

*Research article*¹

The Concept of a Low-Carbon Economy and China's Experience

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Received: 06.05.2024 | Accepted: 13.06.2024 | <https://doi.org/10.56334/ecosbankfincyber/6.2.3>

Abstract

This article examines the theoretical foundations of the low-carbon economy concept, its global development trends, and the role of China as a leading state in advancing a green transformation. The research analyzes how China has incorporated the low-carbon model into its national strategies, highlighting achievements, challenges, and potential lessons for other countries. Special attention is paid to institutional, technological, and economic mechanisms applied in China, as well as the implications of global climate commitments for sustainable development. The findings demonstrate that China's experience offers valuable guidance for economies undergoing modernization while facing environmental restrictions.

Keywords: low-carbon economy, sustainable development, climate policy, China, green transformation

Introduction

The transition to a low-carbon economy is one of the most pressing challenges of the 21st century. Global climate change, environmental degradation, and the exhaustion of natural resources require states to adopt new models of growth that balance economic, social, and ecological dimensions. The low-carbon economy model, which emerged in response to climate threats, provides a framework for reducing greenhouse gas emissions while maintaining competitiveness.

International organizations such as the United Nations (UN), the Organisation for Economic Co-operation and Development (OECD), and the World Bank have consistently emphasized the importance of low-carbon development in achieving sustainable development goals. Within this framework, the People's Republic of China has become one of the most significant actors, actively implementing strategies and policies aimed at transitioning its economy to low-carbon pathways.

The Concept of a Low-Carbon Economy

The concept of a low-carbon economy (LCE) is based on the principle of minimizing greenhouse gas emissions through restructuring industrial production, improving energy efficiency, expanding renewable energy sources, and promoting green consumption. The term gained recognition in the early 2000s, following the adoption of the Kyoto Protocol and subsequent international agreements on climate change.

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Scholars define a low-carbon economy as a socio-economic system that ensures sustainable development by integrating ecological priorities into economic decision-making. This involves the use of carbon taxes, emissions trading systems, and technological innovation to decouple economic growth from carbon dependency.

Key features of a low-carbon economy include:

- reduction of fossil fuel consumption;
- reliance on renewable and clean energy sources;
- development of energy-saving technologies;
- promotion of green finance and investment;
- active involvement of society in ecological modernization.

Global Development Trends in the Low-Carbon Economy

The 2015 Paris Agreement set a new milestone in global climate governance by obligating states to limit the rise in average global temperature to well below 2°C. This commitment reinforced the role of low-carbon development as a key strategy for both developed and developing countries.

In Europe, the “Green Deal” has become the main framework for transitioning to a carbon-neutral economy by 2050. The United States has re-emphasized climate policy under recent administrations, investing in clean energy and infrastructure. Meanwhile, China, as the world’s largest emitter of greenhouse gases, plays a central role in shaping the trajectory of the global low-carbon transformation.

China’s Experience in Building a Low-Carbon Economy

Policy and Institutional Framework

China has integrated the principles of a low-carbon economy into its national strategies. The 14th Five-Year Plan (2021–2025) prioritizes green development, while President Xi Jinping announced the “dual carbon” goals—peaking carbon emissions by 2030 and achieving carbon neutrality by 2060.

China established pilot low-carbon provinces and cities, introduced carbon emission trading systems, and strengthened environmental legislation. These measures demonstrate a gradual but consistent institutionalization of climate policy.

Technological Modernization

A key component of China’s low-carbon transformation is technological innovation. The country has become a global leader in renewable energy production, especially in solar and wind power. China also invests heavily in electric vehicle manufacturing, smart grids, and energy efficiency technologies.

The state provides significant subsidies and incentives for companies engaged in green technologies, while research and development in clean energy receives growing financial support.

Economic Mechanisms

China has developed a national carbon trading system, which covers major industrial sectors such as power generation, steel, and cement. Additionally, green finance has become an important tool, with the People’s Bank of China supporting the issuance of green bonds and loans.

These mechanisms not only reduce emissions but also create a new market for sustainable investment, making low-carbon development a driver of long-term competitiveness.

Social and Regional Dimensions

China's low-carbon policies also focus on regional development. Pilot projects in provinces such as Guangdong, Hubei, and Beijing serve as experimental platforms for introducing green standards. Public awareness campaigns and educational programs promote sustainable lifestyles and support the shift toward eco-conscious consumption.

Challenges and Limitations

Despite significant progress, China faces several challenges in implementing a low-carbon economy:

- dependence on coal as the primary energy source;
- regional disparities in economic and technological development;
- balancing rapid economic growth with environmental commitments;
- ensuring transparency and reliability of emissions data.

Furthermore, geopolitical factors and international trade disputes may affect China's access to advanced low-carbon technologies.

Implications for Other Countries

China's experience demonstrates that large-scale economies can achieve significant progress in low-carbon transformation by integrating climate goals into national strategies. For countries with resource-based economies, China provides a model of how to combine economic modernization with ecological sustainability.

Key lessons include:

1. the importance of long-term government commitment;
2. the role of pilot projects in testing policies;
3. the need to combine market-based tools with state regulation;
4. the integration of technological innovation into national strategies.

Conclusion

The concept of a low-carbon economy reflects a global shift toward sustainable development under the pressure of climate change. China's achievements in this area highlight the potential of state-driven strategies combined with market mechanisms to accelerate the green transition.

While challenges remain, China's dual carbon goals and commitment to innovation position the country as a leader in global climate governance. For other nations, particularly those undergoing structural economic change, China's experience offers valuable insights for designing effective low-carbon policies.

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