

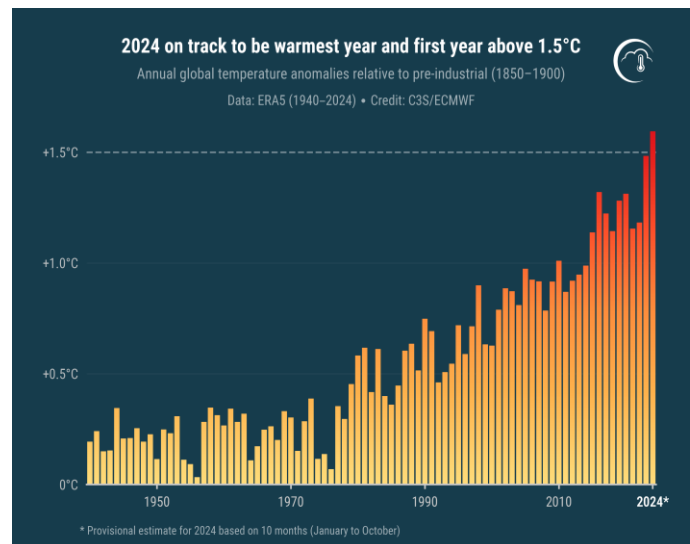
FORUM:	Environment Commission
ISSUE:	Measures to Reduce Greenhouse Gas Emission to Limit the Impact of Rising Global Temperatures
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POSITION:	Deputy Chair of Environment Commission

Introduction

As of 2025, the Earth warmed up at an accelerated rate than predictions in previous models. The Copernicus Climate Change Service of the European Union (EU) reported in November 2023 that the Earth's average global temperature had temporarily surpassed 2 degrees Celsius above pre-industrial levels for the first time in human history. This is in sharp contrast to the Paris agreement threshold, which the 196 parties of the United Nations Framework Convention on Climate Change (UNFCCC) tried to avoid.

As even marginal increases in global temperature can lead to irreversible consequences, the anomaly's brief duration belies its broad impact. Granted, there are multiple factors contributing to this issue, yet the most significant cause among those is the rise in greenhouse gas (GHG) emissions.

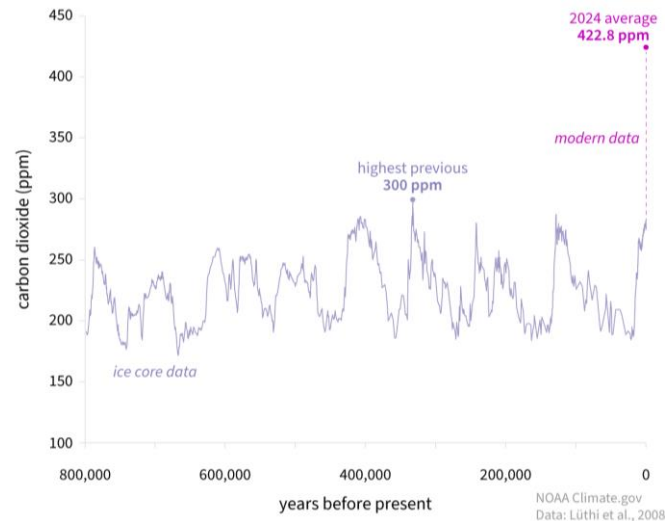
GHG—mainly including carbon dioxide (CO₂)—is emitted through fossil fuel consumption, industrial activities, and land degradation. The atmosphere traps the heat after GHGs are released and alters climatic patterns. According to the World Meteorological Organization (WMO), the past decade has been the warmest ever recorded, with each year's average temperature surpassing the previous year. The Intergovernmental Panel on Climate Change (IPCC) of the United Nations has warned that, unless a substantial reduction in GHG emissions occurs, the average global temperature will go beyond the critical threshold of 1.5 degrees Celsius above pre-industrial levels only within a decade, which will result in severe environmental consequences worldwide.



Annual Global Temperature Record Relative to Pre-Industrial Levels

Background

The current climate crisis is caused by more than a century of GHG accumulation in the atmosphere. With the start of the Industrial Revolution in the late 18th century, the introduction of steam engines, coal-powered factories, and mechanized production processes all contributed to a rapid rise in CO₂ emissions. During this period, the concentration of CO₂ in the atmosphere was about 280 ppm. Yet nowadays, according to the National Oceanic and Atmospheric Administration (NOAA) Global Monitoring Laboratory, the concentration has exceeded 420 ppm, a number that has never been observed in the last two million years. This enhanced greenhouse effect occurs when gas in the atmosphere traps infrared rays emitted from Earth and interfere with the heat release into space. Hence, the global average surface temperature has risen by approximately 1.1°C since 1880.



What is more concerning is the accelerated rate of increase in GHG emissions. Since 1990, GHG emissions have increased significantly, bringing total emissions in 2019 approximately 54% higher than in 1990. Since the outbreak of the COVID-19 pandemic in 2020, there has been a temporary decline in emissions with the economic slowdown. However, according to the International Energy Agency (IEA), the emissions rebounded quickly, far exceeding pre-pandemic levels by 2022, at 36.8 billion tons.

Problems Raised

Rising Sea Levels

According to WMO, as glaciers and polar ice sheets melt and oceans expand due to thermal warming, the global sea level has risen by about 21 cm since 1900. Notably, from 2015 to 2024, sea level climbed at 4.7 mm per year, which is roughly double the rate from 1993–2002. This trend is posing a significant threat to low-lying countries. About 1.23 billion people are currently living between 1~10 m above sea level, and just a 20 cm rise could cause \$1 trillion annually in damages across 136 coastal cities. The number of Small Island Developing States (SIDS) is already experiencing frequent flooding, land erosion, and saltwater intrusion into their agriculture and freshwater sources.

Projections from the IPCC indicate that if GHG emissions continue to rise at the current rate, sea levels could rise by 0.6 to 1 meter by 2100. This outcome potentially causes the loss of more than 200



million lives, dramatically increases the number of climate refugees, and inflicts trillions of dollars in damage to coastal infrastructure.

Intensified Extreme Weather and Disasters

The more the world warms, the more unpredictable the climate system becomes. Warm air holds moisture, so the temperature increases by 1°C, the atmosphere can hold about 7% more moisture, leading to heavier rainfall and intense storms. At the same time, high temperatures increase the likelihood of long-term droughts, heat waves, large wildfires, and strong tropical cyclones. The WMO notes that climate-related disasters increased by 83% between 1980-1999 and 2000-2019, showing how rapidly extreme events are accelerating globally.

Within a single year, more than 18 million hectares of forest were burned by repeated outbreaks of forest fires in Canada; an intense heatwave caused over 61,000 deaths in Europe; and record-breaking floods have submerged about a third of the country and displaced tens of millions in Pakistan. If warming continues, these disasters will become more prevalent and enormous, with droughts and floods destroying infrastructure, disrupting crops, and straining response systems.



Mother Wading Through Flooded Maize Field in South Sudan with Her Child

Economic Disruption and Global Inequality

From 1970 to 2021, meteorological and climate-related disasters caused 11,778 accidents, costing \$4.3 trillion in economic losses worldwide. Droughts are reducing crop yields, floods are destroying infrastructure, and storms are interrupting energy supplies and trade networks. These events eventually led to inflation, unemployment, and instability.

The share of these costs is not evenly distributed. Least Developed Countries (LDCs), which have the smallest carbon footprints, often receive the most destructive influence while they have the least resources to recover. According to the United Nations Development Program (UNDP), 132 million more people could live in poverty due to climate change by 2030 if practical actions are not taken. In contrast, More Developed Countries (MDCs) possess greater adaptability to such disasters, further widening the global inequality gap.

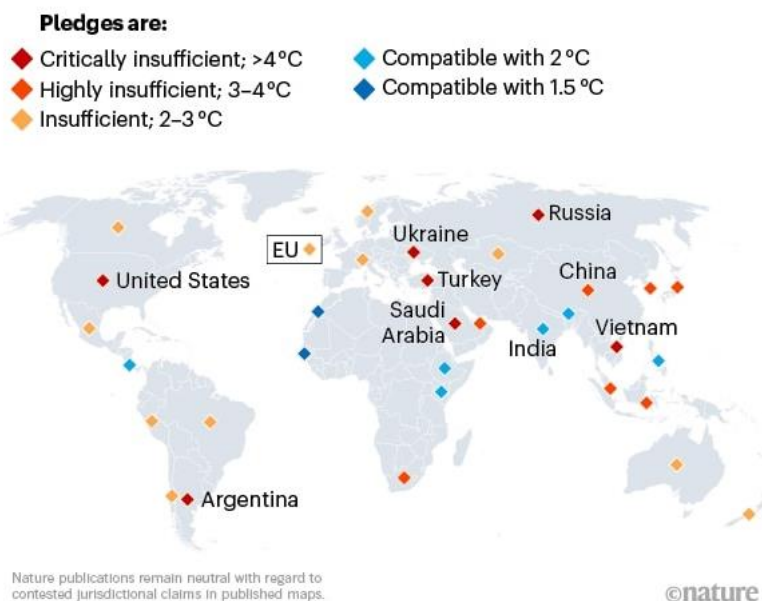
International Actions

The Kyoto Protocol



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The Kyoto Protocol, adopted in 1997, is the first major global effort to address the issue of extensive GHG emissions. The treaty implemented common but differentiated responsibility (CBDR) as its principle to require industrialized nations to reduce their emissions. The first commitment period required developed nations to decrease their emissions by 5% compared to their 1990 levels. The absence of United States participation, combined with developing countries' unrestricted growth, resulted in continued increases in global GHG emissions.



Despite such limitations, the agreement laid the groundwork for the global carbon market, demonstrated the feasibility of cooperation, and raised awareness by introducing mechanisms such as the International Emissions Trading System and the Clean Development Mechanism (CDM).

The Paris Agreement

The Paris Agreement is a legally binding international treaty adopted at the 21st Conference of the Parties (COP21) in 2015. The Paris Agreement works on the principle of universal participation and consequently, all countries must deliver their own Greenhouse Gas Reduction Plans irrespective of developmental status. Moreover, the agreement has a more ambitious target of limiting the increase in average global temperature to under 1.5°C.

The agreement also provides for climate finance, technology transfer, and transparency mechanisms. Developed countries are especially urged to provide \$100 billion in climate finance every year. At the time of entry into force in November 2016, more than 55 countries, which account for more than 55% of global emissions, had already participated, ensuring unprecedented universality. However, according to the first Global Stocktake in 2023, the current reduction commitments alone have confirmed that it will be difficult to achieve the 1.5°C goal without the implementation of stronger strategies.

RE100

Launched in 2014 by Climate Group in partnership with Carbon Disclosure Project (CDP), the RE100 initiative brings together a global coalition of companies aiming to pursue their global business with entirely renewable energy. As of mid-2024, more than 400 influential companies worldwide–



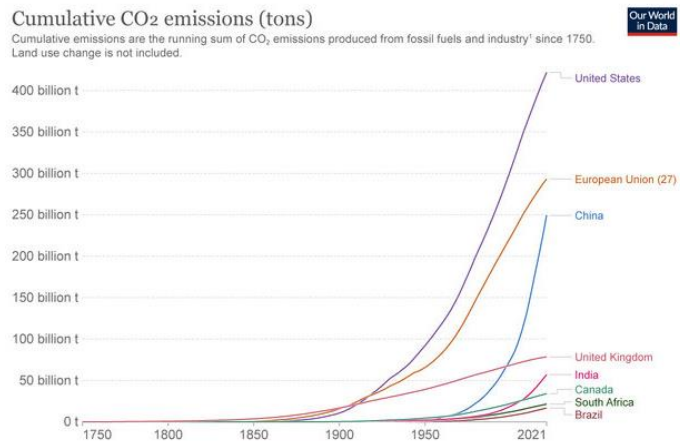
including Apple, IKEA, Nike, and other companies—are members, consuming more than 480TWh of electricity in total.

Participation is voluntary, but most companies firmly target achieving full clean energy by 2040, depending on region and energy market dynamics. According to RE100's 2023 Annual Report, approximately 70% of members now source about 90% of their electricity from renewables, showing measurable progress in decarbonization efforts.

Key Players

United States of America

According to the Global Carbon Project (GCP), the United States has contributed roughly 25% of the world's total CO₂ emissions since 1850. The U.S. joined the Paris Agreement in 2015 but withdrew in 2017, then rejoined in 2021. They enacted the largest climate-related legislation, the Inflation Reduction Act (IRA), which aims to cut GHGs by 40% by 2030 compared to 2005 and achieve net-zero carbon emissions by 2050. However, the recent executive order to begin withdrawal again damaged credibility.



China

China, the largest emitter of GHG, currently accounts for about 35% of global CO₂ emissions. China's total carbon dioxide emissions from energy combustion rose to 12.6 gigatons in 2023, a 4.7% increase from the previous year. While Coal accounted for more than 58 to 60% of China's electricity generation in 2023, China is also the world's largest investor in clean energy. In 2022, China accounted for half of global energy transition investment. As a result, clean energy deployment accelerated rapidly. By mid-2024, renewable accounted for nearly 40% of electricity output, while the fossil fuel development issue remains consistent.

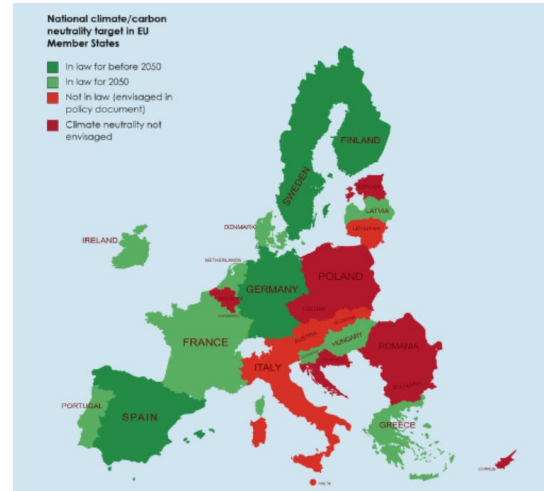
European Union

To reach net zero emissions by 2050, the EU set net GHG emissions for reduction by at least 55% from 1990 levels by 2030, under the European Climate Law. One of the most important EU climates

policies is the Emissions Trading System (ETS), the very first international carbon market launched in 2005. The ETS now covers about 40% of EU emissions, playing an instrumental role in achieving the 2030 milestone. The EU exemplifies the effectiveness of legislative integration.

United Nations Framework Convention on Climate Change

UNFCCC is the international organization that sets the agenda and coordinates international climate change activities. It is the founding charter of the Kyoto Protocol and Paris Agreement which aims to keep the global average temperature which aims to limit the rise of the global average temperature. UNFCCC also conducts a global stocktake every 5 years to track the collective progress made towards the set target of reducing GHG emissions. In addition, UNFCCC provides non-specialized climate assistance and climate finance to support vulnerable regions, like less developed countries LDCs and SIDS.



Carbon Neutrality Target in EU Member States

Possible Solutions

Transition to Renewable Energy

According to the IEA, global investment in renewable energy must more than triple by 2030 to achieve carbon neutrality by 2050. However, according to the International Monetary Fund (IMF), current fossil fuel subsidies reached \$7 trillion in 2022, delaying the transition. Governments should convert a portion of these subsidies toward a clean energy transition. Redirecting part of these funds to renewables could not only cut emissions but also benefit communities by creating jobs, reducing household energy costs, and improving overall air quality.

Economic Instruments

Covering CO₂ emissions with a carbon tax or emissions trading systems (ETS) provides carbon pricing strategies towards CO₂ emissions reduction with a market-based approach. The European ETS and Canada's carbon taxes are representative of efficient emissions pricing that maintains economic growth. According to the Organization for Economic Co-operation and Development (OECD) analysis, the carbon tax reduces emissions per capita by 1.3% in the short term and 4.6% in the long term. However, only 23% of global emissions are currently included in the pricing scheme, with most of the prices being too low to lead to substantial behavioral changes. An alternative solution proposed by IMF economists is the International Carbon Price Bottom (ICPF). This system sets a minimum price per ton of



CO₂– \$75 for high-income countries, \$50 for middle-income countries, and \$25 for low-income countries. This system is projected to reduce global emissions by up to 23% by 2030 with fair cost distribution.

Glossary

Climate Change

Long-term changes in global or regional climate patterns, especially the rise in average global temperatures due to human activities. These phenomena are largely attributed to the accumulation of greenhouse gases in the atmosphere.

Greenhouse Gases

Gases in the atmosphere contribute to the greenhouse effect by trapping heat. The three most prominent greenhouse gases include carbon dioxide, methane, and nitrous oxide. These gases allow sunlight to enter the atmosphere but prevent some of the outgoing heat from escaping into space, causing the heat to be trapped in the atmosphere to altering the temperature.

Renewable Energy

The energy derived from naturally supplemented energy sources such as solar, wind, hydro, and geothermal. Renewable energy sources emit little or no greenhouse gases during operations. Renewable energy sources play a significant role in achieving the carbon neutrality goal and reducing dependence on high-emission energy systems.



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