

The Current Status and Prospects of China's Low-Carbon Economic Development

Yizhe Li*

Northwest Normal University, Lanzhou 730070, Gansu Province, China

*Corresponding author: Yizhe Li, 202131805514@nwnu.edu.cn

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Abstract: This paper aims to explore the importance of developing a low-carbon economy in China and presents a series of key recommendations. Firstly, it emphasizes the adverse impact of economic development on the natural environment and highlights the unsustainable nature of China's previous pursuit of economic growth at the expense of its ecological surroundings. Subsequently, the paper provides specific recommendations in response to the pressing resource and environmental challenges in current economic and social development, along with the urgent need to accelerate the transition towards a greener, low-carbon economy to achieve carbon peak and carbon neutrality goals. The key recommendations include continually enhancing the legal framework for a low-carbon economy, optimizing the energy structure, improving energy efficiency, and optimizing the industrial structure. These proposals aim to offer concrete actions to support the development of a low-carbon economy in China, encompassing legal support, energy transformation, and industrial upgrading. Ultimately, this paper underscores China's potential in developing a low-carbon economy and calls for resolute actions to strengthen legal frameworks, foster technological innovation, and promote industrial restructuring. These actions will guide China towards a more sustainable and environmentally conscious economic future, aligning its growth trajectory with the global imperative to reduce carbon footprints.

Keywords: Low-carbon economics; Green development; Chinese economy

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1. Introduction

In the wake of global concerns about environmental sustainability and the urgent need to mitigate the impact of economic development on the natural world, China finds itself at a pivotal juncture. While the country has experienced unprecedented growth over the past forty years, it has also faced substantial environmental challenges, prominently manifested by a concerning surge in carbon emissions.

This discourse delves into the multifaceted landscape of fostering a low-carbon economy in China, exploring critical areas that demand strategic attention and proactive measures. Addressing the imperative for change, the discussion commences by shedding light on the current status of China's carbon emissions, elucidating how the nation's standing as the world's largest emitter mandates a fundamental shift toward sustainable development.

Key recommendations emerge as crucial drivers in this transformative journey. These recommendations involve a comprehensive review and strengthening of the legal frameworks governing a low-carbon economy, underlining the significance of structural and technological reforms to recalibrate the energy landscape and industry dynamics. The discourse emphasizes the pivotal role of research and development in cultivating innovative low-carbon technologies and industry structures essential for China's pursuit of sustainable economic growth.

In conclusion, this exploration underscores the urgency and significance of embracing a low-carbon economic model in China. By adopting these recommendations and fostering collaboration, the nation can steer its developmental course toward a sustainable and environmentally conscious future. This approach addresses the urgent global call to reduce carbon footprints, paving the way for a more resilient and eco-friendly economic trajectory.

2. Background of a low-carbon economy

The concept of a low-carbon economy first emerged in the early 21st century in the United Kingdom, inspired by the idea of the circular economy ^[1]. An analysis of the similarities between the circular economy and the low-carbon economy reveals a shared emphasis on prioritizing resource conservation and environmental protection as paramount requirements in economic development. Both concepts advocate for environmental preservation as the ultimate goal, with energy efficiency and emission reduction as fundamental approaches. However, they diverge in focus. The circular economy places greater emphasis on resource recycling and reuse, highlighting resource utilization, while the low-carbon economy concentrates on reducing carbon emissions. Its primary objective is to mitigate the threat of global warming to humanity, centering on carbon emission reduction.

3. The current status of China's carbon emissions

Over the past forty years of reform and opening up, China's economic development has achieved remarkable success on a global scale. However, under an extensive economic growth model driven by various factors, the pressure on resource sustainability has continued to rise, resulting in a persistent increase in carbon emissions. According to World Bank data, China's carbon dioxide emissions per capita rose from 2.7 metric tons per person in 2000 to 7.6 metric tons per person in 2019. As the world's largest emitter, China's carbon dioxide emissions reached 11.9 billion tons in 2021, accounting for 33% of the global total of 36.3 billion tons, significantly surpassing other nations and regions.

China's response to climate change holds immense importance on both domestic and international fronts, carrying implications for long-term and overall development. President Xi Jinping has articulated a vision targeting carbon peaking by 2030 and carbon neutrality by 2060 on multiple major international occasions ^[2]. The timeframe for achieving these dual carbon goals in this nation (10 years from peaking to neutrality, 30 years in total) is significantly shorter than that of developed nations (the EU took 30 years to peak and has 60 years from peaking to achieve neutrality by 2050).

Addressing this unprecedented challenge necessitates breaking away from the traditional industrial development path reliant on high energy consumption, high emissions, and high pollution. It requires comprehensively promoting the green transformation of the economy and society. This entails adhering to a path of coordinated development, energy security, and sustainable development, which is a uniquely Chinese approach to modernization.

4. The importance of developing a low-carbon economy

The detrimental impact of economic development on the natural environment has significantly affected the survival and progress of humanity, gradually capturing global attention. As the world's largest developing country, China's previous pursuit of economic growth at the expense of ecological surroundings through an extensive development model is no longer sustainable for the new era's economic and social development. This has garnered substantial attention from China's top decision-makers.

This research aims to provide insight into addressing the pressing resource and environmental challenges faced in the current economic and social development. It seeks to accelerate the transition toward a greener, low-carbon economy and drive the timely achievement of carbon peak and carbon neutrality goals.

5. Several recommendations for developing a low-carbon economy

5.1. Continuously improving the legal framework for a low-carbon economy

A low-carbon economy involves every aspect of a nation's livelihood, requiring a coordinated low-carbon transition across all societal domains. A robust legal system serves as both a constraint and a guide. Presently, China has enacted various legal systems such as the 'Law of the People's Republic of China on Renewable Energy.' However, achieving comprehensive development in the realm of a low-carbon economy necessitates not only a transformation in energy structure but also involvement in critical areas like transportation, construction, and industrial manufacturing. Therefore, China needs to further refine and improve legal systems related to the low-carbon economy in various fields according to the actual development of each economic and social domain, providing a solid legal safeguard for the development of a low-carbon economy.

5.2. Optimizing energy structure and enhancing energy efficiency

An energy structure heavily reliant on coal inevitably results in high levels of carbon dioxide emissions. Therefore, for China to achieve a low-carbon economy, a shift in energy structure and an improvement in energy efficiency are imperative. During industrialization, enhancing energy efficiency emerges as the most effective means of reducing carbon emissions, and the potential for improvement is substantial. For example, in developed economies, one-third of emissions originate from buildings, another third from transportation, and the remaining from industrial sources. Currently, China's emissions are predominantly from industrial sources, with comparatively lower emissions from transportation and buildings. However, with improving living standards and increasing residential space, there is significant potential in adopting zero-emission building practices, following Europe's lead in energy-efficient building construction.

The potential for enhancing energy efficiency in the industrial sector is also substantial. As a developing country, China encompasses both cutting-edge and outdated technologies. In the steel industry, for instance, while leading technologies exist in large and medium-sized enterprises with relatively low comprehensive energy consumption per ton of steel, small-scale steel production and outdated technologies consume more energy and emit higher levels. This necessitates the expedited phasing out of obsolete production capacity.

In response, this paper proposes three suggestions:

- (1) Increasing research and development investment in the energy sector, actively advancing coal-to-oil and olefin technologies, exploring secondary re-heating of coal for electricity generation, and promoting the large-scale development of low-grade coal utilization to maximize coal energy and achieve clean and efficient coal utilization.
- (2) Intensifying the process of natural gas replacing oil: Importing natural gas from abroad through

various channels and establishing domestic strategic energy reserves lay the foundation for energy security while paving the way for low-carbon energy ^[3].

- (3) Vigorously developing clean energy sources: China possesses natural advantages in regions like the northwest, southwest, and southeastern coast for developing solar, hydro, wind, and tidal energy. Leveraging these favorable conditions, China should strongly promote the industries of hydroelectric, wind, and solar power generation to foster a low-carbon economy through green energy development. Additionally, China should diversify the development of clean energy sources based on scientific assessment and evidence, encouraging the development of nuclear power to drive the diverse development of clean energy in the country. The introduction of carbon pricing schemes or “feed-in-tariffs,” which require the use of green energy, has a positive and significant impact on green investment. Other interventions, such as biofuel support, do not appear to be associated with higher green investment ^[4].

5.3. Optimize industrial structure

The industrial structure directly determines the mode of economic development. To foster a low-carbon economy, the low-carbon transformation of the three major industries must be realized. First, China should vigorously promote ecological and circular agriculture while strengthening and consolidating the agricultural foundation, thereby reducing greenhouse gas emissions in agricultural production. Second, there should be a strong emphasis on developing new energy-saving and environmentally friendly industries, utilizing market forces to drive low-carbon development in the industrial sector. Third, China should expedite the development of the service industry, increasing its contribution to the national economy, and optimizing and refining the industrial structure of the nation ^[5].

6. Conclusion

China’s remarkable economic growth, while commendable, has been accompanied by a concerning surge in carbon emissions, indicating an urgent need for immediate action. This analysis highlights crucial recommendations to initiate and guide the transformation towards a low-carbon economy.

The necessity for a robust legal framework to underpin and guide this transformation emerges as a foundational requirement. It emphasizes the importance of aligning laws and regulations with the dynamic requirements of a low-carbon economy across multiple sectors. Additionally, the strategic imperative to enhance technological research and development emerges as a key driver, providing innovative solutions to address challenges in energy efficiency, industry dynamics, and the broader socio-economic landscape.

The path to a low-carbon economy in China is undoubtedly intricate, requiring concerted efforts, collaboration, and sustained commitment. However, with a resolute commitment to the outlined recommendations – strengthening legal frameworks, fostering technological innovation, and restructuring the industry – China stands poised to chart a transformative course toward a more sustainable and environmentally conscious economic future. This aligns its growth trajectory with the global imperative to reduce carbon footprints, securing a resilient and eco-friendly tomorrow.

Disclosure statement

The author declares no conflict of interest.

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