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CURBING THE TREND OF GLOBAL WARMING AND PROTECTING OUR HOME PLANET: CAUSES, IMPACTS, GLOBAL EFFORTS, AND REFLECTIONS

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Abstract: Global warming has become one of the most serious challenges of our time. In the summer of 2026, many regions recorded rare extreme weather events. This study starts from these events and examines why they happen. The paper reviews the main hazards of global warming across seven areas. It identifies greenhouse gas emissions as the root cause of warming and frequent extreme weather, and it analyzes the main sources of these emissions. Carbon dioxide is the largest contributor, so the analysis focuses on carbon dioxide. The paper then reviews the efforts made by the United Nations, the European Union, the United States, and China to slow the warming trend, and it highlights the large progress China has made in renewable energy. Finally, the paper offers several reflections on how emissions can be reduced further, including green hydrogen, green chemicals, low-cost storage, and a bold idea for cross-hemisphere solar power exchange. The aim is to show that the task is hard but not hopeless, and that every citizen shares the responsibility.
Keywords: Global warming; Greenhouse gas emissions; Carbon dioxide; Renewable energy; Green hydrogen; Sustainable development

1 INTRODUCTION

Extreme weather has become more common in recent years. In the summer of 2026, several northern cities in China reported rare high temperatures near 40 degrees Celsius. Many parts of Europe faced similar heat at the same time. These places used to be popular summer destinations for cool weather. In the same period, typhoons and heavy rain caused wide flooding along the coast of China. The flooding disrupted daily life and work. The economic losses were large.

These events raise clear questions. What causes extreme weather? What harm does it bring? Are there fast and good solutions? What can each person do to protect the planet? This study was carried out to explore these questions. The author read technical literature, consulted experienced engineers, and organized the findings into a focused report.

The records give a clear picture. Since systematic weather observation began in 1850, the global mean surface temperature has risen by about 1.1 degrees Celsius above the 1850 to 1900 baseline [1-2]. The warming has been faster in recent decades. The last ten years are the warmest on record [3]. Figure 1 shows the long-term trend and the rapid rise after 1980.

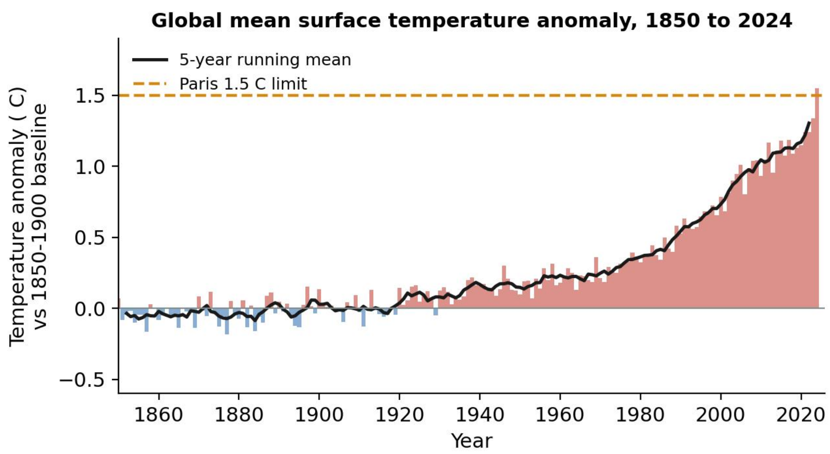

Figure 1 Global Mean Surface Temperature Anomaly from 1850 to 2024, Relative to the 1850 to 1900 Baseline. Data Pattern Based on IPCC, NOAA, and Copernicus Records [1, 3-4]

Table 1 summarizes several key indicators of the changing climate. They give a compact view of how far and how fast the planet has warmed.

Table 1 Key Global Climate Indicators

Indicator	Value
Warming since 1850 to 1900	about 1.1 degrees Celsius
2024 annual mean anomaly	about 1.55 degrees Celsius, first year above 1.5
Recent warming rate	about 0.2 degrees Celsius per decade since 1982
Sea level rise since 1900	about 20 cm and speeding up
Paris Agreement target	well below 2 degrees Celsius, pursue 1.5
Warmest ten years on record	all within 2015 to 2024

In December 2015, the Paris Agreement was adopted at the 21st Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change [5]. Its central aim is to hold the rise in global temperature well below 2 degrees Celsius and to pursue efforts to limit the rise to 1.5 degrees Celsius [5-6]. In 2024, the annual global mean temperature crossed 1.5 degrees Celsius above the pre-industrial level for the first time [4, 7]. This does not mean the long-term target is already broken, but it is a grim milestone. The situation is severe. Young people carry a share of the duty to slow warming and to protect the planet.

2 MAJOR HAZARDS OF GLOBAL WARMING

The impacts of warming reach every corner of the planet. This section groups them into seven areas. Table 2 gives an overview of these areas and their main effects.

Table 2 Main Areas of Impact of Global Warming

Impact area	Main effects
Extreme weather	More frequent heatwaves, stronger typhoons, heavy rain, floods, drought, wildfire
Ice melt and sea level	Faster loss of polar ice, sea level rise of about 20 cm since 1900, saltwater intrusion
Ecosystems	Ocean acidification, loss of coral and shellfish, shrinking polar habitats, species loss
Food security	Lower yields of wheat, rice, and maize, wider pest range, shifting fisheries
Water cycle	Glacier loss in Asia, uneven rainfall, algal blooms in lakes
Human health	Heatstroke, spread of dengue and malaria, worse air pollution
Tipping points	Risk of irreversible change if warming passes 1.5 to 2 degrees Celsius

2.1 More Intense Extreme Weather

Heatwaves now start more often and last longer. Very high temperatures make outdoor work unsafe. Labor productivity falls as a result [8]. Warmer air holds more moisture, so heavy rain events increase. Warmer oceans give tropical cyclones more energy [9]. A recent typhoon passed over coastal provinces of China and caused wide urban flooding. Heavy rain in mountain areas triggered floods and mudslides. Some regions faced drought at the same time. Low river levels blocked ships. Crops failed and drinking water grew scarce. Heat and drought raise fire risk. A recent wildfire in Spain burned more than 20,000 hectares. Heat also warps roads and overloads power grids. Floods damage transport and energy systems. Direct global losses reach hundreds of billions of dollars each year [10].

2.2 Ice Melt and Rising Seas

The ice sheets in Antarctica and the Arctic are melting faster. Global sea level has risen by about 20 cm since the start of the 20th century [3]. The rise is speeding up. Saltwater now moves further inland. Groundwater near the coast turns salty. This harms farm irrigation and drinking water.

2.3 Damage to Ecosystems

The ocean absorbs large amounts of carbon dioxide. This lowers its pH value and threatens shellfish, coral, and other calcifying life [11]. Polar bears and penguins lose habitat as ice retreats. The rate of species loss rises. Biodiversity is under real threat.

2.4 Food Security

High heat lowers the yield of major crops such as wheat, rice, and maize [12]. Pests spread over a wider range. Extreme weather damages farm infrastructure. Warmer seas push fish stocks to move. Traditional fishing grounds see lower catches.

2.5 Disruption of the Water Cycle

The Himalayan glaciers act as a water tower for Asia. Their loss threatens the water supply of about two billion people downstream [13]. Rainfall patterns shift. Some regions grow drier while others flood more often. Water is spread very unevenly in time and space. Warmer water also raises the risk of algal blooms. Several large freshwater lakes in China still see blue-green algae each summer.

2.6 Threats to Human Health

Outdoor workers and older people face higher rates of heatstroke and heart disease [14]. Mosquito-borne diseases such as dengue and malaria spread to higher latitudes and higher ground. Heat also speeds the formation of ground-level ozone. This worsens air pollution and lung disease.

2.7 Risk of Irreversible Tipping Points

Scientists warn about tipping points in the Earth system [15]. If warming passes 1.5 to 2 degrees Celsius, several feedbacks may start. The Amazon rainforest could shift from a carbon sink to a carbon source. Permafrost could melt on a large scale and release methane. The Atlantic Meridional Overturning Circulation could weaken or collapse [16]. Once these points are crossed, the climate may enter a state that is hard to control. Under current emission trends, warming could exceed 2.7 degrees Celsius within this century [17]. That is far above the 1.5 degrees Celsius safety goal.

3 MAIN SOURCES OF GREENHOUSE GAS EMISSIONS

Research shows that human activity is the main driver of global warming [1]. Greenhouse gas emissions are the root cause. The main greenhouse gases are carbon dioxide, methane, nitrous oxide, and fluorinated gases. Carbon dioxide is the largest contributor. Its main sources are the burning of fossil fuels, deforestation, and industrial processes [1, 18]. For this reason, the study focuses on carbon dioxide.
In 2025, China emitted about 11.8 billion tonnes of carbon dioxide. This was about 29 percent of the global total and still the highest in the world. The figure was slightly lower than in 2024, which suggests that emissions have entered a downward path [19]. The main reason is the fast growth of clean energy, especially solar and wind. Figure 2 compares annual emissions across major regions.

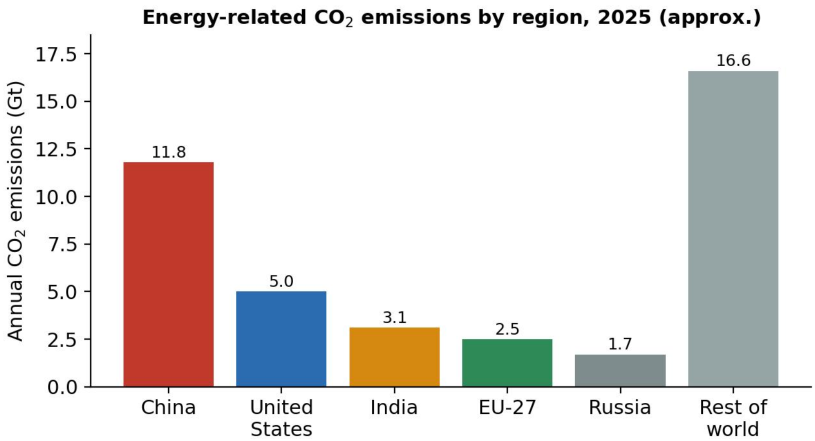

Figure 2 Energy-Related Carbon Dioxide Emissions by Major Region in 2025. Values Are Approximate and Based on Carbon Brief and CREA Analysis [19]

Table 3 Structure of China Carbon Dioxide Emission Sources, 2025

Emission source	Share	Change in 2025
Power sector	about 40 to 45%	Down about 3% as clean energy replaces coal
Steel	about 14%	Broadly stable
Cement	about 9 to 10%	Below the 2021 peak
Petrochemicals	about 15 to 16%	Refining is more than half of this share
Transport	about 10 to 12%	Slight increase
Buildings and residents	about 5 to 8%	Slight increase
Other	about 5%	Not specified

Table 3 shows that the power sector is the largest single source. It also shows the clearest progress. In 2025, clean power generation grew much faster than power demand. This pushed emissions from the power sector down by about 3 percent [19-20]. A senior engineer in the field noted an important detail. Coal power generation fell, but coal power capacity did not shrink. Coal chemical capacity also kept growing. This offset part of the expected reduction. In 2025, coal still made up about 53 percent of total energy consumption in China [21]. The coal-heavy energy mix means the task of cutting carbon is still hard.

4 GLOBAL EFFORTS TO CURB WARMING

Governments and institutions around the world have taken action. Table 4 lists the main steps in a timeline. This section then reviews the efforts of key actors.

Table 4 Timeline of Major Climate Policy Actions

Year	Actor	Action
2015	United Nations	Paris Agreement adopted at COP21
2016	United Nations	Paris Agreement enters into force
2020	China	Dual carbon goals announced
2021	China	1+N policy system and carbon peak action plan
2023	European Union	CBAM transition period begins
2025	United States	Formal notice of withdrawal from Paris Agreement
2026	European Union	CBAM formal implementation begins
2026	China	Renewables cross 60% of installed capacity

4.1 The United Nations and National Governments

The Paris Agreement was adopted in December 2015 and entered into force in November 2016 [5]. Its temperature goal has two levels. The first level is to hold the rise in global mean temperature well below 2 degrees Celsius above the pre-industrial level. This is the level that must be met. The second level is to pursue efforts to limit the rise to 1.5 degrees Celsius [6]. Nearly every country in the world signed the treaty.

4.2 The European Union

The European Union set medium- and long-term carbon reduction plans in line with the Paris Agreement. It also built related binding rules. Figure 3 compares the clean-energy share of power generation across major economies. The European Union leads on this measure.

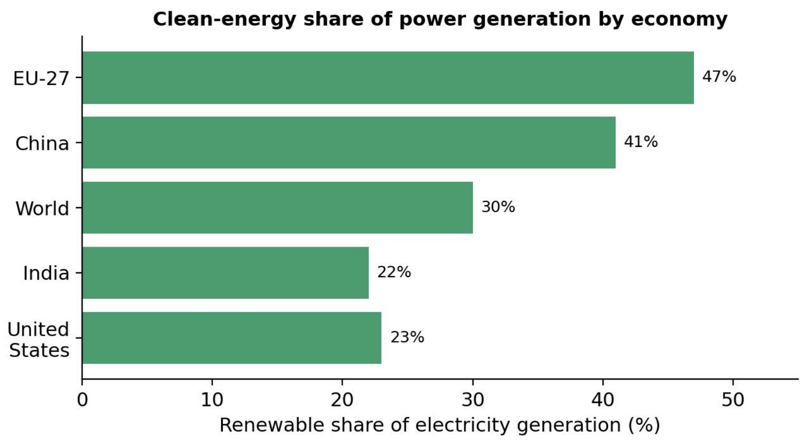

Figure 3 Clean-Energy Share of Electricity Generation by Major Economy, 2025 to Early 2026. Values Are Approximate and Based on IEA and Ember Data [20, 22]

The Carbon Border Adjustment Mechanism (CBAM) is a key tool [23]. It started in October 2023 and enters formal operation in 2026. Full operation is planned for 2034. During the transition period, importers of cement, steel, electricity, aluminum, fertilizer, and organic chemicals must report the embedded carbon of their products each year. Free allowances will be reduced step by step. The European Union will become the first economy in the world to levy a carbon border charge. The International Sustainability and Carbon Certification (ISCC) scheme is another tool [24]. It was the first standard to meet the European Union Renewable Energy Directive and began in 2010. It has grown into a widely accepted certification system. Its aim is to cut emissions, protect nature, promote renewable energy, and support sustainable development. ISCC certification acts as a pass for firms that sell biomass and biofuel to the European market.

4.3 The United States

On 20 January 2025, the President of the United States signed an executive order to withdraw from the Paris Agreement. The United Nations received the notice on 28 January of the same year. The withdrawal took formal effect on 27 January 2026 [25]. This means the United States no longer commits to the reduction targets of the agreement.

4.4 China

China has treated climate action as a national strategy. In September 2020, President announced the dual carbon goals at the United Nations General Assembly. China aims to reach peak carbon dioxide emissions before 2030 and to reach carbon neutrality before 2060. This is a solemn promise to the world. To deliver the goals, China built a 1+N policy system. A central guiding document was issued. The State Council released an action plan for reaching carbon peak before 2030. Ministries issued plans for energy, industry, and buildings. All 31 provinces drew up their own carbon peak plans.

Over the past decade, China pushed a set of clear measures. It expanded solar and wind power on a large scale. It built transmission grids and charging networks. It developed pumped storage, electrochemical storage, and molten-salt heat storage. It grew the supply chains for electric vehicles and batteries. It expanded electrified public transport such as high-speed rail, metro, and electric buses. It also tightened approval of high-energy industries such as coal power, steel, and cement. Figure 4 shows the rapid growth of renewable capacity by type.

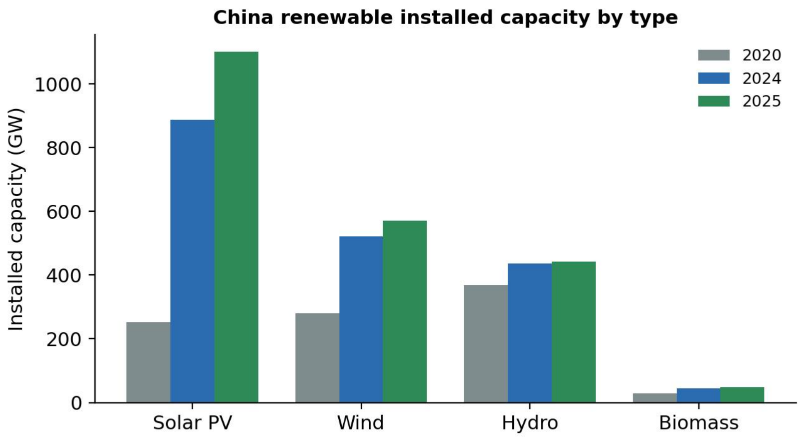

Figure 4 China Renewable Installed Capacity by Type in 2020, 2024, and 2025. Values Are Approximate and Based on National Energy Administration Data [26-27]

By the end of 2025, China had about 2,337 GW of renewable capacity, not counting nuclear power. This passed coal power capacity for the first time in history [26-27]. In the first half of 2026, China added about 117 GW of new renewable capacity. The total reached about 2,455 GW, more than 60 percent of the national total [28]. China ranks first in the world in renewable capacity, wind capacity, hydro capacity, and solar capacity. It also leads in battery and storage technology.

On 30 July 2026, the National Energy Administration released energy data for the first half of the year. Renewable generation, not counting nuclear power, reached nearly 2 trillion kilowatt-hours. This was up about 9 percent from the year before and made up 41.2 percent of national generation. The share crossed 40 percent for the first time. At the same time, coal power generation was about 2.5 trillion kilowatt-hours, or 49.7 percent of the total. This fell below 50 percent for the first time [22, 28]. One share rose and one fell. The power system passed a landmark point. These data show that China made large efforts to meet its Paris commitments over the past decade. The progress has drawn global attention.

5 REFLECTIONS ON FURTHER EMISSION CUTS

Table 3 shows that coal power is the largest source of carbon dioxide in China. Petrochemicals come next. The water-gas shift reaction in coal chemistry is a large part of this. The reaction combines carbon monoxide and water to make hydrogen and carbon dioxide. Using green electricity to split water for hydrogen can replace this reaction. This is a root solution.

Over the past decade, China worked hard on green chemical technology as well as on clean power. Public plans for green hydrogen, green methanol, green ammonia, and sustainable aviation fuel reached tens of millions of tonnes per year. A clear roadmap for green chemical production was drawn. Yet few of these projects have been built so far. Table 5 lists the main barriers and possible measures.

The guiding engineer explained the main reasons behind these barriers. Chemical plants need a steady and continuous supply. Solar and wind power are not steady. The market needs cheap, mature, and safe storage that can work at large scale. The current price of green power off the grid is high. The cost of hydrogen from water splitting is still far above the cost of hydrogen from fossil feedstock. So the cost of green chemical products stays high. The sales channels and prices for these products are uncertain. Many firms wait and watch. Green chemical synthesis also needs a green carbon source such as carbon monoxide or carbon dioxide. Biomass gasification could provide this at scale, but it is not yet proven in large industrial use. This limits the growth of the green chemical industry.

Table 5 Barriers to Green Chemical Deployment and Possible Measures

Barrier	Possible measure
Chemical plants need steady supply, but solar and wind are variable	Deploy low-cost, safe, large-scale storage to smooth green power
Green power price is still high, so green hydrogen costs more than fossil hydrogen	Cut electrolyzer energy use and cost, and lower grid delivery price
Sales channels and prices for green chemicals are uncertain	Build stable markets and clear pricing for green products
Green carbon source supply is not proven at scale	Prove biomass gasification for steady, large-scale carbon supply

The engineer said that a stable biomass gasification technology developed in China is close to a breakthrough. The first problem to solve is the cost of hydrogen from water splitting. The data are encouraging. The generation cost of solar and wind power has already fallen below 0.2 yuan per kilowatt-hour [29]. Offshore wind on the coast is even cheaper. The real bottleneck is the speed at which the grid can absorb green power. It is also the gap between the growth of new capacity and the growth of safe, low-cost storage. The market waits for a major breakthrough in electrolyzer technology that would sharply cut the energy use and cost of hydrogen production.

The author also offers a bold and early-stage idea. Suppose the world could move past the national borders of power grids. Countries could build an interconnected transmission and trade system across the globe. All countries could build solar power together and keep enough spare capacity. The Earth turns, so day and night differ by about twelve hours between hemispheres. This time gap could allow solar power to be shared across hemispheres. The eastern hemisphere could supply the western hemisphere during its daytime, and the reverse could happen later. This could ease the conflict between variable solar supply and steady demand. The author cannot yet answer these hard market and technical questions. The author will study hard, build skill, and prepare to help the country reach green, low-carbon, and high-quality growth.

6 CONCLUSION

Global warming touches every corner of the planet. Every form of life is affected. The current trend shows that cutting global greenhouse gas emissions is still a hard task. It needs all governments to work together. It needs shared technology, talent, and funding. Countries should set medium- and long-term reduction plans in line with the Paris Agreement temperature goals. They should keep carrying out their measures and follow a path of sustainable development. Every citizen of the Earth carries a real share of this duty. The author believes that the dual carbon goals of China will be met. The author also believes that the goal of holding warming below 1.5 degrees Celsius can still be reached.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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