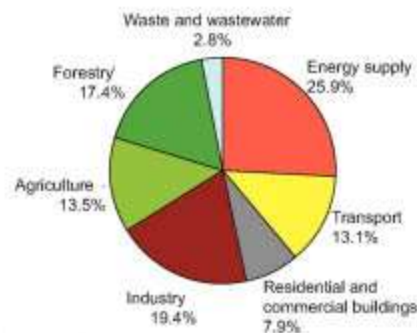
The major natural greenhouse gases are water vapor, which causes about 36-70% of the greenhouse effect on Earth (not including clouds); carbon dioxide CO₂, which causes 9-26%; methane, which causes 4-9%, and ozone, which causes 3-7%. It is not possible to state that a certain gas causes a certain percentage of the greenhouse effect, because the influences of the various gases are not additive. Other greenhouse gases include, but are not limited to, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons and chlorofluorocarbons.

Global warming causes by greenhouse effect: Greenhouse gases in the atmosphere (see above) act like a mirror and reflect back to the Earth a part of the heat radiation, which would otherwise be lost to space. The higher the concentration of green house gases like carbon dioxide in the atmosphere, the more heat energy is being reflected back to the Earth. The emission of carbon dioxide into the environment mainly from burning of fossil fuels (oil, gas, petrol,

kerosene, etc.) has been increased dramatically over the past 50 years,

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.





The Earth maintains a habitable temperature due to the Greenhouse Effect, which allows heat from the sun to penetrate our atmosphere, where it is absorbed by the Earth's surface or radiated out and reflected back to Earth by greenhouse gases in the atmosphere. Without it, the Earth would be a cold and hostile planet, and would most likely be uninhabitable.

However, maintaining the natural balance necessary to keep the Earth's temperature within a range that is viable for life as we know it is a very fine line that can easily be crossed.

Greenhouse gases are naturally occurring gases that pose no harm when they are in balance. However, when they are present in excess, the system becomes unbalanced and things start to go awry.

Effects and emerging issues:

Physical effect: A broad range of evidence shows that the climate system has warmed.[42] Evidence of global warming is shown in the graphs opposite. Some of the graphs show a positive trend, e.g.,

increasing temperature over land and the ocean, and sea level rise. Other graphs show a negative trend, e.g., decreased snow cover in the Northern Hemisphere, and declining Arctic sea ice extent. Evidence of warming is also apparent in living (biological) systems.

Effects on weather: Observations show that there have been changes in weather. As climate changes, the probabilities of certain types of weather events are affected. Changes have been observed in the amount, intensity, frequency, and type of precipitation. Widespread increases in heavy precipitation have occurred, even in places where total rain amounts have decreased. With medium confidence (IPCC (2012)[54] concluded that human influences had contributed to an increase in heavy precipitation events at the global scale.

Changes in precipitation patterns: Average U.S. precipitation has increased since 1900, but some areas have had increases greater than the national average, and some areas have had decreases. More winter and spring precipitation is projected for the



northern United States, and less for the Southwest, over this century.

Projections of future climate over the U.S. suggest that the recent trend towards increased heavy precipitation events will continue. This trend is projected to occur even in regions where total precipitation is expected to decrease, such as the Southwest.

More droughts and heat waves: Droughts in the Southwest and heat waves (periods of abnormally hot weather lasting days to weeks) everywhere are projected to become more intense, and cold waves less intense everywhere. Summer temperatures are projected to continue rising, and a reduction of soil moisture, which exacerbates heat waves, is projected for much of the western and central U.S. in summer. By the end of this century, what have been once-in-20-year extreme heat days (one-day events) are projected to occur every two or three years over most of the nation.

Hurricanes will become stronger and more intense: The intensity, frequency and duration of North Atlantic hurricanes, as

well as the frequency of the strongest (Category 4 and 5) hurricanes, have all increased since the early 1980s. The relative contributions of human and natural causes to these increases are still uncertain. Hurricane-associated storm intensity and rainfall rates are projected to increase as the climate continues to warm.

Extreme weather: Over most land areas since the 1950s, it is very likely that there have been fewer or warmer cold days and nights. Hot days and nights have also very likely become warmer or more frequent. Human activities have very likely contributed to these trends.[55] There may have been changes in other climate extremes (e.g., floods, droughts and tropical cyclones) but these changes are more difficult to identify. Projections suggest changes in the frequency and intensity of some extreme weather events. Confidence in projections varies over time

Tropical cyclones: At the global scale, the frequency of tropical cyclones will probably decrease or be unchanged. Global mean tropical cyclone maximum wind speed and precipitation rates will likely increase.



Changes in tropical cyclones will probably vary by region, but these variations are uncertain.

Effects of climate extremes: The impacts of extreme events on the environment and human society will vary. Some impacts will be beneficial—e.g., fewer cold extremes will probably lead to fewer cold deaths. Overall, however, impacts will probably be mostly negative. The longer a drought lasts, the greater the risk of suicide for men in rural areas between 30 and 49 years of age. Global warming is expected to have far-reaching, long-lasting and, in many cases, devastating consequences for planet Earth. For some years, global warming, the gradual heating of Earth's surface, oceans and atmosphere, was a topic of heated debate in the scientific community. Today, the overwhelming consensus of researchers is that global warming is real and is caused by human activity, primarily the burning of fossil fuels that pump carbon dioxide (CO₂), methane and other greenhouse gases into the atmosphere.

A major report released Sept. 27, 2013, by the Intergovernmental Panel on Climate

Change (IPCC) stated that scientists are more certain than ever of the link between human activities and global warming. More than 197 international scientific organizations agree that global warming is real and has been caused by human action.

Additionally, global warming is having a measurable effect on the planet right now, in a variety of ways. "We can observe this happening in real time in many places. Ice is melting in both polar ice caps and mountain glaciers. Lakes around the world, including Lake Superior, are warming rapidly – in some cases faster than the surrounding environment. Animals are changing migration patterns and plants are changing the dates of activity (e.g., leaf-flush in spring to fall in autumn is longer)," Josef Werne, an associate professor in the department of geology and planetary science at the University of Pittsburgh, told Live Science.

Increase in average temperatures and temperature extremes: One of the most immediate and obvious effects of global warming is the increase in temperatures around the world. The average global



temperature has increased by about 1.4 degrees Fahrenheit (0.8 degrees Celsius) over the past 100 years, according to the National Oceanic and Atmospheric Administration (NOAA).

Since recordkeeping began in 1895, the hottest year on record for the 48 contiguous U.S. states was 2012. Worldwide, 2012 was also the 10th-warmest year on record, according to NOAA. And nine of the warmest years on record have occurred since 2000. According to NOAA, 2013 tied with 2003 as the fourth warmest year globally since 1880.

Ice melt: Since 1970, the area of snow cover in the United States has steadily decreased, according to the EPA, and the average temperature of permafrost (soil that's at or below freezing temperature) has grown warmer.

One of the most dramatic effects of global warming is the reduction in Arctic sea ice: In 2012, scientists saw the smallest amount of Arctic ice cover ever recorded. Most analyses project that, within a matter of years, the Arctic Sea will be completely ice-free during the summer months.

Glacial retreat, too, is an obvious effect of global warming. Only 25 glaciers bigger than 25 acres are now found in Montana's Glacier National Park, where about 150 glaciers were once found, according to the U.S. Geological Survey. A similar trend is seen in glacial areas worldwide

Arctic likely to become ice-free: The Arctic Ocean is expected to become essentially ice free in summer before mid-century.

Sea levels and ocean acidification: As ice melts, the ocean levels rise. In 2014, the World Meteorological Organization reported that sea level rise accelerated .12 inches (3 millimeters) per year on average worldwide. This is around double the average annual rise of .07 in (1.6 mm) in the 20th century.

Melting polar ice in the Arctic and Antarctic region, coupled with melting ice sheets and glaciers across Greenland, North America, South America, Europe and Asia, are expected to raise sea levels significantly. And humans are mostly to blame: In the IPCC report released on Sept. 27, 2013, climate scientists said they are at least 95 percent certain that humans are to blame



for warming oceans, rapidly melting ice and rising sea levels, changes that have been observed since the 1950s.

Plants and animals: The effects of global warming on the Earth's ecosystems are expected to be profound and widespread. Many species of plants and animals are already moving their range northward or to higher altitudes as a result of warming temperatures, according to a report from the National Academy of Sciences.

"They are not just moving north, they are moving from the equator toward the poles. They are quite simply following the range of comfortable temperatures, which is migrating to the poles as the global average temperature warms," Werne said. Ultimately, he said, this becomes a problem when the rate of climate change velocity (how fast a region changes put into a spatial term) is faster than the rate that many organisms can migrate. Because of this, many animals may not be able to compete in the new climate regime and may go extinct

Social effects: As dramatic as the effects of climate change are expected to be on the

natural world, the projected changes to human society may be even more devastating.

Agricultural systems will likely be dealt a crippling blow. Though growing seasons in some areas will expand, the combined impacts of drought, severe weather, lack of snowmelt, greater number and diversity of pests, lower groundwater tables and a loss of arable land could cause severe crop failures and livestock shortages worldwide.

North Carolina State University also notes that carbon dioxide is affecting plant growth. Though CO₂ can increase the growth of plants, the plants may become less nitrite.

Biggest Contributors To Global Warming In The World By Country:

Nation-by-nation contributions to global CO₂ emissions: China emits almost twice the amount of greenhouse gases as the US. Approximately two-thirds of all industrial methane and carbon dioxide released into the atmosphere since 1854 can be traced to burning fossil fuels and producing cement. Over the decades, scientists have



succeeded in confidently tracing how much of climate change can be directly tied to human activities, particularly the burning of fossil fuels. Sadly, the carbon dioxide emissions from human activities are now higher than at any point in human history, further worsening the 'greenhouse effect' contributing to global warming and the consequences of climate change. In fact, recent data shows that global carbon dioxide emissions were 150 times higher in 2011 than they were in 1850.

Since burning fossil fuels is usually a sign of heavy industry, carbon dioxide emissions can also serve as method of measuring a country's economic growth. Nonetheless, a reduction in global greenhouse gas emissions is an important objective of not only environmentalists but of every humanitarian-oriented and environmentally conscious state in the world. At the moment, 192 countries have adopted the Kyoto protocol which, among many other objectives, aimed to reduce greenhouse gas emissions by 55% from the 1990 levels by 2012.

In the world today, established economies have large, but waning, carbon emissions, while new economic giants in the developing world are increasing their emissions rapidly.

China: China emits almost twice the amount of greenhouse gases as the US, which it surpassed in 2006 as the world's top contributor to atmospheric carbon dioxide. Today, the country accounts for approximately 23 percent of all global CO₂ emissions. The United States government estimates project that, barring major reform, China will double its emissions by 2040, due to its heavy reliance on fossil fuels for steel production and electricity. Until recently, China was hesitant to establish targets for emissions, which continue to increase, although at a slower rate.

United States: The US has never entered into any binding treaty to curb greenhouse gases, but has cut more carbon dioxide emissions than any other nation nevertheless. The country is on pace to meet a 2009 pledge by the Obama



administration to reduce CO₂ emissions by 17% from 2005 levels by 2020.

Unfortunately, CO₂ emissions have gone up in recent as the country fights to recover back from the recession that began in 2008. President Obama's administration has not always gained Congressional support, as means to balance making progress economically and reducing emissions do not always go hand in hand, and different political factions propose markedly different strategies concerning how to best do so. Most "clean air" legislation in this country has focused on improving automobile fuel economy and cutting carbon pollution from existing and new power plants.

India: In coming years, India plans to double its coal production to feed a national power grid that suffers from increasingly frequent blackouts. The nation faces the difficult challenge of curbing its greenhouse gases even as its population and economy continues to grow. In 2010, the country voluntarily committed to a 20-25 percent reduction in carbon emissions from 2005

levels (relative to economic output) by 2020.

In summary, when it comes to pure carbon dioxide emissions today,

- China emits more carbon dioxide than 2nd Place US and 3rd Place India combined.
- The US has reduced its CO₂ release for two years in a row despite bipartisan political conflicts.
- India has become the world's third biggest emitter of carbon dioxide, pushing Russia down to the fourth position on our list.

Conclusion: A long series of scientific research and international studies has shown, with more than 90% certainty, that this increase in overall temperatures is due to the greenhouse gases produced by humans. Activities such as deforestation and the burning of fossil fuels are the main sources of these emissions. These findings are recognized by the national science academies of all the major industrialized countries. Global warming is affecting many places around the world. It is accelerating the melting of ice sheets, permafrost and glaciers which is causing average sea levels

to rise. It is also changing precipitation and weather patterns in many different places, making some places dryer, with more intense periods of drought and at the same time making other places wetter, with stronger storms and increased flooding. These changes have affected both nature as well as human society and will continue to have increasingly worse effects if greenhouse gas emissions continue to grow at the same pace as today.

□ <http://whatsyourimpact.org/global-warming>

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