

"Dual-carbon" Goal: Background, Importance, Popular Science Path and Outlook

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Abstract: In the seventy-fifth session of the United Nations General Assembly, the "dual carbon" goal was mentioned for the first time, that is, China strives to achieve carbon peak before 2030, and achieve carbon neutrality before 2060. This paper focuses on the "dual carbon" goal, in-depth analysis of the background and importance of China's "dual carbon" goal and the way to realize the "dual carbon" goal. The goal of "dual carbon" is of great significance to climate change, promoting energy transformation and industrial upgrading, so it is urgent to popularize the knowledge of "dual carbon" to the public. Looking ahead, China is expected to achieve the "dual carbon" goal through multi-faceted efforts and set an example for global sustainable development.

Keywords: "Dual Carbon" Goal; Carbon Peaks; Carbon Neutrality; Energy Transformation; Climate Change; Popular Science Education; Green Development.

1. "Dual Carbon" Background

Climate change has had a wide and far-reaching impact on the earth and human society, among which global warming is a serious issue related to the earth's ecosystem, human society and future sustainable development. Reducing carbon emissions to combat climate change is gradually becoming a global consensus.

1.1. World Background

The issue of global climate change has become a common challenge for all mankind. Since the beginning of the industrial civilization of mankind, we have carried out large-scale activities such as burning fossil fuels in the production process, and emitted a large amount of greenhouse gases, mainly carbon dioxide, into the atmosphere. The rapid increase in these greenhouse gases has gradually warmed the climate around the world, which has led to a series of environmental problems such as glacier retreat, sea level rise, and frequent extreme weather events. Therefore, how to reduce carbon emissions to reduce global warming and promote the healthy development of human society has become an important global issue.

To address this challenge, the global policy landscape is evolving. From the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 to the Kyoto Protocol in 1997 to the Paris Agreement, the world's first climate agreement in 2015, global policies have gradually clarified the goals and responsibilities of countries to control greenhouse gas emissions, and emphasized international cooperation to jointly address climate change.

More and more countries are taking green development as a national strategy, increasing investment in renewable energy, energy conservation and environmental protection, and promoting the green transformation of the economy. International cooperation is also being strengthened to address the challenge of climate change.

1.2. Domestic Background

The "dual carbon" goal is a major strategic decision based

on China's actual development and long-term economic and social development[2]. This goal is not only a commitment to the international community, but also an important strategy to promote the structural transformation and sustainable development of the domestic economy.

After years of rapid development, China's economy is facing the problem of increasingly severe resource and environmental constraints. The traditional development model of high energy consumption and high emissions is no longer sustainable and needs to accelerate economic transformation[3], but China's "dual carbon" goal embodies an important part of the construction of ecological civilization, and will promote the comprehensive green transformation of economic and social development, which is a broad and profound economic and social systemic change. In addition, China's "dual carbon" policy framework and technological innovation policy are also being actively constructed to realize the transformation from resource dependence to technology-driven, and promote the transformation of the corresponding technological innovation policy system. China has made a lot of progress in the field of green and low-carbon technology, such as the launch of the "Jumang" satellite, which demonstrates China's technological progress in carbon sink mechanism research, carbon source carbon sink monitoring, and accounting.

China, as the world's largest developing country, needs to demonstrate its responsibility as a major country in climate action. In the face of the challenge of climate change, China has clearly put forward the "dual carbon" goal, which not only reflects China's deep sense of responsibility to promote the building of a community with a shared future for mankind, but also the inherent requirement of realizing the national sustainable development strategy. China's actions have played an important role in demonstrating and leading global climate governance, providing valuable practical experience and reference for the international community, especially other developing countries, and demonstrating China's unique contribution and value in the process of global climate governance.

2. The Importance of the "Dual Carbon" Goal

Promoting the "dual carbon" goal, that is, carbon peak and carbon neutrality, can effectively reduce the emission of greenhouse gases such as carbon dioxide. Achieving carbon peak and carbon neutrality is a major strategic decision made by our Party to grasp the historical initiative and deliberately, an inherent requirement to grasp the new stage of development, implement the new development concept, build a new development pattern, and promote high-quality development, and it is also an inevitable choice to focus on solving outstanding problems of resource and environmental constraints, realizing the sustainable development of the Chinese nation, promoting the transformation and upgrading of the economic structure, promoting the harmonious coexistence of man and nature, and building a community with a shared future for mankind [4].

2.1. It can Effectively Respond to Global Climate Change, Promote Energy Transition, Promote High-Quality Economic Development, and Promote International Scientific and Technological Cooperation

At the international level, actively promoting carbon peaking and carbon neutrality reflects a country's responsibility. This will help enhance the country's voice and influence in the global climate governance system. For example, China is actively promoting carbon peaking and carbon neutrality, and at the international climate negotiation table, it can use its own practical actions as an example to advocate more countries to jointly respond to climate change and contribute to building a community with a shared future for mankind.

From the perspective of energy structure, this will gradually increase the proportion of renewable energy such as solar energy, wind energy, hydropower, and bioenergy in the energy system. Taking solar energy as an example, solar photovoltaic power generation technology has been continuously developed and the cost has gradually decreased, and has become an important source of electricity in many areas. This energy transition is conducive to ensuring a sustainable supply of energy, reducing dependence on imported fossil fuels, and improving the country's energy security.

The promotion of the "dual carbon" goal will give rise to a large number of emerging industries. For example, in the field of carbon capture, utilization and storage (CCUS), the research and development and application of related technologies have become a new economic growth point. These emerging industries have the characteristics of high-tech content and high added value, which will help optimize the country's industrial structure and promote the transformation of the economy from the traditional high-carbon and extensive to low-carbon and intensive.

For enterprises, adapting to the requirements of carbon peaking and carbon neutrality will prompt enterprises to carry out technological innovation and management innovation. Enterprises need to improve energy efficiency and reduce carbon emissions, which can reduce production costs and improve product competitiveness to a certain extent. For example, some manufacturing companies have improved

production efficiency and product quality while reducing carbon emissions by improving production processes and adopting energy-efficient equipment.

With the advancement of the dual carbon process, it is necessary to establish a unified carbon emission accounting, monitoring and certification standard. By cooperating to formulate these standards, countries can ensure the effective realization of the global dual carbon goals, and at the same time promote international technology exchanges and trade. China actively participates in international climate negotiations and cooperation to promote global climate governance and sustainable development. China shares its experience with other countries, conducts technical exchanges, and provides opportunities for cooperation with other countries to promote the global response to climate change. These experiences show that China has taken positive actions to achieve the goals of carbon peak and carbon neutrality, and has demonstrated firm determination and comprehensive layout. These experiences can be used as a reference for other countries and provide valuable inspiration for the global response to climate change[5].

2.2. The Vision of "Carbon Peak" and "Carbon Neutrality" Can Accelerate the Upgrading of China's Energy Industry, Effectively Improve the Ecological Environment, and Enhance Public Health

Reducing carbon emissions can help improve air quality. Reducing coal use, for example, produces a large number of pollutants such as sulfur dioxide, nitrogen oxides and particulate matter during the combustion of coal. Promoting carbon peaking and carbon neutrality and developing clean energy can reduce the emission of these pollutants, thereby reducing the frequency of haze weather and improving people's respiratory health. For example, in some cities that have achieved a clean energy transition, the number of days with blue skies and white clouds has increased significantly. The promotion of the dual carbon goal is conducive to the protection of biodiversity. With the improvement of the ecological environment, the habitats of many threatened species have been restored and protected.

As mentioned earlier, improving air quality directly benefits the respiratory health of the public. Reducing harmful substances in air pollution can reduce the incidence of respiratory diseases, cardiovascular diseases, etc. Especially for children, the elderly, and people with chronic diseases, the impact of improved environmental quality on their health is even more significant.

Promoting green travel advocacy in the process of carbon peaking and carbon neutrality, such as encouraging walking, cycling and taking public transportation, will also help the public improve their physical fitness. For example, the ever-improving cycle lanes and public transport systems in cities are giving people more opportunities to choose healthy ways to get around.

The development of the new energy industry has led to the transformation of the entire energy industry chain. From energy production and storage to transportation and consumption, new technologies and business models have emerged. For example, battery energy storage technology has advanced rapidly with the development of new energy, which can better solve the problems of intermittency and instability of new energy power generation. Therefore, the proposal of

this vision can force China's energy industry to upgrade, accelerate the transformation of the national economy from high-speed to high-quality, and find a "green" development path with Chinese characteristics in the process of achieving this goal [6].

3. The Path to Achieve "Dual Carbon".

"Carbon peaking and carbon neutrality" is a global goal, and no country can stand alone. This requires extensive cooperation among countries in the field of science and technology, and international cooperation in science and technology should be promoted. Xi Jinping's important exposition on "dual carbon" points out the direction of the practice of socialist modernization with Chinese characteristics in the new era, and it is necessary to adhere to the concept of green development, which provides action guidelines for the construction of ecological civilization, and will inevitably promote the development of "dual carbon" with the comprehensive green transformation of China's economy and society [7]. Actively promote the "dual carbon", increase the carbon sink of the ecosystem, and contribute more natural forces to the response to climate change.

3.1. Strengthen Innovation in Green and Low-Carbon Technologies, and Promote Innovation in Science Popularization Concepts, Methods, and Grassroots Work

First of all, strengthen green and low-carbon technology innovation, scientific and technological innovation is the only way to achieve the "dual carbon" goal, focus on the green and intelligent development of fossil energy, clean and low-carbon utilization, large-scale utilization of renewable energy and other key points, promote low-carbon, zero-carbon and negative carbon and energy storage new materials, new technologies, new equipment, accelerate the application of big data, blockchain, artificial intelligence and other cutting-edge technologies in green economy technology.

Secondly, we should pay attention to promoting the innovation of science popularization concepts, methods, and grassroots work. With the concept of "dual carbon" science popularization as the implementation concept of "dual carbon", creators are encouraged to build content brands based on regional characteristics and national culture, and activities such as knowledge competitions, work competitions, and science popularization explanation competitions are organized in a timely manner, so as to promote the industrialization of popular science content supply and explore the establishment of a "dual carbon" science popularization project management model [8].

3.2. Starting from Institutional Construction, Improve the Carbon Trading Market System, and Promote Carbon Reduction at Both Ends

First of all, it is necessary to start with institutional construction, improve the green and low-carbon policy system, build a modern carbon governance system, and establish a fundamental system for carbon emission reduction through legislative means, so as to provide a long-term and stable legal environment for low-carbon investment. This includes setting carbon emission standards, establishing carbon trading markets and other mechanisms to provide

economic incentives for companies to reduce carbon emissions.

Secondly, it is necessary to improve the carbon trading market system, promote the trading and circulation of carbon emission rights through market mechanisms, promote investors to invest in clean and low-carbon industries, and achieve effective control of total carbon emissions.

Furthermore, it is necessary to start from both ends of energy production and consumption, promote the new energy revolution and the process of diversification of the energy structure, encourage non-carbon energy power generation, strictly control fossil energy consumption, and realize the transformation and upgrading of industries from high energy consumption to low energy consumption and high emissions to low emissions.

3.3. Through Government Guidance, Enterprise Participation, Social Linkage and Public Response, Build a Multi-Level and Three-Dimensional Science Popularization System

The government should formulate relevant policies and regulations, clarify the goals and tasks of "dual carbon" science popularization, strengthen the integration and sharing of science popularization resources, and promote the innovation and development of science popularization content. At the same time, the government should also increase investment in the popularization of "dual carbon" science, and support the implementation of science popularization projects and the development of science popularization activities.

Enterprises should actively respond to the government's call, integrate the "dual carbon" concept into corporate culture and production and operation, and promote green and low-carbon development through technological innovation and industrial upgrading. Enterprises can also make use of their own resources and platform advantages to carry out "dual carbon" science popularization activities to improve the public's awareness and participation in environmental protection.

All sectors of society should participate in the "dual carbon" science popularization work to form a joint force. Scientific research institutions, universities, and the media should give full play to their respective advantages to carry out popular science research, disseminate popular science knowledge, and hold popular science activities, so as to promote the wide dissemination and popularization of the concept of "dual carbon". At the same time, grassroots units such as communities and schools should also strengthen the "dual carbon" science popularization work to improve the public's awareness of environmental protection and low-carbon lifestyle.

The public is the ultimate beneficiary and practitioner of "dual carbon" science popularization. The public should actively participate in the "dual carbon" science popularization activities, learn environmental protection knowledge, improve environmental awareness, and adopt low-carbon lifestyles, such as energy conservation and emission reduction, green travel, etc. At the same time, the public should also actively disseminate the concept of "dual carbon" and form a good atmosphere for the whole society to pay attention to and participate together.

4. The Future Outlook of the "Dual Carbon" Goal

With the issuance of the top-level design of carbon peaking and carbon neutrality, the future roadmap and action plan will be continuously refined around the realization of the "dual carbon" goal, and the policy system covering energy, industry, urban construction and other fields will also be continuously improved. At the same time, however, China's development will face broad opportunities and challenges.

4.1. The Energy Structure is Comprehensively Clean and Intelligent

In the future, China's energy system will move towards a diversified model dominated by clean energy. The proportion of renewable energy such as wind and solar energy will increase significantly, smart grids will achieve nationwide coverage, and energy resources will be efficiently dispatched and fully utilized. Hydrogen energy, energy storage and distributed energy systems will be widely promoted to form a more flexible and reliable energy supply system.

4.2. The Deep Integration of Low-Carbon Industry and Technological Revolution

In the industrial sector, in the future, we will further promote the low-carbon transformation of traditional high-carbon industries, optimize production processes through intelligent and digital technologies, and improve energy efficiency. Advanced manufacturing and green industries will become an important engine for economic development, in addition, the deep application of artificial intelligence, big data and industrial Internet of Things technology will help achieve dynamic monitoring and precise emission reduction, and help the high-quality development of green industries and advanced manufacturing.

4.3. Greening Cities and Transportation Systems in an All-round Way

China's urban development will gradually transform into a "carbon-neutral city". In the future, urban planning will pay more attention to the allocation of green space and the protection of ecosystems. Models such as sponge cities and low-carbon communities have gradually stepped onto the historical stage, and urban carbon emissions have been comprehensively reduced. The transportation sector will also usher in a green revolution, with new energy vehicles widely popularized, and modes such as public transportation and shared mobility will also be more widely accepted. Smart transportation technology helps optimize urban transportation systems, improve efficiency, and reduce energy consumption.

4.4. Deepening the Development of the Carbon Market and Green Financial System

In the future, China's carbon market will further expand its coverage, improve the carbon pricing mechanism, and strengthen the incentive role of the market. Carbon allowance trading among enterprises will become more active, promoting the application and innovation of emission

reduction technologies. At the same time, green financial products will flourish, and green bonds, green credits and green funds will provide more financial support for low-carbon projects.

4.5. A Comprehensive Transformation of Citizens' Low-Carbon Awareness and Lifestyle

With the advancement of the "dual carbon" goal, the public's awareness of low-carbon environmental protection will be significantly enhanced. In the future, low-carbon lifestyles will become the new normal in society, and green lifestyles will become an important part of mainstream social culture. At the same time, digital technologies will enable low-carbon living, such as carbon footprint management tools and low-carbon behavior incentive mechanisms, which will be integrated into people's lives, and the public's sense of participation and identity will be significantly improved.

The realization of the "dual carbon" goal is not only a responsibility to respond to climate change, but also a major opportunity to promote economic and social transformation. Looking to the future, through technological innovation, policy coordination, social participation and international cooperation, China is expected to achieve the organic unity of green development and economic prosperity under the goals of carbon peak by 2030 and carbon neutrality by 2060, and set an example for global sustainable development.

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