

China's Policies and Actions on Carbon Peaking and Carbon Neutrality

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Foreword

The “Sixth Assessment Report Synthesis Report: Climate Change 2023” issued by the Intergovernmental Panel on Climate Change (IPCC) highlights that the global surface temperature has surged by 1.1°C 2011–2020 than 1850–1900, and alarmingly, greenhouse gas emissions show a persistent upward trajectory. Based on calculations derived from the 2021-published data on Nationally Determined Contributions (NDCs), it is projected that by 2030, global greenhouse gas emissions could result in a global temperature increase of 1.5°C in the 21st century, posing a formidable challenge to keeping the increase within a 2°C limit. A notable disparity exists between the emissions anticipated through enacted policies and those projected by NDCs. Additionally, the financial resources currently allocated fall short of meeting the necessary levels for all sectors and regions to attain their climate objectives. The global response to climate change is indeed a matter of grave concern.

On September 22, 2020, Chinese President Xi Jinping made a solemn announcement during the 75th United Nations General Assembly General Debate. He declared that China will strive to peak its carbon emissions before 2030 and achieve carbon neutrality by 2060. This “dual carbon” pledge represents a significant and strategic decision for China, signifying not only a proactive measure in addressing climate change and a solemn promise to the international community, but also an intrinsic necessity for driving high-quality development in the country. It will act as a potent catalyst for the comprehensive shift towards sustainability in China’s economic and social development, thereby contributing significantly to global efforts in combating climate change.

In pursuit of the “dual carbon” goals, China is systematically incorporating “dual carbon” initiatives into all sectors and stages of its economic and social development, in a comprehensive and holistic approach. It has established a well-defined, rational, and powerful “1+N” policy system, creating a coordinated framework for various sectors to collectively advance. By the end of June 2023, China had achieved a historic milestone by reaching a renewable energy capacity of approximately 48.8% of the total installed capacity, surpassing coal-fired power. Furthermore, China has committed to refraining from the construction of new coal-fired power projects abroad and has dedicated 20 billion RMB to create the “China Climate Change South-South Cooperation Fund” for assisting other developing nations in their efforts to combat climate change.

From November 30 to December 13, 2023, the 28th United Nations Climate Change Conference (COP28) convened at Dubai in the United Arab Emirates (UAE). COP28 took stoke of the progress worldwide since adopting the Paris Agreement. In this context, consolidating China’s policies and actions pertaining to carbon peaking and neutrality serves a dual purpose. It allows China to share its crucial practices, progress, and achievements in implementing the “dual carbon” strategy with the global community, thereby contributing China’s wisdoms to the realization of the Paris Agreement’s objectives. Furthermore, it aims to provide valuable insights that can guide China’s future efforts in advancing “dual carbon” initiatives.

Policies in this report were collected by the end of December 2023, with most of the statistics collected by the end of 2022 and a small amount of statistics by the end of 2021.

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CONTENTS

01 China's Policies and Initiatives Concerning Carbon Peaking and Neutrality 01

- ▶ National Level..... 02
- ▶ Ministry Level..... 03
- ▶ Local Level..... 08
- ▶ Enterprise Level..... 12

02 Progress and Achievements in China's Carbon Peaking and Carbon Neutrality 13

- ▶ Clean and Low-Carbon Transformation in Energy..... 13
- ▶ Green and Low-Carbon Transformation in Industry..... 19
- ▶ Construction of a Green Transportation System..... 24
- ▶ Improving Green Development in Urban and Rural Construction..... 27
- ▶ Construction of a Circular Economic System..... 29
- ▶ Ecosystem Carbon Sequestration Capacity..... 30
- ▶ Nationwide Green and Low-Carbon Action..... 33
- ▶ Green and Low-Carbon Technological Innovation..... 35
- ▶ Promoting Synergistic Efficiency in Emissions Reduction and Carbon Reduction..... 37
- ▶ Playing the Role of Market Mechanisms..... 39
- ▶ International Cooperation on Dealing with Climate Change..... 40

03 Future Expectations 42

04 References 43



China's Policies and Initiatives Concerning Carbon Peaking and Neutrality

Since the introduction of the “dual carbon” goals, China has leveraged its energy and resource strengths, maintaining a strategy focused on setting clear objectives, rationalizing division of labor, implementing robust measures, and ensuring seamless coordination within the “dual carbon” “1+N” policy framework (Figure 1). In this framework, “1” signifies the high-level design, incorporating the successive releases at the central level of the “Guidelines for Comprehensive Implementation of the New Development Philosophy and the Achievement of Carbon Peak and Neutrality Work” (referring to as “Guidelines”) and the “Carbon Peaking Action Plan Before 2030” (referring to as “Plan”). “N” comprises sector-specific and industry-specific plans for achieving carbon peaking, accompanied by an array of complementary measures.

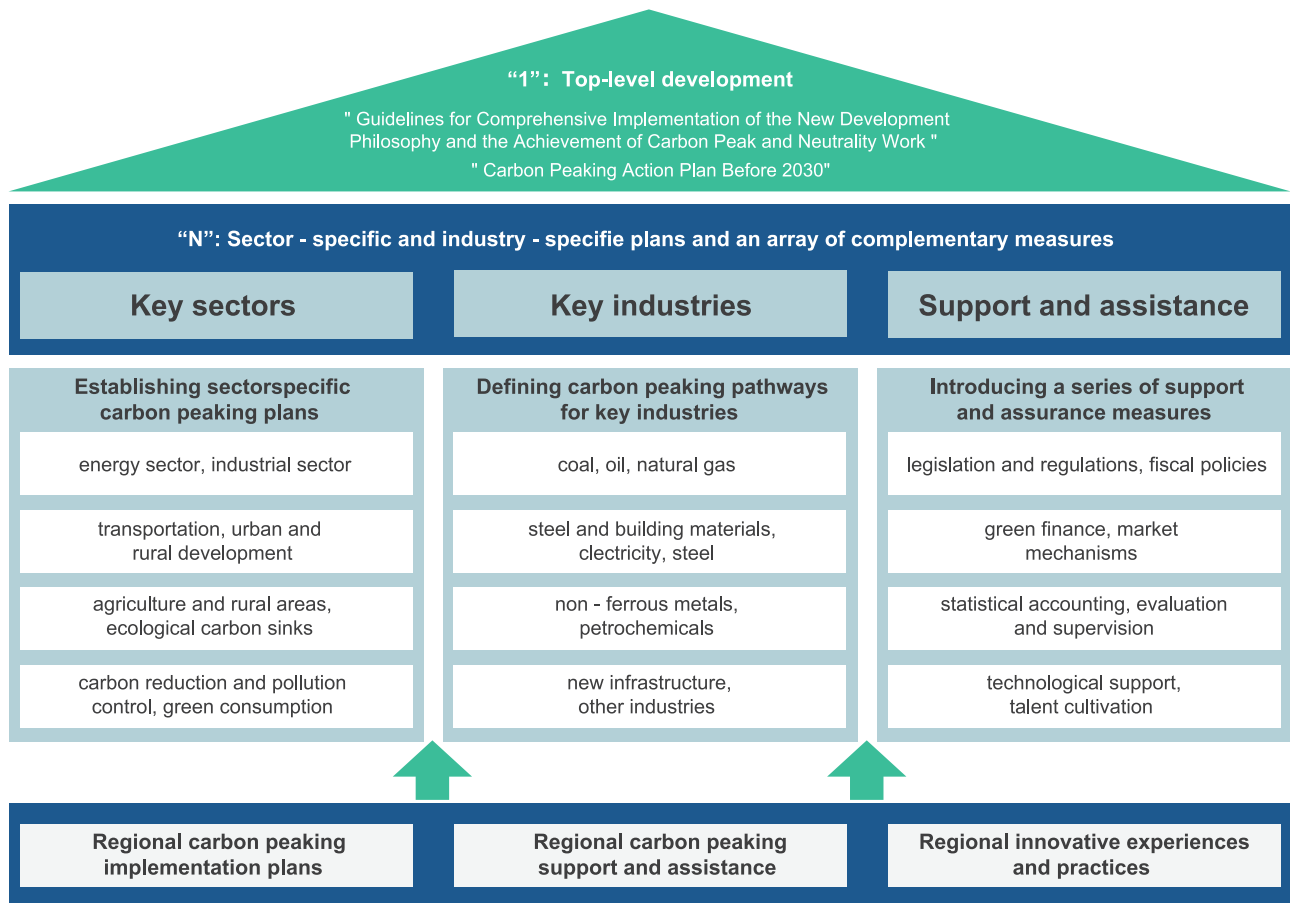


Figure 1. China's Carbon Peaking and Neutrality “1+N” Policy Framework

► National Level

The national “Guidelines” and “Plans” offer a well-defined timetable, roadmap, and framework for the “dual carbon” initiatives. China has seamlessly embedded carbon peaking into all facets and stages of its economic and social development, elucidating the core goals for achieving carbon peaking and neutrality (Table 1). These initiatives encompass a wide range of efforts, such as transitioning to green and low-carbon energy, enhancing energy efficiency, implementing carbon peaking strategies in industrial sectors, urban and rural development, promoting green and low-carbon transportation, embracing circular economy practices for carbon reduction, fostering innovation in green and low-carbon technologies, improving carbon sequestration capabilities, and launching nationwide green and low-carbon programs. Additionally, they involve a step-by-step and well-ordered pursuit of carbon peaking in diverse regions. Together, these actions constitute the comprehensive “Top Ten Carbon Peaking Actions.”

Table 1. China’s Main Objectives for Carbon Peaking and Neutrality

Main Objectives	2025	2030	2060
Energy Consumption Per Unit of GDP Reduced (%)	13.5 ^a	decrease dramatically	——
Carbon Dioxide Emissions Per Unit of GDP Decreased (%)	18 ^b	more than 65 ^c	——
Share of Non-Fossil Energy Consumption (%)	around 20	around 25	more than 80
Forest Coverage (%)	24.1	around 25	——
Forest Volume (100 million cubic meters)	180	190	——
Others	——	wind power and solar power installed capacity exceeds 1.2 billion kilowatts; carbon dioxide emissions reach the peak, followed by a gradual decline	achieving carbon neutrality goal successfully.

Note: Excerpt from the “Guidelines for Comprehensive Implementation of the New Development Philosophy and the Achievement of Carbon Peak and Neutrality Work” and the “Carbon Peaking Action Plan Before 2030”

^a By 2025, energy consumption per unit of GDP will drop by 13.5%, compared with 2020 level

^b By 2025, carbon dioxide emissions per unit of GDP will be lowered by 18% from the 2020 level

^c By 2030, carbon dioxide emissions per unit of GDP will be lowered by 65% from the 2005 level

► Ministry Level

Ministry-level initiatives have been introduced to implement “dual carbon” goals in key sectors and industries, complemented by corresponding support and assistance measures (Table 2). These constitute the “N” component of the “dual carbon” “1+N” policy system. Key sectors include energy, industry, transportation, urban and rural development, agriculture, rural areas, pollution reduction, and carbon reduction. Key industries consist of coal, oil and natural gas, steel, non-ferrous metals, petrochemicals, and building materials. In addition, support and assistance measures include legal regulations, fiscal policies, finance support, market systems, technological innovation, statistical accounting, and various others.

Table 2. Lists of the key policy documents related to “dual carbon” initiatives in China

No.	Release Time	Name of Documents
1	22 February, 2021	State Council’s Guiding Opinions on Accelerating the Establishment of a Sound Green, Low-Carbon, and Circular Development Economic System
2	18 January, 2022	Implementation Plan for Promoting Green Consumption
3	30 January, 2022	Opinions on Improving the System Mechanism and Policy Measures for Energy Green Low-Carbon Transformation
4	19 April, 2022	Action Plan for Strengthening the Education and Training System for Carbon Peaking and Carbon Neutrality in Higher Education
5	22 April, 2022	Implementation Plan for Accelerating the Establishment of a Unified and Standardized Carbon Emission Accounting System
6	25 May, 2022	Opinions on Financial Support for Carbon Peaking and Carbon Neutrality
7	31 May, 2022	Guidelines for Preferential Tax and Fee Policies to Support Green Development
8	1 June, 2022	Green Finance Guidelines for Banks and Insurers
9	10 June, 2022	Implementation Plan for Synergizing Pollution Reduction and Carbon Reduction for Increased Efficiency
10	24 June, 2022	Implementation Opinions on the Implementation of the Communist Party Central Committee and State Council’s Opinion on Fully and Accurately Implementing the New Development Concept and Achieving Carbon Peaking and Carbon Neutrality in the Ministry of Transportation, National Railway Administration, Civil Aviation Administration of China, and State Post Bureau
11	24 June, 2022	Implementation Plan Supported by Technology for Carbon Peaking and Carbon Neutrality (2022-2030)
12	30 June, 2022	Implementation Plan for Agricultural and Rural Emission Reduction and Carbon Sequestration

13	7 July, 2022	Implementation Plan for Carbon Peaking in the Industrial Sector
14	13 July, 2022	Implementation Plan for Carbon Peaking in Urban and Rural Development
15	20 September, 2022	Action Plan for Standardizing Energy Carbon Peaking and Carbon Neutrality
16	18 October, 2022	Implementation Plan for Establishing a Sound Standard Measurement System for Carbon Peaking and Carbon Neutrality
17	2 November, 2022	Implementation Plan for Carbon Peaking in the Building Materials Industry
18	10 November, 2022	Implementation Plan for Carbon Peaking in the Nonferrous Metal Industry
19	1 April, 2023	Guidelines for the Construction of Carbon Peaking and Carbon Neutrality Standard System
20	22 April, 2023	Implementation Plan for Strengthening and Enhancing Ecosystem Carbon Sink Capacity
21	19 October, 2023	Measures for Administration of the Trading of Voluntary Greenhouse Gas Emission Reduction (for Trial Implementation)

Key Areas: Following the proposal of the “Dual Carbon” goals, several ministries, including the National Development and Reform Commission, the Ministry of Ecology and Environment, the National Energy Administration, the Ministry of Industry and Information Technology, the Ministry of Housing and Urban-Rural Development, the Ministry of Agriculture and Rural Affairs, and the Ministry of Transport, among others, have outlined essential tasks and strategies for achieving carbon peaking in critical sectors, encompassing energy, industry, transportation, urban and rural development, agriculture and rural regions, circular economy, ecological carbon sequestration, pollution reduction, and nationwide efforts. In the mean time, they have strengthened pragmatic actions, effectively advancing these pivotal initiatives in a robust and well-organized manner.



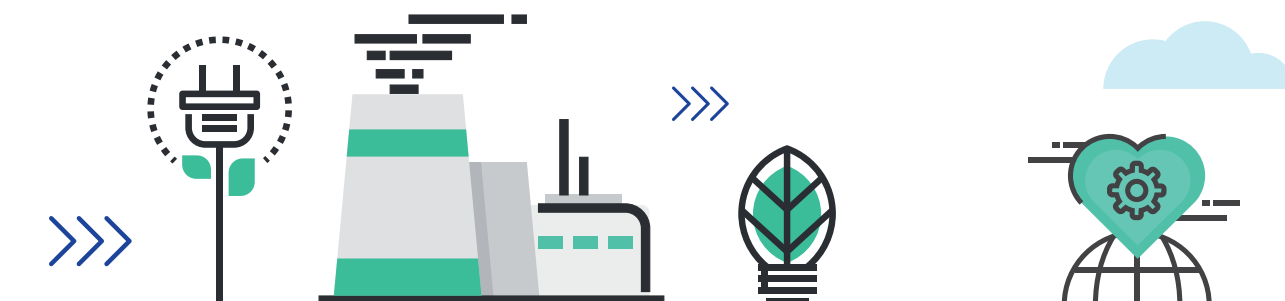
Table 3. China's Key Areas for "Dual Carbon" Targets and Measures

No.	Key Areas	Main Targets and Measures
1	Energy	<ul style="list-style-type: none"> ▪ Vigorous Development of Non-Fossil Energy ▪ Clean and Efficient Use of Fossil Energy ▪ Building a New Power System with Gradually Increasing Proportion of New Energy Sources ▪ Hydrogen Energy Industry and Energy Storage Technologies ▪ Green and Low-Carbon Transformation of the Energy System ▪ Standardization Enhancement
2	Industry	<ul style="list-style-type: none"> ▪ Optimizing and Adjusting Industrial Structure ▪ Promoting Energy Efficiency through Energy Conservation and Recycling ▪ Strengthening and Improving the Green Manufacturing System
3	Transportation	<ul style="list-style-type: none"> ▪ Optimizing Transportation Infrastructure ▪ Promoting Energy-Efficient and Low-Carbon Transportation Vehicles ▪ Construction of Green Transportation Infrastructure
4	Urban and Rural Construction	<ul style="list-style-type: none"> ▪ Green and Low-Carbon Cities, Towns and Villages ▪ Green and Low-Carbon Buildings ▪ Energy-Efficient Buildings ▪ Rural Energy Transformation
5	Agriculture and Rural Areas	<ul style="list-style-type: none"> ▪ Promoting Clean Energy Sources ▪ Optimizing Agricultural Industry Structure ▪ Research and Application of Low-Carbon Technologies
6	Recycling Economy	<ul style="list-style-type: none"> ▪ Recycling of Waste Materials ▪ Recycling and Resource Utilization of Industrial Waste ▪ Circular Economy in Agriculture ▪ Plastic Pollution Control and Reduction of Excessive Packaging
7	Ecological Carbon Sink	<ul style="list-style-type: none"> ▪ Reform of Ecological Compensation System ▪ Ecological Protection and Restoration ▪ Mechanisms for Realizing the Value of Ecological Products ▪ Carbon Sequestration Accounting ▪ Land Greening
8	Action for All	<ul style="list-style-type: none"> ▪ Energy Conservation and Carbon Reduction in Public Institutions ▪ Guiding Enterprises in Carbon Reduction Efforts ▪ Advocating Public Participation and Green Consumption ▪ Strengthening Talent Development
9	Reduce Pollution and Carbon	<ul style="list-style-type: none"> ▪ Strengthening Collaborative Efforts in Source Control ▪ Emphasizing Collaboration in Key Areas ▪ Strengthening Collaborative Environmental Governance ▪ Collaborative Innovation in Management Models

Key Industries: China is committed to implementing industry-specific measures, demonstrating consistent advancements in the reduction of carbon emission intensity and the regulation of carbon emissions. The nation has initiated carbon peak initiatives within pivotal sectors and has developed comprehensive implementation plans and guidelines for carbon peaking in industries like steel, construction materials, petrochemicals, and non-ferrous metals, thereby providing clear and defined pathways toward achieving carbon peaking objectives. Furthermore, it actively promotes the establishment of low-carbon roadmaps for sectors such as consumer goods, equipment manufacturing, and electronics.

Table 4. “Dual Carbon” Tasks and Measures in China’s Key Industries

No.	Key Industries	Main Targets and Measures
1	Steel	<ul style="list-style-type: none"> ▪ Deepening supply-side structural reform ▪ Continuing to streamline the process flow and structure ▪ Exploring new approaches to developing green and low-carbon technologies ▪ Jointly developing green and low-carbon industrial chains
2	Construction Materials	<ul style="list-style-type: none"> ▪ Strengthening volume control ▪ Advancing raw material replacement ▪ Transforming energy consumption structure ▪ Accelerating technological innovation
3	Petrochemicals and Chemical Industry	<ul style="list-style-type: none"> ▪ Increasing the proportion of low-carbon raw materials ▪ Reasonably control the scale of coal-to-oil and coal-to-gas production capacity ▪ Developing technology for producing high-value chemicals from renewable energy sources ▪ Promoting the application of green and low-carbon technology and equipment
4	Non-Ferrous Metals	<ul style="list-style-type: none"> ▪ Optimizing smelting capacity scale ▪ Adjusting and upgrading the industrial structure ▪ Promoting technology to save energy and reduce carbon footprint ▪ Advancing clean energy alternatives ▪ Building a green manufacturing system



Support and Guarantee. In order to ensure the successful achievement of the “Dual Carbon” objectives, various government departments, including the Ministry of Ecology and Environment, the Ministry of Finance, the Ministry of Science and Technology, the National Bureau of Statistics, and the State Administration for Market Regulation, have collaboratively devised a comprehensive framework of institutional safeguards and policy support. These encompass critical domains such as legislation, financial and fiscal measures, market structures, technological innovation, and statistical tracking. These measures collectively serve as a robust foundation for the successful execution of the “Dual Carbon” agenda.

Table 5. Key Tasks and Measures in the Realm of Support and Assurance for China’s “Dual Carbon” Goals

No.	Key Aspects	Main Targets and Measures
1	Legal Framework	<ul style="list-style-type: none"> ▪ Providing legal services to actively and prudently advance carbon peaking and carbon neutrality ▪ Revising existing relevant laws in areas such as pollution control, natural resources, and energy ▪ Expediting the formulation of comprehensive laws and regulations to address climate change
2	Financial and Fiscal Measures	<ul style="list-style-type: none"> ▪ Increasing financial support from the government ▪ Expanding the coverage of government green procurement ▪ Implementing tax incentives ▪ Providing special purpose loans and green finance.
3	Market Mechanisms	<ul style="list-style-type: none"> ▪ Implementing the “Measures for the Administration of Carbon Emissions Trading (for Trial Implementation)” and the “Measures for Administration of the Trading of Voluntary Greenhouse Gas Emission Reduction (for Trial Implementation)” ▪ Establishing and improving supporting systems for carbon emission rights registration, trading, settlement, and verification of enterprise greenhouse gas emissions reports ▪ Accelerating the revision of the “Measures for Administration of the Trading of Voluntary Greenhouse Gas Emission Reduction (for Trial Implementation)” and related technical specifications ▪ Providing guidance for green electricity trading and the operation of the electricity market
4	Technological Innovation	<ul style="list-style-type: none"> ▪ Strengthening basic research ▪ Reinforcing technology research and development ▪ Enlarging application demonstrations ▪ Dissemination of achievements ▪ Popularizing talent development and more. ▪ Boosting the cultivation of skillful talents
5	International Cooperation	<ul style="list-style-type: none"> ▪ Actively and extensively participating in global climate governance ▪ Strengthening cooperation in the energy sector ▪ Enhancing cooperation in low-carbon technology innovation ▪ Conducting international cooperation in green economy, finance, and more ▪ Strengthening cooperation in low-carbon standards and carbon measurement, among other areas

► Local Level

Based on their unique resource endowments, industrial structures, developmental stages, and regional strategic priorities, all provinces, autonomous regions, and municipalities have crafted localized carbon peaking action plans. These plans are closely aligned with strategies for regional coordination and the specific goals of key functional zones. These plans outline practical and achievable task objectives. Notably, Liaoning and Shandong provinces have set targets for a 14.5% reduction in energy consumption per unit of regional GDP by 2020, higher than the national target (Figure 2). Meanwhile, provinces like Shanghai, Sichuan, and Shandong have proposed even more aggressive targets for reducing carbon dioxide emissions per unit of regional GDP, using 2005 as a baseline year (Figure 3). Additionally, provinces such as Qinghai, Hainan, and Sichuan have established the most ambitious targets for the share of non-fossil energy consumption in 2025 and 2030, significantly higher than the national requirements (Figure 4).

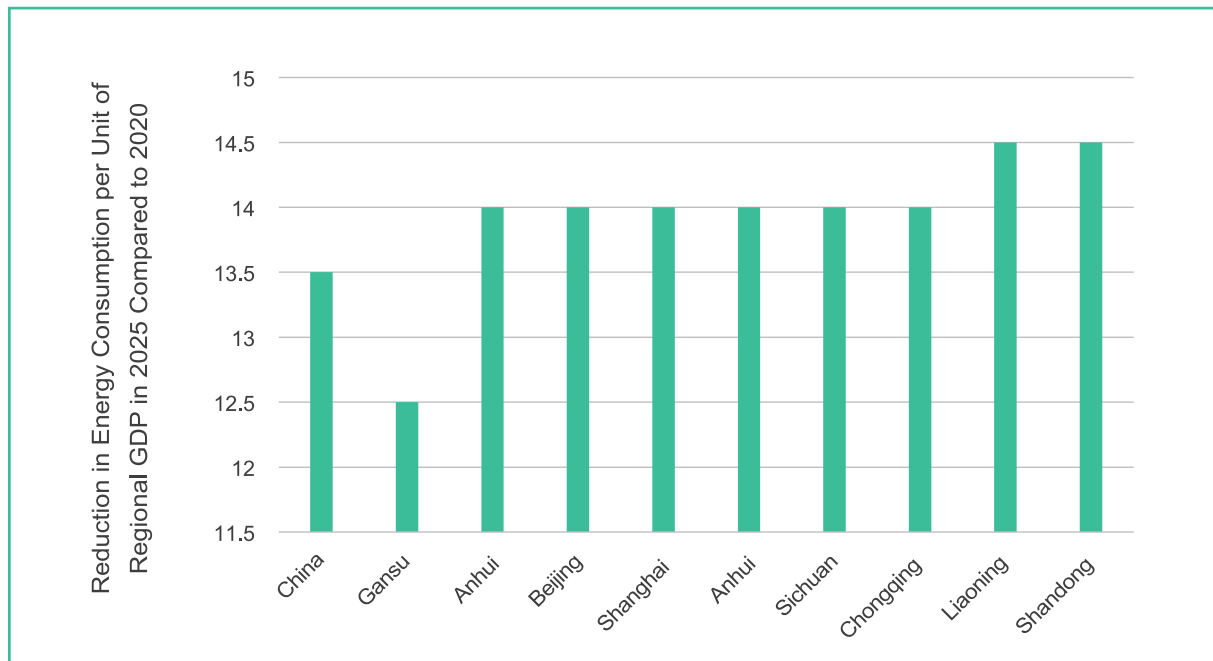


Figure 2. 2025 Targets for Energy Consumption Per Unit of Regional GDP Across Different Regions

Data source: Carbon Peaking Implementation Plans of Various Provinces, featuring only regions with specified target data displayed on the graph.

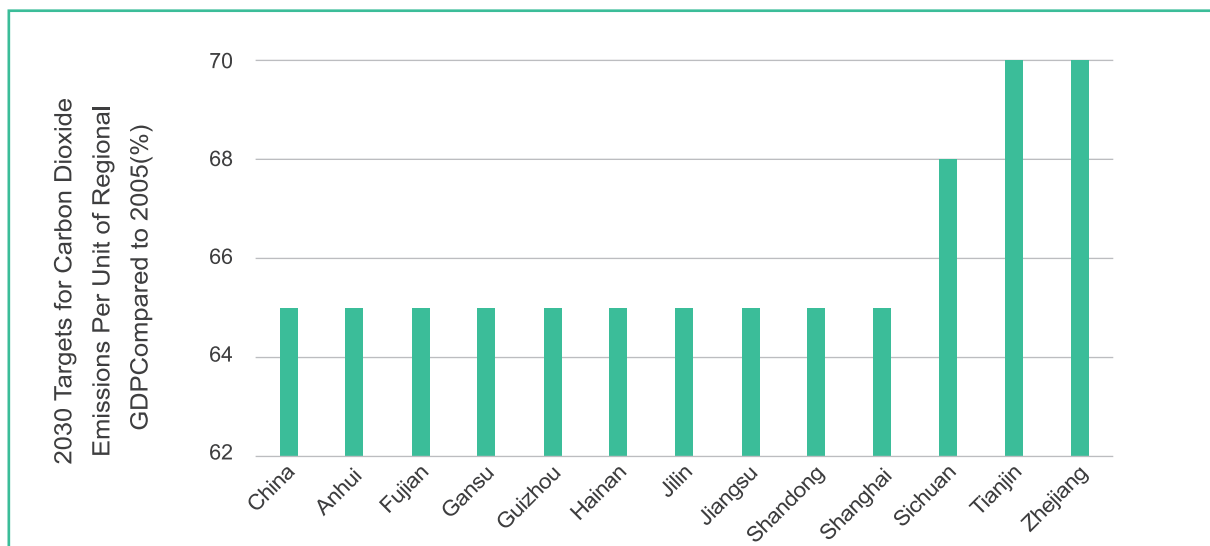


Figure 3. Regional Requirements for the 2030 Targets for Carbon Dioxide Emissions Per Unit of Regional GDP

Data source: Carbon Peaking Implementation Plans of Various Provinces, shown on the graph only regions that provided specific target data.

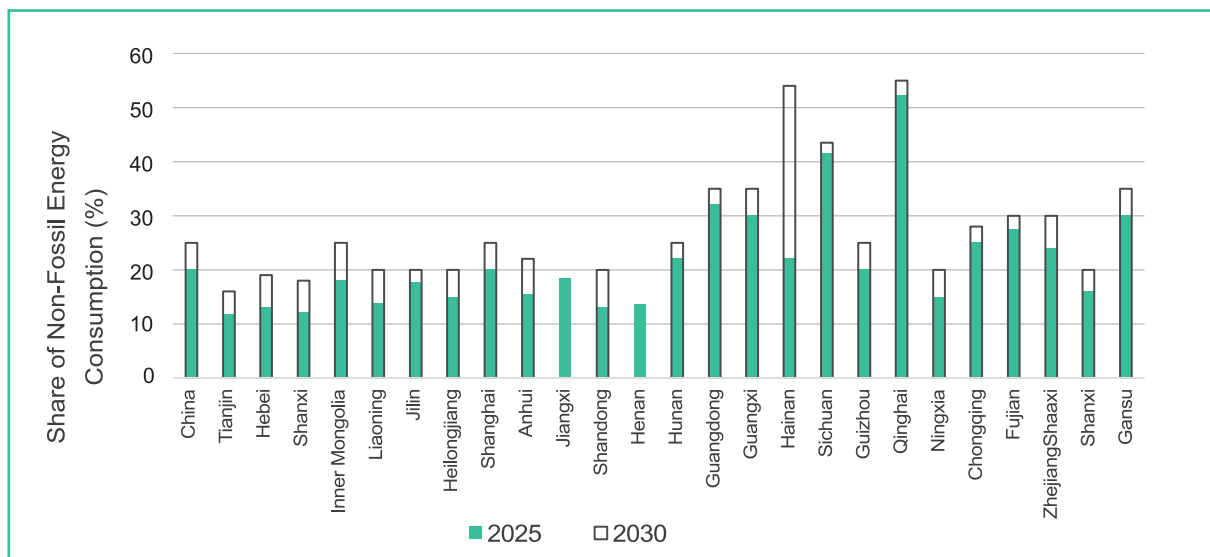


Figure 4. 2025 and 2030 Targets for Changes in the Share of Non-Fossil Energy Consumption Across Different Regions

Data source: Carbon Peaking Implementation Plans of Various Provinces, with only regions that provided specific target data shown on the graph.

In order to ensure the timely attainment of the “Dual Carbon” objectives, provinces, autonomous regions, and municipalities have conscientiously embraced national directives pertaining to “Dual Carbon” objectives. They have devised and enhanced their localized “Dual Carbon” policy frameworks, taking into consideration regional disparities and pioneering innovative approaches, as exemplified in Table 6. Several provinces have integrated “Dual Carbon” endeavors into overarching strategic projects such as the development of the Yangtze River Economic Belt, the establishment of the Guangdong-Hong Kong-Macao Greater Bay Area, the advancement of the Chengdu-Chongqing Economic Circle, the preservation of the ecological integrity and promotion of high-quality development in the Yellow River basin, and similar strategic endeavors.

Table 6. Key Tasks and Measures for “Dual Carbon” Initiatives in Various Sectors at the Local Level

No.	Areas	Main Targets and Measures of All Regions
1	Energy	<ul style="list-style-type: none"> Coastal provinces such as Shanghai and Jiangsu are vigorously developing offshore wind power Northwestern provinces like Inner Mongolia, Gansu, Qinghai and Xinjiang are establishing large-scale wind and solar power bases Southwestern provinces, including Yunnan and Sichuan, are deeply promoting hydropower Major coal-producing provinces such as Shanxi, Inner Mongolia, and Shaanxi are pushing for clean and efficient coal utilization
2	Industry	<ul style="list-style-type: none"> Steel-producing provinces with large output like Hebei, Jiangsu, and Shandong are promoting green and low-carbon development in the steel industry Provinces like Fujian, Guangdong, Jiangsu, Anhui, and Shandong are advancing the green development of the building materials sector Efforts in textile industry green and low-carbon development are being led by provinces such as Zhejiang, Jiangsu, Shandong, and Henan Provinces like Shandong, Jiangsu, Hebei, and Tianjin are driving high-quality development in the petrochemical and chemical industry
3	Urban and Rural Development	<ul style="list-style-type: none"> Municipalities and provinces including Beijing, Anhui, Heilongjiang, and Inner Mongolia are accelerating green and energy-efficient construction Beijing, Zhejiang, Guizhou, Hainan, and others are promoting the development of prefabricated buildings Northern regions like Hebei, Heilongjiang, and Shaanxi are promoting clean heating in rural areas
4	Transportation	<ul style="list-style-type: none"> Provinces like Fujian, Guangxi, Hainan, Jiangsu, and Qinghai are developing the new energy vehicle industry Jiangsu, Henan, Hebei, and Shandong are promoting a shift from road and water to rail transportation Hubei and other provinces are developing the green and intelligent shipping industry
5	Circular Economy	<ul style="list-style-type: none"> Promoting approximately 100 cities at the prefecture level and above to implement the “Zero Waste City” construction Provinces like Fujian and Hainan are promoting the resource utilization of construction waste Zhejiang, Fujian, Shandong, Tianjin, and other provinces are carrying out the recycling of waste materials

6	Technological Innovation	<ul style="list-style-type: none"> ▪ Municipalities and provinces including Anhui, Hebei, Hunan, Hubei, Jiangsu, Jiangxi, Ningxia, Qinghai, Shanghai, and Tianjin have issued technology support plans for carbon peaking and carbon neutrality ▪ Beijing, Sichuan, Inner Mongolia, and other provinces are conducting green and low-carbon technology innovation and demonstration projects
7	Enhancing Carbon Sequestration	<ul style="list-style-type: none"> ▪ Provinces like Gansu, Jilin, Henan, Guangdong, Hunan, Jiangsu, Jiangxi, Shanghai, Yunnan, and others have put forth measures for scientific afforestation ▪ Qinghai, Gansu, Tibet, Heilongjiang, and other provinces are strengthening grassland protection and restoration ▪ Focus on emissions reduction and carbon sequestration in agriculture and rural areas in provinces like Fujian, Hubei, Hunan, Henan, and Jiangxi ▪ Establishing and perfecting mechanisms for realizing the value of ecological products in provinces such as Guangdong, Guizhou, Hebei, and Jiangxi ▪ Developing marine ecosystems as carbon sinks in coastal provinces like Zhejiang, Hainan, Guangdong, and Shandong
8	National Efforts	<ul style="list-style-type: none"> ▪ Provinces including Ningxia, Chongqing, Guizhou, Fujian, Jiangsu, Shandong, Sichuan, Tianjin, and others are promoting energy conservation and carbon reduction in public institutions ▪ Issuing green and low-carbon plans for major events in provinces like Shanxi, Heilongjiang, Fujian, and Shandong ▪ Provinces like Hebei, Guizhou, Fujian, Jiangsu, Shanxi, and Yunnan have issued plans for promoting green consumption ▪ Providing guidance on corporate carbon peaking in provinces such as Beijing and Sichuan ▪ Promoting carbon-inclusive mechanisms in provinces like Tianjin, Shanghai, Hainan, and Shandong
9	Support and Assistance	<ul style="list-style-type: none"> ▪ Provinces such as Liaoning, Hunan, Tianjin, and others have committed themselves to providing financial support for the objectives of carbon peaking and carbon neutrality ▪ Initiatives to foster green finance are being championed in provinces like Zhejiang, Guangdong, Sichuan, and Chongqing ▪ In the city of Tianjin, regulations have been instituted to advance the goals of carbon peaking and carbon neutrality ▪ Provinces such as Beijing, Guangdong, Shanghai, and Chongqing are actively expanding their carbon markets

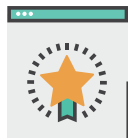
► Enterprise Level

At the enterprise level, China has mandated State-owned enterprises to develop customized carbon peaking action plans. These plans aim to drive industrial structural transformation and upgrade, optimize energy structures, foster green and low-carbon technological innovation, and facilitate concurrent progress in pollution reduction and carbon emissions reduction for enhanced efficiency. Private enterprises are also encouraged to actively participate in the advancement of “Dual Carbon” initiatives, including engagement in carbon emissions trading and energy rights trading. A number of State-owned and private enterprises have taken proactive steps to formulate their “Dual Carbon” action plans. These plans outline pivotal tasks and strategies designed to attain the dual carbon objectives (as detailed in Table 7). On July 10, 2023, a joint effort has been witnessed, with 12 industry associations and 19 corporate leaders from various sectors—ranging from electricity and steel to construction materials, petrochemicals, and non-ferrous metals—jointly endorsing the “Declaration on Carbon Peaking and Carbon Neutrality in Key Industry Sectors”¹.

Table 7. Action Plans on Carbon Peaking and Carbon Neutrality for State-Owned and Private Enterprises in China

Industry Sector	Action Plan Title	Key Tasks
Financial Sector	Carbon Peaking and Carbon Neutrality White Paper for CITIC Group	Providing financing solutions for industry decarbonization
	Ant Group's carbon neutrality roadmap	While reducing its carbon emissions, it drives the upstream and downstream of the industrial chain to jointly implement carbon reduction initiatives and promotes the green investment to guide the flow of capital to low-carbon areas.
Energy	Carbon Peaking and Carbon Neutrality Action Plan for China Energy Construction	Constructing a new type of power system
	Carbon Peaking and Carbon Neutrality Action Plan for State Grid Corporation of China	Energy transformation and green development
	High-Quality 'Dual Carbon' Action Report for State Grid Zhejiang Electric Power	Constructing a new type of power system
	Carbon Peaking Plan for Harbin Electric Group	Environmental protection industry development, comprehensive layout of hydrogen energy industry chain
	Outline of Carbon Peaking and Carbon Neutrality Action for China Datang Corporation	New energy substitution and technological innovation in the power industry
	Action Plan for Carbon Peaking and Carbon Neutrality for China National Nuclear Corporation	Developing the nuclear energy industry, technological innovation, and constructing a diversified clean energy system
	LONGi “Decarbonization” Green Energy Solutions	“Multi-energy complementation/power generation, transmission, loading, and storage solution”, “Photovoltaic green hydrogen”, “High energy consumption decarbonization solution”, “Ecological restoration solution”, “Rural revitalization solution”
Steel Industry	Carbon Peaking and Carbon Neutrality declaration for An steel Group Limited	In 2025, the total carbon emissions will reach the peak, and in 2030, the industrialization of cutting-edge metallurgical technology will be achieved. The total carbon emissions will be reduced by 30% than in 2035, and will become the first large steel enterprises in China to achieve carbon neutrality.
	Carbon Neutrality Action Plan for China Baowu Steel Group	Accelerating its low-carbon development through technology innovations, business's decarbonization, carbon asset management and green culture.
Construction	Carbon Peaking and Carbon Neutrality Action Plan for China Merchants Group	Green manufacturing, green construction, etc.
Telecommunications Industry	Carbon Peaking and Carbon Neutrality White Paper for China Mobile	Three action lines: energy efficiency, clean energy, and enabling; six pathways: green network, green energy use, green supply chain, green office, green empowerment, and green culture, among others
	Carbon Peaking and Carbon Neutrality Action Plan for China Telecom	Efficiently supporting “New Infrastructure” and the green development of the digital economy
	Carbon Peaking and Carbon Neutrality Action Plan for China Unicom	Green infrastructure of communication network
Energy Efficiency	Carbon Peaking and Carbon Neutrality Action Plan for Energy Efficiency in China	Green power, pollution control, green building, comprehensive energy, ecological product value realization mechanism, standard setting, zero-carbon technology industry incubation, etc.
Transportation	Carbon Peaking and Carbon Neutrality Action Plan for China Southern Airlines	Promoting clean energy and enhancing operational management efficiency

¹ Government of China. Focusing on Achieving the “Dual Carbon” Goals and Jointly Promoting Green Development—Remarks on the Occasion of the 33rd National Energy Conservation Publicity Week Launch [EB/OL]. (2023-07-11)[2023-10-10]. https://www.gov.cn/yaowen/liebiao/202307/content_6891039.htm



Progress and Achievements in China's Carbon Peaking and Carbon Neutrality

Since the introduction of the “Dual Carbon” objectives, regions, departments, industries, and enterprises have diligently adhered to the high-level directives of the “Dual Carbon” initiatives. They have put these directives into action by implementing policies and measures, strengthening practical efforts, and efficiently advancing critical initiatives in an organized and methodical fashion. This concerted effort has yielded significant achievements across multiple fronts, covering energy, industry, transportation, urban and rural development, circular economy, ecological carbon sequestration, nationwide initiatives, pollution reduction, carbon abatement, and technological innovation.

► Clean and Low-Carbon Transformation in Energy

China's energy consumption structure is rapidly transitioning towards cleaner and low-carbon alternatives. The country has launched robust initiatives to substitute low-carbon energy sources for high-carbon ones and to promote the use of renewable energy instead of fossil fuels. Simultaneously, stringent measures are in place to control the addition of coal-fired power projects. From 2013 to 2022, China saw a reduction in coal consumption from 67.4% to 56.2%, accompanied by an increase in non-fossil energy consumption from 10.2% to 17.5% (Figure 5). China has systematically conserve energy and reduce consumption when burning coal for power, transform heating methods of coal-based power generation, and increase flexibility, i.e., “Triple Transformation” reforms. In 2022, these reforms were successfully implemented for coal-fired units with a total capacity exceeding 290 million kilowatts. By the end of 2022, China had cumulatively transformed more than 1.06 billion kilowatts of coal-fired power units into ultra-low emissions systems, accounting for approximately 94% of the total coal-fired installed capacity. Furthermore, there was a 0.3% reduction in the average coal consumption rate for thermal power units². China has also taken proactive steps to integrate oil and gas exploration and development with the expansion of new energy sources. In 2022, crude oil production marked a steady increase for the fourth consecutive year, and natural gas production achieved incremental growth of over 10 billion cubic meters for the sixth consecutive year³ (Figure 6).

² China Electricity Council. China Electric Power Industry Annual Development Report 2023 [R]. 2023.

³ National Energy Administration. Top Ten Landmark Achievements in Oil and Gas Exploration and Development Nationwide in 2022. [EB/OL]. (2023-1-20)[2023-10-16] [EB/OL]. (2023-1-20)[2023-10-16]. http://www.nea.gov.cn/2023-01/20/c_1310692197.htm

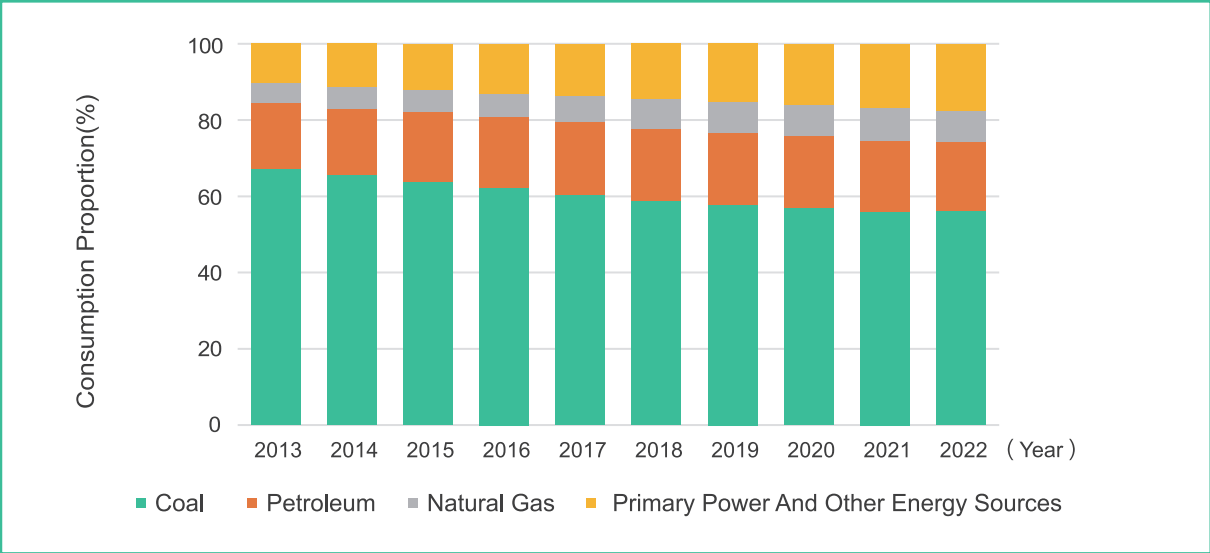


Figure 5. China's Energy Consumption Structure from 2013 to 2022

Data source: National Bureau of Statistics, National Development and Reform Commission

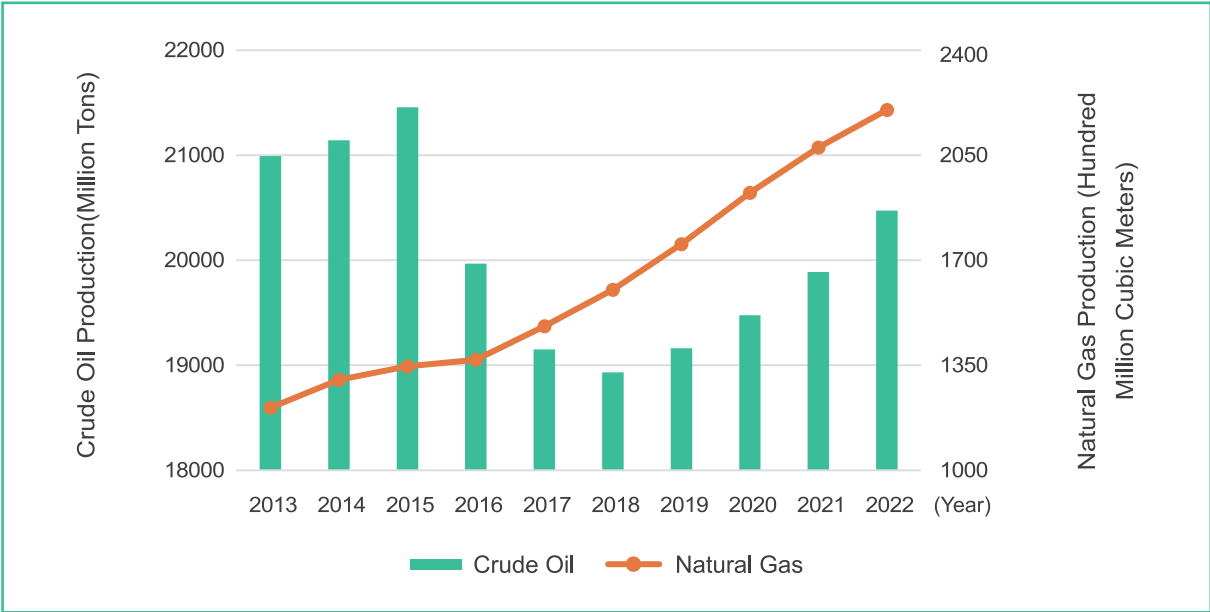


Figure 6. Changes in China's Petroleum and Natural Gas Production from 2013 to 2022

Data source: National Bureau of Statistics

Renewable energy has emerged as the cornerstone of China's newly added power generation capacity. In the course of advancing the transition to clean and low-carbon energy, China has accorded precedence to non-fossil energy sources in its energy development strategy. In 2022, China installed 152 million kilowatts of new renewable energy capacity, representing a substantial 76.2% of the country's total new power generation capacity. This notable addition includes 37.63 million kilowatts of new wind power, 87.41 million kilowatts of new solar power, 15.07 million kilowatts of new conventional hydropower, and 8.8 million kilowatts of new pumped storage capacity⁴. Notably, China maintains its position as the world's primary contributor to the expansion of renewable energy power generation capacity, accounting for a remarkable 51.7% of the global increase in 2022 (Figure 7).

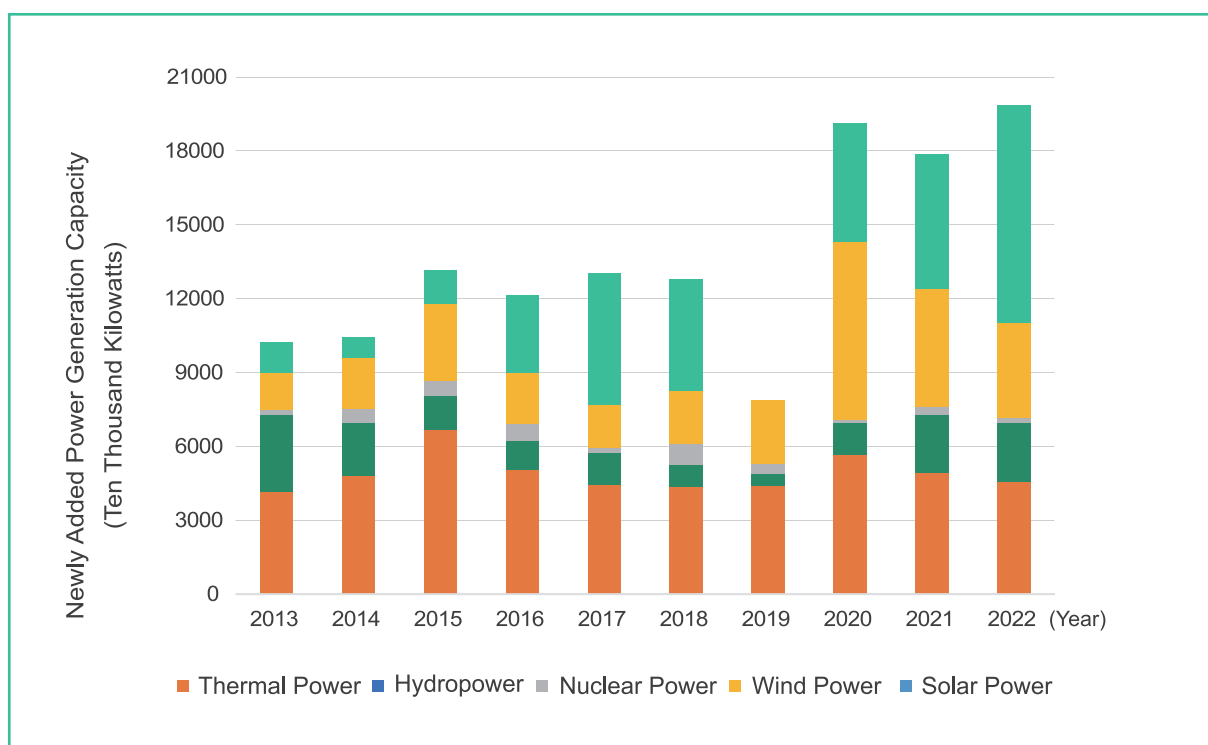


Figure 7. New Power Generation Capacity and Composition in China from 2013 to 2022

Data source: China Electricity Council

⁴ Government of China. The National Energy Administration released the development status of renewable energy in 2022 and introduced the progress of work on improving the renewable energy green power certificate system [EB/OL]. (2023-2-14)[2023-10-16]. https://www.gov.cn/xinwen/2023-02/14/content_5741481.htm?eqid=ddaae0aa0052b1c6000000046472bd19

The installed capacity and power generation of renewable energy have continued to grow rapidly, maintaining a consistent position as the global leader. By the first half of 2023, China's renewable energy installed capacity had reached 1.322 billion kilowatts, reflecting an 18.2% year-on-year increase. This achievement marks a significant milestone as it surpasses coal-fired power and accounts for approximately 48.8% of China's total installed capacity. It has consistently exceeded global averages for several years (Figure 8). In 2022, China's renewable energy power generation reached 2.7 trillion kilowatt-hours (Figure 9), constituting 31.6% of the total electricity consumption in the entire society.

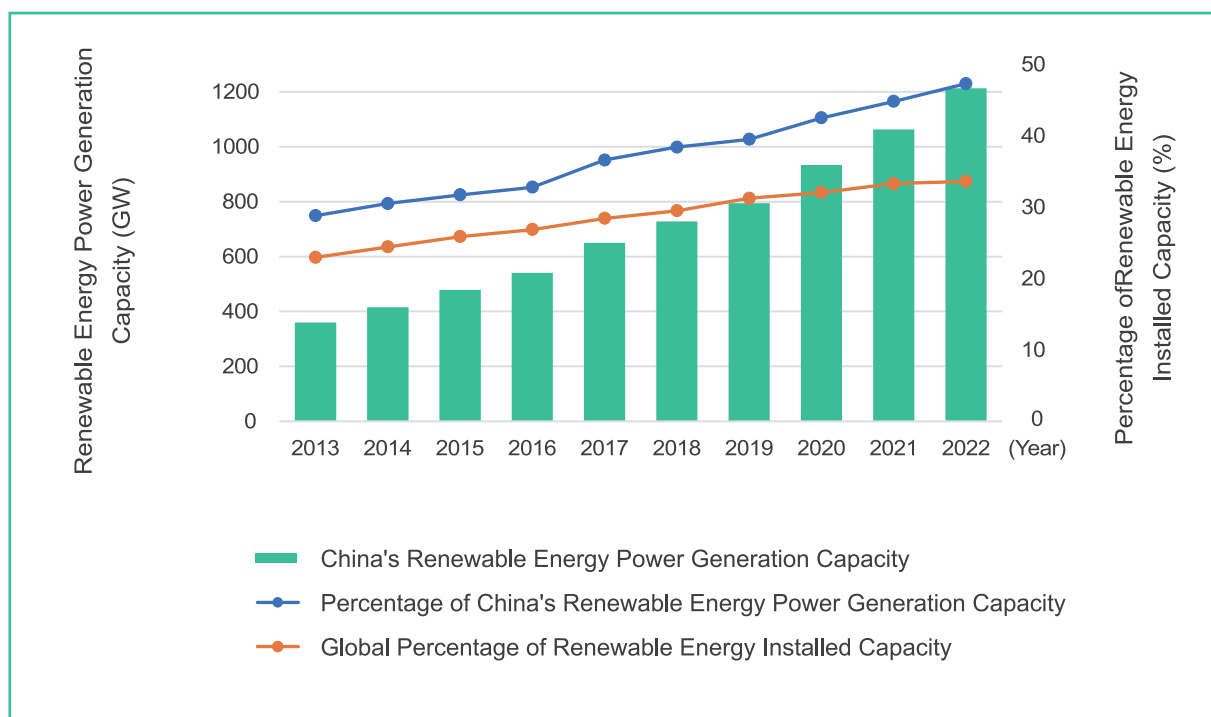


Figure 8. Renewable Energy Installed Capacity in China from 2013 to 2022

Data Source: National Energy Administration, China Electricity Council, IRENA, IEA

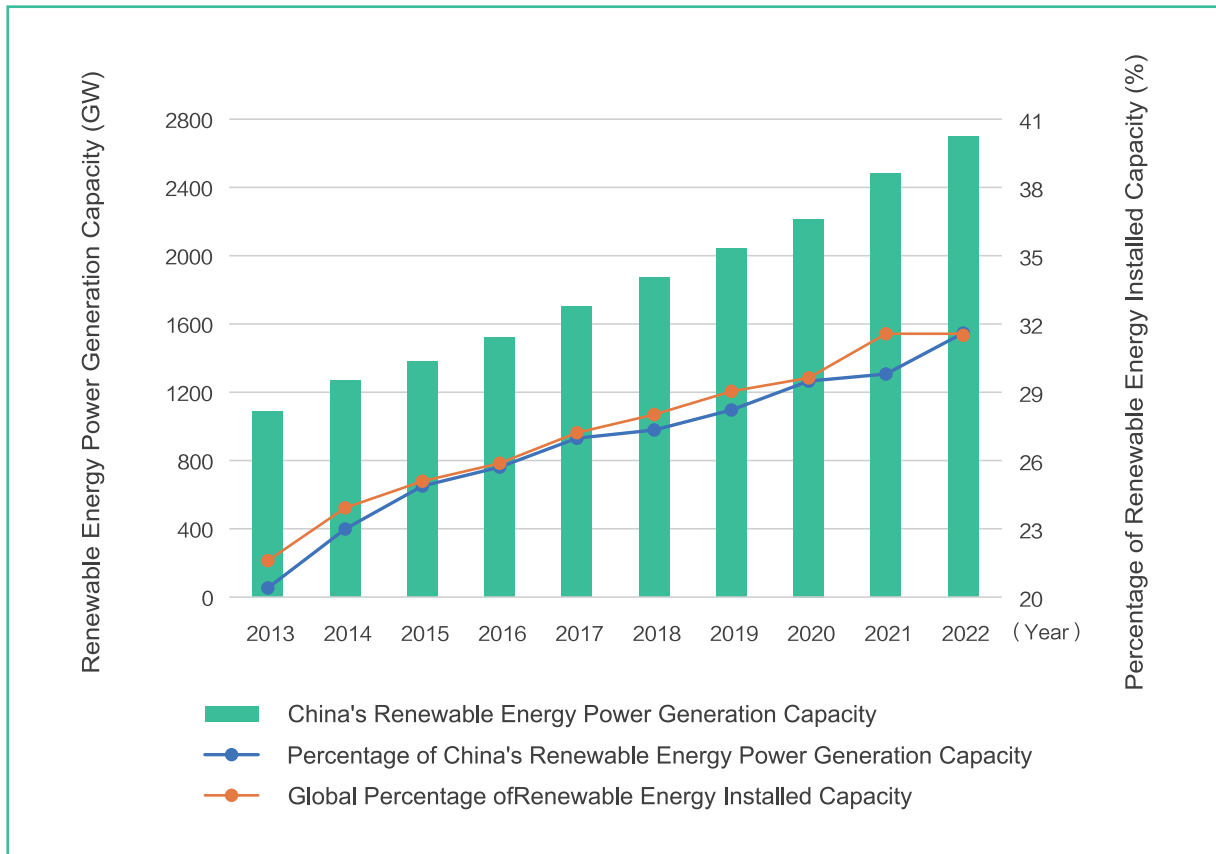


Figure 9. Renewable Energy Power Generation in China from 2013 to 2022

Data Source: National Energy Administration, China Electricity Council, IRENA, IEA



The hydrogen energy storage industry has developed rapidly. The production of hydrogen energy has been rising recent years, from 1.6 million tons in 2012 to 3.3 million tons in 2022 (Figure 10). As of the end of 2022, China had commissioned a cumulative installed capacity of 59.8 gigawatts in electric energy storage projects, accounting for 25% of the total global capacity, with an impressive average annual growth rate of 38%⁵. Among them, 8.7 million kilowatts of new energy storage projects have been put into operation, with an increase of 110% than 2021⁶. In terms of the newly commissioned capacity in 2022, compressed air energy storage and flow battery energy storage technologies represented 3.4% and 2.3%, respectively.

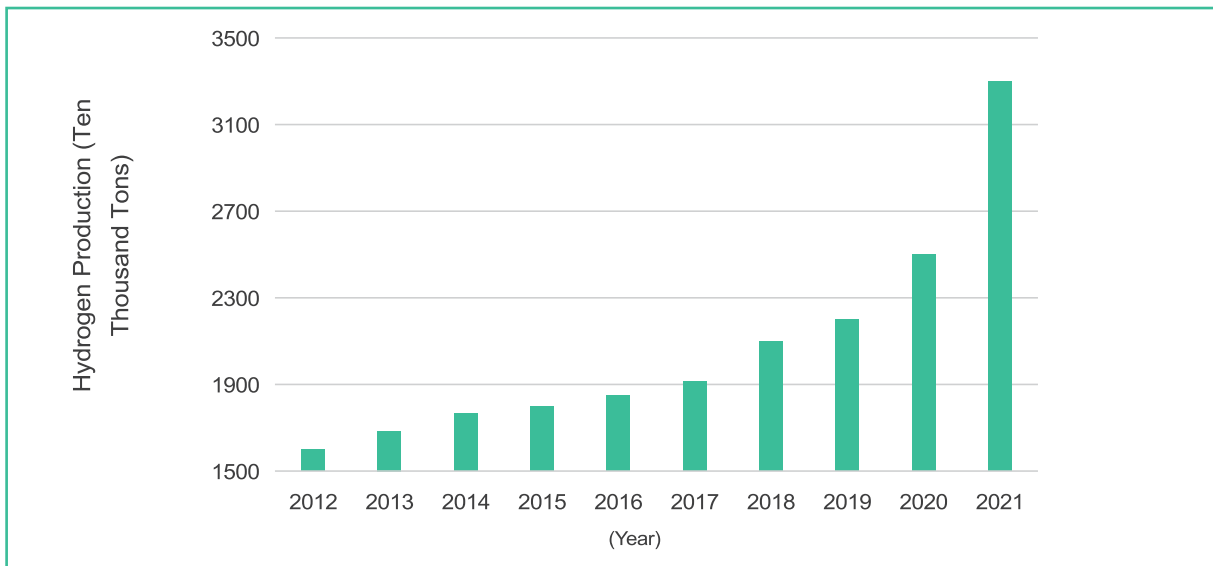
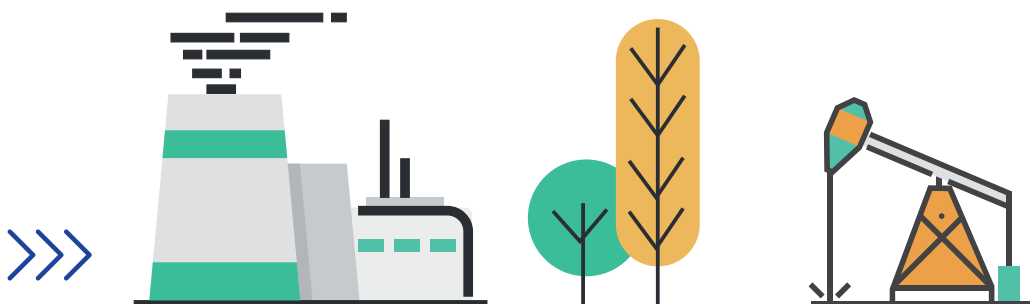


Figure 10. Hydrogen Production in China from 2012 to 2021

Data Source: China Coal Industry Association, KPMG



⁵ China Energy Research Association. Energy Storage Industry Research White Paper 2023 [M]. 2023.

⁶ National Energy Administration. Transcript of the National Energy Administration's Press Conference for the First Quarter of 2023 [EB/OL]. (2022-2-13)[2023-10-16]. https://www.nea.gov.cn/2023-02/13/c_1310697149.htm

► Green and Low-Carbon Transformation in Industry

As China's three industries continue to undergo structural upgrades, the internal landscape of the industrial sector is consistently refined through strategic adjustments. The relative proportion of these three sectors has evolved from 8.9:44.2:46.9 in 2013 to 7.3:39.9:52.8 in 2022 (as shown in Figure 11). Comprehensive efforts have been exerted to ensure the ongoing refinement of the industry's internal structure and organization. During the 13th Five-Year Plan period, China successfully phased out an excess of over 150 million tons of steel production capacity and more than 300 million tons of surplus cement production capacity. In this process, sub-standard steel was entirely eliminated, and outdated capacities in industries such as electrolytic aluminum and cement were significantly reduced⁷. By 2022, 99.41% of blast furnace processes and 84.92% of converter processes in China achieved benchmark efficiency levels. This resulted in a 4% reduction in comprehensive energy consumption per ton of steel, which now stands at 551.36 kilograms of standard coal per ton, as compared to 2015 figures. China has taken robust measures to curb the unchecked development of high-energy-consuming and highly polluting projects. In 2021, the number of projects featuring “two high and one low” was significantly slashed, leading to a decrease in the demand for approximately 270 million tons of standard coal⁸.

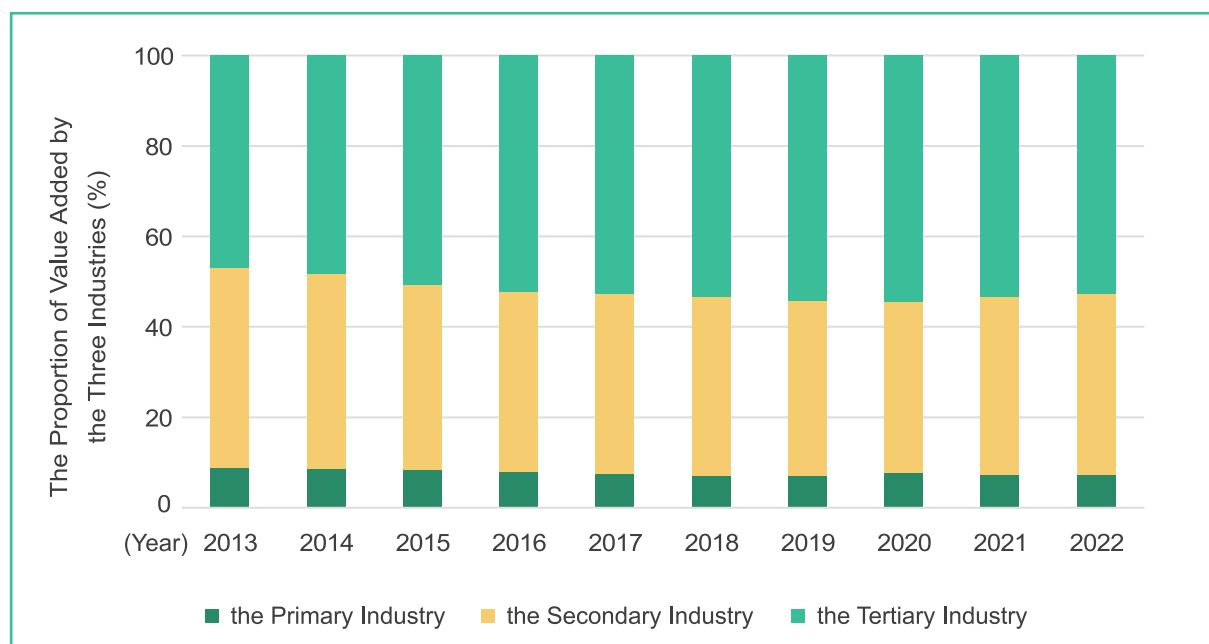


Figure 11. The Proportion of Value Added by the Three Major Industries in China from 2013 to 2022 as a Percentage of Gross Domestic Product

Data source: National Bureau of Statistics

⁷ State Council Information Office. China's Green Development in the New Era [R]. (2023-1-19) [2023-10-16]. http://www.scio.gov.cn/zfbps/zfbps_2279/202303/t20230320_707666.html

⁸ Government of China. Progress on the Implementation of China's Nationally Determined Contributions (2022) [R/OL]. (2022-11-12) [2023-10-16]. https://www.gov.cn/xinwen/2022-11/12/content_5726372.htm

China has been proactive in enhancing energy and resource efficiency in key industries. This effort includes the selection and promotion of over 500 advanced energy-saving technologies, equipment, and products in both the industrial and communication sectors. A dedicated program has been put in place to boost the energy efficiency of crucial electrical equipment. Additionally, there has been a concerted effort to reinforce the supply of green and low-carbon products in key sectors, facilitated by a dual approach of “energy-saving inspection + energy-saving diagnosis”⁹. In 14 key industries, which notably include petrochemicals and steel, 43 industry leaders have been identified to spearhead initiatives aimed at elevating overall industry energy efficiency. The results have been impressive. Between 2012 and 2022, there has been a cumulative reduction of over 36% in energy consumption per unit of value added by industrial enterprises of substantial scale¹⁰. Furthermore, the comprehensive energy consumption per unit of products in various sectors such as cement clinker, flat glass, electrolytic aluminum, and more, has consistently met world-class standards.

Significant efforts have been consistently made in elevating the standards of clean production within key industries. China has expedited the construction of a green manufacturing system. As of the end of 2022, a notable 2,783 green factories, 223 green industrial parks, and 296 green supply chain enterprises have been established. Moreover, over 20,000 green design products have been introduced to the market¹¹. Since 2019, five groups of demonstration companies of industrial product green design have been nurtured, providing guidance to companies aiming to continually enhance their capability in delivering green products and services, ultimately expanding their presence in the market. China has also fostered a category of specialized “small giants” in the field of energy conservation and environmental protection, effectively enhancing the innovative capacities of small and medium-sized enterprises in the realm of green and low-carbon solutions.



⁹ Power Planning and Design Institute. China Power Development Report 2023 [R]. 2023.

¹⁰ Economic Daily Comprehensive Edition. The Energy Consumption of China's Above-Scale Industrial Units Has Cumulatively Decreased by 36% in 10 Years—Significant Achievements in Industrial Green Development [N/OL]. (2023-6-12)[2023-10-16]. http://paper.ce.cn/po/layout/202306/12/node_03.html

¹¹ China Economic Times Green and Low Carbon Edition. 2023: Green Manufacturing System Embarks on a New Journey of High-Quality Development [N/OL]. (2023-2-16) [2023-10-16].

The integration of digitalization and environmental sustainability has seen sustained progress. China has been actively advancing the integration of industrial internet platforms within industrial parks and businesses. It has also provided support for a range of pilot and demonstration projects centered on the convergence of digitalization and green initiatives. Furthermore, China has nurtured innovative applications in industrial internet platforms, generating effective green transformation solutions for vital industries, including steel, petrochemicals, and construction materials. The role of digital technology in steering the green transformation of traditional industries has become increasingly prominent. Simultaneously, China has offered strong support for the eco-friendly development of emerging infrastructure types. Presently, the energy consumption of 5G base stations at individual sites has been reduced by more than 20% compared to their first commercial application in 2019. The average Power Usage Effectiveness (PUE) value for large-scale and higher-tier data centers under construction in China has been lowered to below 1.3¹².

Green and low-carbon industries are injecting fresh momentum into economic development. Over the past years, China's renewable energy sector has exhibited consistent growth, marked by an accelerated pace of technological innovation. In 2022, China retained its global leadership in photovoltaic module production for the 16th consecutive year¹³, while maintaining its first-place ranking in polysilicon production for the 12th year running¹⁴ (Figures 12 & 13). This dominance extends across the entire photovoltaic industry chain, covering polysilicon, wafers, solar cells, and photovoltaic modules, all contributing over 70% to global production. As of 2022, China is the world's largest wind power equipment manufacturing base, with a cumulative export capacity of 11.93 million kilowatts (kW), spreading across 5 continents and 49 countries. More than two-thirds of the world's wind turbines are manufactured in China, with the main components such as generators, hubs, frames, blades, and gearboxes accounting for 60%-70% of the global output. Chinese enterprises occupy 6 out of the top 10 and 8 out of the top 15 in terms of global installed capacity by the end of 2022¹⁵. The production and sales of new energy vehicles in China have consistently held the top global positions for several years. In 2022, China manufactured 7.058 million and sold 6.887 million new energy vehicles (Figure 14), collectively representing over 60% of the worldwide market. Furthermore, China's ecological and environmental protection industries, as well as energy-saving sectors, have seen sustained expansion. In 2022, the operating income of China's ecological and environmental protection industry reached 2.22 trillion RMB, reflecting a 12.8% increase compared to 2020¹⁶ (Figure 15), with an average annual output value growth rate of over 10%¹⁷.

¹² Government of China. Energy Consumption of 5G Base Stations in China Reduced by Over 20% in the Early Commercial Stage [EB/OL]. (2022-9-16) [2023-10-16]. https://www.gov.cn/xinwen/2022-09/16/content_5710291.htm

¹³ National Energy Administration. Strong Demand: Photovoltaic Industry Accelerates Quality Upgrading [EB/OL]. (2023-2-24) [2023-10-16]. https://www.nea.gov.cn/2023-02/24/c_1310699967.htm

¹⁴ National Energy Administration. China's Photovoltaic New Installed Capacity Maintains Global Leadership [EB/OL]. (2020-11-30) [2023-10-16]. https://www.nea.gov.cn/2020-11/30/c_139555797.htm

¹⁵ Date sources: Chinese Wind Energy Association

¹⁶ People's Daily Second Edition. Strengthening Ecological Environmental Protection and Comprehensive Advancement of Building a Beautiful China [N/OL]. (2023-7-28) [2023-10-16]. http://paper.people.com.cn/rmrb/html/2023-07/28/nbs.D110000renmrb_02.htm

¹⁷ Government of China. China's Energy Conservation and Environmental Protection Industry Output Reaches 8 Trillion Yuan [EB/OL]. (2022-7-5) [2023-10-16]. https://www.gov.cn/xinwen/2022-07/05/content_5699273.htm

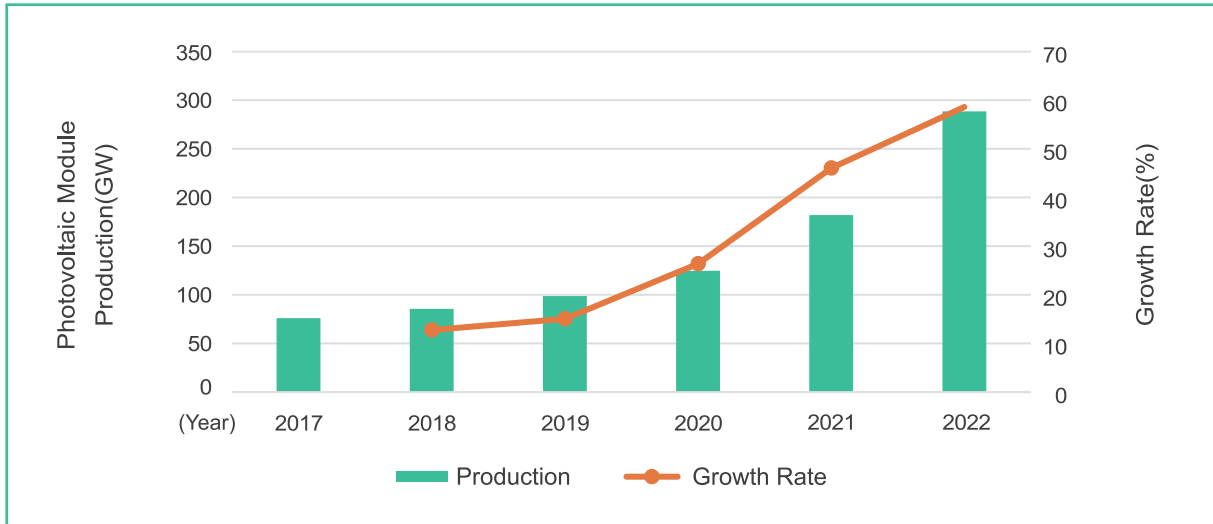


Figure 12. Photovoltaic Module Production and Growth Rate in China from 2017 to 2022

Data source: China Photovoltaic Industry Association

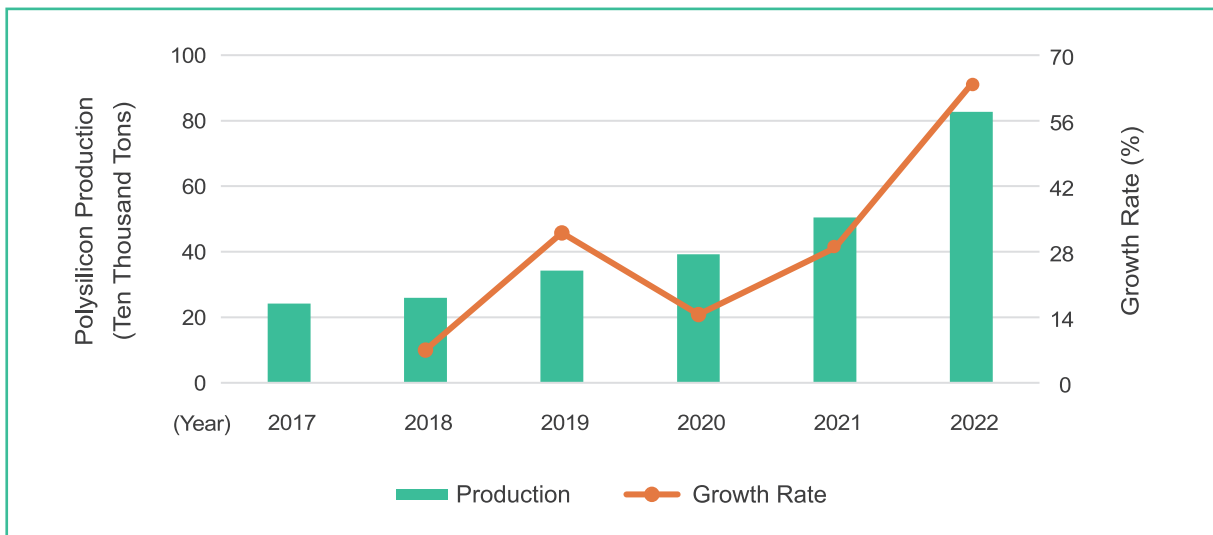


Figure 13. Polysilicon Production and Growth Rate in China from 2017 to 2022

Data source: China Photovoltaic Industry Association

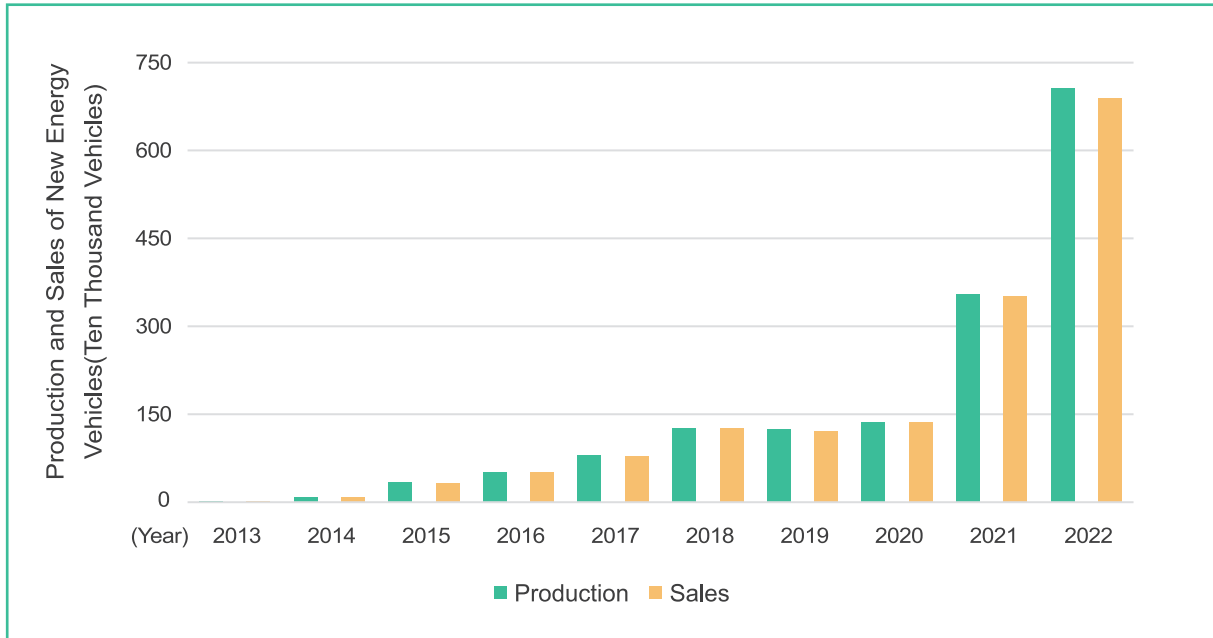


Figure 14. Production and Sales of New Energy Vehicles in China from 2013 to 2022

Data source: National Bureau of Statistics, China Association of Automobile Manufacturers

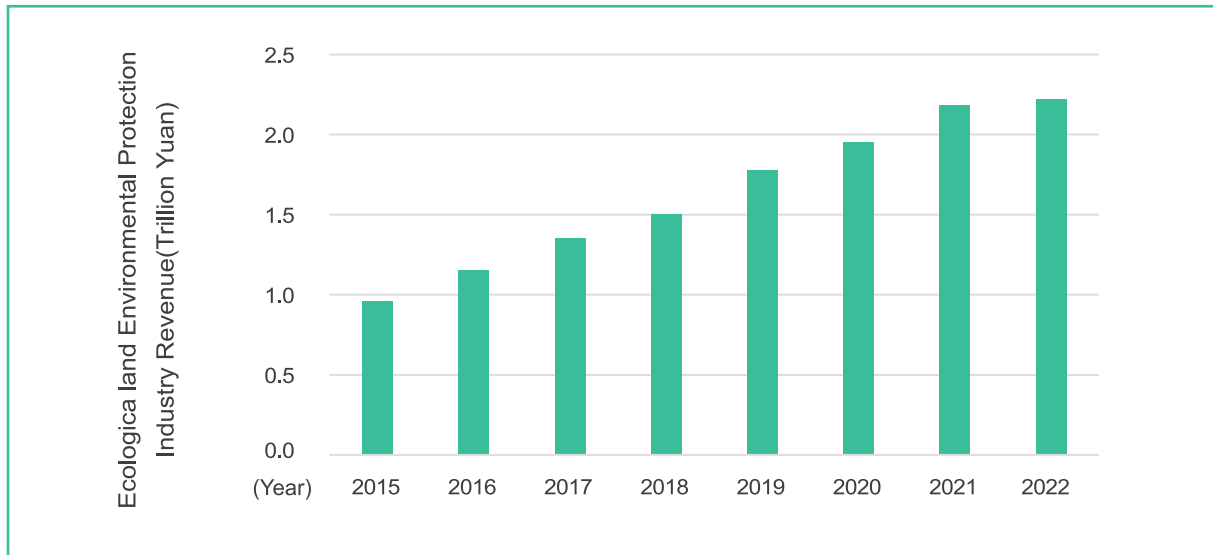


Figure 15. Revenue of China's Ecological and Environmental Protection Industry from 2015 to 2022

Data source: China Environmental Protection Industry Association

► Construction of a Green Transportation System

The policies of “shifting from road to rail” and “shifting from road to water” have yielded remarkable results, leading to the continuous optimization of the transportation structure in China. The country has been steadfastly enhancing its comprehensive multi-modal transportation network and vigorously advancing the construction of port-rail intermodal transportation, logistics parks, and dedicated railway lines serving large industrial and mining enterprises. In 2022, China witnessed a significant increase in the volume of railway and waterway freight, reaching 4.984 billion tons and 8.554 billion tons, respectively. Their respective shares of the total national freight volume saw an upward trend, rising from 8.0% and 13.9% in 2018 to 9.8% and 16.9% (Figure 16). Moreover, China successfully completed the transportation of 8.747 million standard container units through intermodal rail-water transport, marking a substantial 94.2% increase compared to 2018.

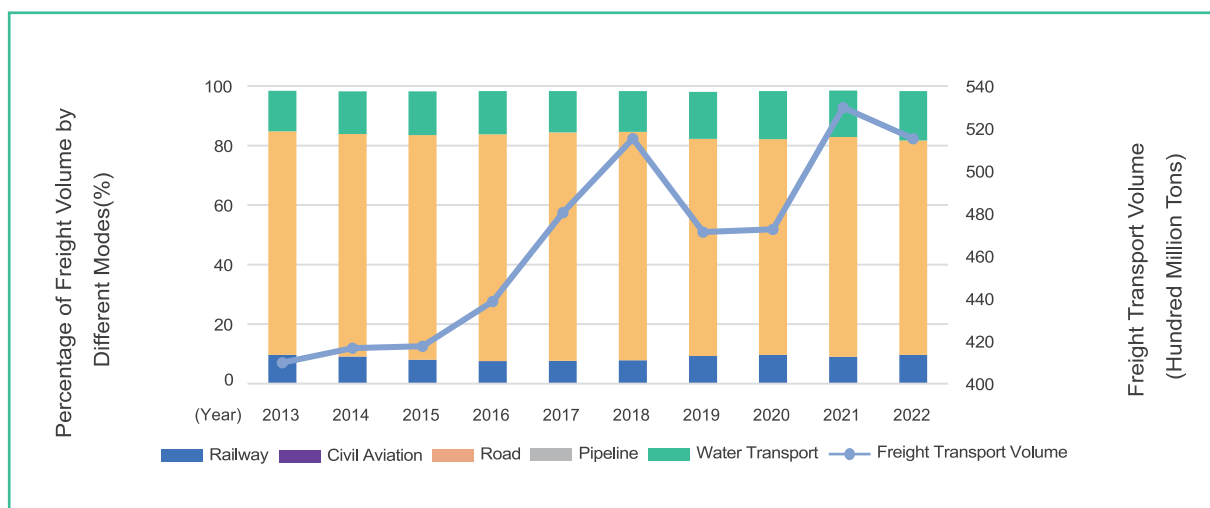


Figure 16. China's Freight Volume and Composition from 2013 to 2022
(Data source: National Bureau of Statistics)

Data source: National Bureau of Statistics

China has been proactively advancing the development of a green transportation system featuring new energy and clean energy. New energy vehicles have gained widespread adoption in various sectors, including urban public transportation, taxis, sanitation, logistics, civil aviation, airports, and government fleets. To accelerate the transition towards electrified transportation, the country has initiated comprehensive electrification pilot projects in public sectors across the nation. As of the end of 2022, China's new energy vehicle inventory reached a remarkable 13.1 million units, exceeding half of the global total¹⁸. Among these, the number of new energy public buses reached 542,600, accounting for 77.2% of the total, while nearly 300,000 new energy taxis were in operation, representing 22% of the total taxi fleet¹⁹. China is also actively driving the adoption and expansion of new energy heavy-duty trucks. In 2022, sales of new energy heavy-duty trucks in China surged by 141% compared to the previous year, with electric heavy-duty trucks capturing an impressive 90.09% market share within the new energy heavy-duty truck segment²⁰.

The development of green transportation infrastructure continues to make significant progress in China. The country has been actively promoting the electrification of railways, increasing the electrification rate from 52.3% in 2012 to 73.3% in 2021²¹. Simultaneously, efforts have been made to expedite the construction of charging infrastructure along highways. As of the end of 2022, China had successfully built a cumulative total of 5.21 million charging stations and 1,973 battery swapping stations²². China has also consistently implemented pilot programs for battery swapping in new energy vehicles and has encouraged innovative advancements in this field. Notably, in 2022, the sales of battery-swapping electric heavy-duty trucks accounted for 49.43% of the total annual sales of new energy heavy-duty trucks²³. It is worth noting that in 2020, only eight models of battery-swapping heavy-duty trucks were included in the product catalog of the Ministry of Industry and Information Technology. However, by 2021, this number had significantly increased to 156²⁴.

¹⁸ National Development and Reform Commission. May Press Conference: Support for New Energy Vehicles in Rural Areas. [EB/OL]. (2022-6-1) [2023-10-16]. https://www.ndrc.gov.cn/xwdt/spfg/xwfbh/202306/t20230601_1357141.html

¹⁹ Ministry of Transport. China Sustainable Transportation Development Report 2022 [R/OL]. (2021-10-14) [2023-10-16]. https://xxgk.mot.gov.cn/2020/jigou/gjhzs/202112/t20211214_3631113.html

²⁰ Data Source: terminal licensing information

²¹ State Council Information Office. China's Green Development in the New Era [R]. (2023-1-19) [2023-10-16]. http://www.scio.gov.cn/zfbps/zfbps_2279/202303/t20230320_707666.html

²² Government of China. China's New Energy Vehicle Production and Sales Rank First Globally for 8 Consecutive Years [EB/OL]. (2023-1-24) [2023-10-16]. https://www.gov.cn/xinwen/2023-01/24/content_5738622.htm

²³ Data source: research reports published by China Post Securities

²⁴ Kearney Consulting. White Paper on the Development of China's Electric Heavy-duty Truck Industry [M]. 2022.

Column 1. Promoting Green Transformation for Carbon-Intensive Heavy-Duty Vehicles in Yibin²⁵

In March 2022, Yibin City unveiled the “Comprehensive Implementation Plan for the ‘Electric Yibin’ Project (2022-2025),” which lays out a clear vision for the 14th Five-Year Plan period. The plan calls for an early establishment of battery swapping stations to serve both heavy-duty trucks and passenger vehicles, particularly logistics vehicles. The target is to set up 60 battery swapping stations dedicated to heavy-duty trucks, with the goal of fostering the adoption of electric heavy-duty trucks, ultimately reaching a fleet of 3,000 such vehicles. By 2025, it plans to have 37 core demonstration area battery swapping stations, alongside 23 stations in high-priority development zones. This will create a unified and cohesive battery swapping system across the entire city, promoting compatibility and resource sharing among vehicles, batteries, and charging stations.



²⁵ Sichuan Provincial People's Government. Yibin: Promoting Electric Heavy-duty Trucks and Making Carbon-Intensive Enterprises Green [EB/OL]. (2022-7-11) [2023-10-16]. <https://www.sc.gov.cn/10462/10464/10465/10595/2022/7/11/fa41c00325ad4838afadab5b27a7aaa3.shtml>

► Improving Green Development in Urban and Rural Construction

The green and low-carbon development in both urban and rural areas has been advanced. This commitment is underscored by a strategic approach that involves meticulously defining the boundaries of urban expansion, optimizing city layouts, population density, functional arrangements, and construction methodologies. The implementation of green and low-carbon development extends to county towns, fostering their evolution into compact, resource-efficient, and harmoniously integrated communities that resonate with the natural environment. Concurrently, China has undertaken well-considered planning for rural construction and the creation of green and low-carbon villages. These endeavors have yielded a substantial reduction in resource and energy consumption while enhancing the ecological and environmental quality of rural landscapes. Notably, in the northern regions, a robust clean heating initiative during the winter season is actively promoting energy-efficient renovations in rural housing, resulting in an impressive overall energy efficiency improvement of over 30%.

Green architecture has become a focal point of development. The country is proactively advocating green construction techniques, establishing a systematic framework for standardized design and production in modular construction. The adoption of prefabricated assembly methods extends to residential housing projects, resulting in noteworthy reductions in energy consumption during the construction phase, streamlining of construction processes, and enhanced rates of component recycling. China is also intensifying the refinement of its green building standards and is expediting the growth of green buildings. By the end of 2022, China had successfully completed green construction of more than 10 billion square meters, with newly constructed urban green buildings comprising 90% of the overall new construction²⁶.

Remarkable advancements have been made in energy efficiency. The nation has systematically elevated the standards for building energy efficiency and expedited the development of ultra-low energy consumption structures. Through proactive measures to enhance the energy performance of existing buildings, substantial progress has been made in retrofitting approximately 30.3 billion square meters of floor space by the end of 2022²⁷. Furthermore, China has bolstered the integration of renewable energy into the construction sector, with an emphasis on building-integrated photovoltaics. In 2021, a pilot project was initiated to promote the development of rooftop solar systems across entire counties. In addition, region-specific renewable energy sources like geothermal, air source heat pumps, and biomass energy are actively promoted and tailored to local conditions. The electrification of end-use energy consumption has been a central focus, with the electrification rate in the Chinese construction sector reaching 44.9% in 2022²⁸.

²⁶ People's Daily Tenth Edition. National Cumulative Green Building Area Exceeds 10 Billion Square Meters [N/OL]. (2023-6-26) [2023-10-16]. http://paper.people.com.cn/rmrb/html/2023-06/26/nbs.D110000renmrb_10.htm

²⁷ People's Daily Tenth Edition. National Cumulative Green Building Area Exceeds 10 Billion Square Meters [N/OL]. (2023-6-26) [2023-10-16]. http://paper.people.com.cn/rmrb/html/2023-06/26/nbs.D110000renmrb_10.htm

²⁸ China Electricity Enterprise Association. China Electrification Annual Development Report 2022 [R]. 2022.

Column 2. Significant Progress in Green Building and Ultra-Low Energy Construction in Shanghai²⁹

Shanghai has made significant strides in the development of green buildings. By the end of 2022, the city had conducted a total of 127 ultra-low energy building projects, covering 10.3 million square meters, to secure its position as a national leader in terms of development scale. Among these projects, the Lingang World-class Scientists Forum Convention Center emerged as the country's largest ultra-low energy public building. Additionally, Shanghai established 21 green ecological urban areas by the end of 2022, stretching a total land area of roughly 58.7 square kilometers. In 2022 alone, six green ecological urban area projects were successfully completed, covering a total land area of approximately 17 square kilometers. These areas include the Zhangjiang Science City International Community Pilot Area, the Beihai Bay Area, the Jing'an North High-tech Park, Ruihong New City, Baoshan Nanda District, and Jinshan Fengjing Town. As the city advances its urban renewal initiatives, existing buildings are being integrated into the green transformation process. By the end of 2022, Shanghai had completed 4.4 million square meters of energy-saving renovations in existing public buildings, and 8.87 million square meters of energy-saving renovations in residential buildings.



²⁹ Shanghai Municipal People's Government. Shanghai Ranks First in Scale of Ultra-Low Energy Consumption Buildings [EB/OL]. (2023-6-15) [2023-10-16]. <https://www.shanghai.gov.cn/nw4411/20230615/c0959ff86f7a40869399474ed8e476f6.html>

► Construction of a Circular Economic System³⁰

The comprehensive utilization of bulk solid waste continues to improve. China has actively promoted the circular transformation of industrial parks. By the end of 2021, 75% of national-level parks and 50% of provincial-level parks across the country had initiated circular transformations. This effort led to the establishment of 129 national-level park circular transformation pilot projects, 109 national-level eco-industrial parks, and 223 national-level green parks. China has also advanced the construction of 90 bulk solid waste comprehensive utilization demonstration bases and 60 key enterprises. In 2021, the comprehensive utilization rate of bulk solid waste in China reached approximately 57%, up about 16% compared to 2012.

The establishment of the waste recycling system has paid off. In 2021, China significantly increased its utilization of primary recycled resources, surpassing the 2012 levels by more than twofold. China is also vigorously advancing the pilot programs for recycling and utilizing power batteries, implementing the innovative “Internet + recycling” model for discarded electronic products, introducing target responsibility systems for manufacturers of household appliances, and actively nurturing industry leaders in the field of recycled resource utilization. During 2021, China effectively harnessed 385 million tons of recycled resources across nine categories, resulting in a reduction of approximately 750 million tons of carbon emissions when compared to the use of primary materials.

The agricultural circular economy is witnessing a surge of innovation and growth. China has implemented a robust strategy for the comprehensive utilization of crop straw, establishing a versatile “five-fold” utilization model that leverages straw as fertilizer, feed, fuel, raw material, and basic material. In 2021, China achieved an impressive 88.1% comprehensive utilization rate for crop straw, marking a 14% increase compared to 2012. Across entire counties, efforts are made to maximize the resource utilization of livestock and poultry manure, resulting in a national comprehensive utilization rate surpassing 76% in 2021—a 16% increase from 2015. Moreover, a concerted drive to improve the scientific use and recycling of plastic mulch has led to the enhancement of a comprehensive system for recycling and utilizing waste agricultural films, achieving a national recycling rate exceeding 80% in 2021. In addition, China is actively promoting a circular development model in agriculture and forestry, vigorously advocating for practices such as agricultural and photovoltaic synergy, the integration of “photovoltaics + facility agriculture,” and the convergence of “offshore wind power + marine ranching” to foster low-carbon agricultural practices.

Remarkable progress has been made in the campaign to combat plastic pollution and over-packaging. China has doubled its efforts to comprehensively manage the entire plastic pollution cycle, refining standards and regulations in various domains including biodegradable plastics, eco-friendly packaging for express delivery, and restrictions on excessive product packaging. Between 2011 and 2020, a total of 170 million tons of diverse waste plastics have been recycled and repurposed. Notably, in 2021, China achieved a plastic waste recycling rate of 31%. Furthermore, China is actively championing the eco-friendly transformation of express delivery packaging, with large-scale pilot programs for recyclable packaging in motion. By the end of June 2022, the nationwide adoption rate of recyclable transit bags in the postal and express delivery industry had exceeded 96%.

³⁰ China Circular Economy Association. A Decade of Circular Economy [R]. 2022.

► Ecosystem Carbon Sequestration Capacity

Safeguarding the safety and integrity of natural ecosystems. To this end, China is forging a new paradigm for sustainable national land development and protection, one that prioritizes environmental sustainability, green practices, and low carbon emissions. This approach draws ecological protection redlines, fortifies the establishment of natural reserves, and creates a comprehensive system of natural reserves centered around national parks. The goal is to secure and bolster the carbon sequestration potential of existing forests, grasslands, wetlands, oceans, soils, permafrost, karst landscapes, and other vital ecosystems. A crucial aspect of this strategy involves strengthening land use regulations, enhancing the overall efficiency of natural resource utilization, and mitigating potential harm to ecosystem carbon sequestration caused by natural disasters. In a significant milestone achieved in 2022, China designated an ecological protection redline area spanning approximately 3.19 million square kilometers. Within this area, the land-based ecological protection redline reaches around 3.04 million square kilometers, constituting over 30% of the country's total land area³¹.

Promoting the integrated management of mountain, water, forest, farmland, lake, grassland, and sand ecosystems. Over the past decade, China has achieved remarkable progress in large-scale environmental restoration, solidifying the gains made in the conversion of croplands into forests and grasslands³². The country has also carried out precision initiatives to elevate the quality of its forests, resulting in a cumulative afforestation of 960 million mu (approximately 64 million hectares). This endeavor has contributed to a quarter of the world's newly added forested area, solidifying China's position as the world's fastest-growing nation in terms of forest resources³³. In 2022, China reached a forest coverage rate of 24.02%³⁴ with a forest stock volume of 19.493 billion cubic meters³⁵, maintaining “double growth” for over three decades (as depicted in Figure 17). The net increase in the total carbon stock of forest vegetation reached a remarkable 1.375 billion tons, totaling 9.2 billion tons³⁶. China has actively undertaken initiatives for the ecological restoration of grasslands, including the return of pastures to their natural state and the enhancement of degraded grasslands. In the last ten years³⁷, approximately 600 million mu (around 40 million hectares) of grasslands have undergone restoration³⁸, resulting in a comprehensive vegetation coverage of 50.32% in 2022. Efforts have been made to protect and restore wetlands including the transformation of former farmlands and fisheries into wetland areas, the replenishment of water resources within wetlands, and the control of detrimental species in wetland ecosystems. Now, the forest and grassland ecosystems in China are in better shape, of higher quality, and functioning well. The total carbon stock of forest and grassland vegetation has reached an impressive 11.443 billion tons³⁹.

³¹ Ministry of Natural Resources. Blue Book on China's Ecological Protection Red Line (2023) [M]. 2023.

³² Yang Yuanhe, Shi Yue, Sun Wenjuan, et al. Characteristics of China and Global Terrestrial Ecosystem Carbon Sources and Sinks and Their Contribution to Carbon Neutrality [J]. Science China: Life Sciences, 2022, 52(04): 534-574.

³³ National Forestry and Grassland Administration. Continuous Increase in Forest Carbon Sink Reserves [EB/OL]. (2023-5-7)[2023-10-16]. <http://www.forestry.gov.cn/main/586/2220507/083059960668959.html>

³⁴ National Forestry and Grassland Administration. Continuous Increase in Forest Carbon Sink Reserves [EB/OL]. (2023-5-7)[2023-10-16]. <http://www.forestry.gov.cn/main/586/20220507/083059960668959.html>

³⁵ National Forestry and Grassland Administration. The First National Ecology Day Is Here! A Set of Data Shows You a New Picture of Beautiful China [EB/OL]. (2023-8-15)[2023-10-16]. <http://www.forestry.gov.cn/lyj/1/1cdt/20230815/517072.html>³¹

³⁶ National Forestry and Grassland Administration. Continuous Increase in Forest Carbon Sink Reserves [EB/OL]. (2022-5-7)[2023-10-16]. <http://www.forestry.gov.cn/main/586/20220507/083059960668959.html>

³⁷ Government of China. Protection and Restoration: China's Grassland Construction and Management Enter a New Stage [EB/OL]. (2022-10-14)[2023-10-16]. http://www.gov.cn/xinwen/2022-10/14/content_5718270.htm

³⁸ Ministry of Ecological Environment. China's Ecological and Environmental Conditions Bulletin 2022 [R]. 2022.

³⁹ National Forestry and Grassland Administration. China's Forest and Grass Resources and Ecological Conditions in 2021 [R]. 2021.

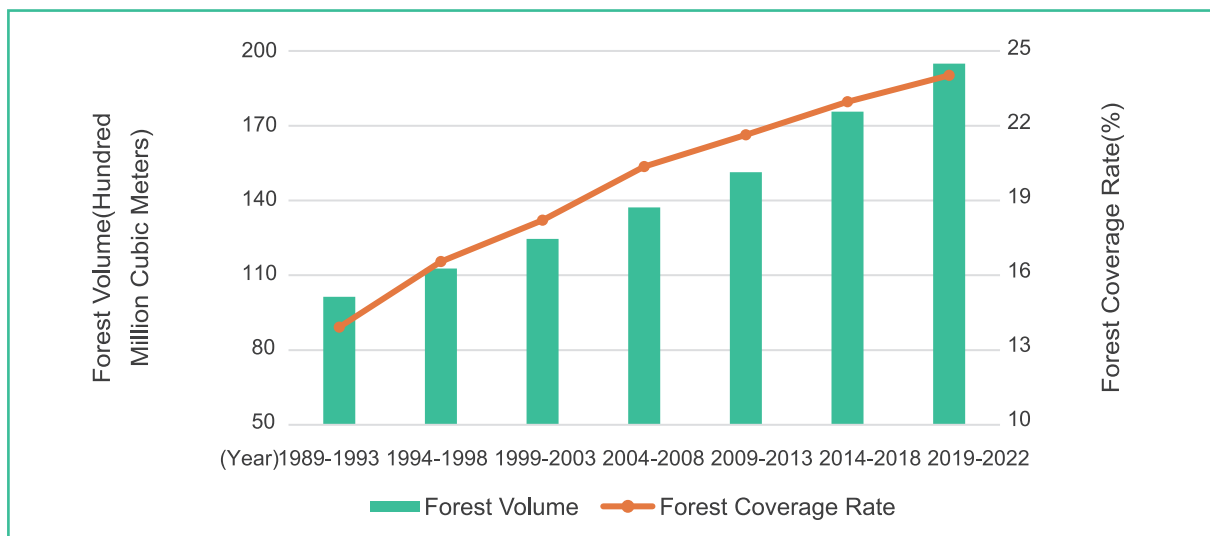


Figure 17. China's Forest Volume and Forest Coverage Rate Over the Last 30 Years

Data Source: National Forestry Administration

Column 3. The Ministry of Natural Resources Releases 10 Typical Chinese Ecological Restoration Cases⁴⁰

In June 2021, the Ministry of Natural Resources unveiled ten emblematic cases of ecological restoration in China, which were subsequently featured in the publication "Chinese Practice of Nature-Based Solutions: Typical Cases," a collaborative effort between the Ministry of Natural Resources and the International Union for Conservation of Nature (IUCN). These cases involve a wide spectrum of projects, such as the management of the Guanting Reservoir Basin, the ecological protection and restoration of Helan Mountain, the Fuxian Lake Basin management in Yunnan, the protection and restoration of the Ulan Suhai Lake Basin in Inner Mongolia, the conservation of the Qiantang River Headwaters Area, the development of Wuyuan Village in Jiangxi, the protection and sustainable utilization of black soil in Heilongjiang, urban renewal in Chongqing, comprehensive ecological restoration in land and sea areas in Beihai, Guangxi, and the restoration of mangrove wetlands in Shenzhen Bay. These cases are all based on the fundamental principle of "nature-based solutions" and encompass a broad range of ecosystem types and land-use functions, spanning the realms of nature, agriculture, and urban development. They serve as exemplars and valuable references for the localized application of nature-based solutions, not only within China but also for global initiatives in ecological restoration.

⁴⁰ Ministry of Natural Resources. Ministry of Natural Resources Releases 10 China-Specific Ecological Restoration Typical Cases [EB/OL]. (2021-6-24)[2023-10-16]. https://vod.mnr.gov.cn/spxw/202106/t20210624_2659284.htm

Enhancing Carbon Sequestration and Carbon Sink Capacity in Agricultural Ecosystems. China has made significant strides in the development of high-standard farmland, placing a strong emphasis on safeguarding permanent basic farmland, grain production functional zones, and critical agricultural production protection areas. Substantial efforts have been channeled into the establishment of high-standard farmland. By the end of 2022, China has successfully cultivated 1 billion mu (approximately 66.7 million hectares) of high-standard farmland. Furthermore, China has undertaken initiatives for the preservation and fertility restoration of black soil, with a specific focus on the black soil regions in Northeast China. In 2022, the area under protective tillage in the provinces of Heilongjiang, Jilin, Liaoning, and the Inner Mongolia Autonomous Region expanded to 83 million mu from 46 million mu in 2020. These three northeastern provinces have collectively developed 180 million mu of high-standard farmland, resulting in a notable enhancement of the quality of cultivated black soil⁴¹.



⁴¹ Chinese Academy of Sciences Institute of Geographic Sciences and Natural Resources Research, etc. Report on the Protection and Utilization of Black Soil in Northeast China (2022) [R]. 2023.

► Nationwide Green and Low-Carbon Action

There has been a substantial boost in public awareness on thrift, environmental preservation, and ecological protection. China has consistently organized events with specific themes, including World Earth Day, National Energy Conservation Promotion Week, National Low-Carbon Day, and “Beautiful China, I am an Action-Taker,” to advocate a lifestyle characterized by simplicity, moderation, and eco-friendly, low-carbon choices. Today, the general public not only embraces but actively practices green and low-carbon values, viewing everyday low-carbon actions as a reflection of both economic and social responsibility. People are willingly engaging in low-carbon practices across various aspects of their daily lives, including the purchase of eco-friendly products, energy conservation, and the promotion of resource recycling. Year by year, the adoption of green consumption and recycling is on a progressive upswing, fostering a pervasive culture of thrift and conservation throughout the entire population⁴².

Progress has been made in establishing green and low-carbon society demonstrations. China has extensively promoted the concept of sustainable living into all aspects of daily life, including clothing, food, housing, transportation, and leisure. This has driven the construction of conservation-oriented government offices, eco-conscious households, green schools, sustainable communities, eco-friendly transportation, environmentally responsible shopping centers, and green buildings, all of which have yielded positive results. By the end of 2022, 70% of government offices at the county level and above in China have transitioned into conservation-oriented institutions⁴³, resulting in a remarkable 24% decrease in per capita comprehensive energy consumption by national public agencies compared to 2011⁴⁴. Substantial strides have been taken in waste separation efforts in cities at or above the prefectural level, with an average coverage rate of 82.5% for waste separation in residential areas across 297 such cities⁴⁵. The adoption of green transportation in urban areas and satisfaction with green transportation services have witnessed significant growth, with 109 cities actively engaging in high-quality green transportation initiatives⁴⁶. Shared bicycle programs have gained widespread recognition throughout society⁴⁷. Over 84% of the public is familiar with policies related to plastic pollution control⁴⁸. Considerable headway has been made in food conservation endeavors. Local governments and businesses have introduced carbon-inclusive platforms that quantify carbon reduction actions in the daily lives and consumption patterns of the public, offering incentives and rewards to promote sustainability⁴⁹.

⁴² Center for Environmental and Economic Policy Research, Ministry of Ecology and Environment. Report on Citizen Ecological Environmental Behavior Survey (2022) [R]. 2023.

⁴³ National Development and Reform Commission. Special Press Conference of the National Development and Reform Commission Introducing the Comprehensive Consolidation of Major Achievements in Epidemic Prevention and Control, and Promoting the Strengthening of Medical and Health and Environmental Protection Work [EB/OL]. (2023-3-15) [2023-10-16]. <https://www.ndrc.gov.cn/xwdt/wszb/bdbqrxygqk/>

⁴⁴ State Council Information Office. China's Green Development in the New Era [R]. (2023-1-19) [2023-10-16]. http://www.scio.gov.cn/zfbps/zfbps_2279/202303/120230320_707666.html

⁴⁵ Ministry of Housing and Urban-Rural Development. In-depth Study and Implementation of the Spirit of General Secretary Xi Jinping's Letter Reply, Launching the First National Urban Household Waste Classification Publicity Week [EB/OL]. (2023-5-23) [2023-10-16]. https://www.mohurd.gov.cn/xinwen/gzdt/202305/20230524_772335.html

⁴⁶ State Council Information Office. China's Green Development in the New Era [R]. (2023-1-19) [2023-10-16]. http://www.scio.gov.cn/zfbps/zfbps_2279/202303/120230320_707666.html

⁴⁷ Center for Environmental Development of the Ministry of Ecology and Environment and China Environmental Certification Center. Full Life-cycle Pollution Reduction and Carbon Reduction Report for Shared Cycling [R]. 2022.

⁴⁸ National Development and Reform Commission. Obvious Effects of Green and Low-Carbon Actions—Progress in the Top Ten Actions for Carbon Peaking (Five) [EB/OL]. (2023-11-30) [2023-10-16]. https://www.ndrc.gov.cn/fggz/hjzy/tfdtzh/202211/t20221130_1343071.html

⁴⁹ Center for Environmental Education of the Ministry of Ecology and Environment. Research Report on China's Carbon-Inclusive Development and Practice Cases [R]. 2023.

Column 4. The “Green Life in the Three Jin Regions” Carbon-Inclusive Platform⁵⁰

The “Green Life in the Three Jin Regions” is a provincial-level platform in Shanxi designed to promote carbon-inclusive mechanisms. It centers on various aspects closely intertwined with everyday life, covering clothing, food, housing, transportation, leisure, and consumption. This platform offers a multitude of emission reduction scenarios and incentive mechanisms. Users who adopt eco-friendly practices on different platforms, such as using public transportation, cycling on shared bikes, driving electric vehicles, minimizing disposable tableware use, participating in clean plate campaigns, and recycling old items, have their actions quantified and logged in their personal carbon accounts. In return, they earn corresponding green points as incentives. These green points can be exchanged for green consumption vouchers, discount coupons, and various other rewards. The mini-program began a trial run on September 18, 2022. As of July 3, 2023, the cumulative number of individuals participating in emission reductions has reached 2.7 million, with emissions reduced by a total of 66.28 million times, resulting in a cumulative reduction of 66,500 tons of carbon dioxide emissions.

A significant increase in the proactivity and enthusiasm of industrial enterprises for energy conservation and carbon reduction has been observed. Central enterprises have proactively engaged in green and low-carbon planning, optimizing capital allocation, adjusting industrial and energy structures, and actively pursuing low-carbon technological innovations. Over the past five years, central enterprises have seen an average annual growth rate of over 20% in their investments in strategic emerging fields such as new energy and new materials. They have established digital innovation platforms in areas like new energy vehicles, BeiDou satellite navigation, e-commerce, and blockchain. Additionally, they have created collaborative innovation platforms in areas like logistics big data and marine equipment, playing a leading role in driving industrial development. As of the end of 2022, approximately 30% of private industrial enterprises in China have formulated “dual-carbon” action plans. Within energy-intensive industries, 53.5% of private enterprises have established specific departments for energy conservation and carbon reduction, actively applying carbon reduction technologies. Private industrial enterprises in key regions, such as the Beijing-Tianjin-Hebei area and the Fenwei Plain, exhibit a higher level of proactivity in energy conservation and carbon reduction⁵¹.

⁵⁰ People's Government of Shanxi Province. Shanxi Carbon-Inclusive Platform Three Jin Green Life Drives Over 3.7 Million People to Reduce Carbon Emissions by 86,000 Tons. [EB/OL]. (2023-9-17)[2023-10-16]. https://www.shanxi.gov.cn/ywdt/sxyw/202309/t20230917_9332583.shtml

⁵¹ All-China Federation of Industry and Commerce. China's Private Enterprises Green Development Report (2022) [R]. 2023.

► Green and Low-Carbon Technological Innovation

China is a prominent global contributor to green and low-carbon technological innovation. This innovation on green and low-carbon technology is the cornerstone and a crucial factor in achieving the "dual-carbon" objectives, and China has made it a top priority to make such innovation. From 2016 to 2022, China obtained a total of 178,000 granted patents relating to green and low-carbon technologies, representing 31.9% of the worldwide total. The average annual growth rate stood at an impressive 12.5%, a stark contrast to the global average of 2.5%. China has been a key player in the world's green and low-carbon technological inventions, with 13 companies or entities ranking among the top 50 global patent holders in this field, coming second only to Japan, which boasts 15. Additionally, recent innovations in energy storage technologies have seen remarkable growth in China. The number of granted patents in electrochemical energy storage surged from 43,000 in 2016 to 130,000 in 2022, with an average annual growth rate of 19.9%. This now accounts for 44.9% of the global total, marking a substantial increase from the 35.5% share in previous years⁵².

New energy technologies, such as hydrogen and large-scale energy storage, have made significant strides in research and practical application. China has fostered a relatively comprehensive industry chain for research and manufacturing in new energy technologies. In the field of solar photovoltaics, China has repeatedly broken world records for conversion efficiency. Moreover, China leads globally in the development of technologies for low-wind-speed, typhoon-resistant, super-tall tower, and high-altitude wind power solutions. China has also achieved a preliminary grasp of key technologies and production processes in the domains of hydrogen production, storage, transportation, hydrogenation, fuel cells, and system integration. Notably, China has achieved breakthroughs in the long-distance transportation of hydrogen through existing natural gas pipelines. Additionally, technologies such as lithium-ion batteries and compressed air energy storage have reached world-leading levels. Novel technologies like supercapacitor energy storage, solid-state battery storage, and lithium titanate battery storage are now undergoing practical engineering demonstrations. Emerging applications, including the integration of "new energy + energy storage," conventional thermal power combined with energy storage, and the implementation of intelligent microgrids, are continually surfacing⁵³. In terms of the newly commissioned capacity in 2022, compressed air energy storage and flow battery energy storage technologies represented 3.4% and 2.3%, respectively. Furthermore, various energy storage technologies, including flywheels, gravity-based systems, and sodium-ion technology, have entered into the engineering demonstration phase.

⁵² Government of China. State Intellectual Property Office: China is an Important Contributor to Global Green and Low-Carbon Technology Innovation [EB/OL]. (2023-7-19)[2023-10-16]. https://www.gov.cn/govweb/zhengce/fjiedu/tujie/202307/content_6892864.htm

⁵³ National Energy Administration. Interpretation of the 14th Five-Year Plan Implementation Plan for New Energy Storage Development [EB/OL]. (2022-3-21)[2023-10-16]. https://www.nea.gov.cn/2022-03/21/c_1310523223.htm?eqid=8d14296200077d570000000364351e5f

Significant breakthroughs have been achieved in critical green and low-carbon core technologies within key industries and sectors. Across the nation, regions are intensifying their efforts to convert and implement green and low-carbon technological advancements. In Guangdong Province, for instance, a major initiative is underway to research and demonstrate key technologies designed to attain carbon peaking and carbon neutrality. Additionally, forward-looking research has been initiated for an industrial chain demonstration project centered on carbon capture, utilization, and storage (CCUS), with the capacity extending to tens of millions of tons. Several provinces and cities, including Tianjin, Guangdong, Shaanxi, and Xinjiang, have embarked on the construction of CCUS demonstration projects with capacities in the millions of tons. Furthermore, prominent industrial enterprises are actively exploring innovative green and low-carbon technologies. For instance, the world's first 1.2 million-tonne hydrogen metallurgy demonstration project was completed by HBIS Group. The hydrogen metallurgy process can reduce carbon dioxide emissions by 70%⁵⁴.



⁵⁴ People's Daily First Edition. Promoting green ways of production and life, form a synergy between reducing pollution and bringing down carbon dioxide emissions, and foster green development as the defining feature of China's high-quality development [N/OL]. (2023-7-19)[2023-10-16]. https://paper.people.com.cn/rmrb/html/2023-08/17/nw.D110000renmrb_20230817_2-01.htm

► Promoting Synergistic Efficiency in Emissions Reduction and Carbon Reduction

In its pursuit of the “dual-carbon” goals, China is steadfast in applying green development principles into every facet and phase of economic advancement. The core strategy revolves around achieving high-quality economic growth through robust ecological conservation, ultimately delivering benefits for the environment, climate, and the economy. By 2022, China had achieved a substantial reduction in energy consumption per unit of GDP, decreasing it from 0.79 tons of standard coal per 10,000 RMB of GDP in 2013 to 0.61 tons of standard coal per 10,000 RMB of GDP⁵⁵ (as 2010 price, Figure 18). Carbon dioxide emissions per unit of GDP declined by 51% compared to 2005 level⁵⁶. The annual average concentration of fine particulate matter (PM2.5) dropped from 72 micrograms per cubic meter in 2013 to 29 micrograms per cubic meter. Furthermore, the proportion of days with good air quality increased from 76.7% in 2015 to 86.5% (see Figure 19). Over the past decade, China managed to sustain a 3% annual growth in energy consumption, simultaneously supporting a 6.2% economic expansion. This achievement is equivalent to conserving 1.4 billion tons of standard coal and reducing carbon dioxide emissions by nearly 3 billion tons.

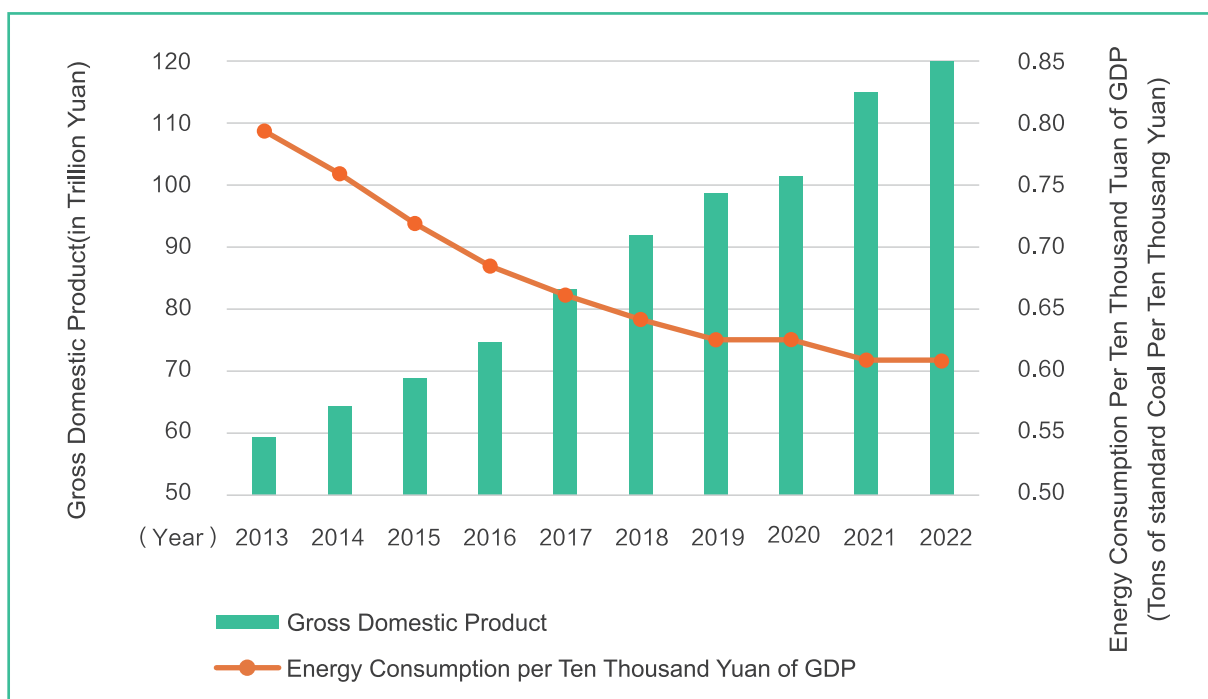


Figure 18. Ten Thousand Yuan GDP Energy Consumption in China from 2013 to 2022

Data source: National Bureau of Statistics

⁵⁵ Calculated from data on GDP, total energy consumption and the GDP index (100 for the previous year), GDP is at constant 2010 prices.

⁵⁶ Ministry of Ecology and Environment, China's Policies and Actions on Climate Change Annual Report 2023 [R], 2023.

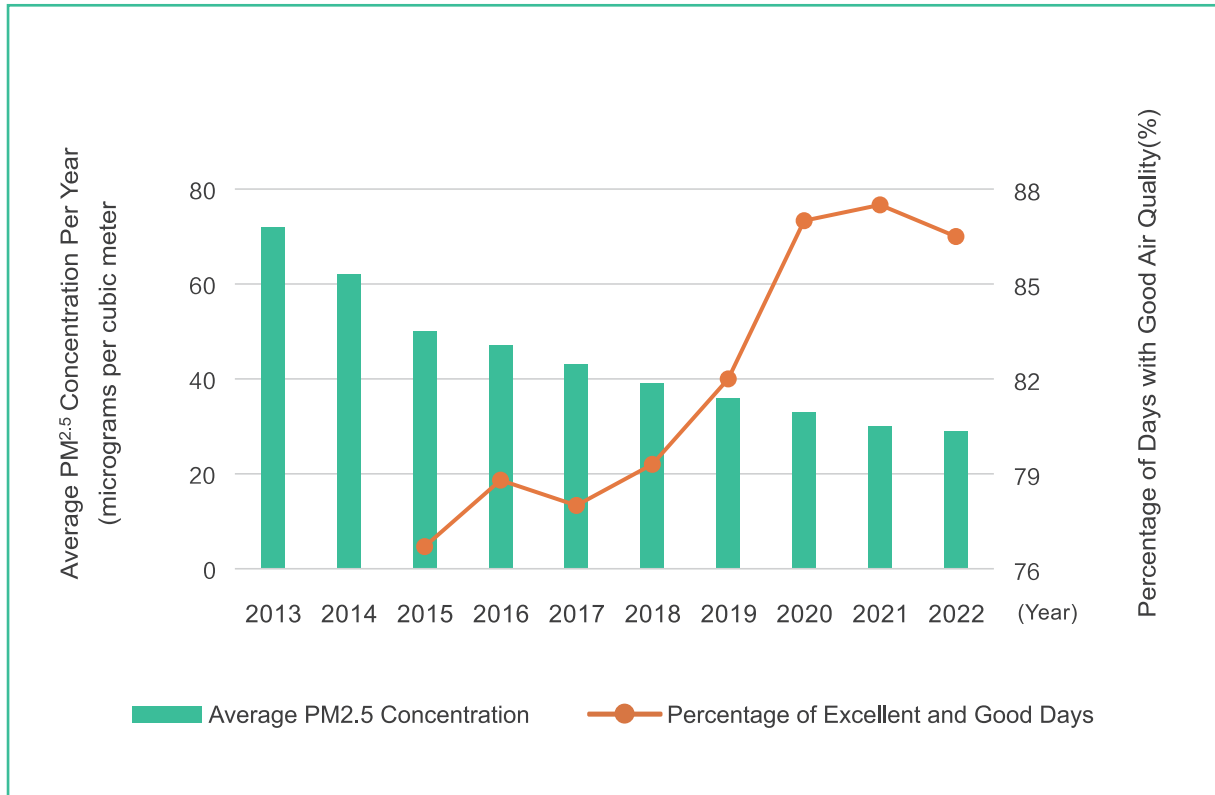


Figure 19. Average PM_{2.5} Concentration and Percentage of Days with Good Air Quality in China from 2013 to 2022

Data source: Ministry of Ecology and Environment



► Playing the Role of Market Mechanisms

The carbon market is playing a crucial role in optimizing the allocation of carbon emission resources, fostering cost-effective emissions reduction, and facilitating economic and social transformation. By June 30, 2023, the cumulative trading volume of Carbon Emission Allowances (CEA) in the national carbon market had reached 238 million tons, with a total trading value of 10.912 billion yuan⁵⁷. The market's overall performance has demonstrated stability and orderliness. Furthermore, on October 19, 2023, China introduced the "Measures for Administration of the Trading of Voluntary Greenhouse Gas Emission Reduction (for Trial Implementation)," allowing various entities to independently develop greenhouse gas emissions reduction projects in compliance with relevant regulations. Once these projects undergo scientific quantification, verification of emissions reduction effectiveness, and successful registration, they can be traded in the market to reap corresponding emissions reduction contribution benefits. The initiation of the voluntary emissions reduction trading market supports the growth of projects in areas such as forest carbon sequestration, renewable energy, methane emissions reduction, energy conservation, and efficiency enhancement. It also fosters broader involvement from various industries, businesses, and society, encouraging collective participation in greenhouse gas emissions reduction efforts. This holds significant promise in advancing the green and low-carbon transformation of the economy and society, ultimately realizing high-quality development.

Green certificates and green energy trading serve as pivotal market mechanisms in China, driving the nation's pursuit of its "dual carbon" objectives. In 2017, China launched a nationwide voluntary subscription trading system for green power certificates, establishing a comprehensive framework for renewable energy green power certificates (commonly referred to as "green certificates") and encompassed all renewable energy-generated electricity in 2023. As of the end of July 2023, the cumulative issuance of domestic green certificates has surpassed 120 million, with approximately 46.2 million green certificates having been traded, equivalent to over 120 billion kilowatt-hours of electricity⁵⁸. Since the inception of the green energy trading pilot program in September 2021, China has swiftly devised green energy trading schemes and regulations, efficiently established green energy trading platforms, and established seamless communication channels between these platforms and the authorities responsible for green certificate issuance.

⁵⁷ Data Source: Shanghai Environment and Energy Exchange (SEEE)

⁵⁸ China Energy News. "Dual carbon" initiative has made remarkable achievements over the past three years. Market vitality stimulates green development [N/OL]. (2023-9-22)[2023-10-16]. http://www.cnenergynews.cn/guonei/2023/09/22/detail_20230922137314.html

► International Cooperation on Dealing with Climate Change

China proactively advances the realization and effectiveness of the Paris Agreement through bilateral channels. By strengthening collaborations with major nations, China seeks to foster political consensus that paves the way for the seamless conduct of global multilateral climate conferences. The pivotal role of joint statements by leaders of China and the United States in achieving, ratifying, ensuring effectiveness, and executing the Paris Agreement cannot be overstated. The signing of the “The Sunnylands Statement on Enhancing Cooperation to Address the Climate Crisis” is of great significance for the two countries to actively participate in the first global stocktaking of the Paris Agreement at the 28th United Nations Climate Change Conference (COP28). Moreover, bilateral joint declarations with the European Union, the United Kingdom, France, and other developed countries have been instrumental in building consensus and contributing positively to the success of the Paris Climate Conference. Concurrently, China intensifies its communication with developed nations and actively participates in ongoing climate change dialogues and negotiations at both ministerial and working levels with the United States, the European Union, Australia, New Zealand, the United Kingdom, Germany, with a firm commitment to implementing the agreements reached by leaders of China and France. The promotion of a China-France climate change dialogue mechanism is a focal point, underscoring the joint efforts towards the success of the Paris Conference⁵⁹.

China continues to achieve remarkable progress in its cooperative projects with neighboring countries under the framework of the Belt and Road. In partnership with the United Nations Environment Programme, China has launched the establishment of the “Belt and Road” International Green Development Alliance. This collaborative endeavor provides valuable support to nations along the Belt and Road, aiding them in the development of renewable energy projects, including hydropower, wind energy, and photovoltaics. Notably, it is underpinned by a commitment to refrain from initiating new coal-fired power projects overseas. Furthermore, China has instituted the China Climate Change South-South Cooperation Fund and initiated the “Ten-Hundred-Thousand” project for South-South climate cooperation. This multifaceted initiative includes the establishment of ten low-carbon demonstration zones, the implementation of one hundred projects dedicated to climate change mitigation and adaptation, and the provision of one thousand training opportunities to address climate change in developing countries. Its overarching goal is to foster green development and contribute to the formation of an equitable, cooperative global environmental governance system. This undertaking has garnered widespread consensus among Chinese companies to engage themselves in low-carbon initiatives abroad. At the third Belt and Road Forum for International Cooperation, President Xi Jinping announced China’s eight steps to support high-quality Belt and Road cooperation, and promoting green development is one of them.

⁵⁹ National Center for Climate Change Strategy and International Cooperation. China’s Strategies for Global Climate Governance and International Cooperation [R]. 2023.

Column 5. China Assists Latin American Nations in Developing Clean Energy for a Green and Bright Future⁶⁰

A Chinese enterprise group took on the construction of a 300-megawatt photovoltaic power project in the northern Hu Huayi Gaochari Plateau of Argentina. Once the project was integrated into the grid, it made a significant impact by resolving electricity supply challenges for over 100,000 local households and creating 1,500 employment opportunities during peak periods. This endeavor marked a historic turning point for Hu Huayi Province, as it transitioned from relying on electricity imports from other provinces to achieving energy self-sufficiency. In a commitment to supporting Chile's national “decarbonization plan” and advancing the adoption of green energy, the State Grid Corporation of China (SGCC) dispatched a high-level executive team to oversee the expansion of the Agua Santa substation. With SGCC's steadfast support, the team efficiently coordinated financial, managerial, and technical resources, displaying unwavering dedication in advancing the project. Despite challenges stemming from the COVID-19 pandemic, including staff isolation, logistical constraints, rising costs, and contractor bankruptcies, the project successfully commenced operations on July 11, 2023. Over the past decade, China has been proactively sharing advanced technologies and solutions, not only to facilitate the development of a series of clean, efficient, and high-quality green energy collaborative projects, but also to offer substantial support for the green and low-carbon energy growth of partner nations. This support has materialized in the present and will continue to be given in the future.



⁶⁰ people.com.cn. The third in a series of reports on the Belt and Road Initiative: China-Latin America Cooperation Sails Away: Clean Energy Travels Ten Thousand Miles; China and Latin America Jointly Build a Green and Bright Future [N/OL]. (2023-10-20)[2023-10-27]. <http://finance.people.com.cn/n1/2023/1020/c1004-40099951.html>



Future Expectations

Advancing the “dual-carbon” goals is not only an intrinsic requirement for China to position itself in a new stage of development and foster high-quality growth, but it also represents an urgent demand for a major nation to build a community with a shared future for mankind. China remains steadfast in its dedication to the “dual-carbon” objectives. In the future, China will strike a balance between development and emissions reduction, overall picture and specific areas, long-term goals and short-term targets, as well as government and market. China will work actively and prudently toward the goals of reaching peak carbon emissions and achieving carbon neutrality. Furthermore, it aims to construct a modern society where humanity coexists harmoniously with the nature.

On the one hand, China will continue to implement the “dual-carbon” and “1+N” policy framework. China will expedite the development and enhancement of a legal and regulatory framework geared towards advancing the achievement of “dual-carbon” goals. It will build a carbon emission management system that puts regional and departmental responsibilities under centralized national oversight. Additionally, more efforts will be made to strengthen statistical accounting, inspection and assessment procedures, and fiscal and financial pricing policies in alignment with the “dual-carbon” commitment. China will expedite the introduction of the “National Carbon Emission Trading Management Regulations,” expand the reach of carbon markets in a timely manner, and actively promote the seamless integration of carbon markets with CCER, green electricity trading, and other market-based mechanisms. China will bolster innovation in critical core technologies within the energy sector, actively advocate key advancements for low-carbon, zero-carbon, and negative-carbon emissions. Furthermore, it will drive the eco-friendly development of both the industrial and supply chains, while fostering research and the practical application of green and low-carbon technologies.

On the other hand, China will proactively engage in global efforts to address climate change. As China advances towards the realization of “dual-carbon” goals, it remains steadfast in its commitment to the concept of building a community with a shared future for mankind. With a proactive stance, China will actively participate in climate negotiations and the development of international regulations, contributing to a more cooperative and sustainable approach on the global stage. China will consistently offer Chinese wisdom, innovative solutions, and its own unique capabilities to foster the development of a global climate change governance system that is characterized by equality, fairness, cooperation and mutual benefit. Additionally, China will continue to implement the “Ten Hundred Thousand” Initiative for South-South Cooperation on Climate Change and the “Belt and Road” South-South Cooperation Plan for Climate Change. China will lend its support, to the best of its capacity, for other developing nations, including small island states, the least developed countries and African nations, to help them deal with climate change. In this endeavor, China is committed to extending crucial assistance to these countries in their climate change mitigation efforts.



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