Editorial: Green finance & carbon neutrality: strategies and policies for a sustainable future

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Editorial on the Research Topic
Green finance & carbon neutrality: strategies and policies for a sustainable future

Introduction

Facing severe global environmental challenges, nations must prioritize carbon neutrality. In this context, green finance is key for sustainable development and environmental protection, and is attracting increasing attention. This Research Topic, "Green Finance & Carbon Neutrality: Strategies and Policies for a Sustainable Future", includes 35 studies highlighting green finance's role in transitioning to a low-carbon economy. Articles analyze green finance strategies in various economies and industries, discussing policymaking to support sustainable growth and environmental improvement. With interdisciplinary approaches and innovations, this Research Topic aids policymakers, researchers, and practitioners in tackling green transition challenges, offering insights for achieving global sustainability.

Green finance and technological innovation

Green finance and technological innovation reshape the global economy as key carbon neutrality drivers. They support sustainable investments and balance growth with environmental protection, offering pathways for a sustainable future.

In *Measurement, Dynamic Evolution and Pollution Emission Effects of the Coupling of Green Finance and Digital Technology - Evidence from China*, Liu et al. investigate the interplay between green finance and digital technology in China using a game theory-based weighting method. Results show increasing provincial coordination, club convergence, and a "Matthew Effect" (where advantaged regions gain more). This synergy promotes pollution reduction through green innovation, offering critical support for synergistic interactions.

Zhang et al. demonstrated that digital financial inclusion boosts sustainable agriculture in China by offering accessible, low-cost services. The study, covering 31 provinces

(2013–2021), revealed impacts via industrial structure and entrepreneurship, with spatial spillover effects, highlighting its transformative potential for policy and practice.

Liu and Zhu explore how green finance influences carbon emission intensity and efficiency, highlighting the digital economy as a moderator. Findings show green finance reduces emission intensity via mechanisms like green innovation and enhances emission efficiency. The digital economy amplifies these effects, supporting policies for green finance and environmental protection.

Low-carbon policies and urban development

Low-carbon policies are vital for urban development, reducing emissions, fostering sustainable growth, and improving life quality. Green finance supports this transition, funding clean energy, green infrastructure, and ecological innovation.

Geng and Yang examine low-carbon economy pilot policies' effects on economic development and urban ecological efficiency. Their findings show a 2.2% increase in ecological efficiency in pilot cities. While industrial structure optimization was negligible, energy structure improvements were notable. The research validates these policies as effective in advancing green urban development.

Xiao et al. show that the low-carbon city pilot policy boosts urban circular economies by 6.42%. An analysis of 273 Chinese cities (2012–2022) reveals industrial structure rationalization as a key mediator. Expanding this policy can further support sustainable economic transitions.

Li et al. show that green finance and new infrastructure significantly improve carbon emission performance in Chinese cities, especially in marketized eastern regions, policy-supported digital sectors, and resource-based cities. Key pathways include green innovation, industrial upgrading, and resource optimization.

Carbon trading and market mechanisms

In global climate change efforts, carbon trading is key for carbon neutrality. By trading emission rights, it encourages emission reduction, tech innovation, and sustainable investment. Analyzing these markets enhances policies, benefits the environment, and transforms economies.

Han et al. use a Time-Varying Parameter Vector Autoregression- Bayesian Kalman Model (TVP-VAR-BK) model to study risk spillover between China's carbon market and high-emission industries. The carbon market's short-term impact is greater on the cement industry, while long-term effects stem from industry fluctuations. Economic policy uncertainty significantly influences risk spillovers asymmetrically at the median but not at extreme quantiles, indicating a complex transmission mechanism.

Tian et al. demonstrate that China's Carbon Emission Trading (CET) significantly boosts the construction industry's green development. Analysis of 107 listed companies (2007–2022) shows a 0.36 GTFP increase. The Difference-in-Differences method reveals CET's impact, particularly on large, state-owned, indebted companies, and those in the east receiving subsidies. Future research should explore CET effects across sectors and regions.

Han et al. show that carbon trading policies significantly lower corporate carbon emission intensity across ownership types, marketization levels, and digitalization. Using 2009–2019 A-shares data, they reveal that these policies drive nearby firms to cut emissions via demonstration and competition. Initially, ESG information disclosure weakens this effect but later enhances it as ESG ratings improve policy efficacy. This study guides policy optimization towards "dual carbon" goals.

Corporate environmental performance and financial impact

Amid serious global ecological challenges, corporate environmental performance increasingly affects financial markets. Green finance prompts corporate upgrades and influences financial outcomes and investor choices. Studying this relationship aids understanding of green finance, aiding policymakers and resource allocation for a low-carbon economy.

Zhu et al. show the "Green Credit Guidelines" policy enhances corporate environmental investments. Using A-share data (2004–2020) and PSM-DID, the study finds variable impacts based on ownership and region. Green credit increases financing constraints, encouraging environmental investment, innovation, and capital structure change. Macroeconomic and monetary policies, alongside government focus, affect investment attitudes, informing green finance policy-making.

Zhang et al. reveal that ESG performance boosts technological innovation in China's A-share companies. From 2011–2021, ESG enhances innovation through better network positions, increased institutional ownership, reduced labor costs, and eased financing constraints. Effects are stronger in labor-intensive, private, competitive, mature firms. Companies should enhance ESG practices, communication, and equity structure, while governments should improve ESG policies.

Guo et al. show green finance in China (2004–2021) significantly reduces carbon emissions, with green credit being most effective. Regional variances exist. Command-control tools aid reduction; market tools are less effective. This informs precise policies and promotes regional cooperation for climate goals.

Environmental policy and social impact

Effective environmental policies profoundly impact ecosystems, transform social structures, and lifestyles. They enable rational resource allocation, promote a green economy, and enhance public awareness. This harmony fosters sustainable economic, social, and environmental development.

Jing and Feng used a "Tool-Goal-Object" framework to analyze "dual carbon" policy texts. They identified tool imbalance, limited target coverage, object misalignment, and poor dimensional compatibility. Their suggested improvements aim to optimize the policy framework for better environmental outcomes.

Dempere et al. highlight greenwashing tactics in sustainable finance, such as vague terms and information opacity, harming reputation and trust. They stress stronger regulations and true transparency to mitigate risks, despite weak current measures.

Jiang et al. used a set-theoretic approach to study China's environmental policy implementation complexity. They found four configurations: "priority governance" for high pollution, "financial emphasis" in the northwest, "coordinated implementation" with socio-economic conditions, and a "comprehensive strategy" in capitals. These insights aid regional policy optimization.

Economic development and environmental benefits

Balancing economic growth with environmental benefits is urgent. Green finance bridges this gap, facilitating carbon neutrality through efficient resources and innovation. Sustainable development demands integrated policies, market mechanisms, collective action, and long-term commitment.

Wen et al. found that RCEP bilateral trade enhances economic growth and reduces pollution in ASEAN countries, though carbon mitigation is uncertain. Differences exist between ASEAN and non-ASEAN regions. The study suggests optimizing environmental quality to support growth and transition.

Zhang et al. find that financial inclusion, urbanization, and energy efficiency improvements significantly enhance environmental performance for "Belt and Road" countries. Additionally, green finance can drive low-carbon innovation in China's aging economy, promoting market diversity and balancing economic and environmental goals.

Rizwanullah et al. analyzed factors influencing Belt and Roads Initiatives (BRI) countries' environmental performance using 1991–2021 data. Financial inclusion, urbanization, trade, and industry impact ecology. Findings stress robust policies for sustainable economic and environmental progress.

Conclusion and future directions

The 35 articles in this Research Topic comprehensively examine the crucial role of green finance in promoting the transition to a low-carbon economy. The research addresses the implementation of green finance strategies across different economies and industries, as well as how policy formulation can effectively support these efforts to foster sustainable economic growth and environmental enhancement. As the global community continues to confront the challenges posed by climate change, these studies underscore the importance of interdisciplinary approaches and cross-sector collaboration. By integrating technological innovation, financial mechanisms, and public participation, relevant stakeholders can make significant progress toward achieving a low-carbon and sustainable future. Future research should further explore the synergistic effects of green finance and digital technologies, deepen the effectiveness of policy support, and expand cross-regional collaboration to advance the realization of global sustainable development.

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