

**Committee:** United Nations Industrial Development Organization (UNIDO)

**Issue:** Bolstering the usage of carbon neutral means of production

**Student Officer:** Maria-Artemis Pavlidi

**Position:** Deputy President

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## PERSONAL INTRODUCTION

Dear Delegates,

My name is Maria-Artemis (Madianna) Pavlidi, and I am a 10th grade student at Ekpedeutiki Anagennisi. It is a great honor and pleasure to serve as the Deputy Chair of the United Nations Industrial Development Organization during the 6th session of ACGMUN. After attending 10 conferences, I've concluded that MUN is my motivation to step outside my comfort zone and improve as an individual in a broad sense. Having said that, MUN is a huge passion of mine.

UNIDO is a committee brand new to MUN conferences, and it serves as a model of the United Nations Industrial Development Organization, an UN specialized organization that aids states in attaining financial and industrial growth in accordance with the Sustainable Development Goals. Breaking Barriers, the conference theme, is directly connected to all committee subject matters, especially this one, seeing as barriers arise and need to be broken when it relates to achieving a carbon neutral production method, which serves the upper purpose of manufacturing and developing in respect to the environment.

This study guide examines the subject of "Bolstering the usage of carbon neutral means of production," which is a pivotal and intriguing topic to learn about. Throughout this guide, you can find information on all aspects of the topic, including definitions, previous attempts to solve the issue, a timeline, and everything else you will need to prepare for the conference. Having said that, you should conduct extensive research on the subject to guarantee a comprehensive understanding of it. Of course, if you have any questions or need further explanations, please contact me at the email address listed below:

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Kindest Regards,

Maria-Artemis Pavlidi

## TOPIC INTRODUCTION

As climate change remains a pressing issue and the 2030 Agenda time limit approaches faster than ever, a need for a movement for carbon neutrality is gaining traction. Whilst Covid-19 virus outbreak has momentarily lowered carbon emissions, CO<sub>2</sub> levels still remain at historic levels, continuously rising. As evidenced<sup>1</sup>, (Newburger, 2022), the last decade has been the warmest on record, with the Arctic sea ice being by far the lowest it has ever been, and horrific forest fires, floods, periods of drought, and storm surges increasing inexorably. Biosphere is dwindling, desert areas are spreading, and the sea's temperature increases and becomes clogged with plastic pollution. The disease outbreak recovery has provided the world with an unforeseen but critical chance to address climate change and repair our environment. That being said, crucial is to increase the use of carbon-neutral production systems.

Production is the third-largest emitter of carbon dioxide. The manufacturing sector is held responsible for one-fifth of carbon emissions globally.<sup>2</sup> Thus, it is critical for producers to swivel, as both the energy and transportation sectors have started to progressively do. Carbon neutral production takes into account how products are manufactured as well as the way a corporation as a whole operates. Enterprises will need to modify their daily operations, their manufacturing processes, their mindsets as a whole in order to achieve carbon neutral manufacturing.

The United Nations has alerted<sup>3</sup> that unless quick and substantial action is taken to reduce the emission of greenhouse gasses from the intensive industry of manufacturing, which contributes for about 20% of total CO<sub>2</sub> emissions globally, the world will fall short of the 1.5-degree C average temperature raise goal. Economic systems rely on the production system heavily, so they play a critical role in the low-carbon feature. There are routes available for the production industry to shift to a carbon-neutral process while preserving and improving future prosperity. The industry to reach the purpose of reducing the world temperatures should cut its emissions by 7.3 Gt per year<sup>4</sup> by adopting new laws, monitoring emissions, recycling, smart planning, and utilizing new technical tools such as satellite observations. Such solutions must be implemented as soon as possible to ensure a stable climate below

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<sup>1</sup> Newburger, Emma. "The Arctic is Getting Warmer and Stormier, and Ship Traffic is Increasing As Ice Melts." *CNBC*, [www.cnbc.com/2022/12/13/arctic-getting-warmer-stormier-from-climate-change-scientists.html](http://www.cnbc.com/2022/12/13/arctic-getting-warmer-stormier-from-climate-change-scientists.html).

<sup>2</sup> "Reducing the Carbon Footprint of the Manufacturing Industry Through Data Sharing." *World Economic Forum*, 23 Mar. 2022, [www.weforum.org/impact/carbon-footprint-manufacturing-industry/](http://www.weforum.org/impact/carbon-footprint-manufacturing-industry/).

<sup>3</sup> "COP27: UN Report Shows Pathways to Carbon-neutrality in "energy Intensive" Steel, Chemicals and Cement Industries." *UNECE*, [unece.org/media/press/372890](http://unece.org/media/press/372890).

<sup>4</sup> "The Six-sector Solution to the Climate Crisis." *UN Environment*, 7 Dec. 2020, [www.unep.org/interactive/six-sector-solution-climate-change/](http://www.unep.org/interactive/six-sector-solution-climate-change/).

1.5°C, because global warming continues, and day-to-day it has a more detrimental impact on the planet.

## DEFINITION OF KEY TERMS

### Carbon Capture, Usage, and Storage (CCUS)<sup>5</sup>

Carbon Capture, Usage, and Storage (CCUS) is a technique capable of capturing and effectively using or storing high quantities of CO<sub>2</sub> released by industrial activity.

### Carbon dioxide emissions<sup>6</sup>

Carbon dioxide emissions are the releases of CO<sub>2</sub> into the atmosphere generated by human activities, when fossil fuels are burned in automobiles, structures, and industrial operations, which contribute to climate change.

### Carbon footprint<sup>7</sup>

The amount of carbon dioxide generated by a person or other entity such as a building, organization, or state is referred to as the carbon footprint. It includes direct emissions from the burning of fossil fuels in manufacturing, heating, and transportation, along with emissions from the generation of power-to-power products and services.

### Carbon neutral<sup>8</sup>

Industries, procedures, and goods become carbon neutral once their carbon dioxide emissions are calculated and compensated for through carbon offsetting initiatives.

### Carbon offsetting

Carbon offsetting is the technique of eliminating greenhouse gasses from the atmosphere in proportion to other activities' emissions.

### Carbon sequestration<sup>9</sup>

The method of absorbing and storing atmospheric carbon dioxide is known as carbon sequestration. It is one way of decreasing carbon dioxide levels in the atmosphere with the purpose of slowing global climate change.

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<sup>5</sup> Chevron Policy, Government, Public Affairs. "What is Carbon Capture, Utilization, & Storage?" *Chevron.com*, 18 May 2022, [www.chevron.com/newsroom/2022/q2/what-is-carbon-capture-utilization-and-storage](http://www.chevron.com/newsroom/2022/q2/what-is-carbon-capture-utilization-and-storage).

<sup>6</sup> "DataBank." *DataBank | The World Bank*, [databank.worldbank.org/metadataglossary/world-development-indicators/series/EN.ATM.CO2E.PC](http://databank.worldbank.org/metadataglossary/world-development-indicators/series/EN.ATM.CO2E.PC).

<sup>7</sup> "Carbon Footprint." *VEDANTU*, 29 Nov. 2022, [www.vedantu.com/biology/carbon-footprint](http://www.vedantu.com/biology/carbon-footprint).

<sup>8</sup> "Carbon Neutral." *ClimatePartner*, [www.climatepartner.com/en/carbon-neutral](http://www.climatepartner.com/en/carbon-neutral).

<sup>9</sup> "What is Carbon Sequestration? | U.S. Geological Survey." *USGS.gov | Science for a Changing World*, [www.usgs.gov/faqs/what-carbon-sequestration](http://www.usgs.gov/faqs/what-carbon-sequestration).

### Conference of the Parties (COP)

The UNFCCC Convention's top decision-making body is the COP, which is a conference of countries-signatories.

### Logarithmic mean division index method<sup>10</sup>

The LMDI decomposition method is used to decompose carbon emissions. This decomposition approach is used to assess and categorize shifts in production indices such as energy usage, CO<sub>2</sub>-emissions, labor supply, and additional value.

### Millennium Development Goals <sup>11</sup>

The Millennium Development Goals (MDGs) are eight goals for 2015 that include quantifiable targets and explicit dates for enhancing the lives of the world 's impoverished citizens.

### Nitrogen Fertilizer

Nitrogen fertilizer is one of the most prevalent types of fertilizer made from nitrogen (N) chemical combinations.

### Sustainable Development Goals (SDGs)<sup>12</sup>

The Sustainable Development Goals are a set of 17 interconnected goals for the year of 2030 intended to act as a common guide by all countries – poor, rich, and middle-income – to promote prosperity and protection for both individuals and the planet, now and in the future.

## BACKGROUND INFORMATION

### Historical Background

As part of the ecological footprint, the notion of carbon output was established as one indicator of human influence on the Earth. As researchers were exploring what caused the Ice Age in the 1800s, they discovered that quantities of carbon dioxide present in the atmosphere could influence the Earth's temperature - this is when the name "greenhouse effect" was coined. Between 1850 and 1960, the world's emissions increased steadily, owing mostly to industrialization and population expansion, notably in the United States. This progress was only interrupted by historic events such as the Great Depression in the 1930s and the end of the Second World War in 1945.

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<sup>10</sup>Ana Sayfa » DergiPark, [dergipark.org.tr/tr/download/article-file/996678](http://dergipark.org.tr/tr/download/article-file/996678).

<sup>11</sup>"United Nations Millennium Development Goals." *Welcome to the United Nations*, [www.un.org/millenniumgoals/](http://www.un.org/millenniumgoals/).

<sup>12</sup>"Sustainable Development Goals | United Nations Development Programme." *UNDP*, [www.undp.org/sustainable-development-goals](http://www.undp.org/sustainable-development-goals).

Swedish scientists Arvid Högbom and Svante Arrhenius became the first to quantify the amount of CO<sub>2</sub> emitted by coal combustion and to warn about the warming effect of increased emissions around the turn of the twentieth century. Nevertheless, from the 1950s, the most industrialized countries' emissions began to rise as their economies expanded. Only in the 1990s did people begin to pay heed to what experts were stating about climate change and to petition their governments for action. The United Nations, seeing the climate change warnings by experts, formed the Intergovernmental Panel on Climate Change (IPCC) in 1989 to give a scientific understanding of climate change and its political and economic effects, and the Rio Summit in 1992 provided a prominent illustration of this transition. Worldwide, government authorities-initiated talks to try to halt the outflow of greenhouse gas emissions in order to avoid the most terrible forecasted results.

The Kyoto Protocol, the first worldwide accord to limit greenhouse gas emissions, was enacted in 1997. In March 2001, the United States announced that they would not adopt the Kyoto Protocol, citing worries that the agreement would harm the American economy. The Paris Climate Agreement, another milestone treaty on climate change, was signed later in 2015. In that treaty, 197 nations promised to set their own greenhouse gas reduction targets and to report on their progress. The United States once again announced its withdrawal from the treaty in June 2017, while the Earth's surface temperatures in 2016 were reported <sup>13</sup>to be the hottest since historical record-keeping began in 1880. In October 2018, the United Nations' Intergovernmental Panel on Climate Change published a report concluding that "rapid, far-reaching" changes are required to limit global warming to 1.5 degrees Celsius and avoid the most grave, irreversible effects for the world. After new climate change evidence became available, the United States rejoined the Paris accord on February 19, 2021. By 2020, the world average atmospheric CO<sub>2</sub> concentration had risen to 415 ppm, representing a significant increase from the preindustrial level of 285 ppm circa 1850. According to figures released from researchers from the University of East Anglia<sup>14</sup>, the global COVID-19 lockdowns reduced fossil CO<sub>2</sub> emissions by an approximate 2.4 billion tons in 2020, a record drop, as it was the highest annual drop in international carbon dioxide emissions ever since the Second World War. However, following a drop in April 2020, global emissions increased significantly and exceeded 2019 levels by December 2020. Carbon dioxide levels in the atmosphere reached 149% of pre-industrial levels in 2021, owing mostly to emissions from fossil fuel burning and cement manufacture. Human-caused greenhouse gas

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<sup>13</sup> History.com Editors. "Climate Change History." *HISTORY*, 6 Oct. 2017, [www.history.com/topics/natural-disasters-and-environment/history-of-climate-change](http://www.history.com/topics/natural-disasters-and-environment/history-of-climate-change).

<sup>14</sup>"COVID Lockdown Causes Record Drop in Carbon Emissions for 2020." *Stanford Earth*, 10 Dec. 2020, [earth.stanford.edu/news/covid-lockdown-causes-record-drop-carbon-emissions-2020](http://earth.stanford.edu/news/covid-lockdown-causes-record-drop-carbon-emissions-2020).

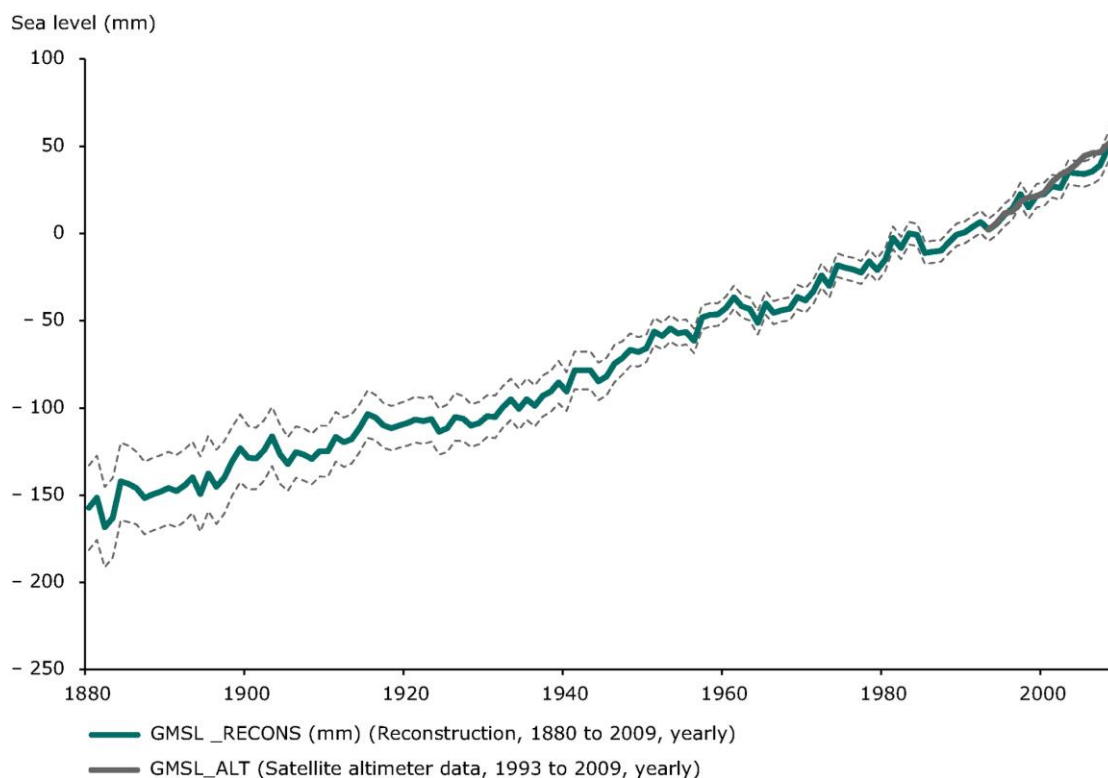
emissions have recovered after a brief decrease in 2020 due to the COVID-19 pandemic.

The UN COP26 climate negotiations occurring in Scotland in 2021 conclude with a consensus that states would "revisit and strengthen" their efforts to reduce global warming emissions before the 2022 summit. According to the UN, however, only 24 of 193 nations have submitted better carbon reduction targets since then, while 74 countries formally adopted a net zero future at COP26. NASA scientists and foreign experts recently concluded that carbon dioxide emissions in 2022 were the greatest on record. Earth's temperature in 2022 was 0.89 degrees Celsius higher than the average, according to experts at NASA's Goddard Institute for Space Studies (GISS) in New York. For 2022, COP27 was held in Sharm el-Sheikh, Egypt, in November 2022, and the discussions culminated with a historic decision to develop and implement a loss and damage fund, particularly for nations most susceptible to the climate issue.

### **Consequences of the carbon dioxide emissions**

Greenhouse gas emissions have far-reaching environmental and health consequences. Generally, they contribute to creating respiratory problems due to smog and air pollution, and they affect global warming by trapping heat. Other implications of climate change produced by greenhouse gasses include weather extremes, food supply shortages, and increasing wildfires. More precisely, CO<sub>2</sub> emissions cause global ice melting, particularly in the Earth's poles. Mountain glaciers, ice sheets covering West Antarctica and Greenland, and Arctic sea ice are all examples of this. A large portion of the melting ice leads to sea-level rise (3.2 millimeters a year). Rising temperatures are having an impact also on wildlife and their habitats. Melting ice has presented challenges to species such as penguins, polar bears, and others, while also forcing many species to relocate. Some butterflies, foxes, and alpine plants have moved further north or to higher, colder elevations.

At the same time, precipitation (rain and snowfall) has increased globally. Many parts of the world are suffering extreme drought, raising the danger of wildfires, agricultural losses. Hurricanes as well as other storms are intensifying, while floods have grown more prevalent. Because glaciers retain almost three-quarters of the world's freshwater, there are less drinking water shortages available. At the same, diseases are spreading more readily as a result of glacial melt, which have buried microorganisms, and due to all of the chemicals utilized in every facet of our life.



**Figure 1<sup>15</sup>:** Graph regarding the sea-level rise for the period of 1880- 2000

### Carbon Neutrality

Carbon neutrality emerged as a worldwide policy target in the context of international global warming accords. The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro with the goal of balancing greenhouse gas concentrations in the air at reasonable levels and preventing detrimental effects on the environment. The Convention went into effect in 1994, ever since, signatory states have met at regular intervals at Conferences of the Parties (COP) to consider future climate-protection efforts. The Kyoto Protocol, the first instrument with legally enforceable requirements for CO<sub>2</sub> limitations and reductions, was approved at the 1997 COP in Kyoto, Japan.

In accordance with the suggestions of the Kyoto Protocol,<sup>16</sup> the first climate neutral certification was established and trademarked in 1999 by the Climate Neutral Network. Following a succession of changes in international accords and promises, carbon neutrality emerged as a crucial aim of global climate policy. In 2014, UNEP published a letter suggesting that global carbon neutrality should be achieved by the

<sup>15</sup> "Global and European Sea Level Rise." European Environment Agency's — European Environment Agency, 16 Dec. 2022, [www.eea.europa.eu/ims/global-and-european-sea-level-rise](http://www.eea.europa.eu/ims/global-and-european-sea-level-rise).

<sup>16</sup> Federal Office for the Environment FOEN. "International Climate Policy: the Kyoto Protocol." [www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/climate--international-affairs/international-climate-policy--the-kyoto-protocol.html](http://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/climate--international-affairs/international-climate-policy--the-kyoto-protocol.html).



mid- to late-century in order to limit global temperature rise to 2 °C and avoid the worst effects of climate change. The same year, the UN Climate Summit brought together 100 Heads of States, as well as government ministers and executives from international institutions, companies, financial services, civil society, and local communities, to galvanize the political support and dynamism needed to reach an international agreement on global warming and mobilize initiative on the ground across all sectors.

Several nations signed the 'Paris Agreement' on reducing greenhouse gas emissions. The signatory parties promised in the agreement to keeping global warming to less than 2 degrees Celsius above pre-industrial levels. A worldwide climate accord with enforceable obligations was agreed for the first time in 20 years of climate-related discussions, requiring widespread and fundamental changes from governments, corporations, and individuals.

### **Benefits of becoming carbon neutral**

As a significant aspect of the solution to global warming, becoming carbon neutral is part of our moral virtue to cut emissions. Carbon neutrality provides other benefits such as decreased air pollution and enhanced building resiliency, not to mention lower energy expenditures. According to CDP data<sup>17</sup>, organizations that rigorously monitor and regulate their emissions may generate an 18% greater investment return than enterprises that do not. The shift to a carbon-neutral has the potential to create millions of additional employment globally, many in disadvantaged regions and emerging economies, as new demands must be met for advancements to occur. Alongside, companies with sustainable practices expand 5.6 times faster than non-sustainable competitors, while also significantly lowering expenses.

Adopting carbon-neutral techniques aids in mitigating growing operational costs such as raw material prices and the real cost of carbon. For enterprises in the manufacturing sector, becoming carbon-neutral demonstrates their commitment to cutting emissions and their desire to mitigate for residual effects, while also improving their sustainability efforts and aligning themselves with the UN SDGs, lowering the risks linked with climate change. According to a NIEHS-funded<sup>18</sup> study, cutting global greenhouse gas emissions to delay climate change might save millions of lives due to air pollution over the next century. Because air pollution and greenhouse gasses are frequently emitted from the same sources, reducing greenhouse gas emissions to halt

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<sup>17</sup> ---. "Five Reasons To Become Carbon Neutral." *Positive Planet*, 12 Aug. 2022, [positiveplanet.uk/five-reasons-to-become-carbon-neutral/](https://positiveplanet.uk/five-reasons-to-become-carbon-neutral/).

<sup>18</sup> "Reducing Greenhouse Gas Emissions Can Improve Air Quality and Save Lives." *Global Environmental Health Newsletter*, [www.niehs.nih.gov/research/programs/geh/geh\\_newsletter/2013/12/spotlight/reducing\\_greenhouse\\_gas\\_emissions\\_can\\_improve\\_air\\_quality\\_and\\_save\\_lives\\_.cfm](https://www.niehs.nih.gov/research/programs/geh/geh_newsletter/2013/12/spotlight/reducing_greenhouse_gas_emissions_can_improve_air_quality_and_save_lives_.cfm).



climate change also decreases air pollutants. Reduced co-emitted air pollutants enhance air quality and human health. Achieving carbon-neutrality decreases the pace of rising temperature and sea-level, ice melting, and ocean acidification, while also reducing the frequency and intensity of extreme weather events, improving water quality, preserving biodiversity, and promoting a healthy food supply. Animals and plants, which are key players in the production sector and in the environment as a whole, can survive, compete, and recreate in standard climate conditions to which they are biologically and physiologically adapted, thus carbon-neutrality can slow the impacts of climate change, minimizing the adaptation pressure placed on plants and animals. Carbon-neutrality decreases the usage of pesticides and chemicals, which can have developmental consequences, namely illnesses and food insecurity.

Lastly, carbon-neutrality can lessen extreme weather occurrences that often cause displacement and pressure; therefore it can help minimize relocation due to environmental causes and enhance mental health in the long run. Carbon neutrality may be seen as an industrial revolution that would represent a significant milestone in human progress. Carbon neutrality could be the fifth industrial revolution, following the previous four. The past industrial revolutions increased our living conditions at the price of numerous natural resources, many of which are not renewable. The usage of fossil fuels, which causes not just global warming but also environmental deterioration, lies at the heart of the challenges in human-nature interaction. This industrial revolution that can come with the carbon neutrality initiative has the potential to address these fundamental concerns, and hence carbon neutrality would be the first step toward a sustainable future in which humans and environment may dwell in harmony.

### **Difficulties of becoming carbon neutral**

Despite its seeming simplicity, the goal of carbon neutrality faces several obstacles, both conceptually and practically, on key aspects such as the extent of the emissions at issue or the means for removing CO<sub>2</sub> from the environment. Carbon neutrality is difficult to attain since practically every step of the manufacturing process emits greenhouse gasses. There are also substantial economic barriers since the cost of implementing all of the new technology required to achieve carbon neutrality is substantially higher than the cost of carbon taxes, while at the same time altering a company's equipment are all costly processes.

At the same time, there are legislative challenges since certain agreements prohibit CO<sub>2</sub> movement from one nation to another, as well as societal concerns about the sustainability of burying technology. Many nations have insufficient statistics and incomplete sectoral carbon information, which makes developing carbon-neutral policy difficult due to a lack of technical research and innovation. As for the technological advancements, particularly in carbon-neutral technologies, there

are challenges to upgrading businesses and, by extension, to adjusting them to a new economic structure. Carbon neutrality policies are difficult to integrate into national social and economic plans as they accelerate the optimisation and green upgrading of industrial structures and energy structures, as well as the encouragement of the creation of new low-carbon technologies. All of the above demand a change in the overall mentality, as well as a substantial amount of economic sources and international collaboration, both of which are challenging to achieve.

## MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED

### People's Republic of China

China is the greatest emitter of carbon dioxide as it emits more greenhouse gasses than the rest of the industrialized world combined<sup>19</sup>, due to its coal-based manufacturing and production industries, which contributes significantly to climate change in China. In terms of cumulative CO<sub>2</sub> emissions from 1751 to 2017, China is responsible for 13% of world emissions. China has been severely impacted by the consequences of global warming on all sectors, particularly agriculture, forestry, and water resources, although it has made significant changes in recent years to enhance its carbon neutrality programs and is taking steps to cut greenhouse gas emissions by 2030. They anticipate achieving carbon neutrality by 2060 by enacting tougher regulations and procedures in this regard. The country is still struggling to wean itself off coal, as it is extremely difficult to reconcile economic and growth interests with attaining climate goals, particularly in an economy where coal is the primary energy source.

### United States of America

As the second largest emitter of greenhouse gasses, the USA plays a significant role on climate change and carbon emissions. The United States has released more than 422 billion metric tons<sup>20</sup> of greenhouse gasses in total, more than any other country on the planet. Because of these circumstances, the country has conducted several worldwide climate research in order to cut greenhouse gas emissions as much as feasible. The United States of America's climate change policy has a significant impact on global climate change and its mitigation. Despite being one of the countries with the highest levels of greenhouse gas emissions in the world, the USA is attempting to improve the issue. Its administration's environmental strategy provides

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<sup>19</sup>"Report: China Emissions Exceed All Developed Nations Combined." *BBC News*, 7 May 2021, [www.bbc.com/news/world-asia-57018837](http://www.bbc.com/news/world-asia-57018837).

<sup>20</sup> "Cumulative CO<sub>2</sub> Emissions Globally by Country 1750-2021." *Statista*, 22 Nov. 2022, [www.statista.com/statistics/1007454/cumulative-co2-emissions-worldwide-by-country/](http://www.statista.com/statistics/1007454/cumulative-co2-emissions-worldwide-by-country/).

an ambitious plan for reducing carbon emissions through the use of clean renewable energy. In 2020, the United States generated 5.2 billion metric tons, with industrial production accounting for 24% of these CO<sub>2</sub> metric tons, thus the United States is aiming for carbon neutrality by 2050.

### India

In regard to climate change, India ranks third<sup>21</sup> among the nations most impacted by the phenomenon in 2015. Every year, India emits around 3 gigatons (Gt) of carbon dioxide equivalent greenhouse gas. All of this leads India to substantially warm up. The country has vowed to reduce its emissions by 2070, falling short of a key aim of the COP26 summit, which was for nations to commit to meeting that target by 2050. However, the nation confronts other hurdles, including a significant reliance on coal and a lack of investment.

### Gabon

Gabon emits extremely low percentages of CO<sub>2</sub> while absorbing a large amount. Gabon has been certified as an environmental conservation model by the United Nations, and it is the first African country to receive results-based incentives for decreased emissions from deforestation and forest degradation. The government has proved that emissions reductions in the Congo Basin Forest are possible with a strong vision, devotion, and determination. Every year, the country's forests absorb 140 million tons of CO<sub>2</sub>, the equivalent of eliminating 30 million automobiles from the road globally.

### Pakistan

Pakistan is among the most vulnerable countries to climate change. According to a Germanwatch study, Pakistan is the world's sixth most fragile country in terms of climate change. According to the Global Climate Risk Index, Pakistan is responsible for less than 1% of the world's greenhouse gas emissions<sup>22</sup>, but it is the eighth most exposed country to the climate problem. It is paying a high price, not just in terms of lives but also in terms of wrecked schools, houses, and bridges. Pakistan has vowed to reduce its greenhouse gas (GHG) emissions by 2030 following a carbon-neutral initiative.

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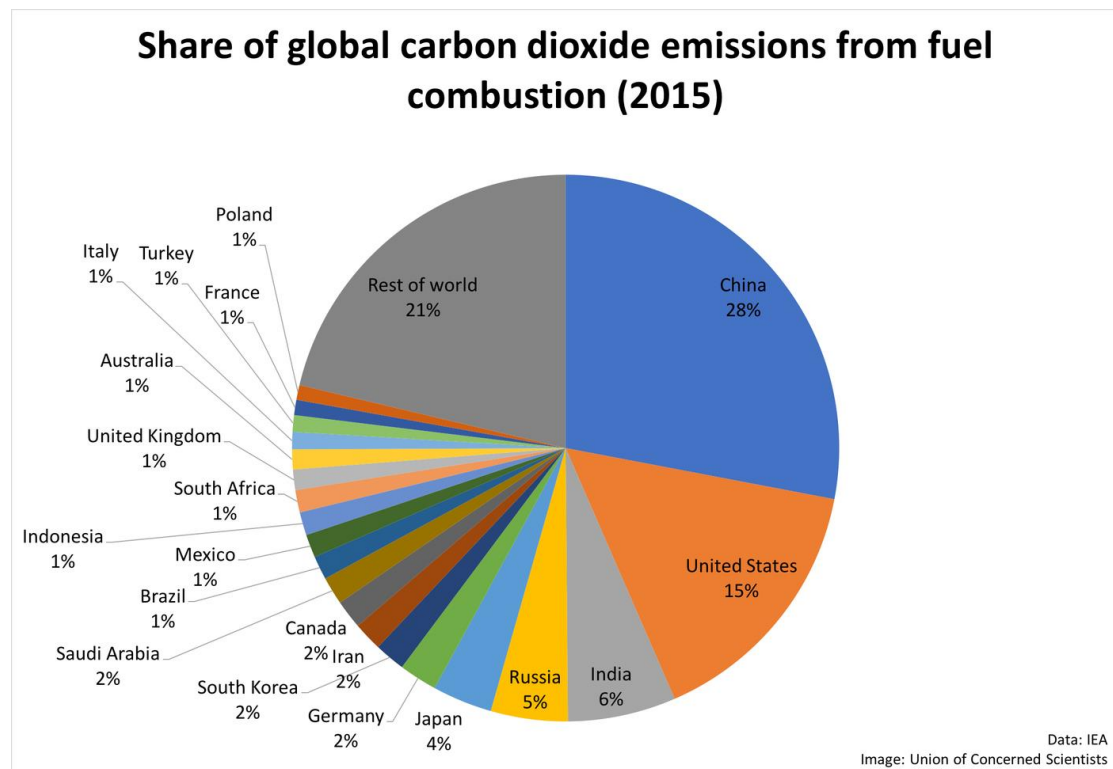
<sup>21</sup> "The 5 Countries That Produce the Most Carbon Dioxide (CO<sub>2</sub>)." *Investopedia*, 29 Sept. 2015, [www.investopedia.com/articles/investing/092915/5-countries-produce-most-carbon-dioxide-co2.asp](http://www.investopedia.com/articles/investing/092915/5-countries-produce-most-carbon-dioxide-co2.asp).  
<sup>22</sup>---. "Pakistan Emits Less Than 1% of the World's Planet-warming Gases. It's Now Drowning." *CNN*, 31 Aug. 2022, [www.cnn.com/2022/08/30/asia/pakistan-climate-crisis-floods-justice-intl/index.html](http://www.cnn.com/2022/08/30/asia/pakistan-climate-crisis-floods-justice-intl/index.html).

## Bhutan

Bhutan has made history by being the first country to achieve carbon neutrality. The nation has rapidly approached carbon neutrality, owing mostly to its huge forests, which cover 70% of the area, and river resources, which can generate large quantities of renewable hydroelectricity. Bhutan can absorb more carbon dioxide than it emits. The country emits just 2.2 million tons of CO<sub>2</sub>,<sup>23</sup> yet it can sequester nearly three times that much, according to 2017 figures.

## Afghanistan

Afghanistan ranks among the world's lowest emitting countries. Afghanistan released 0.3 tons of CO<sub>2</sub> per capita in 2018, with its energy being heavily reliant on hydropower. Despite contributing little to total global emissions, Afghanistan is one of the world's most susceptible countries to climate change and one of the least prepared to deal with the repercussions. Temperatures in Afghanistan climbed by 1.8oC between 1950 and 2010, and the country's climate problem became intractable.



**Figure 2:** The graph illustrates the worlds' highest CO<sub>2</sub> emitters based on 2015 figures.

<sup>23</sup>Nguyen, Lei. "Bhutan: The First Carbon Negative Country In The World." *Earth.Org*, 4 Aug. 2022, [earth.org/bhutan-carbon-negative-country/](https://earth.org/bhutan-carbon-negative-country/).

## TIMELINE OF EVENTS

Date	Description of events
1750-1850	Industrial Revolution
1960	Population increases mainly in the United States
5-16 June 1972	United Nations Conference on the Human Environment
1979	World Climate Conference
16 September 1987	Adoption of the Montreal Protocol
1989	Creation of the Intergovernmental Panel on Climate Change
9 May 1992	Adoption of the United Nations Framework Convention on Climate Change
11 December 1997	Adoption of the Kyoto Protocol
March 2001	USAs' withdrawal from the Kyoto Protocol
30 November – 12 December 2015	Adoption of the Paris Agreement
June 2017	USAs' withdrawal from the Paris Agreement
28 November 2019	EU declaration climate change as an emergency
12 December 2019	EU decision to become climate neutral by 2050
February 19, 2021	United States rejoining the Paris accord on
31 October- 12 November 2021	COP26 takes place in Scotland
6-20 November 2022	COP27 takes place in Sharm el-Sheikh

## RELEVANT UN RESOLUTIONS, TREATIES AND EVENTS

### Montreal Protocol

The Montreal Protocol is an international pact aiming to safeguard the stratospheric ozone layer by phasing out the manufacture of various ozone-depleting chemicals. It was negotiated on September 16, 1987, and went into effect on January 1, 1989. The Montreal Protocol has shown to be creative and effective, and it is the first pact to be ratified by all nations in the world. Taking advantage of this global participation, the Montreal Protocol has stimulated international investment in

alternative technologies and put the ozone layer, which was in jeopardy, on a road to repair.

### **Paris Agreement**

The Paris Agreement is a 2015 international climate change deal that includes climate change mitigation, adaptation, and financing. It aims to assist nations in adapting to the consequences of climate change and to raise sufficient funds. The Paris Agreement's long-term temperature objective is to maintain global temperatures far below 2 degrees Celsius over pre-industrial levels, ideally 1.5 degrees Celsius, acknowledging that doing so would significantly decrease the consequences of climate change. Emissions should be decreased as quickly as practicable, with a goal of reaching net-zero by the middle of the 21st century. To keep global warming at 1.5 degrees Celsius, emissions must be reduced by around 50% by 2030. Each country is required by the agreement to identify, prepare for, and report on its contributions on a regular basis. The United States left the pact in 2020 but returned in 2021.

### **United Nations Framework Convention on Climate Change (UNFCCC)**

The UNFCCC went into effect on March 21, 1994, and it now has nearly universal participation. The UNFCCC aims to prevent risky human interference with the climate system; it acknowledges the problem, places a burden on developed countries to lead the way, allocates additional monies to climate change efforts in developing nations, and monitors the issue and what's being performed about it. It also lays the groundwork for maintaining a balancing act and begins official discussion of climate change adaptation.

### **Conference of the Parties (COP)**

The UNFCCC Convention's top decision-making body is the COP. All Parties to the Convention are represented at the COP, where they evaluate the implementation of the Convention and any other legal instruments adopted by the COP and make decisions essential to endorse the efficient implementation of the Convention, including institutional and managerial provisions. The evaluation of national communications and emission inventories presented by Parties is a critical duty for the COP. The COP evaluates the consequences of the actions adopted by Parties and the progress made toward the ultimate goal of the Convention based on this information.

### **Climate Neutral Now Initiative**

The Climate Neutral Now Initiative is one of a number of initiatives created by the UNFCCC secretariat to enhance climate action by including non-Party

stakeholders, businesses, and organizations. It was established in 2015 with the mission of encouraging the voluntary adoption of carbon market mechanisms authorized by the Convention. The Climate Neutral Immediately Initiative promotes and encourages organizations and other interested stakeholders to act now in order to realize the Paris Agreement's goal of achieving climate neutrality by 2050. It is a tool for encouraging and recognizing extra volunteer climate action.

### **SDGs and Millennium Goals**

The sustainable development goals are all interconnected with the goal of decreasing carbon emissions and achieving a carbon-neutral industry. The SDG 13 in particular emphasizes the need to take immediate action to halt climate change, which affects every country on the planet. Carbon neutrality is relevant to this objective since it is critical to halting climate change, in addition it pertains to the SDG 12 about guaranteeing sustainable consumption practices.

The SDGs 12 and 13 both are critical actors in the topic, as they are serving the goal of achieving a sustainable, carbon-neutral manufacturing and safeguarding the lives of present and future generations. The millennium goals are also linked to the goal of reaching carbon neutrality in the industry sector, particularly goal number 7, which is about maintaining environmental sustainability. More specifically, reaching carbon neutrality implies attaining in long-term environmental sustainability, as carbon dioxide is a primeval cause of environmental degradation. Integrating carbon-neutral manufacturing into every nation's policies and programs will ultimately fulfill both the SDG and the millennium objectives.

### **PREVIOUS ATTEMPTS TO SOLVE THE ISSUE**

#### **European Green Deal**

The European Green Deal is a combination of policy efforts aimed at putting the EU on a sustainable transition path, with the ultimate objective of obtaining carbon neutrality by 2050. It promotes the EU's development into a just and affluent society with a modern and competitive economy. It aims at making the EU's climate, energy, transportation, and tax policies capable of decreasing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.

#### **European Union Emissions Trading System**

The EU has established an emissions trading mechanism to minimize emissions from energy-intensive businesses. The EU ETS is a marketplace for carbon permits that determines the quantity of emissions that power stations, industrial facilities, and airlines can emit into the environment. Permit limits are gradually decreased in order to decrease emissions from involved companies. The EU ETS is a pillar of the EU's



global warming strategy and its primary weapon for lowering greenhouse gas emissions in a cost-effective manner. It was the world's first significant carbon market and continues to be the largest.

### **The Just Transition Mechanism**

The Just Transition Mechanism of the European Union intends to tackle the socioeconomic effect of the shift to a low-carbon economy as well as ecological legacy issues in order to harness new sustainable economic growth prospects for the most impacted locations and people. This mechanism assists companies and sectors participating in comprising carbon-intensive industries in transitioning to low-carbon technologies and economic diversity based on climate-resilient investments and jobs, as well as in creating attractive circumstances for public and private investors.

## **POSSIBLE SOLUTIONS**

### **CO2 emissions tracking**

To support carbon neutrality, it is critical to be able to track carbon emissions and have a clear understanding of the parts of the production process where they may be reduced. It is critical to map carbon emissions using tools such as input-output models, create spatial systems, and develop the logarithmic mean divisia index (LMDI) method. In order to develop more efficient and precise policies, decision-makers can benefit greatly from mapping direct and indirect carbon emissions by the LMDI methods, as well as systematic survey analysis. The LMDI decomposition method may be utilized in manufacturing to break down the relevant variables of greenhouse gas emissions. It is possible to categorize affecting aspects including production scale, industrial structure, resource consumption, resource mix, and electricity emission factor.

### **Climate change legislation and new guidelines**

Clear guidelines are required to facilitate the commercialization of neutral carbon alternatives as well as the decarbonization of energy-intensive businesses. Legislation must be updated to incorporate new restrictions that apply to all energy-intensive enterprises, such as pricing carbon emissions from companies. It is critical to establish a specialized regulation for the spot carbon market. Carbon finance legislation should be strengthened. Effective financial market policies can aid in the construction of carbon-neutral infrastructure.

A quick implementation of the climate change law is also critical. Laws and regulations should be updated to reflect the idea of low-carbon development after specifying the legal objectives, fundamental principles, management bodies,

mitigation and adaptation system measures, and accountability systems, while at the same time it is important to increase citizen, and most importantly environmental specialists, involvement in policy formulation and execution. It is critical to formulate a legislation that will apply carbon fees to imported commodities from less climate-conscious countries. This would deter corporations from shifting manufacturing away from host nations and toward countries with less rigorous greenhouse gas emission regulations.

### **Planning within the companies**

Construct a Greenhouse gas neutralization strategy to reduce internal emissions, taking into account the primary sources of Greenhouse gas emissions each company has as well as the anticipated cost-effectiveness of various emission reduction strategies. These plans should be evaluated to monitor progress against planned measures and the feasibility of additional cuts, taking into consideration the new available technology, and the governmental supporting policies and incentives, and the general business environment. Where relevant, responsibilities for supervising the creation and execution of emission reduction programs should be assigned.

### **Recycle regulations**

Reduce, reuse, recycle, and recover regulations mandated by all governments all assist to decrease the amount of carbon emissions from enterprises by lowering energy usage throughout the entire supply system. The fewer new items that are developed from raw, virgin minerals, the less extraction and mining takes place. Especially in LEDC's where mining occurs mostly, such an initiative would be really helpful to lower extractions that have a huge environmental impact within their region. Recycled paper, cardboard, and branded, reusable bags can all assist to reduce the environmental impact.

### **Agricultural food production systems**

Cropland fertilizers and water usage optimisation may significantly cut Greenhouse gas emissions in crop production systems. To improve N usage efficiency, new synthetic N fertilizer types, including as slow- and control-release N fertilizers, as well as N fertilizers containing urease and nitrification inhibitors, must be developed. Improved farming methods, fertilization, and irrigation practices, as well as the use of high-tech electronic agriculture technologies such as multi-sensor aerial drones to enable farmers to manage crop production, land, fertilizer application, and water management more efficiently and precisely, can decrease emissions.

### **Carbon-neutral initiatives and financial support**

Acquiring funding and promoting public-private collaborations are critical (PPP). Early funding of carbon-neutral initiatives is required to scale favorable circumstances and enable for quicker commercialization of carbon-neutral solutions. Investments in energy-intensive sectors must be aimed toward modernization and decarbonization. There is a need for multi-stakeholder programs that are inclusive and bolstered by public-private partnerships. At the same time, it is critical to accept concepts such as the circular carbon economy and industrial clusters, which are focused on carbon reduction, capture, reuse, and removal. Government investments and private-sector efforts may produce long-term jobs while also providing a low-carbon boost to economies.

### **CO2 utilization**

CO2 chemical utilization refers to methods that transform CO2 into other high-value compounds under specified temperature, pressure, and catalyst conditions. CO2 chemical utilization may directly realize CO2 conversion and usage and has a direct reduction in emissions effect. Meanwhile, this sort of technology may be used to create a novel chemical synthesis method that can replace the need of fossil fuels or raw materials. Diverse techniques, such as thermochemical catalysis, can be developed to enable CO2 conversion, with significant breakthroughs achieved in recent years.

### **Satellite observation of CO2 concentrations**

In the field of satellite observation, support for carbon neutralization contains quick monitoring of greenhouse Gas concentrations, ground land cover change, and spatial analysis of global natural Carbon sinks, which plays a crucial supplementary role in determining when to reach the peak of Carbon emissions and the possibilities of a natural Carbon sink. Techniques for measuring greenhouse gasses must be developed not only to include ground-based surveillance, but mostly satellite distant sensing. To provide reliable greenhouse gas concentration data, a worldwide system of greenhouse gas observation stations should be developed early on.

## **BIBLIOGRAPHY**

UNITED NATIONS. "Climate Neutral Now | UNFCCC." [unfccc.int/climate-neutral-now](https://unfccc.int/climate-neutral-now).

AFRICAN UNION. *African Union*, [au.int/sites/default/files/documents/40790-doc-AU\\_Green\\_Recovery\\_Action\\_Plan\\_ENGLISH1.pdf](https://au.int/sites/default/files/documents/40790-doc-AU_Green_Recovery_Action_Plan_ENGLISH1.pdf).

European Parliament. "What is Carbon Neutrality and How Can It Be Achieved by 2050? | News | European Parliament." 12 Sept. 2020,

[www.europarl.europa.eu/news/en/headlines/society/20190926STO62270/what-is-carbon-neutrality-and-how-can-it-be-achieved-by-2050](http://www.europarl.europa.eu/news/en/headlines/society/20190926STO62270/what-is-carbon-neutrality-and-how-can-it-be-achieved-by-2050).

"Achieving Carbon Neutrality in China: Legal and Policy Perspectives." *Frontiers*, [www.frontiersin.org/articles/10.3389/fenvs.2022.1043404/full#h6](http://www.frontiersin.org/articles/10.3389/fenvs.2022.1043404/full#h6).

*Ana Sayfa » DergiPark*, [dergipark.org.tr/tr/download/article-file/996678](http://dergipark.org.tr/tr/download/article-file/996678).

"Yale Experts Explain Carbon Neutrality." *Yale Sustainability*, [sustainability.yale.edu/explainers/yale-experts-explain-carbon-neutrality](http://sustainability.yale.edu/explainers/yale-experts-explain-carbon-neutrality).

"How." *Carbon Neutral*, [www.carbonneutral.com/how](http://www.carbonneutral.com/how).

Dymond, Alexa. "Achieving Carbon Net-zero and How Does Recycling Help?" *Unisan UK*, 13 Oct. 2022, [www.unisanuk.com/achieving-carbon-net-zero-and-how-recycling-helps/](http://www.unisanuk.com/achieving-carbon-net-zero-and-how-recycling-helps/).

"10 Ways to Become Carbon Neutral | Sustainability | IGI." *IGI | Jewelry & Gemstone Grading | International Gemological Institute*, [www.igi.org/sustainability/10-ways-to-become-carbon-neutral](http://www.igi.org/sustainability/10-ways-to-become-carbon-neutral).

Ramirez, Rachel, and Angela Dewan. "Pakistan Emits Less Than 1% of the World's Planet-warming Gases. It's Now Drowning." *CNN*, 31 Aug. 2022, [www.cnn.com/2022/08/30/asia/pakistan-climate-crisis-floods-justice-intl/index.html](http://www.cnn.com/2022/08/30/asia/pakistan-climate-crisis-floods-justice-intl/index.html).

"NASA Says 2022 Fifth Warmest Year on Record, Warming Trend Continues – Climate Change: Vital Signs of the Planet." *Climate Change: Vital Signs of the Planet*, 12 Jan. 2023, [climate.nasa.gov/news/3246/nasa-says-2022-fifth-warmest-year-on-record-warming-trend-continues/](http://climate.nasa.gov/news/3246/nasa-says-2022-fifth-warmest-year-on-record-warming-trend-continues/).

"After Steep Drop in Early 2020, Global Carbon Dioxide Emissions Have Rebounded Strongly." *IEA*, [www.iea.org/news/after-steep-drop-in-early-2020-global-carbon-dioxide-emissions-have-rebounded-strongly](http://www.iea.org/news/after-steep-drop-in-early-2020-global-carbon-dioxide-emissions-have-rebounded-strongly).

"Sustainable Consumption and Production." *United Nations Sustainable Development*, 29 July 2022, [www.un.org/sustainabledevelopment/sustainable-consumption-production/](http://www.un.org/sustainabledevelopment/sustainable-consumption-production/).

United Nations Statistics Division. "— SDG Indicators." *UNSD - Welcome to UNSD*, [unstats.un.org/sdgs/report/2021/](http://unstats.un.org/sdgs/report/2021/).