



CLIMATE POLICY
INSTITUTE

China's Climate Strategy

Past, Present, & Future

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1. China's New Approach to Climate Change

As the world grapples with the pressing challenge of climate change, the global community has turned its attention to the actions and policies of the world's largest greenhouse gas emitter, China. In recent years, China has emerged as a key player in the fight against climate change, redefining its role on the international stage and embarking on a remarkable transformation in its approach to environmental sustainability. This chapter serves as an exploration into China's new approach to climate change, examining the evolving landscape of its climate policies, the motivating factors behind its strategic shift, and the potential implications for the global climate agenda.

1.1 Implementing a New Development Philosophy (Yunqiao Zhan)

Since the Reform and Opening up in 1978, China's development philosophy has undergone three levels of evolution, gradually integrating core concepts such as environmental protection and green development with essential goals of economic growth.

1.1.1 Economic Growth is No Longer the Only Goal

The goal of China's economic development has gradually shifted from focusing on economic growth to achieving multiple goals together. From 1978 to 2010, the development of China's economy always prioritized economic development. In 16 out of 35 years, China's GDP growth rate exceeded 10%. At this stage, China's development goals were based on the principal contradiction in Chinese society at that time: backward social production and weak economic foundation, but the people's demand for materials continued to grow. Therefore, based on this economic background, the concept of social development is that all forces serve economic development, and environmental protection is temporarily put on hold. However, after 2010, China's economic development entered a period of stable growth, while ecological and environmental issues gradually became undeniable. With the awakening of people's environmental awareness, the development concept of temporarily serving environmental protection in economic construction no longer met the needs of the Chinese people at that time. Therefore, China's development philosophy has gradually shifted from „economic growth is the primary goal” to „coexistence of multiple goals such as economic development and environmental protection.”

1.1.2 Improving Environmental Protection Organization Construction

China's environmental protection institutions have shifted from marginal and informal sectors to specialized and functional departments. From 1978 to 1982, China's environmental protection department was in a non-independent state, which was relatively weak compared to the economic sector. In 1982, China established the official National Environmental Protection Agency. As the concept of environmental protection is increasingly valued in China, the organizational construction of environmental protection departments is gradually improving. Firstly, the position of environmental protection departments in national organizational structures is gradually increasing. In 2008, the administrative level of the State Environmental Protection Administration was elevated, and it became one of the constituent departments of



the State Council. In 2018, China established the Ministry of Ecology and Environment of the People's Republic of China, fully expressing its importance to environmental protection work. In addition, there is no unified management system for the responsibilities of China's environmental protection departments nationwide. Local environmental protection agencies do not agree with national standards, have lax management, and do not have the right to speak. Since 2010, the country has been actively improving local environmental protection institutions, coordinating the division of labor and cooperation between provincial economic and environmental departments, and clarifying responsibilities. By improving the organizational construction of a top-down environmental protection system, China has provided organizational support for the transition from „economic growth as the primary goal” to „integrated development of environment and economy” from an institutional perspective.

1.1.3 Constraining Economic Development with Environmental Responsibility

Environmental protection has gradually become a critical assessment basis for measuring the quality of economic development, and various departments have implemented their environmental protection responsibilities. In 2016, the Chinese government began subdividing various environmental assessment indicators into responsibilities and implementing them for specific industries and positions. From 2013 to 2017, the State Council of China successively issued the „Three Ten Articles” to prevent environmental pollution, namely the Action Plan for Air Pollution Prevention and Control,” „Action Plan for Water Pollution Prevention and Control,” and „Action Plan for Soil Pollution Prevention and Control,” which concertized and clarified the responsibility for environmental protection. In 2017, the Central Leading Group for Comprehensive Deepening Reform reviewed and approved more than 40 specific reform plans for ecological civilization and environmental protection and issued and implemented environmental protection responsibilities of various departments in a high-frequency system. Implementing various environmental protection-related systems and clarifying environmental responsibilities have actively alleviated the contradiction between uncontrolled economic development and environmental protection in various parts of China.

1.2 Putting People at the Center (Yunqiao Zhan)

On July 28, 2003, former Chinese President Hu Jintao put forward the scientific concept of development:

- i. adhering to people-oriented
- ii. establishing a comprehensive, coordinated, and sustainable development concept
- iii. promoting all-round economic, social, and human development

This view has been guiding the urbanization and economic growth process in China.

1.2.1 Contradiction Between Urbanization and Environmental Protection

China's urbanization process, which has achieved remarkable results for 45 years, is facing resource consumption challenges and environmental pollution. According to China's National Bureau of Statistics, China's urban population grew from 36.1% in 2000 to 64.7% at the end of 2021, based on the resident population. The outstanding achievements of China's urbanization have greatly benefited Chinese residents and improved their living standards. However, at the



same time, the rough way of development in the early years has brought problems such as resource consumption and environmental pollution. In addition, super-large cities' formation and population pressure have also destroyed the environment and resources, forming a living environment that is not conducive to human health. According to the China Statistical Yearbook, at the end of 2022, the three most populous cities in China are Chongqing (32.133 million), Shanghai (24.75 million) and Beijing (21.843 million). The number of cars in Beijing increased by 33% from 5.44 million in 2013 to 7.13 million in 2022. The pressure of environmental pollution control from the highly rapid urban process cannot be ignored. In recent years, the country has promoted the green and low-carbon development of urbanization from top to bottom, hoping to alleviate the damage to the environment and resources caused by the pressure of population and the process of urbanization, as well as the hidden dangers to the health of the Chinese people. Environmental pollution damage to human health is also typical in China, so it is the only way to develop a sustainable, low-carbon, people-oriented economy, protect people's health, and promote environmental change.

1.2.2 People-oriented concept adapted to the development of low-carbon technology

Developing a low-carbon economy is a feasible measure to optimize energy structure in China at present. Due to China's large population, rough economic growth model, serious waste of resources, massive energy consumption, arduous industrial adjustment, and lack of independent innovation. It comes from the tremendous pressure of energy and environment. Therefore, both countries and enterprises must solve the fundamental difficulties in implementing a low-carbon economy from the technical level. The people-oriented concept adapted to the development of low-carbon technology should recognize the importance of the natural environment to the development of human society and regard following the ecological laws of nature as the guiding principle of all people's production activities. At the same time, we should regard survival and development as the fundamental right of human beings to pay attention to the development of the economy and the protection of the environment. Developing a low-carbon economy and increasing the proportion of renewable energy can effectively reduce the carbon emissions of disposable energy consumption, promote socially sustainable development, and better reflect the people-oriented policy of the Chinese government.

1.2.3 Enterprises provide carbon reduction paths for individuals

Under the state's call, all the major enterprises in China adhere to the urban business operation model of „people-oriented and environment-oriented.” During the 45 years of reform and opening up, the primary demand of Chinese residents is no longer the material wealth brought about by economic growth but a higher quality, healthier, and sustainable development model. For individuals, the low-carbon model in daily life is in line with the latest ideas of the Chinese people and is conducive to the healthy development of Chinese residents. At present, all kinds of carbon reduction scenarios that individuals have access to in the Chinese market need Chinese users to take the initiative to choose but also need relevant platforms and businesses to provide more options for green and low-carbon life. According to Alibaba's 2023 ESG report, the e-commerce giant provides eight low-carbon paths for Chinese people's daily life: carbon goods, low-carbon travel, low-carbon catering, recycling of idle goods, low-carbon cloud services, low-carbon logistics, low-carbon office systems, and low-carbon production.



1.3 Vigorously promote carbon peaking and carbon neutrality (Li Deng)

China's rise is one of the focal points of global attention. With rapid development since the era of reform and opening-up, China has achieved remarkable economic success and has become one of the world's largest carbon-emitting nations. This chapter delves into the establishment of China's dual carbon goals, including their background, the process of their establishment, main objectives, implementation pathways, and policy measures. This goal holds significant importance for both China and the global community in the context of green development and addressing climate change.

1.3.1 Background of the Establishment of Dual Carbon Goals

1.3.1.1 China's Carbon Emission Background

China's rapid economic growth since the era of reform and opening up has garnered global attention. However, this achievement has been accompanied by substantial carbon emissions, making China one of the world's largest carbon-emitting nations. China's annual emissions are close to 10 billion tons (The data is sourced from the Carbon Emission Allowance Exchange), accounting for one-third of global carbon emissions and exceeding the combined emissions of the European Union, the United States, and Japan. Whether viewed from the perspective of historical cumulative emissions, annual emissions, emission increments, per capita emissions, or GDP-based emissions, China consistently ranks among the world's leaders. This reality compels China to confront severe environmental and climate challenges.

1.3.1.2 China's Climate Responsibility

As global temperatures rise, international concern about climate change deepens. All nations must collectively bear the responsibility of addressing climate change. China, as one of the world's largest carbon emitters, has historically made significant contributions to the climate issue and is required to meet the 1.5°C temperature control target set for the world. As a responsible major nation, China must take more robust measures to accelerate carbon reduction, achieve carbon peaking, and ultimately attain carbon neutrality.

1.3.1.3 International Expectations and Climate Cooperation

International climate cooperation has become increasingly crucial for addressing global climate challenges. The international community widely anticipates China to shoulder greater climate responsibilities and make more significant contributions to the global transition to a green and low-carbon future. China's role in climate negotiations and climate financing is highly anticipated. Consequently, the establishment of China's dual carbon goals has become a focal point for the international community, with general expectations for China to take on a more prominent role.

1.3.2 Establishment of Dual Carbon Goals

1.3.2.1 President Xi Jinping's Declaration

On September 22, 2020, Chinese President Xi Jinping delivered an important speech during the 75th United Nations General Assembly debate, emphasizing China's commitment to addressing



climate change. President Xi pointed out that the Paris Agreement, as a global blueprint for green and low-carbon transformation, represents the minimum action required to protect our planet. In his speech, he explicitly outlined China's dual carbon goals: „China will enhance its nationally determined contributions and take more forceful policies and measures. We aim to peak carbon dioxide emissions before 2030 and strive to achieve carbon neutrality before 2060.” This declaration not only provides a clear timetable for China's carbon reduction goals but also elevates China's climate policy to a higher level.

1.3.2.2 Definitions of Carbon Peaking and Carbon Neutrality

Within the framework of the dual carbon goals, „carbon peaking” refers to the point when carbon dioxide emissions in a specific region, sector, or organization reach their historical peak within a certain time frame and then continue to decline after a plateau period. This signifies a historic turning point where carbon emissions decouple from economic growth. „Carbon neutrality” means that the carbon dioxide produced within a specific region, sector, or organization is offset through measures like afforestation, energy efficiency, or other emission reduction methods, resulting in zero net carbon emissions. When the net carbon emissions are equal to zero, it is termed „net-zero emissions.”

1.3.3 Main Objectives and Implementation Pathways

China's dual carbon goals have laid out specific key indicators and timelines. Let's delve deeper into the logic behind these objectives and their significance. Firstly, by 2025, China plans to increase the share of non-fossil energy consumption to around 20%. This objective reflects China's transformative vision in the energy sector. By reducing dependence on traditional fossil fuels, China will promote a greater share of clean energy sources in its energy consumption structure, thereby reducing carbon emissions. Secondly, energy consumption per unit of Gross Domestic Product (GDP) will decrease by 13.5%. This implies that China will place greater emphasis on improving energy efficiency, producing more products and services while using fewer energy resources. This is not only beneficial for carbon reduction but also enhances China's economic sustainability. Thirdly, carbon dioxide emissions per unit of GDP will decrease by 18%. This indicator directly relates to carbon emission intensity. By reducing carbon emissions per unit of GDP, China will achieve the decoupling of carbon emissions from economic growth, establishing a solid foundation for reaching carbon peaking. Fourthly, by 2030, the share of non-fossil energy consumption will reach around 25%. This objective underscores China's commitment to expanding renewable and clean energy sources. Over time, non-fossil energy will occupy a larger share of the market, which is critical for China's energy structure and carbon reduction goals. Lastly, carbon dioxide emissions per unit of GDP will decrease by over 65% to achieve the carbon peaking goal before 2030. This is an ambitious target that requires China to implement large-scale carbon reduction measures and alter the trajectory of carbon emissions growth.

To achieve the dual-carbon goals, China has formulated a series of implementation paths to meet the requirements of these objectives. First, the government will focus on an in-depth examination of major issues, such as optimizing industrial structure, adjusting energy structure, developing green and low-carbon technologies, and refining policy frameworks. Through



comprehensive research, the government will be able to formulate targeted and actionable policy measures. Second, the government will leverage the leadership role of state-owned enterprises, especially central enterprises. Central enterprises will develop their own carbon peak implementation plans based on their specific situations, clarifying target tasks, leading in reducing outdated production capacity, and promoting low-carbon, zero-carbon, and negative-carbon technologies. State-owned enterprises will play an active guiding role in carbon emissions reduction.

The following explores these action plans in detail:

1. Green and Low-Carbon Energy Transformation Action

China's green and low-carbon energy transformation action is at the core of the dual-carbon goals. This action plan covers multiple areas, from energy production to consumption. First, China plans to reduce its dependence on high-carbon energy sources. Traditional coal and petroleum hold significant positions in China's energy structure, but they also result in high carbon emissions. By gradually reducing the use of these high-carbon energy sources, China will decrease carbon emissions. Second, China will increase the share of non-fossil energy sources. This includes the development of clean energy sources like solar, wind, and hydropower. The government will encourage investment and research and development to promote the expansion of these energy sources. Furthermore, renewable energy will receive greater attention. China plans to increase investment in renewable energy to drive its development and adoption. Finally, China will enhance energy efficiency. This encompasses improving the efficiency of energy equipment, reducing energy wastage, advancing green technology research and application. Improved energy efficiency not only helps reduce carbon emissions but also enhances economic benefits.

2. Energy Efficiency and Carbon Reduction for Increased Effectiveness

China's energy efficiency and carbon reduction actions aim to achieve more energy savings and carbon emissions reduction. First, China will take measures to improve energy utilization efficiency. This includes upgrading existing energy equipment to enhance their efficiency. Additionally, China will encourage enterprises and individuals to reduce energy wastage. Second, China will promote the research and application of energy-saving technologies. This will involve multiple sectors, including industry, construction, transportation, and more. The government will encourage enterprises to adopt the latest energy-saving technologies to reduce carbon emissions. Finally, China will strengthen energy management and monitoring to ensure the effective implementation of energy-saving measures. This will involve establishing energy management systems and monitoring systems to track energy consumption and carbon emissions.

3. Carbon Peak Action in the Industrial Sector

The industrial sector plays a significant role in China's carbon emissions. As such, China will take a series of actions to achieve the peak and reduction of industrial carbon emissions. First, China will optimize industrial structure, involving the elimination of outdated, high-carbon industries, encouraging the use of efficient energy sources, and promoting the development of



green technologies. Second, China will enhance the promotion of green technologies. This includes the application of green production and clean energy sources. The government will provide support to help enterprises adopt these technologies. Finally, China will encourage industrial enterprises to reduce carbon emissions. This will involve reducing waste emissions, improving resource utilization efficiency, and implementing other measures to lower carbon emissions.

4. Urban and Rural Carbon Peak Actions in Construction

The urban and rural construction sector also plays a significant role in China's carbon emissions. China will take action to achieve the carbon emissions peak in this sector. First, China will adopt green building and urban planning, promoting sustainable urban development, reducing construction waste, and enhancing building energy efficiency. Second, China will improve the energy efficiency of buildings and cities. This will involve the application of energy-saving technologies and clean energy sources. Finally, China will encourage urban and rural residents to take energy-saving measures to reduce energy consumption and carbon emissions. The government will provide support to help residents implement these measures.

5. Green and Low-Carbon Transportation Action

The transportation sector has a significant impact on carbon emissions in China. China will take a series of actions to reduce carbon emissions in the transportation sector. First, China will encourage green transportation, including promoting the use of public transportation, reducing personal vehicle use, and improving the convenience of city cycling and walking. Second, China will enhance the efficiency of the transportation system. This will involve optimizing traffic signals, reducing traffic congestion, and improving traffic management. Finally, China will promote the development and application of green transportation technologies, including the adoption of electric vehicles, high-speed railways, and other clean transportation methods.

6. Circular Economy to Support Carbon Reduction

The circular economy is considered a key measure for carbon reduction in China. By reducing resource wastage and increasing resource reuse, China can lower carbon emissions. First, China will strengthen waste management and resource recycling. This includes establishing waste classification and recycling systems to reduce waste quantities. Second, China will encourage the development of the circular economy, which involves the reuse of waste resources, the recovery of waste energy, and the promotion of other circular economy measures. Finally, China will encourage businesses and individuals to take action to save resources and reduce carbon emissions.

7. Green and Low-Carbon Technology Innovation Action

Innovation in green and low-carbon technologies is crucial to achieving China's dual-carbon goals. China will take a series of actions to promote technological innovation and application. First, China will increase investments in the innovation of green and low-carbon technologies. The government will provide support to encourage businesses and research institutions to conduct research and development in green technologies. Second, China will encourage the application of clean technologies. This includes promoting renewable energy, carbon capture

and storage technologies, and the widespread adoption of other clean technologies. Lastly, China will strengthen intellectual property protection to encourage technological innovation.

8. Strengthening and Enhancing Carbon Sink Capacity Action

China's carbon sink capacity is essential for achieving the dual-carbon goals. China will take action to strengthen the development of carbon sink capacity. First, China will increase investments in forest protection and afforestation. This will help offset carbon emissions and increase forest coverage. Second, China will enhance the management and monitoring of carbon sink capacity. This will include the establishment of a carbon sink database to track changes in carbon sink capacity. Lastly, China will encourage businesses and the public to participate in enhancing carbon sink capacity. This will involve the development of carbon offset projects to help businesses and individuals reduce carbon emissions.

9. Green and Low-Carbon All-People Action

China encourages the participation of all citizens in carbon reduction actions to advance the dual-carbon goals. First, China will encourage residents to adopt green transportation, including using public transportation, biking, walking, and reducing personal vehicle use. Second, China will promote energy-saving and resource-conserving lifestyles, which includes reducing energy consumption, minimizing waste, and adopting eco-friendly living practices. Lastly, China will strengthen environmental education and advocacy to raise public awareness of carbon reduction and encourage more people to participate.

10. Gradual and Ordered Carbon Peak Actions in Various Regions

China's various regions will progressively advance carbon peak actions according to their respective circumstances. First, China will formulate corresponding measures based on the carbon emissions situation in different regions. Some regions exhibit higher carbon emissions, necessitating more comprehensive measures, while regions with lower emissions can adopt moderate measures. Second, China will encourage the sharing of carbon reduction experiences among different regions. This will help regions learn from each other and enhance the efficiency of carbon reduction. Finally, China will strengthen the management and monitoring of carbon reduction targets at the regional level. This will help ensure the realization of carbon reduction goals across all regions.

1.3.4 Policy Measures

The implementation of China's dual-carbon goals relies on comprehensive policy measures and institutional frameworks to ensure effective execution and supervision of carbon reduction efforts. The Chinese government has already formulated a series of policy documents and schemes, establishing specific policy measures to support the goals of carbon peak and carbon neutrality.

1.3.4.1 1+N Policy Framework

China's dual-carbon goals are implemented under the guidance of a series of policy documents, among which the most important are the „Opinions of the Communist Party of China Central Committee and the State Council on Comprehensively Implementing the New Development



Concept and Effectively Carrying Out Carbon Peak and Carbon Neutrality Work” and the „Action Plan for Achieving Carbon Peak by 2030.” These policy documents provide guiding principles and a strategic framework for carbon reduction efforts.

1.3.4.2 Implementation Plans for Key Industries

China’s carbon reduction efforts encompass various key industries, including energy, industry, construction, transportation, agriculture, and more. The government has developed specific implementation plans tailored to the carbon reduction needs of different industries to drive industry transformation and upgrading. These plans include specific measures for technological innovation, improved resource utilization efficiency, and clean production.

1.3.4.3 Technological Support and Financial Assistance

To achieve carbon reduction goals, the Chinese government has increased investment in technological innovation. In August 2022, the Ministry of Science and Technology, the National Development and Reform Commission, the Ministry of Industry and Information Technology, and nine other departments jointly issued the „Technology-Supported Implementation Plan for Carbon Peak and Carbon Neutrality (2022–2030),” outlining actions and safeguards to support technological innovation towards achieving the carbon peak target by 2030. This includes support for research and application of green and low-carbon technologies and the increased use of clean energy. Additionally, the government provides financial support to incentivize businesses and local governments to participate in carbon reduction efforts.

1.3.4.4 Carbon Peak Implementation Plans for Local Governments

All 31 provinces in China have formulated specific carbon peak implementation plans according to their individual circumstances and carbon emissions. This helps ensure the realization of carbon reduction goals in different regions and promotes the orderly progression of carbon reduction efforts nationwide. Local governments play a vital role in supervising and driving the execution of carbon reduction efforts through these plans.

1.3.4.5 Significance of Policy Measures

Policy measures are pivotal for achieving the dual-carbon goals. These policy documents and implementation plans provide guidance for carbon reduction efforts, clarifying the government’s policy direction and objectives. Government support and oversight help encourage the participation of businesses and individuals in carbon reduction efforts, promote technological innovation, disseminate green technologies and clean energy applications, and improve resource utilization efficiency. Effective implementation of policy measures will be key to achieving the dual-carbon goals and will provide robust support for 5. China’s sustainable development.

The establishment of China’s dual-carbon goals represents a significant strategic decision, signifying that China will undertake comprehensive green transformation measures to address climate change and carbon emissions. The achievement of these dual-carbon goals will serve as a new engine for China’s development and set a powerful example for the world. From carbon

peak to carbon neutrality, China faces enormous challenges, but also significant opportunities. Compared to some developed countries, China's carbon reduction tasks are more urgent and the challenges more severe, yet China possesses strong determination and potential. China will integrate its comprehensive green transformation strategy into its overall development plan, adhering to a systematic perspective, coordinating development and emissions reduction, the whole and the parts, short-term and long-term goals. It will steer economic and social development toward comprehensive green transformation, with energy green and low-carbon development as a key component. China will accelerate the formation of an industrial structure, production methods, lifestyles, and spatial patterns that conserve resources and protect the environment, resolutely following the path of high-quality development with an ecological priority and a focus on green and low-carbon practices.

In summary, the establishment of China's dual-carbon goals holds significant importance not only for its own sustainable development but also offers robust support for global climate change mitigation. Through the adoption of effective policy measures and implementation paths, China is poised to achieve its carbon reduction and carbon neutrality objectives in the coming years, making a positive contribution to global green development. China will continue to fulfill its international responsibilities, contributing to the building of a shared future for humanity, striving to achieve carbon peak and carbon neutrality, and laying a solid foundation for a sustainable future.

2. Implementing a Proactive National Climate Strategy

China has emerged as a global leader in addressing climate change, primarily by focusing on reducing greenhouse gas emissions and bolstering resilience against its impacts. As the world grapples with the consequences of a warming planet, China has made significant strides in strengthening its climate change mitigation efforts, paving the way for a more sustainable future. This chapter delves into China's journey in this regard, with a particular focus on the National Climate Change Adaptation Strategy 2035.

2.1 Strengthening Climate Change Mitigation Efforts (Kinga Biró, Kok Sin Woon)

China's commitment to mitigating climate change has evolved significantly over the years. In the past, China was often criticized for its heavy reliance on coal and rapid industrialization, which led to high carbon emissions. However, in recent years, the nation has undergone a profound transformation in its approach to climate change mitigation. In 2020, China announced its commitment to achieving carbon neutrality by 2060. This ambitious target demonstrates the nation's dedication to mitigating climate change and reducing its carbon footprint. To achieve this, China is taking several proactive steps, including transitioning to renewable energy sources, improving energy efficiency, and reducing its reliance on coal.

One of the pivotal aspects of China's climate change mitigation strategy is the significant investment in renewable energy. China is the world's largest producer and consumer of solar panels and wind turbines, and the government has implemented various policies to incentivize the use of renewable energy sources. These efforts are reducing the country's reliance on fossil



fuels, and as a result, carbon emissions are on a downward trajectory.

China has consistently set and met emission reduction targets. In its 14th Five-Year Plan¹ (2021-2025), the government pledged to reduce carbon intensity per unit of GDP by 18% compared to 2020 levels. This ambitious target aligns with the nation's long-term commitment to carbon neutrality. China is also making efforts to peak its carbon emissions by 2030, reinforcing its dedication to the fight against climate change. The National Climate Change Adaptation Strategy 2035² is a cornerstone of China's climate change mitigation efforts. This strategy, released in 2018, outlines a comprehensive and multifaceted approach to adapt to the impacts of climate change. The strategy aims to enhance the resilience of various sectors, including agriculture, water resources, infrastructure, and ecosystems, to the challenges posed by a changing climate. It also highlights the importance of regional coordination and capacity building to better prepare for climate-related disasters.

China's efforts to strengthen its climate change mitigation endeavors have positioned the country as a global leader in the fight against climate change. The commitment to carbon neutrality by 2060, coupled with the promotion of renewable energy and the pursuit of emission reduction targets, underscores China's dedication to a sustainable future. The National Climate Change Adaptation Strategy 2035 complements these mitigation efforts by focusing on adaptation and resilience building, ensuring that the nation is well-prepared to face the challenges of a changing climate. With these strategic initiatives in place, China is not only contributing to global climate change mitigation but also safeguarding its own future against the impacts of climate change.

2.2 Commitment to a Green and Low-Carbon Development Path (Kinga Biró, Kok Sin Woon)

In recent years, China has emerged as a global leader in promoting green and low-carbon development. As the world grapples with the urgent need to address environmental challenges and mitigate the impacts of climate change, China's commitment to sustainability has become increasingly evident. This chapter explores the key elements of China's strategy for green and low-carbon development, highlighting its significance on both a national and international scale.

China's journey towards green and low-carbon development began with the recognition of its environmental challenges. The country's rapid economic growth had led to severe pollution, environmental degradation, and a growing carbon footprint. In response, the Chinese government initiated a series of policies and reforms aimed at transforming the nation's development model. Central to China's commitment to green and low-carbon development are

¹ The State Council of the People's Republic of China. (2020). China's 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives Through the Year 2035.

² National Development and Reform Commission (NDRC). (2020). China's National Strategy for Climate Adaptation (2021-2035). Retrieved from <http://www.ndrc.gov.cn>



its ambitious policy and regulatory frameworks. The government has implemented a wide range of measures to curb pollution, reduce greenhouse gas emissions, and promote renewable energy sources.

Humanity has always sought reliable, sustainable energy sources. China's approach to nuclear energy stands out for its focus on reducing greenhouse gas emissions and achieving net-zero goals. In its 13th Five Year Plan³, China outlined key objectives for 2020, aiming to advance renewable, fossil fuel, and nuclear technologies, along with mini-grids, super-grids, and smart grids to boost its global energy sector competitiveness. In the latest 14th Five Year Plan⁴, the government aims for innovation in the energy sector. It outlines the goals of advancing renewable energy technologies, creating new power supply systems, enhancing safe and efficient nuclear energy, and implementing digital and intelligent applications within the energy sector by 2025. China leads in nuclear reactor construction with 21 reactors under development, capable of generating 21.61 gigawatts⁵, surpassing all other countries. Nuclear power's advantage over renewables like wind lies in its seamless integration with energy-intensive consumers along China's eastern coast. Moreover, China possesses substantial uranium resources, exceeding 2.8 million metric tons.

China's proactive promotion of safe nuclear energy contrasts with some developed nations that closed existing nuclear plants or halted new construction after the Fukushima disaster. To assess the social acceptance of nuclear power in Shandong Province, China conducted a survey (Xueliang et al., 2017)⁶, revealing low public awareness but high local acceptance due to environmental concerns and rising electricity costs. The stability of electricity supply, lower prices, and reduced fossil fuel consumption are the most significant social, economic, and environmental benefits. China's government emphasizes the importance of enhancing social acceptance to achieve its strategic nuclear power development goals.

China's investment in renewable energy sources is a central pillar of its green and low-carbon strategy. The country has become a global leader in renewable energy production and deployment, particularly in solar and wind energy. By supporting the development of clean energy technologies and increasing their accessibility, China not only reduces its reliance on fossil fuels but also contributes to global efforts to combat climate change. The commitment to green development is evident in its rapid technological advancements. The nation is at the forefront of innovation in electric vehicles, energy storage, and green building technology.

³ China 13th Energy Technology Innovation Five Year Plan (2016-2020): <https://www.iea.org/policies/6267-china-13th-energy-technology-innovation-five-year-plan-2016-2020>

⁴ China Unveils 14th Five-Year Plan for Scientific and Technological Innovation in Energy Sector: <https://research.hktdc.com/en/article/MTA0MjI5Nzc2Ng#:~:text=China's%2014th%20Five%E2%80%91Year%20Plan,the%20energy%20sector%20before%202025>

⁵ <https://www.cnbc.com/2023/08/30/how-china-became-king-of-new-nuclear-power-how-us-could-catch-up.html>

⁶ Xueliang Y., Jian Zuo, R.M., Yutao W. (2017). How would social acceptance affect nuclear power development? A study from China, *Journal of Cleaner Production*, Volume 163, 2017, p. 179-186 <https://doi.org/10.1016/j.jclepro.2015.04.049>



These advancements not only enhance China's domestic sustainability but also create opportunities for international cooperation and technology transfer. China's green and low-carbon development commitment extends beyond its borders. The „Belt and Road Initiative” includes sustainable development goals and promotes green infrastructure in partner countries. Additionally, China plays a leading role in international climate negotiations, working towards the goals set out in the Paris Agreement. This reflects the country's commitment to global environmental stewardship. The commitment to green and low-carbon development is not only an environmental strategy but an economic one as well. By transitioning towards sustainability, China aims to achieve more balanced and sustainable economic growth. This transformation can generate new economic opportunities, reduce economic volatility, and improve overall quality of life for its citizens.

While China has made substantial progress, challenges remain in its pursuit of green and low-carbon development. These include addressing regional disparities in environmental protection, ensuring the enforcement of environmental regulations, and balancing economic growth with sustainability. Nevertheless, China's commitment to green and low-carbon development represents a significant step towards addressing the global environmental crisis.

China's commitment to a green and low-carbon development path is a testament to the nation's determination to tackle environmental challenges head-on. Through policy and regulatory frameworks, investments in renewable energy, technological advancements, international engagement, and a focus on sustainable growth, China is emerging as a global leader in sustainability. As the world seeks solutions to climate change and environmental degradation, China's journey provides valuable insights and inspiration for the path towards a more sustainable and low-carbon future.

2.3 Enhanced Control of Greenhouse Gas Emissions (Kinga Biró, Kok Sin Woon)

China, as the world's most populous country and one of the largest economies, has long been a focal point in discussions about global climate change. From a historical perspective, China is relatively new as the world's leading emitter. For much of the 19th and 20th centuries, Chinese output was low, and later, as the Chinese economy boomed, Chinese output skyrocketed, eventually overtaking that of the United States around 2006. China's aggregate carbon emissions since the start of the industrial revolution are roughly half those of the United States or Europe. In this chapter, we will explore China's journey toward enhanced control of greenhouse gas emissions, examining its historical context, key policies, and the challenges it faces.

China's leaders have declared that climate change is “a grim challenge facing all mankind” and that China is „one of the country most adversely affected by climate change”⁷. The Chinese government has set targets to limit emissions of heat-trapping gases, including a pledge to peak carbon emissions by 2030 and achieve carbon neutrality by 2060, and has adopted a wide range of policies to help achieve these targets.

⁷ People's Republic of China, China's Achievements, New Goals and New Measures for Nationally Determined Contributions (October 2021) at p.1; People's Republic of China, China's Mid-Century Long-Term Low Greenhouse Gas Emission Development Strategy (October 2021) at p.4.



The policies are partly shaped by other objectives, including growing the economy, enhancing energy security, reducing local air pollution, and supporting strategic industries.

The Chinese government's climate change policies are contained in a wide range of official documents. The key climate policy documents are as follows: The 14th Five-Year Plan for a Modern Energy System (NDRC and NEA, 2022)⁸; Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality (State Council, 2021)⁹; Action Plan for Carbon Dioxide Peaking Before 2030 (NDRC, 2021); Nationally Determined Contributions submitted to the UN Framework Convention on Climate Change (2021)¹⁰; China's Mid-Century Long-Term Low Greenhouse Gas Emission Development Strategy (2021); Guiding Opinions on Coordinating and Strengthening Work Related to Addressing Climate Change and Environmental Protection (Ministry of Ecology and Environment, 2021).

In October 2021, President Xi Jinping announced that China will adopt a „1+N” policy framework on climate change. The ‚1’ refers to a long-term approach to tackling climate change as set in the State Council's Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality, and the ‚N’ refers to concrete plans to peak carbon emissions by 2030, such as the NDRC's action plan to peak carbon emissions before 2030. Chinese government's policy documents on climate change cover a range of topics, including promoting low-carbon development, expanding clean energy sources, investing in the industries of the future, balancing low-carbon development with energy security, and actively engaging in climate diplomacy.

China has significantly increased its investments in renewable energy sources, particularly wind and solar power. The government introduced feed-in tariffs and other incentives to promote the use of clean energy, which has led to impressive growth in the renewable sector. China initiated pilot carbon trading schemes in various provinces, which laid the groundwork for a national carbon market. The launch of this market marked a significant step in controlling emissions and incentivizing businesses to reduce their carbon footprint. The government set ambitious targets for improving energy efficiency in various sectors, including industry, transportation, and construction. Regulations and standards were put in place to ensure businesses met these goals, leading to reductions in greenhouse gas emissions. China is the largest market for electric vehicles (EVs) in the world. Subsidies, incentives, and regulations promoting EVs have not only reduced emissions from the transportation sector but also advanced the development of EV technology. To combat deforestation and increase carbon sequestration, China has embarked on ambitious afforestation and reforestation programs. These efforts contribute to carbon capture and biodiversity conservation.

Despite these efforts, China still faces significant challenges in its quest to control greenhouse gas emissions. Balancing the need for economic growth with emissions reduction remains a critical challenge.

⁷ NDRC and NEA, 14th Five-Year Plan for a Modern Energy System (in Chinese) (March 2022).

⁹ State Council, Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full And Faithful Implementation of the New Development Philosophy (October 24, 2021).

¹⁰ People's Republic of China, China's Achievements, New Goals and New Measures for Nationally Determined Contributions (October 2021).



The country must ensure that its economic development is sustainable and environmentally responsible. China's emissions are unevenly distributed across regions, with some areas still heavily reliant on coal. Bridging these regional disparities in emissions control is a complex task. There have been concerns about the accuracy of emissions data reported by local governments and industries. Enhancing data transparency and accountability is crucial for effective policy implementation. As a global issue, climate change requires international cooperation. China's role in international climate negotiations, as well as its relationships with other major emitters, will influence the success of global climate initiatives.

China's enhanced control of greenhouse gas emissions represents a crucial component of global efforts to combat climate change. The nation's transition toward cleaner energy sources, the implementation of carbon pricing, and a renewed focus on energy efficiency are all signs of a promising shift. However, China's path to sustainability is fraught with challenges that require innovative solutions and international cooperation. As the world watches, China's actions in the coming years will have a profound impact on the future of the planet and the fight against climate change.

2.4 Leveraging Market Mechanisms (Li Deng)

Carbon markets offer an efficient pathway to address the relationship between economic development and carbon emissions reduction. The National Carbon Emission Rights Trading Market is a significant institutional innovation aimed at controlling and reducing greenhouse gas emissions through market mechanisms, thus promoting green and low-carbon development. It also serves as a vital policy tool to achieve China's carbon peak target and carbon neutrality vision.

2.4.1 Participants

Initially, carbon emission rights trading primarily involved power generation enterprises, making them the focal point during the initial phase. Later, qualified investment institutions and individuals adhering to trading rules will be included as and when deemed appropriate.

On December 29, 2020, the Ministry of Ecology and Environment issued the „2019-2020 National Carbon Emission Allowance Total Allocation and Distribution Implementation Plan (Power Industry),” which established the criteria for including key emission units in the management of carbon trading market allowances for the years 2019-2020. This includes the power industry, including self-owned power plants from other industries. Enterprises that emitted 26,000 tons of CO₂ in any year between 2013 and 2019 would be incorporated into the National Carbon Trading Market.

On October 20, 2020, the Ministry of Ecology and Environment, the National Development and Reform Commission, the People's Bank of China, the China Banking and Insurance Regulatory Commission, and the China Securities Regulatory Commission jointly issued the „Guidance on Promoting Investment and Financing in Response to Climate Change.” The guidance emphasizes the gradual expansion of the scope of carbon emission rights trading, including the timely inclusion of investment institutions and individuals that meet trading rules.



2.4.2 Types of Transactions

China's carbon emission rights trading market primarily comprises two types of transactions: total control quota trading and project emission reduction trading. The former involves trading carbon emission allowances allocated to control-emitting enterprises, while the latter focuses on trading emission reduction credits acquired through the implementation of greenhouse gas reduction projects (voluntary emission reduction credits registered by the National Environmental Protection Department, known as „National Certified Voluntary Emission Reductions” or „CCER”). For control-emitting enterprises (key greenhouse gas-emitting entities) determined by the carbon trading regulatory authority, carbon emission allowance trading is mandatory. Local ecological environment authorities allocate a certain amount of carbon emission quotas to control-emitting enterprises based on the national and provincial, autonomous region, and municipal emission quota totals. Carbon emission quotas must be traded through carbon emission rights trading institutions.

CCER trading is voluntary, and China manages voluntary emission reduction trading through registration. This includes project registration and emission reduction credit registration. Control-emitting enterprises undertake voluntary emission reduction projects using methodologies registered with the national regulatory authority. These projects are subject to approval by accredited agencies with the necessary qualifications and undergo expert assessment commissioned by the national regulatory authority. Once the projects are approved and registered by the national regulatory authority, they become national certified voluntary emission reduction projects. After operation, the emission reduction credits are verified by accredited agencies, undergo expert assessment commissioned by the national regulatory authority, and are subsequently reviewed and registered by the national regulatory authority as national certified voluntary emission reductions. CCER transactions can be conducted within registered trading institutions and are used to offset carbon emissions. Upon completion of the transaction, the emission reduction credits used for carbon offset are cancelled in the national registry.

2.4.3 Establishment of China's Carbon Markets

Carbon markets enable the allocation of greenhouse gas emission responsibilities to enterprises, employing market mechanisms to determine appropriate carbon prices and guide the optimal allocation of carbon emission resources. In line with the requirements of China's „Twelfth Five-Year Plan” outline for the gradual establishment of carbon emission trading markets, China initiated carbon emission rights trading pilot programs in October 2011. These pilots were launched in Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong, and Shenzhen. They were gradually operationalized from 2013 to 2014. In September 2016, Fujian Province became the eighth region in China to launch carbon emission rights trading pilot programs, commencing operations in December of the same year. Regional carbon markets cover over 20 industries, involving around 3,000 enterprises and institutions, with an annual trading volume of approximately 12 billion tons of quotas. The compliance rate of pilot carbon market key emitting units has remained at a high level, and the total emissions and intensity within the market's coverage have shown a declining trend. These initiatives effectively encourage greenhouse gas reduction by enterprises and enhance awareness of low-carbon development within society. The experiences from regional carbon markets have provided valuable lessons for the development of the national carbon market, laying the groundwork for its successful implementation.

Table 1. The coverage scope of regional carbon markets.

Province	Industry	Number of entrepreneurs
Shen Zhen	Electricity, water supply, gas supply, public transportation, subway, hazardous waste management, sludge treatment, wastewater treatment, port terminals, flat panel display information chemicals, and other specialty chemicals industries, manufacturing, and other industries.	684
Shang Hai	Power generation, power grid, heating supply, data centers, industrial, aviation, ports, water transportation, tap water production, shopping malls, hotels, business offices, airports, and other buildings.	357
Bei Jing	Heat production and supply, cement manufacturing, petrochemical production, transportation, aviation transportation, other service industries (property management, data centers, communication), other industries (power grid, automobile manufacturing, biopharmaceutical manufacturing, sewage treatment, and recycled water supply, tap water supply).	909
Guang Dong	Cement, steel, petrochemical, papermaking, and civil aviation.	217
Tian Jin	Steel, chemical, petrochemical, building materials, oil and gas exploration, non-ferrous, machinery and equipment manufacturing, agricultural and sideline food processing, electronic equipment manufacturing, food and beverage, pharmaceutical manufacturing, mining, aviation transportation (airports).	145
Hu Bei	Steel, cement, chemical, petrochemical, heat production and supply, water production and supply, ceramics manufacturing, automobile manufacturing, equipment manufacturing, glass and other building materials, non-ferrous metals, textile industry, food and beverage, pharmaceuticals, papermaking, and other industries.	339
Chong Qing	Cement manufacturing, steel, aluminum smelting, glass and glass product manufacturing, paper and paper product production, chemical, municipal solid waste incineration, machinery and equipment manufacturing, electronic equipment manufacturing, food, tobacco and alcohol, beverage and refined tea production, other non-ferrous metal smelting and processing, petrochemicals, petroleum and natural gas production, ceramics, others.	304
Fu Jian	Electricity, steel, chemical, petrochemical, non-ferrous, civil aviation, building materials, papermaking, ceramics.	296

In December 2017, the National Development and Reform Commission proposed to advance the development of carbon markets. The institutional framework is a crucial safeguard for promoting carbon market construction. In order to enhance the carbon trading market, the „National Carbon Emission Rights Trading Market Construction Plan (Power Industry)” was successively issued.

In December 2020, the Ministry of Ecology and Environment released the „Measures for Carbon Emission Rights Trading (Trial),” which specified the inclusion thresholds for key emitting units, quota allocation and distribution rules, and trading regulations. Since 2021, there have been successive releases of corporate greenhouse gas emission reports, verification technical specifications, and carbon emission rights registration, trading, and settlement management rules, laying the foundation for a comprehensive national carbon market institutional framework. There are active efforts to promote the legislative process of the „Provisional Regulations on Carbon Emission Rights Trading Management,” which aims to solidify the legal foundation for carbon emission rights trading and standardize key aspects of the operation and management of the national carbon market.

On July 16, 2021, the national carbon market was officially launched with an opening price of 48 yuan per ton, resulting in a first-day trading volume of 4.1 million tons of quotas and a total trading value of 210 million yuan. China’s national carbon market includes 2,162 key emitting units in the power generation sector, covering approximately 4.5 billion tons of carbon dioxide emissions, making it the world’s largest carbon market in terms of scale. As of October 25, 2023, the cumulative trading volume of carbon emission allowances has reached 365 million tons, with a total trading value of 19.437 billion yuan. The online trading debut of the national carbon market has garnered significant attention and positive reviews both domestically and internationally.

2.4.4 Carbon Prices

Carbon prices are primarily influenced by supply and demand dynamics, with factors categorized into macro-level and micro-level considerations. From a macro-level perspective, these factors include government emissions reduction targets, economic conditions, energy prices, future policy expectations, and CCER offset policies. On the micro-level, factors include default penalties, verification fairness, corporate carbon asset management, market speculation, hot money considerations, market liquidity, and trading rules. Currently, in China’s national carbon market, carbon prices have remained stable with a gradual upward trend, averaging around 80 yuan per ton. The moderate increase in carbon prices reflects the market-driven nature of carbon pricing and essentially mirrors China’s emissions reduction costs. The stability and increase in carbon quota prices, along with increased market activity, reflect the trend of power generation control-emitting enterprises’ transition from learning and observation to becoming gradually familiar with carbon trading mechanisms.

After nearly a decade of development, China’s carbon emission rights trading has achieved significant results, both in terms of legislative construction and practical operations. The vitality of the Chinese carbon market is expected to gradually increase with the continuous development of market mechanisms. The openness of the Chinese carbon market has positive implications for enhancing market activity and liquidity, and it assists control-emitting enterprises in managing carbon asset risks, providing a proactive push for the market.



2.5 Strengthening Climate Adaptation Capabilities (Kinga Biró, Kok Sin Woon)

In a world where the impacts of climate change are becoming increasingly apparent, the need for nations to adapt and build resilience to these changes is paramount. China has recognized the urgency of this challenge and has taken significant steps to strengthen its climate adaptation capabilities. To address this challenge, the Chinese government has formulated a comprehensive roadmap for climate adaptation through the National Climate Change Adaptation Strategy 2035. China's vulnerability to climate change is evident through the increase in extreme weather events, sea-level rise, water scarcity, and disrupted agricultural patterns. These challenges necessitate a proactive approach to adaptation, which is fundamentally anchored in understanding the current and potential future risks. This chapter explores China's efforts in this regard, focusing on key policies, initiatives, and innovations that are driving the country's resilience revolution.

2.5.1 National Adaptation Plan (NAP): A Holistic Approach

China's journey towards climate adaptation began with the establishment of a comprehensive National Adaptation Plan (NAP) to identify and address climate vulnerabilities across different sectors and prepare for extreme weather events. The NAP takes a multi-pronged approach, considering factors such as agriculture, water resources, public health, and infrastructure. This holistic perspective allows China to prioritize its most pressing needs and allocate resources efficiently.

2.5.2 China's National Climate Change Adaptation Strategy 2035 (NCCAS)

The National Climate Change Adaptation Strategy 2035, unveiled in 2020, is a visionary document that outlines a roadmap for China's climate resilience. It recognizes the importance of adaptation in conjunction with mitigation efforts and serves as a holistic guide for climate adaptation.

2.5.2.1 Ecosystem-Based Adaptation

China promotes ecosystem-based adaptation strategies, emphasizing the protection and restoration of natural systems such as wetlands and forests to enhance resilience. The National Climate Change Adaptation Strategy promotes the integrated protection and systematic management of mountains, rivers, forests, farmlands, lakes, grasslands, and deserts; implements the principle of „four things to be determined by water”¹¹. China has embraced the concept of ecological civilization. One remarkable initiative within this framework is the massive reforestation program. By planting billions of trees and restoring degraded ecosystems, China aims to enhance its natural resilience against climate-related disasters. These efforts not only sequester carbon but also protect against soil erosion, regulate water flow, and preserve biodiversity.

2.5.2.2 Climate-Resilient Infrastructure

The rapid urbanization of China has necessitated the development of resilient cities. The government is actively promoting green infrastructure and sustainable urban planning.

¹¹ The „four things to be determined by water” refers to determining the location and scale of cities, farmland, population, and industry based on the availability of water.



These approaches encompass everything from energy-efficient buildings to flood-resistant urban design. Cities like Shenzhen have emerged as pioneers, demonstrating how urban centers can be both sustainable and climate resilient. Enhancing the resilience of critical infrastructure includes retrofitting and designing infrastructure to withstand climate-related stress, such as floods, typhoons, and droughts.

2.5.2.3 Stakeholder Engagement

The strategy emphasizes the inclusion of all relevant stakeholders, from government agencies and local communities to scientific organizations. This collaborative approach fosters a collective understanding of climate risks and the co-development of adaptation solutions.

2.5.2.4 Cutting-Edge Technology/ Technological Resilience?

China's commitment to strengthening its climate adaptation capabilities is also evident in its embrace of cutting-edge technology and innovation. The NCCAS recognizes the importance of building local and national capacity to plan, implement, and monitor adaptation measures effectively. This involves the development of human resources, technological capacity, and institutional frameworks. Comprehensive vulnerability and risk assessments help identify the most pressing threats across regions and sectors. These assessments inform targeted adaptation strategies. The country is heavily investing in weather forecasting, early warning systems, and data analytics to better predict and respond to extreme weather events. China's space program has been instrumental in providing data for climate monitoring and disaster management. Satellite technology assists in assessing the impact of climate change and tracking natural disasters. Additionally, innovations in agriculture, such as drought-resistant crops and smart irrigation, are enhancing food security in a changing climate.

2.5.3 Challenges

While China's commitment to strengthening climate adaptation capabilities is commendable, it also faces challenges. Allocating resources for adaptation can be a challenge, given China's vast population and pressing development needs. The scale of adaptation efforts requires substantial funding. China is exploring various financing mechanisms, including public-private partnerships and international climate finance. The scale of adaptation efforts requires substantial funding. China is exploring various financing mechanisms, including public-private partnerships and international climate finance. Ensuring that policies and strategies are implemented uniformly across the vast nation is a logistical challenge. Promoting behavioral change to reduce carbon emissions and enhance climate resilience is an ongoing challenge. Education and awareness campaigns are being utilized to encourage sustainable practices.

China's commitment to strengthening its climate adaptation capabilities is not only a national imperative but a global example of leadership in the face of climate change. Through a holistic NAP and NCCAS, ecosystem restoration, resilient cities, technological innovation, and international collaboration, China is pioneering a path towards climate resilience. As the effects of climate change continue to unfold, the world will closely watch China's progress and look to its experiences as a model for building a more climate-resilient future for all.



2.6 Continuously Improving Climate Change Support Systems (Kinga Biró, Kok Sin Woon)

In this chapter, we explore China's evolving climate change support systems, from its early efforts to its current initiatives, highlighting its dedication to sustainability and a greener future.

China's journey towards addressing climate change began in the 1980s, primarily as a response to environmental degradation within its borders. The realization that unchecked industrialization and economic growth could have dire consequences for the environment prompted the Chinese government to take its first steps towards climate action. China's engagement with international climate agreements marked a significant milestone in its commitment to addressing global climate change. By signing the Kyoto Protocol in 1998 and later ratifying it in 2002, China demonstrated its willingness to collaborate on reducing greenhouse gas emissions. China's climate support systems include substantial investments in renewable energy sources. The country has become a global leader in solar and wind energy production.

The ambitious Belt and Road Initiative (BRI) extends China's influence by exporting its green technology, thereby contributing to global emissions reduction. In 2017, China launched its national carbon trading system, further demonstrating its dedication to carbon neutrality. Additionally, the country pledged to peak its carbon emissions by 2030 and achieve carbon neutrality by 2060. These targets set the stage for significant policy changes and the adoption of low-carbon technologies. China's rapid urbanization has led to the creation of megacities. In response, the Chinese government is promoting sustainable urban planning and development. Initiatives like „Sponge Cities” focus on improving water management and creating more environmentally friendly urban spaces. China has become the largest market for electric vehicles (EVs) globally. The government's subsidies, incentives, and investments in charging infrastructure have accelerated the adoption of EVs and reduced carbon emissions from the transportation sector. China actively collaborates with other nations and international organizations to tackle climate change. Joint projects, such as the China-U.S. Clean Energy Research Center and participation in the Paris Agreement, emphasize China's role as a global climate leader. While China has made significant strides in climate change support systems, it still faces challenges. Balancing economic growth with environmental sustainability is a delicate act, and ongoing efforts are needed to ensure a smooth transition to a low-carbon future. Challenges also include air pollution, water scarcity, and environmental degradation, all of which require comprehensive solutions.

China's continuously improving climate change support systems reflect its commitment to addressing the global climate crisis. From early recognition of the issue to embracing renewable energy, carbon trading, sustainable urban planning, and international collaboration, China has demonstrated its dedication to a greener and more sustainable future. As the country works to overcome challenges and meet ambitious emission reduction goals, its role in the global fight against climate change remains pivotal.

3. Historic Transformations in China's Climate Change Response

China has undergone significant transformations in its approach to climate change response over the years. In this chapter, we will delve into the historical journey of China's efforts to address climate change, highlighting key milestones, challenges, and shifts in policy and practice.



3.1 Synergy Between Economic Development and Pollution Reduction (Li Deng)

China has achieved remarkable economic growth over the past few decades. In 2020, the GDP grew more than fourfold compared to 2005. This growth not only contributed to the nation's overall development but also marked a significant victory in lifting nearly 100 million rural poor out of poverty and completing the arduous task of eradicating absolute poverty. Concurrently, China has made historic achievements in the field of ecological and environmental protection.

China has committed steadfastly to the path of green, low-carbon, and sustainable development. The concept of „green” has become the shining backdrop for the country's high-quality economic development. Furthermore, carbon emissions per unit of GDP have significantly decreased. According to data, in 2021, the proportion of good air quality days in cities at or above the prefecture level was 87.5%, marking a 0.5% year-on-year increase. The concentration of fine particulate matter (PM_{2.5}) was reduced by 9.1% to 30 micrograms per cubic meter, and the proportion of surface water sections with quality levels I to III increased by 1.5% to 84.9%.

The synergy between „pollution reduction” and „carbon reduction” will be a crucial aspect of implementing the new development philosophy and building a new development paradigm in the ecological and environmental field during the „14th Five-Year Plan” period. In 2021, the Political Bureau of the Central Committee of the Communist Party of China emphasized that „achieving synergistic and efficient reduction of pollution and carbon should be the overarching approach to promote comprehensive green transformation of economic and social development.” This signifies that the government will give more emphasis to reducing pollution and lowering carbon emissions in future development.

The „Twenty-First Report” suggests a comprehensive approach to adjusting the industrial structure, controlling pollution, protecting the environment, and responding to climate change. It aims to synergize efforts to reduce carbon emissions, curb pollution, increase greenery, and promote growth, while emphasizing eco-priority, resource conservation, and green and low-carbon development. The guiding principles include highlighting the synergy for enhanced efficiency, strengthening prevention and control at the source, optimizing technological pathways, focusing on innovative mechanisms, and encouraging early attempts.

The primary objective is to achieve a fundamental shift towards synergy in pollution reduction and carbon reduction by 2025. This will lead to a significant structural optimization and clear progress in key regions and sectors, as well as notable achievements in green and low-carbon development. By 2030, the ability to synergize pollution reduction and carbon reduction will significantly improve. It will contribute to achieving the carbon peak target, with significant progress in key areas for controlling atmospheric pollution, such as carbon peak and air quality improvement.

The synergy in pollution control in areas like water, soil, and solid waste will also see substantial advancements. This development strategy underscores that the Chinese government has recognized the synergy between pollution reduction and economic growth. Sustainable economic development necessitates environmental protection, with due consideration for social equity. China's success can serve as a valuable example for other nations, especially those grappling with the delicate balance between economic growth and environmental preservation.

In China’s developmental journey, pollution reduction and carbon reduction are no longer optional but fundamental strategies. These strategies will help China achieve its carbon peak and carbon neutrality goals while offering the world valuable insights into addressing climate change. China’s successful experiences are expected to exert a profound global influence, motivating more countries to take action and advance global sustainability.

3.2 Remarkable Achievements in Energy Production and Consumption (Yunqiao Zhan)

China’s total primary energy production has increased 158-fold in the past 70 years, according to data released at the conference on energy development achievements on the 70th anniversary of the founding of the People’s Republic of China. China had almost no energy industry foundation in the early days of the founding of the People’s Republic of China and has developed into the world’s largest country in energy production.

3.2.1 Energy unit of measurement

To better manage the production and consumption of different energy sources, China has set unified domestic standards for quantitative analysis and calculation in the energy field. According to Chinese national standards, China’s energy measurement unit is coal equivalent (standard coal). The commonly used units of measurement are ton coal equivalent (tce) and kilogram coal equivalent (kgce). 1kg coal equivalent (kgce) = 29.3MJ/kg. The conversion methods of raw coal, crude oil, and natural gas are as follows:

- i. Conversion of raw coal into coal equivalent: equal to the average calorific value 20.9MJ/kg (5000 kcal/kg), the conversion coefficient is 0.714.
- ii. Conversion of crude oil to coal equivalent: equal to the average calorific value of 41.8 MJ/kg (10000 kcal/kg), the conversion coefficient is 1.427.
- iii. Natural gas is converted to coal equivalent: equal to the average calorific value of 39.0 MJ/m³ (9310 kcal/m³), the conversion coefficient is 1.33.

3.2.2 Energy production

Before 2016, China’s policy for developing energy production and consumption was to „expand the total supply and ensure energy demand.” Fossil energy is the primary source of energy production and consumption, especially coal. After 2016, with the promulgation of several national policies, such as the Revolutionary Strategy for Energy Production and Consumption (2016 Me 2030) and the 13th five-year Plan for Energy Development, the development policy of China’s energy and production and consumption has changed to „improving the quality and efficiency of energy production and consumption.” Clean energy has been regarded as a critical object of supply growth. From 2012 to 2022, the total amount of disposable energy production in China showed a steady upward trend (see Table 2), with a growth rate of 41.67%.

Table 2. 2013-2022 China’s total primary energy production (unit: 100 million tons of standard coal)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total energy production	36	36.2	34.6	35.9	37.7	39.7	40.8	43.3	51

However, the proportion of fossil fuels, such as raw coal and crude oil, in primary energy production is decreasing, while the proportion of clean energy, such as natural gas, in primary energy production is increasing. From 2014 to 2022, the proportion of raw coal in total primary energy production decreased by 8.30% (see Table 3), the proportion of crude oil in total primary energy production decreased by 24.10% (see Table 4), and the proportion of natural gas in total primary energy production increased by 25.53% (see table 5).

Table 3. The proportion of raw coal in the total primary energy production in China from 2014 to 2022 (%)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
proportion	73.5	72.2	69.8	69.6	69.2	68.5	67.5	66.7	67.4

Table 4. 2014-2022 The proportion of crude oil in the total primary energy production in China (%)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
proportion	8.3	8.5	8.3	7.6	7.2	6.9	6.8	6.7	6.3

Table 5. 2014-2022 the proportion of natural gas in the total primary energy production in China (%)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
proportion	4.7	4.8	5.2	5.4	5.4	5.6	6	6	5.9

3.2.3 Energy consumption

From 2014 to 2022, China's total energy consumption showed an upward trend (see Table 3-5), with a growth rate of 44.27%. By the end of 2022, China's total energy consumption will reach 5.41 billion tons of standard coal. In response to the call of the United Nations SDG goal, natural gas has always been the first choice for China to realize the green and low-carbon transformation of energy production and consumption. China has always hoped that natural gas will gradually replace fossil energy in industrial, heating, transportation, civil and other fields. From 2014 to 2022, the proportion of natural gas in total energy consumption increased by 1.5 times. On the other hand, coal and oil consumption showed an overall downward trend. According to China's National Bureau of Statistics, non-fossil energy consumption accounted for 18% of total energy consumption in 2022.

Table 6. 2014-2022 Total Energy consumption (in 100 million tons of standard coal)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
proportion	37.5	43.0	43.6	44.9	46.4	48.6	49.8	52.4	54.1

Table 7. 2014-2022 the proportion of coal in total energy consumption (%)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
proportion	65.8	63.8	62.2	60.6	59	57.7	59.9	55.9	56.2

Table 8. 2014-2022 the proportion of oil in total energy consumption (%)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
proportion	17.3	18.4	18.7	18.9	18.9	19	18.8	18.6	17.9

Table 9. 2014-2022 the proportion of natural gas in total energy consumption (%)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
proportion	5.6	5.8	6.1	6.9	7.6	8	8.4	8.8	8.4

3.3 Industrial Decarbonization Driving Green Development (Yunqiao Zhan)

From 2014 to 2022, China made outstanding achievements in energy structure optimization and low carbonization. According to Zhang Jianhua, director of China's National Energy Administration, China's energy consumption per unit of GDP has been reduced by more than 20 percent over the past eight years, equivalent to a reduction of about 1.4 billion tons of standard coal, supporting an average annual growth of 6.2 percent of GDP with an average annual growth of about 3 percent. The quality and efficiency of energy use have risen as expected. The proportion of clean energy consumption of natural gas has gradually increased, accounting for about 1/4 of the total consumption. Clean energy includes hydropower, nuclear power, new energy power generation, etc. In addition, China has also achieved a regional balance between energy supply and demand, and the cross-regional allocation of energy production and consumption is highly efficient through the construction of various energy transmission infrastructures. In 2022, the total mileage of China's long-distance natural gas pipeline will be 118000 km. According to the China Association of Automobile Manufacturers, the production and sales of new energy vehicles in China in 2012 were 17500 and 18000, respectively, and sales rose to 7.058 million and 6.887 million in 2022, with an ultra-high production growth rate of 403% and a sales growth rate of more than 382%

3.5 Green and Low-Carbon Lifestyles Gaining Popularity (Yunqiao Zhan)

Under the guidance of the „dual carbon” goal, various organizations in China formulate measures to change the traditional high-energy consumption lifestyle of residents. The Chinese government actively creates a low-carbon living culture environment, schools carry out low-carbon science education, and the media vigorously promotes low-carbon lifestyles. The popularization of low-carbon lifestyle in China is reflected in the following four aspects: low-carbon lifestyle awareness, low-carbon consumption behavior, low-carbon public participation, and low-carbon policy support.

3.5.1 Low Carbon Lifestyle Awareness

The change in low-carbon living awareness among Chinese residents is reflected in the following two aspects. Firstly, the awareness of low-carbon living, environmental protection, and other related concepts among residents across the country has increased. Baidu is the largest search engine platform in China. According to the Baidu Index, the information index for the.



term ‚low-carbon‘ has increased by 223.65% annually from 2020 to the end of October 2023, indicating a sharp increase in the discussion and promotion of low-carbon concepts among various users in the Chinese internet world over the past three years. The reasons for the changes are as follows: Chinese residents have personally felt the climate and environmental changes in China over the past two decades, residents have more opportunities to be exposed to environmental protection and low-carbon concepts in the era of streaming media, and government and various institutions have provided publicity and education. Secondly, the attitude of Chinese residents towards the contradiction between environmental protection and economic development has changed. In the 40 years after the reform and opening up, the Chinese government’s development philosophy has completed a transformation from „emphasizing the economy over environmental protection” to „green mountains and clear waters are golden mountains and silver mountains.” From 1978 to 2012, under the guidance of China’s economic development policies, the concept of environmental protection, obeying and serving economic development, was widely recognized nationwide from top to bottom. After 2012, environmental protection issues have received unprecedented attention, and the public has gradually accepted the concept of low-carbon living. Moreover, the willingness of domestic residents to pay the cost of low-carbon living has also increased.

3.5.2 Low Carbon Consumption Behavior

With the increase of low-carbon awareness, Chinese residents have completed the transformation from traditional consumption behavior of high energy consumption and high pollution to green consumption behavior of low energy consumption and environmental friendliness. In China’s over 60-year urbanization process, domestic residents habitually used high energy consumption and high pollution household appliances and products, such as non-degradable plastic products. Energy vehicles are also commonly used for transportation, and whether it is low-carbon and environmentally friendly when choosing products is not a factor for consumers to consider. However, with the popularization of low-carbon lifestyles, low-carbon lifestyles such as garbage sorting, new energy vehicles, and shared bicycles have become deeply ingrained in people’s hearts. In 2014, the first shared bicycle brand was established at Peking University, and shared bicycles, a low-carbon mode of transportation, were popularized by college students to the entire society. In 2016, Alibaba launched the Ant Forest application on Alipay, encouraging consumers to make low-carbon payments and fully integrate low-carbon lifestyles into the lives of ordinary people. In 2019, cities in China, led by Shanghai, began to promote garbage classification on a large scale to residents, and environmentally friendly living practices were popularized throughout the country. In January 2022, seven departments, including the National Development and Reform Commission of China, jointly released the „Implementation Plan for Promoting Green Consumption,” committed to promoting low-carbon consumption behavior as a conscious choice for Chinese citizens.

3.5.3 Low Carbon Public Participation

Chinese residents spontaneously engage in low-carbon public participation by supporting low-carbon living policies, practicing low-carbon living behaviors, and promoting low-carbon concepts to others. Driven by Ant Forest, Chinese citizens have a high level of practice in afforestation, environmental protection, and public welfare.



At the same time, the public actively responds to various low-carbon policies and activities of the country and the media, such as reducing the use of disposable products, garbage classification, second-hand trading, green consumption, and other public participation activities.

4. Building a Fair, Reasonable, and Win-Win Global Climate Governance System

4.1 Global Climate Change Challenges (Enikő Ördög)

As we stand on the precipice of an increasingly uncertain environmental future, the global community finds itself confronted with unprecedented challenges stemming from climate change. This subchapter aims to illuminate the pressing issues that define the climate landscape in 2023, emphasizing their relevance to the broader discourse on sustainability and environmental policy. The focus will be on the international stage, with a particular lens on China, given its significant role in shaping the global environmental and climate narrative.

4.1.1 Rising Temperatures and Extreme Weather Events

One of the most tangible manifestations of climate change is the rise in global temperatures. The year 2023 marks another milestone in this trend, with a continuation of the warming pattern observed over recent decades. The consequences of this rise are not only felt in terms of melting ice caps and rising sea levels but also through a surge in extreme weather events. Scientific literature, including the Intergovernmental Panel on Climate Change (IPCC) reports (IPCC, 2021)¹², underscores the link between human activities and the frequency and intensity of heatwaves, hurricanes, and droughts.

4.1.2 Global Sea Level Rise and Impact on Coastal Regions

The melting of polar ice caps contributes to the rise in sea levels, threatening coastal regions worldwide. As temperatures soar, glaciers and ice sheets experience accelerated melting, directly impacting vulnerable ecosystems and communities. Recent studies (Oppenheimer et al., 2022)¹³ highlight the urgency of addressing this issue, emphasizing the need for international collaboration to mitigate the consequences for low-lying regions and island nations. China has thousands of kilometers long coastal lines, as well as islands so it is an extremely relevant issue for them too.

4.1.3 Biodiversity Loss and Ecosystem Disruption

The interconnectedness of climate change and biodiversity loss is increasingly evident. As temperatures shift and extreme weather events become more frequent, ecosystems face disruptions that challenge the survival of numerous species. This subchapter draws attention to the landmark Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem

¹² IPCC. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

¹³ Oppenheimer, M., et al. (2022). Sea Level Rise and Implications for Low-Lying Islands, Coasts, and Communities. Annual Review of Environment and Resources.



Services (IPBES) reports (IPBES, 2019)¹⁴, which emphasize the intricate link between climate change and the loss of biodiversity, with implications for food security, human health, and overall ecosystem stability. In 2022 December the Kunming-Montreal Global Biodiversity Framework was approved, which was chaired by China. The policy aims to put 30% of the planet's ecosystems under protection by 2030, to reverse biodiversity loss trends (UNEP, 2022)¹⁵.

4.2 Policy Responses and the Role of China

Addressing the challenges posed by climate change demands collective action on a global scale. The Paris Agreement, a cornerstone in international efforts, sets the stage for nations to collaborate in mitigating greenhouse gas emissions. China, as the world's largest emitter of carbon dioxide, plays a pivotal role in determining the success of these efforts. Recent policy shifts and commitments from the Chinese government, as discussed in this paper, signal a growing recognition of the need for sustainable practices. However, the success of global climate initiatives remains contingent on continued cooperation and the effective implementation of policies.

4.3 Conclusions

As we navigate the complexities of a changing climate in 2023, the need for proactive and ambitious policies has never been more apparent. This subchapter has provided a snapshot of the challenges that define the global climate landscape, underscoring the urgency for collaborative and decisive action. The inclusion of China in the discourse is essential, given its general influence on the international stage and its actions as a major greenhouse gas emitter. By acknowledging and addressing these challenges head-on, the global community can collectively strive towards a sustainable and resilient future, leaving a lasting legacy for generations to come.

4.4 China's Significant Contribution to Global Climate Governance (Yunqiao Zhan)

The „Belt and Road” is the abbreviation of the „Silk Road Economic Belt” and the „21st Century Maritime Silk Road”. In September and October 2013, Chinese President Xi Jinping initiated cooperation initiatives to build the „New Silk Road Economic Belt” and the „21st Century Maritime Silk Road”. Since then, the Chinese government has continued to promote the discussion and implementation of energy cooperation projects in the „Belt and Road.” Over the past decade, the Chinese government has actively explored climate development issues and promoted green energy projects worldwide through various means, such as international conferences, intergovernmental cooperation platforms, and non-governmental cooperation platforms, contributing to climate management worldwide.

Since October 2013, China has held various conferences on low-carbon development. For example, two „Belt and Road” energy ministers’ meetings were held to actively help countries build the „Belt and Road” energy cooperation partnership.

¹⁴ IPBES. (2019). Global Assessment Report on Biodiversity and Ecosystem Services. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

¹⁵ UNEP (2022) COP15 ends with landmark biodiversity agreement.



At present, the number of member countries has reached 33. The third „the Belt and Road” International Cooperation Summit Forum put forward the „Belt and Road” green development Beijing initiative, formed the „the Belt and Road” green development outlook report and launched the green development investment and financing partnership. The specific achievements include:

- i. „The Belt and Road” 20 Urban Sustainable Development Initiative (released by „the Belt and Road” Sustainable Cities Alliance)
- ii. Green finance supports „the Belt and Road” energy transformation (released at the „Belt and Road” Energy Partnership Forum)
- iii. „The Belt and Road” Energy Cooperation Think Tank Joint Action Proposal (released at the „the Belt and Road” Energy Cooperation Partnership Forum)
- iv. 2023 Annual Report on Green Investment Principles of the „Belt and Road”
- v. The Medium- and Long-term Plan for the Green Investment Principles of the „Belt and Road” 2023-2026

In addition, China has also established government energy cooperation platforms with more than 50 countries and regions and built cooperation bridges with more than 30 energy-related international organizations. At the same time, we have carried out green energy project cooperation with more than 100 countries and regions, taking low-carbon development and green energy as the core theme of the joint construction of the „Belt and Road.” The specific achievements include:

- i. Export of nuclear power technology equipment „Hualong No.1” and export of green technology - ultra-high voltage direct current transmission technology to overseas markets.
- ii. Promoting the development of the international photovoltaic industry, providing approximately 70% of the components to the global market.
- iii. Interconnection with infrastructure such as oil, gas, and electricity in neighboring countries, advocating the development of natural gas and clean energy.

China has actively made efforts in international climate and energy governance, contributing to building a green and clean world and promoting sustainable global energy development.