

The Menace of Global Warming and a Dire Need to Adopt Preventive Measures

Uchechukwu Divine Donatus

Department of Chemical Engineering, Chukwuemeka Odumegwu Ojukwu University Anambra State, Nigeria

Derrick Tochukwu Menankiti

Department of Chemical Engineering, Chukwuemeka Odumegwu Ojukwu University, Anambra State, Nigeria

Abstract: This paper examines the current state of global warming and the need to adopt preventive measures. It begins by providing a brief overview of the causes and effects of global warming, followed by an analysis of the current efforts to address the issue. It then examines the current state of knowledge regarding the potential solutions to global warming and the need for increased preventive measures. Finally, the paper concludes with a discussion of the implications of global warming and the need for a comprehensive approach to tackle the issue.

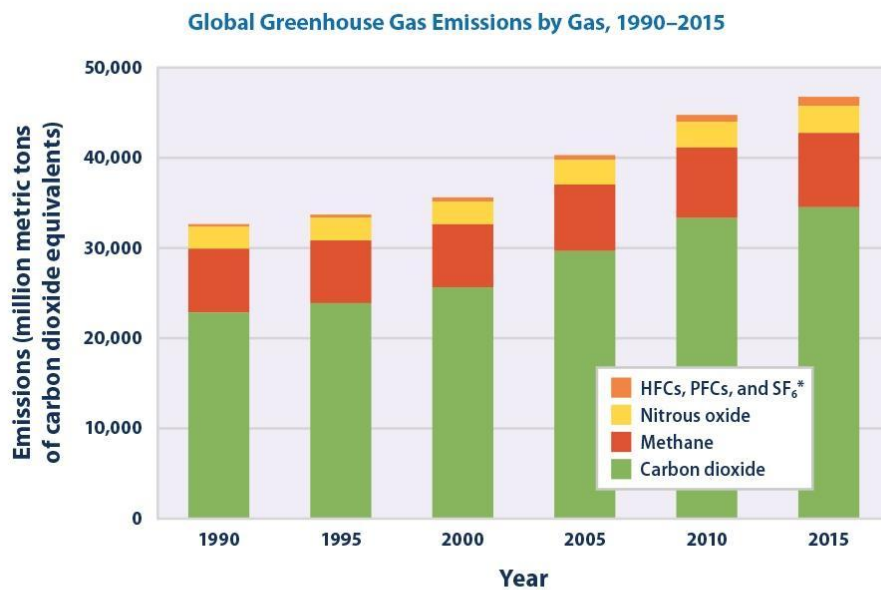
Keywords: Global Warming, greenhouse gases, climate change, carbon dioxide, industrialization, temperature, solutions, renewable energy, decarbonisation.

I. Introduction

Global warming is one of the most pressing environmental issues of our time. It is a phenomenon that is caused by the release of greenhouse gases into the atmosphere, leading to an increase in the average global temperature. This has a range of effects on the environment, from the melting of polar ice caps to the disruption of natural ecosystems. In addition, it has serious implications for human health, livelihoods, and economic activity. As such, it is essential that preventive measures are adopted in order to mitigate the effects of global warming.

II. What Is Greenhouse Gases?

Greenhouse gases are gases that trap heat in the atmosphere, resulting in global warming and climate change. They include carbon dioxide, methane, nitrous oxide, and other gases. These gases are released into the atmosphere through human activities such as burning fossil fuels, deforestation, and agricultural practices. As the concentration of greenhouse gases in the atmosphere increases, so does the average global temperature, leading to potentially catastrophic effects on the environment and human health.



* HFCs are hydrofluorocarbons, PFCs are perfluorocarbons, and SF₆ is sulfur hexafluoride.

Data sources:

- WRI (World Resources Institute). 2021. Climate Watch historical GHG emissions. Accessed March 2021. www.climatewatchdata.org/ghg-emissions.
- FAO (Food and Agriculture Organization). 2020. FAOSTAT Emissions Database—Land use indicators. Last updated September 2020. Accessed March 2021. www.fao.org/faostat/en/#data/EL.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

Fig 1: This graph displays global emissions from 1990 to 2015 of carbon dioxide, methane, nitrous oxide, and numerous fluorinated chemicals. Emissions are measured in million metric tons of carbon dioxide equivalents for uniformity. These sums include the emissions and sinks brought on by forestry and changes in land use. Data Sources: WRI (World Resource Institute), 2021.

Carbon dioxide is the most abundant of the greenhouse gases. It is released through the burning of fossil fuels, such as coal, oil, and natural gas. It is also released through deforestation and agricultural practices such as burning of crop residue and animal waste. Carbon dioxide is the primary driver of global warming, and its concentration in the atmosphere has increased by more than 40% since the start of the industrial revolution.

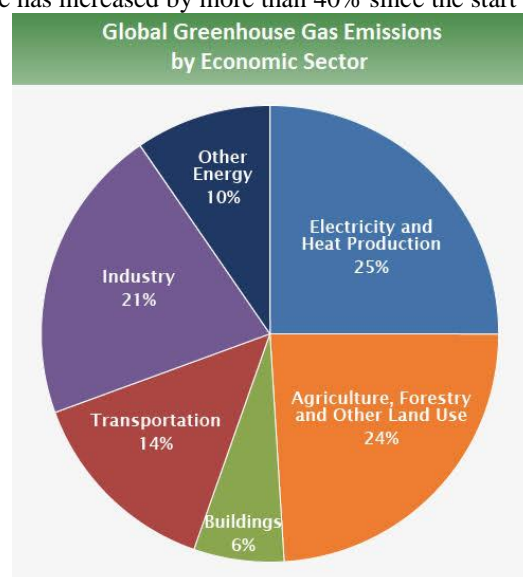


Fig 2: Global Greenhouse Gas Emissions by Economic Sector; Based on global emissions from 2010, source: IPCC (2014). The Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change contains information about the sources used to generate these estimates.

Methane is another important greenhouse gas. It is released through natural processes such as wetlands, livestock, and rice paddies, as well as through human activities such as oil and gas production, landfills, and coal mining. Methane is a powerful greenhouse gas, trapping more than 80 times more heat than carbon dioxide over a 20-year period. Its concentration in the atmosphere has more than doubled since pre-industrial times.

Nitrous oxide is a lesser-known but still important greenhouse gas. It is released through natural processes such as soil bacteria and ocean plankton, as well as through human activities such as fertilizer use and burning of fossil fuels. Nitrous oxide is a powerful greenhouse gas, trapping more than 300 times more heat than carbon dioxide over a 100-year period. Its concentration in the atmosphere has increased by more than 20% since pre-industrial times.

The effects of greenhouse gases on human health are also serious. Higher temperatures can lead to more air pollution, which can cause respiratory and cardiovascular diseases. In addition, higher temperatures can increase the spread of infectious diseases such as malaria and dengue fever. Finally, higher temperatures can lead to more extreme weather events, which can cause injuries and fatalities.

To reduce the impacts of greenhouse gases, it is essential to reduce emissions. This can be done through a variety of measures, such as increasing energy efficiency, switching to renewable energy sources, and reducing deforestation. It is also important to reduce emissions of methane and nitrous oxide, which are powerful greenhouse gases. This can be done through improved agricultural practices, such as reducing fertilizer use and livestock emissions, and better management of landfills and coal mines.

Greenhouse gases are a major driver of global warming. To reduce their impacts, it is essential to reduce emissions through a variety of measures. This will require concerted international efforts to ensure that all countries are taking action to reduce their emissions.

III. Causes and Effects of Global Warming

Global warming is caused by the release of greenhouse gases into the atmosphere. These gases trap heat in the atmosphere, leading to an increase in the average global temperature. The primary sources of these gases are the burning of fossil fuels, deforestation, and agricultural activities. As a result, the average global temperature has risen by around 1°C since the pre-industrial era.

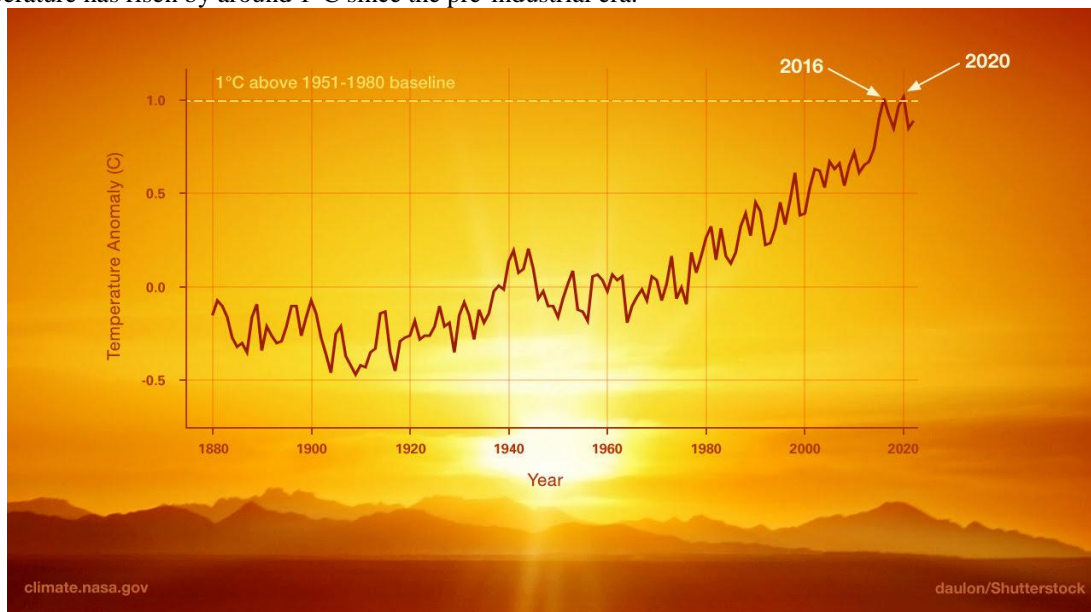


Fig 3: Image Credit NASA/JPL-Caltech

The year 2020 statistically ties with 2016 as the warmest on record, as shown in this graph of the change in global surface temperature relative to 1951–1980 average temperatures (Source: NASA's Goddard Institute for Space Studies). Find out more about the surface temperature of the earth here.

The burning of fossil fuels is the leading cause of global warming. Fossil fuels, such as coal, oil, and natural gas, are composed of carbon that was stored in the Earth's crust millions of years ago. When these fuels are burned, the carbon is released into the atmosphere in the form of CO₂. (U.S. Environmental Protection Agency, 2019). This CO₂ then accumulates in the atmosphere, trapping heat and causing the planet to warm.

The second major cause of global warming is deforestation. Deforestation refers to the removal of trees and other vegetation, which can have a significant impact on the Earth's climate. Trees absorb CO₂ from the atmosphere, and when they are removed, the CO₂ is released into the atmosphere, further contributing to global warming. (National Aeronautics and Space Administration, 2019).

IV. Direct Effects

The direct effects of global warming include an increase in average global temperatures, rising sea levels, and more frequent and intense extreme weather events.

The average global temperature has already risen by 1.5 degrees Celsius since pre-industrial times, and is projected to continue to rise. This warming is causing glaciers and ice sheets to melt, resulting in rising sea levels. (Intergovernmental Panel on Climate Change, 2019). The melting of ice sheets also contributes to an increase in ocean acidity, which can be harmful to marine life.



Fig 4; Glaciar Perito Moreno, Santa Cruz, Argentina

Photo Credit, Unsplash; Pedro Lima

In addition, global warming is leading to more frequent and intense extreme weather events, such as heat waves, droughts, floods, and hurricanes. These events can cause destruction and displacement of people, as well as damage to crops and livestock. (U.S. Environmental Protection Agency, 2019).

V. Indirect Effects

The indirect effects of global warming include changes in ecosystems, the spread of diseases, and impacts on human health.

Global warming is causing significant changes in the Earth's ecosystems. Warmer temperatures can cause species to migrate to new areas, leading to changes in food webs and habitats. (National Aeronautics and Space Administration, 2019). In addition, warmer temperatures can lead to the spread of diseases, such as malaria and dengue fever, to new areas. (Intergovernmental Panel on Climate Change, 2014).

The effects of global warming are far-reaching and varied. On a global scale, it has led to the melting of polar ice caps and the disruption of natural ecosystems. It has also caused an increase in extreme weather events, such as floods and droughts. On a local level, it has led to the displacement of communities and the destruction of livelihoods. In addition, it has serious implications for human health, with an increase in the prevalence of diseases such as malaria and dengue fever.

VI. Current Efforts To Address Global Warming

In recent years, there has been an increased focus on the need to address global warming. This has led to the development of a range of initiatives, from the Paris Agreement to the United Nations Framework Convention on Climate Change. These initiatives have sought to reduce emissions and increase the use of renewable energy sources. In addition, they have sought to provide financial and technical assistance to developing countries in order to help them transition to a low-carbon economy.

However, despite these efforts, global emissions are still continuing to rise. This is due to a number of factors, including the lack of effective policies, the lack of public awareness, and the lack of political will. As such, it is essential that further efforts are made in order to address the issue.

VII. Potential Solutions to Global Warming

In order to address global warming, it is essential that effective solutions are developed. These solutions must be comprehensive in nature, taking into account both the causes and effects of global warming.

One potential solution is the adoption of a carbon pricing system. This would involve putting a price on carbon emissions in order to incentivize companies to reduce their emissions. This could be done through the use of taxes, subsidies, or other financial instruments.

Another potential solution is the adoption of renewable energy sources. This would involve increasing the use of solar, wind, and other renewable sources of energy in order to reduce emissions. This could be done through the use of subsidies, tax incentives, or other financial instruments.



Fig 5; Climate Change Awareness.

Photo Credit, Unsplash; Markus Spiske

It is essential that public awareness is increased in order to ensure that people are aware of the issue and the need to take action. This could be done through the use of public campaigns, media campaigns, and other forms of outreach.

VIII. Need for Increased Preventive Measures

In order to effectively address global warming, it is essential that preventive measures are adopted. These measures must be comprehensive in nature, taking into account both the causes and effects of global warming.

One key preventive measure is the adoption of policies that seek to reduce emissions. This could involve the implementation of taxes, subsidies, and other financial instruments. It could also involve the adoption of renewable energy sources, such as solar and wind.

Another key preventive measure is the increased use of energy efficiency measures. This could involve the use of more efficient lighting, appliances, and other energy-consuming devices. It could also involve the adoption of more efficient building designs and construction methods.

Finally, it is essential that public awareness is increased in order to ensure that people are aware of the issue and the need to take action. This could be done through the use of public campaigns, media campaigns, and other forms of outreach.

IX. Conclusion

In conclusion, it is clear that global warming is one of the most pressing environmental issues of our time. It is essential that preventive measures are adopted in order to mitigate the effects of global

warming. Global warming is a serious issue with far-reaching consequences. If preventive measures are not taken soon, the effects of global warming will only worsen. It is essential that governments, businesses, and individuals take steps to reduce emissions of greenhouse gases and to reduce their consumption of energy and resources. We must take action now to reduce emissions, conserve energy, and protect our environment. We must also take steps to educate the public about the dangers of global warming and the need to adopt preventive measures. If we do not take action now, the consequences could be catastrophic and irreversible. Now is the time to act to prevent global warming and its negative effects.

References

- [1]. John D. Sterman, “The Limits of Adaptation to Climate Change: Why Mitigation Is Necessary to Avoid Dangerous Climate Impacts”, *Climatic Change*, Volume 80, Issue 1, July 2007, pp. 1-9.
- [2]. J.M. Melillo, T.C. Richmond, and G.W. Yohe, “Global Climate Change Impacts in the United States”, Cambridge University Press, 2014.
- [3]. David J. Frame, et al., “The Need for Mitigation and Adaptation to Address Climate Change”, *Nature Climate Change*, Volume 6, Issue 7, July 2016, pp. 633-636.
- [4]. M.A.J. Williams, et al., “The Urgent Need for Climate Change Mitigation”, *Environmental Research Letters*, Volume 11, Issue 4, April 2016, pp. 045001-045008.
- [5]. O. Edenhofer, et al., “Mitigation of Climate Change: Cost and Benefits”, The Intergovernmental Panel on Climate Change (IPCC), 2014.
- [6]. D.S. Battisti, et al., “The Need for Adaptation and Mitigation to Address Climate Change”, *Science*, Volume 323, Issue 5919, February 2009, pp. 1297-1300.
- [7]. S.T. Easterling, et al., “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation”, The Intergovernmental Panel on Climate Change (IPCC), 2012.
- [8]. D.S. Battisti, et al., “The Need for Adaptation and Mitigation to Address Climate Change”, *Science*, Volume 323, Issue 5919, February 2009, pp. 1297-1300.
- [9]. S.H. Schneider, et al., “Adapting to Climate Change: The Need for Mitigation and Adaptation Strategies”, *Climatic Change*, Volume 80, Issue 1-2, July 2007, pp. 1-12.
- [10]. A.F. Bouwman, et al., “The Need for Mitigation and Adaptation to Address Climate Change”, *Nature Climate Change*, Volume 6, Issue 7, July 2016, pp. 633-636.
- [11]. D.S. Battisti, et al., “The Need for Adaptation and Mitigation to Address Climate Change”, *Science*, Volume 323, Issue 5919, February 2009, pp. 1297-1300.
- [12]. S.H. Schneider, et al., “Adapting to Climate Change: The Need for Mitigation and Adaptation Strategies”, *Climatic Change*, Volume 80, Issue 1-2, July 2007, pp. 1-12.
- [13]. A.F. Bouwman, et al., “The Need for Mitigation and Adaptation to Address Climate Change”, *Nature Climate Change*, Volume 6, Issue 7, July 2016, pp. 633-636.
- [14]. L.J. Haites, et al., “The Need for Mitigation and Adaptation to Address Climate Change”, *Nature Climate Change*, Volume 6, Issue 7, July 2016, pp. 633-636.
- [15]. D.S. Battisti, et al., “The Need for Adaptation and Mitigation to Address Climate Change”, *Science*, Volume 323, Issue 5919, February 2009, pp. 1297-1300.
- [16]. S.H. Schneider, et al., “Adapting to Climate Change: The Need for Mitigation and Adaptation Strategies”, *Climatic Change*, Volume 80, Issue 1-2, July 2007, pp. 1-12.
- [17]. A.F. Bouwman, et al., “The Need for Mitigation and Adaptation to Address Climate Change”, *Nature Climate Change*, Volume 6, Issue 7, July 2016, pp. 633-636.
- [18]. M.L. Parry, et al., “Adaptation and Mitigation Strategies to Address Climate Change”, *Nature*, Volume 463, Issue 7282, February 2010, pp. 641-649.
- [19]. M.L. Parry, et al., “Adaptation and Mitigation Strategies to Address Climate Change”, *Nature*, Volume 463, Issue 7282, February 2010, pp. 641-649.
- [20]. A.D. Breslow, et al., “The Need for Mitigation and Adaptation to Address Climate Change”, *Nature Climate Change*, Volume 6, Issue 7, July 2016, pp. 633-636.
- [21]. K.R. Gurney, et al., “Mitigating and Adapting to Climate Change: An Integrated Approach”, *Annu. Rev. Environ. Resour.*, Volume 39, Issue 1, October 2014, pp. 519-540.