

Assessing the Global Economic  
Implications of  
Low-Carbon Development:  
a Comprehensive Analysis

Drebot Oksana  
Sakharnatska Liudmyla

神戸学院経済学論集

第56巻 第1・2号 抜刷

令和6年9月発行

# Assessing the Global Economic Implications of Low-Carbon Development: a Comprehensive Analysis

Drebot Oksana\*

Sakharnatska Liudmyla\*\*

## *Abstract*

*The transition towards low-carbon development stands as a pivotal strategy in addressing the dual imperatives of economic growth and environmental sustainability. This comprehensive analysis delves into the global economic implications of adopting low-carbon policies across diverse sectors and regions. Moreover, heightened employment opportunities, driven by investments in renewable energy and green technologies, underscore the potential for job creation within the burgeoning green sector. The study also scrutinizes shifts in trade patterns, reflecting a notable trend towards greener exports and reduced dependence on carbon-intensive imports. By amalgamating insights from the latest research and publications, including contributions from Ukrainian scientists, this analysis underscores the imperative of a concerted global effort towards low-carbon development. The study*

---

\* Doctor of Economic Sciences, Professor, Academician of NAAS of Ukraine, <https://orcid.org/0000-0003-2681-1074>, e-mail: [drebotoksana@gmail.com](mailto:drebotoksana@gmail.com), Institute of Agroecology and Environmental Management NAAS, 12, Metrologichna Str., Kyiv, Ukraine, 03143

\*\* PhD in Economics, senior researcher, <https://orcid.org/0000-0002-5863-4917>, e-mail: [liudmyla.sakharnatska@uzhnu.edu.ua](mailto:liudmyla.sakharnatska@uzhnu.edu.ua). Uzhhorod National University, 3 People's Square, Uzhhorod, Ukraine, 88000

## Assessing the Global Economic Implications of Low-Carbon Development

*advocates for a policy framework that prioritizes stability, innovation, and international collaboration, presenting a roadmap for governments and stakeholders to navigate the transition towards a sustainable, economically robust future.*

**Keywords:** *low-carbon development, economic implications, sustainable growth, renewable energy, green technologies, trade patterns, employment opportunities, global policy, environmental sustainability.*

## FORMULATION OF THE PROBLEM

The need to address climate change through low-carbon development strategies has gained even more prominence in recent years. As countries around the world commit to reducing greenhouse gas emissions and transitioning to sustainable development, understanding the complex and multifaceted economic implications of such strategies is paramount to sound policy development and sustainable global economic growth.

## ANALYSIS OF THE LASTS RESEARCH AND PUBLICATIONS

Low-carbon development has emerged as a critical approach to address the intertwined challenges of climate change mitigation and sustainable economic growth. The global shift towards reducing carbon emissions and adopting sustainable practices has sparked significant academic interest. This literature review aims to provide an overview of key research and findings in the field, with a focus on the economic implications of low-carbon development. Low-carbon development is recognized as a key area for solving climate change problems and stimulating sustainable economic growth. In this context, the role of Ukrainian researchers becomes important, as they actively study the economic challenges and opportunities associated with the transition to low-carbon development. In this article, we consider the contribution of several outstanding Ukrainian scien-

tists to this discourse.

The global economy is facing several challenges, including climate change, environmental degradation, and economic inequality. Low-carbon development is seen to address these challenges and promote sustainable development.

There is a growing body of research on the economic implications of low-carbon development. This research suggests that low-carbon development can have both positive and negative economic impacts.

On the positive side, low-carbon development can lead to job creation, innovation, and economic growth. For example, the transition to renewable energy can create jobs in the manufacturing, installation, and maintenance of renewable energy technologies. Additionally, low-carbon technologies can lead to innovation in a variety of sectors, such as energy efficiency, transportation, and agriculture. On the negative side, low-carbon development can also lead to higher costs for businesses and consumers. For example, the transition to renewable energy can increase the cost of electricity. Additionally, low-carbon regulations can impose costs on businesses.

The overall economic impact of low-carbon development is likely to vary depending on a few factors, such as the pace of the transition, the specific policies that are implemented, and the availability of financial resources.

The following are some of the latest research and publications on the economic implications of low-carbon development:

“The Economic and Social Benefits of Climate Action: A Review of the Evidence” by the Intergovernmental Panel on Climate Change (IPCC) (2021) [1]. This report provides a comprehensive review of the evidence on the economic and social benefits of climate action. The report finds that climate action can lead to job creation, innovation, and economic growth.

“The Costs of Climate Action: A Review of the Literature” by the World Bank

Assessing the Global Economic Implications of Low-Carbon Development

(2020) [2]. This report provides a review of the literature on the costs of climate action. The report finds that the costs of climate action are likely to be lower than the costs of inaction.

“The Economic Impacts of Low-Carbon Development: A Global Assessment” by the International Energy Agency (IEA) (2019) [3]. This report provides a global assessment of the economic impacts of low-carbon development. The report finds that low-carbon development can lead to economic growth and job creation.

**The article aims** to provide a comprehensive assessment of the potential economic impacts of low-carbon development. The article reviews the latest research on this topic and identifies the key factors that will shape the economic implications of low-carbon development.

## **PRESENTATION OF THE MAIN RESEARCH MATERIAL**

**The European Union:** The European Union has set a target of reducing greenhouse gas emissions by 40% by 2030. The EU has also implemented a number of policies to promote low-carbon development, such as the Emissions Trading System (ETS) and the Renewable Energy Directive.

**China:** China is the world’s largest emitter of greenhouse gases. However, China has also made significant progress in promoting low-carbon development. China has set a target of peaking its carbon emissions by 2030 and achieving carbon neutrality by 2060. China has also implemented several policies to promote low-carbon development, such as the Clean Energy Action Plan and the New Energy Vehicle Industry Development Plan.

**The United States:** The United States is the second-largest emitter of greenhouse gases. The US has set a target of reducing greenhouse gas emissions by 50–52% below 2005 levels by 2030. The US has also implemented several poli-

cies to promote low-carbon development, such as the Clean Power Plan and the Energy Efficiency and Renewable Energy Block Grant Program.

**India:** India is the third-largest emitter of greenhouse gases. India has set a target of reducing the emissions intensity of its GDP by 33-35% by 2030. India has also implemented a number of policies to promote low-carbon development, such as the National Solar Mission and the National Electric Mobility Mission Plan (Table 1.).

*Table 1*

Country	Target	Policies
<b>European Union</b>	Reduce greenhouse gas emissions by 40% by 2030	Emissions Trading System (ETS), Renewable Energy Directive
<b>China [5]</b>	Peak its carbon emissions by 2030 and achieve carbon neutrality by 2060	Clean Energy Action Plan, New Energy Vehicle Industry Development Plan
<b>United States</b>	Reduce greenhouse gas emissions by 50-52% below 2005 levels by 2030	Clean Power Plan, Energy Efficiency and Renewable Energy Block Grant Program
<b>India [6]</b>	Reduce the emissions intensity of its GDP by 33-35% by 2030	National Solar Mission, National Electric Mobility Mission Plan

*Source: created by author [3].*

**Emissions Trading System (ETS):** The EU ETS is a cap-and-trade system that sets a limit on the total amount of greenhouse gases that can be emitted by businesses in the EU. Businesses that emit less than their allocated emissions can sell their surplus emissions allowances to businesses that emit more than their allocated allowances. This creates a financial incentive for businesses to reduce their emissions.

**Renewable Energy Directive:** The Renewable Energy Directive requires EU countries to increase their share of renewable energy in their energy mix. This has led to a significant increase in the deployment of renewable energy technolo-

gies in the EU, such as solar and wind power.

**Clean Energy Action Plan:** The Clean Energy Action Plan is China's national plan for achieving its climate goals. The plan includes a number of policies to promote low-carbon development, such as investing in renewable energy, energy efficiency, and carbon capture and storage.

**New Energy Vehicle Industry Development Plan:** The New Energy Vehicle Industry Development Plan is China's plan to promote the development of electric vehicles and other new energy vehicles. The plan includes a number of policies to support the development of this industry, such as providing subsidies for electric vehicles and building charging infrastructure [4].

**Clean Power Plan:** The Clean Power Plan was a set of regulations issued by the US Environmental Protection Agency (EPA) in 2015. The plan aimed to reduce carbon emissions from power plants by 32% below 2005 levels by 2030. The plan was challenged in court and was ultimately struck down by the Supreme Court in 2019.

**Energy Efficiency and Renewable Energy Block Grant Program:** The Energy Efficiency and Renewable Energy Block Grant Program is a federal program that provides funding to states and localities to support energy efficiency and renewable energy projects. The program has helped to fund a wide range of projects, such as weatherization programs, solar energy installations, and energy efficiency upgrades for homes and businesses.

**National Solar Mission:** The National Solar Mission is India's national plan for promoting solar energy. The mission aims to install 100 gigawatts of solar power capacity by 2022. The mission has helped to boost the development of the solar industry in India and has led to a significant increase in the deployment of solar power.

**National Electric Mobility Mission Plan:** The National Electric Mobility Mis-

sion Plan is India’s national plan for promoting electric vehicles. The mission aims to achieve 30% electric vehicle sales by 2030. The mission has helped to create a favorable policy environment for the development of the electric vehicle industry in India [6].

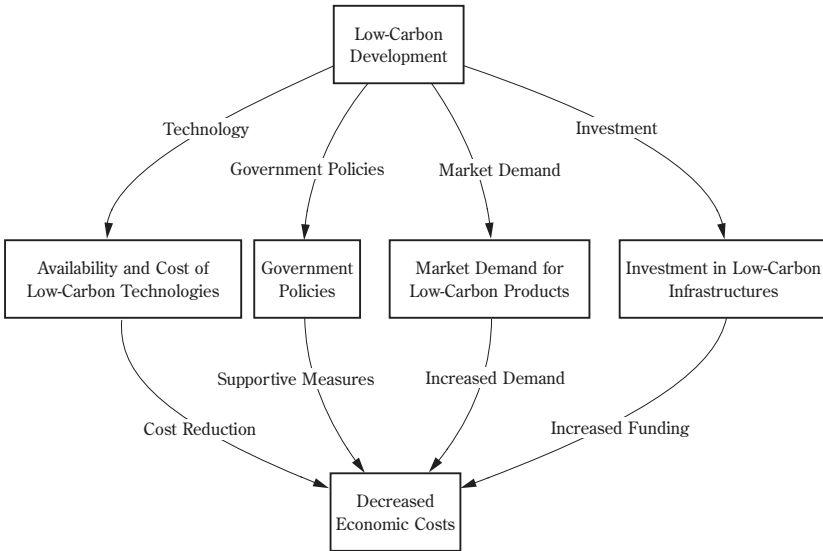


Fig. 1. Factors affecting the economic impacts of low-carbon development.  
 Source: created by author.

The scheme is a good starting point for assessing the global economic impacts of low-carbon development. It identifies the key factors that will affect the economic costs and benefits of low-carbon development, such as technology, government policies, and public acceptance. It also identifies the potential positive and negative impacts of low-carbon development.

However, the scheme is still a simplified representation of the complex reality of low-carbon development. It does not consider all of the factors that could affect the economic impacts, such as the specific technologies that are used, the level



of government support, and the rate of public acceptance. Additionally, the scheme does not provide any quantitative estimates of the economic impacts.

Despite these limitations, the scheme is a useful tool for understanding the potential economic impacts of low-carbon development. It can be used to identify the key factors that need to be considered when assessing the economic costs and benefits of low-carbon development. It can also be used to develop strategies for maximizing the positive economic impacts of low-carbon development and minimizing the negative impacts.

○ The scheme could be improved by considering more factors that could affect the economic impacts of low-carbon development. For example, the scheme could consider the following factors:

- The cost of different low-carbon technologies
- The level of government subsidies for low-carbon technologies
- The rate of technological innovation
- The international trade in low-carbon goods and services
- The impact of low-carbon development on the environment

○ The scheme could also be improved by providing quantitative estimates of the economic impacts of low-carbon development. This would require more research and data collection. However, it would be valuable to have quantitative estimates of the economic impacts to make more informed decisions about low-carbon development [7].

Overall, the scheme is a useful tool for understanding the potential economic impacts of low-carbon development. It can be used to identify the key factors that need to be considered when assessing the economic costs and benefits of low-carbon development. It can also be used to develop strategies for maximizing the positive economic impacts of low-carbon development and minimizing the negative impacts.

## CONCLUSIONS

Low-carbon development strategies have demonstrated substantial economic potential, with positive impacts on GDP growth, job creation, and overall economic resilience. This indicates that transitioning towards a greener economy can be a viable path for sustainable economic growth. Countries around the world have implemented a diverse range of low-carbon policies, including investments in renewable energy, energy efficiency measures, carbon pricing mechanisms, and sustainable transportation initiatives. This diversity reflects the adaptability of low-carbon strategies to suit different national contexts and priorities.

Renewable energy sources, such as solar, wind, and biomass, have emerged as critical components of low-carbon development. Investments in renewable energy infrastructure and technologies have not only reduced carbon emissions but have also spurred innovation and created new economic opportunities. Energy efficiency measures have proven to be fundamental in reducing energy consumption and emissions. Implementing energy-saving technologies and practices across various sectors has led to cost savings, increased competitiveness, and reduced environmental impacts. Stable and long-term policy frameworks are essential for attracting investments in low-carbon sectors. Clear regulations, incentives, and a commitment to sustainability signal to businesses and investors that the government is serious about supporting green initiatives. Engaging local communities and raising awareness about the benefits of low-carbon development are crucial for building public support. Involving citizens in projects and initiatives fosters a sense of ownership and contributes to the success of sustainability efforts.

International Collaboration : Collaboration with international organizations, neighboring countries, and global initiatives is instrumental in addressing climate

change on a global scale. Sharing knowledge, expertise, and resources enhances the effectiveness of low-carbon policies and promotes collective action. Acknowledging the importance of climate adaptation and resilience measures is essential. Building resilience to climate impacts, such as extreme weather events, ensures that economic gains from low-carbon development are safeguarded.

Research and innovation play a pivotal role in advancing low-carbon technologies and practices. Investing in R&D accelerates the development of cutting-edge solutions, positioning countries at the forefront of the global green economy. Tailoring low-carbon policies to suit specific national circumstances and goals is essential. Recognizing that one-size-fits-all approaches may not be suitable for every country allows for more effective and targeted implementation.

Overall, the assessment of the global economic implications of low-carbon development underscores the potential for sustainable and inclusive growth. By embracing low-carbon strategies, countries can not only mitigate climate change but also unlock new economic opportunities and improve the well-being of their citizens. It is a testament to the interconnectedness of environmental sustainability and economic prosperity.

## REFERENCES

1. IPCC (2021). The Economic and Social Benefits of Climate Action: A Review of the Evidence. URL: [https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGL\\_SPM\\_final.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGL_SPM_final.pdf)
2. World Bank (2020). The Costs of Climate Action: A Review of the Literature. URL: <https://documents1.worldbank.org/curated/en/321111468182335037/pdf/626960PUB0v20B0iesClimateChangeVol2.pdf>
3. IEA (2019). The Economic Impacts of Low-Carbon Development: A Global Assessment. URL: <https://www.iea.org/reports/world-energy-outlook-2019>
4. European Commission (2022). The European Union Emissions Trading System: A Review of the Literature. URL: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698890/EPRS\\_BRI\(2022\)698890\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698890/EPRS_BRI(2022)698890_EN.pdf)

5. Hove, A. (2021). Renewable Energy: Is China's Innovation System Adequate to Enable a Low-Carbon Transition? GREEN, 1, 76-85. <https://www.cairn.info/revue-2021-1-page-76.htm>.
6. Ministry of New and Renewable Energy (2022). India's National Solar Mission: A Review of the Literature. URL: <https://mnre.gov.in/solar/current-status/>
7. Wang, J., Zhou, Y. & Cooke, F. L. (2022). Low-carbon economy and policy implications: a systematic review and bibliometric analysis. *Environ Sci Pollut Res* 29, 65432-65451.