



Renewable Energy Development for Green Growth in Vietnam: Current Situation and Solutions

Hoang Thi Thu Huong ^{1*}, Hoang Thi Thinh ²

¹ Department of Industry, CPV Central Committee's Economic Commission, Hanoi, Vietnam

² Faculty of Politics-Civic Education, Hanoi National University of Education, Hanoi, Vietnam

* Corresponding Author: **Hoang Thi Thu Huong**

Article Info

ISSN (online): 2583-6641

Volume: 04

Issue: 01

January-February 2025

Received: 12-12-2024

Accepted: 13-01-2025

Page No: 82-88

Abstract

Green growth is an important component of sustainable development, emphasizing the harmonious integration of socio-economic progress and environmental protection. In the context of Vietnam, the adverse impacts of climate change and energy insecurity pose significant challenges to economic stability, highlighting the urgent need for renewable energy development and energy transition. Achieving net-zero emissions by 2050 has become a national priority, with renewable energy playing a pivotal role in this endeavor. Recent advancements in renewable energy have contributed positively to Vietnam's sustainable development across economic, social, and environmental dimensions. However, despite these achievements, significant challenges persist in leveraging renewable energy to drive green growth effectively. Moreover, there is a notable research gap in understanding the comprehensive role, impacts, and actionable strategies for renewable energy development in promoting green growth in Vietnam. This study addresses this gap by providing an in-depth analysis of the role of renewable energy in fostering green growth, assessing its current status, and proposing practical solutions to enhance its development and contribution to Vietnam's sustainable future.

DOI: <https://doi.org/10.54660/IJMOR.2025.4.1.82-88>

Keywords: Green growth; Renewable energy; Sustainable development.

1. Introduction

In the context of depleting fossil resources, global climate change, and political conflicts leading to energy crises, renewable energy development has become a critical priority for nations worldwide (Ha, PTH, 2021; Huong, HTH, 2014) ^[8]. The 13th National Congress of the Communist Party of Vietnam emphasized sustainable development, aligning with global trends such as the digital economy, circular economy, and green growth. The United Nations' 2030 Agenda for Sustainable Development has further shaped international approaches to economic cooperation, trade, and investment, reinforcing the shift toward renewable and green energy as an inevitable trend.

Renewable energy plays a vital role in promoting sustainable development globally. Emerging prominently in the late 20th century amid an energy crisis and pressing environmental challenges, renewable energy garnered attention in international forums. The International Energy Agency (IEA) defines renewable energy as "energy that comes from natural sources such as solar irradiation and wind and is replenished at a faster rate than it is consumed," emphasizing its infinite supply and natural origin (Omar *et al.*, 2014) ^[13]. In Vietnam, the Law on Environmental Protection 2014, Clause 1, Article 43, expands on this by defining renewable energy as energy derived from water, wind, sunlight, geothermal sources, ocean waves, biofuels, and other renewable resources, underscoring its renewable nature.

Green growth, a cornerstone of sustainable development, integrates socio-economic development with environmental protection. According to the United Nations Green Growth Initiative, green growth entails restructuring economic activities and infrastructure to achieve better outcomes from investments in resources, human capital, and finance while reducing greenhouse gas emissions, resource consumption, waste generation, and social inequality. The Organization for Economic Cooperation and Development (OECD) further defines green growth as promoting economic growth and development while ensuring that natural assets continue to provide resources and environmental services for long-term prosperity, serving as a catalyst for investment, innovation, and sustainable growth (OECD, 2011).

Renewable energy development aligns seamlessly with green growth objectives by facilitating the transition to sustainable development, increasing access to clean and affordable energy, and reducing greenhouse gas emissions compared to traditional energy sources. Global trends toward green growth, energy transitions, equity, and carbon neutrality have significantly influenced the renewable energy sector, which is integral to the socio-economic development of nations. Over the next three decades, global energy demand is projected to rise slightly alongside economic growth. At the COP26 Global Summit on Climate Change in November 2021, 197 countries adopted the Glasgow Climate Agreement, making commitments to achieve net-zero emissions by mid-century. Among these, 147 nations, representing nearly 90% of global emissions and GDP, pledged ambitious climate goals. Vietnam, with significant renewable energy potential, has committed to robust measures to reduce greenhouse gas emissions by leveraging domestic resources and international support, particularly from developed nations. As part of its commitment to the Paris Agreement, Vietnam aims to achieve net-zero emissions by 2050, reaffirming its critical role in the global renewable energy transition.

Recent years have seen a growing body of research on renewable energy development, driven by the urgent need to address diminishing fossil resources, climate change, and the global push for sustainable energy transitions. Several studies have investigated the role of renewable energy in advancing sustainable development and promoting green growth. For instance, Xuan (VTT, 2016) ^[22], Viet (CH, 2017), Xuan (HT, 2022) ^[21], and Huang (F., 2023) have highlighted the transformative potential of renewable energy in achieving sustainability goals. Concurrently, research has examined the socio-economic impacts of renewable energy development, emphasizing its contributions to job creation, economic growth, and improved energy access (Tuyet, TT *et al.*, 2022; Van, NTC, 2022; Shang, Y., Lian, Y., Chen, H., & Qian, F., 2023) ^[16]. Additionally, policy-oriented studies have explored frameworks for supporting renewable energy development, particularly in the context of achieving sustainable development objectives (Dap, ND, 2022; Truc, HTT, 2023).

Domestic and international literature has also addressed renewable energy policies and strategies across different contexts. For example, Cuong (NH, 2017) analyzed the renewable energy policies of various countries, deriving lessons applicable to Vietnam, while Dung (TV, 2020) examined the legal and policy framework for renewable energy and energy efficiency development in Vietnam. Comparative studies, such as Xuan (VTT, 2016) ^[22], explored

lessons from green economies like Germany, providing valuable insights for Vietnam's green transition. Moreover, several researchers have focused on the barriers to renewable energy development in Vietnam, such as Ky (LH, 2022) and Mai (NTT, 2022), who identified challenges ranging from financial constraints and regulatory issues to technological limitations and market barriers.

Despite these contributions, there remains a significant gap in the literature regarding a comprehensive analysis of Vietnam's current renewable energy landscape and the formulation of actionable solutions to advance green growth. Existing studies have largely concentrated on individual aspects, such as policy evaluation or socio-economic impacts, but have not holistically integrated these findings to propose a strategic roadmap for Vietnam. Addressing this gap, this study aims to provide a detailed assessment of the role of renewable energy in achieving green growth in Vietnam. It also seeks to propose innovative, actionable solutions to enhance the development and deployment of renewable energy, ensuring alignment with the country's sustainability objectives and international commitments.

2. Methodology

This study employs a comparative and contrastive approach to analyze and evaluate statistical data with the primary objective of assessing the current state of renewable energy development within the framework of green growth. This methodology is designed to identify existing limitations in renewable energy initiatives and uncover their underlying causes. By doing so, the study aims to propose well-founded viewpoints and actionable solutions to promote the development of renewable energy in Vietnam, aligning with the country's sustainability goals and commitments to global climate change mitigation.

To achieve these objectives, the research relies on diverse and reliable data sources. These include official reports from the Government of Vietnam, the Ministry of Industry and Trade (MOIT), the Institute of Energy, and the Vietnam Electricity Group (EVN). Additional data are obtained from the General Statistics Office (GSO) and survey results published by academic and research institutions. This multi-source data collection ensures that the analysis is grounded in a comprehensive and representative dataset, providing a robust foundation for evaluating renewable energy development across various dimensions.

Once data collection is complete, the study employs descriptive statistical methods to process, analyze, and interpret the information. Descriptive statistics are used to synthesize complex datasets, enabling the identification of key trends, patterns, and disparities in renewable energy development. By comparing and contrasting data across different regions, sectors, and timeframes, the analysis aims to highlight both achievements and gaps in Vietnam's renewable energy landscape. For instance, regional disparities in renewable energy deployment, differences in the adoption rates of various technologies, and the financial performance of renewable energy projects may all be explored to gain a nuanced understanding of the sector.

The comparative and contrastive approach is particularly well-suited to this study, as it facilitates an in-depth evaluation of Vietnam's renewable energy development relative to international benchmarks and regional peers. By drawing on international best practices and lessons learned from countries with advanced renewable energy sectors, the

study identifies areas where Vietnam can improve and adapt successful models to its unique socio-economic and environmental context.

In addition to assessing the current state of renewable energy, the study delves into the structural and systemic challenges that hinder its development. These challenges may include regulatory barriers, financial constraints, technological limitations, and social acceptance issues. By analyzing these barriers in detail, the study seeks to uncover their root causes and propose targeted interventions to address them.

Ultimately, the insights generated from this research will contribute to a clearer understanding of how Vietnam can achieve its renewable energy and green growth goals. By synthesizing data and providing actionable recommendations, the study not only serves as a valuable resource for policymakers and stakeholders but also enriches the academic discourse on renewable energy development in the context of green growth. Through this comprehensive approach, the study aspires to bridge the gap between existing policies and the practical measures needed to drive sustainable energy transitions in Vietnam

3. Discussions and Results

3.1. The role of renewable energy development in green growth and sustainable development

In Vietnam, the demand for energy consumption is constantly increasing due to the country's industrialization and modernization process. However, traditional energy sources are becoming depleted, and the country is also facing challenges from climate change and energy security. To address these issues, transitioning to renewable energy and developing it further are crucial steps towards achieving the goal of reaching net zero emissions by 2050. With its great potential, renewable energy development can reduce the country's reliance on imported fossil fuels, decrease greenhouse gas emissions, ensure energy security, and promote green growth. Therefore, it is essential for Vietnam to prioritize the development of renewable energy for various reasons related to the environment, economic growth, and energy security. In 2020, Vietnam's power system had a total installed capacity of approximately 69GW. Solar power (including rooftop solar power) accounted for 24% of the national power capacity structure, while wind power and biomass power accounted for 1% each. This is a significant increase from previous years, where the power system mainly relied on coal, natural gas, and hydropower. By the end of 2022, the total installed capacity of Vietnam's power system is expected to reach 76GW, with renewable energy sources accounting for 26.4% of the total. This shows the important role of renewable energy development in promoting the country's economic growth and development.

Economic aspects: Vietnam's rapid economic growth has led to an increasing demand for energy. However, relying on fossil fuels poses risks to energy security due to unstable supply and fluctuating prices. On the other hand, Vietnam has a vast potential for renewable energy, particularly solar, wind, and biomass. Effectively harnessing these sources can diversify the country's energy supply, reduce pressure on traditional sources, decrease dependence on imported energy, and enhance energy security to meet the demands of economic growth. Investing in renewable energy also stimulates the development of supporting industries and encourages technological innovation, contributing to sustainable economic growth. While the initial costs of

renewable energy projects may be high, in the long run, they can be more cost-effective than fossil fuels due to lower fuel costs and less exposure to global price fluctuations. Additionally, the decreasing costs of renewable energy technology and supportive government policies make investing in renewable energy more attractive.

Social aspects: Developing the renewable energy sector can create numerous job opportunities in manufacturing, installation, operation, and maintenance of renewable energy systems. In rural or remote areas, renewable energy, especially solar and wind, can provide electricity to communities that previously had no access to the national grid. This improves their quality of life, facilitates socio-economic development, reduces inequality, protects public health, and ensures sustainability for future generations. Renewable energy development programs often include educational activities and raise awareness about environmental protection and sustainability, leading to a change in the community's attitudes and behaviors towards energy use and environmental conservation.

Environmental aspects: Vietnam is facing significant challenges from climate change, such as rising sea levels, natural disasters, and changes in climate patterns. Developing renewable energy can help reduce greenhouse gas emissions, slowing down the process of climate change. At the United Nations Climate Change Conference (COP26), Vietnam committed to achieving net zero emissions by 2050. To fulfill this commitment, developing renewable energy is a crucial solution. The transition to renewable energy also helps Vietnam meet international standards for environmental protection, enhancing the country's reputation and position in the world.

3.2. Impact of renewable energy development on sustainable development and green growth in Vietnam

3.2.1. Positive impacts of renewable energy development on Vietnam's green growth in recent years

Renewable energy development has had a positive impact on sustainable development in our country in all three aspects: economic, social, and environmental.

In terms of the economy, renewable energy development has contributed to creating added value for the Vietnamese economy. From 2010 to 2020, the GDP scale of the economy increased by 2.4 times (from 116 billion USD to 268 billion USD), and the GDP per capita in 2020 reached 2,750 USD. In 2022, Vietnam's GDP increased by 8.02% compared to the previous year, which is the highest increase in the period of 2011-2022. The GDP per capita in 2022 at current prices is estimated at 95.6 million VND (about 4,110 USD). Renewable energy development has also accelerated the expansion of investment in the renewable energy sector, promoting research and development of renewable energy technology. It has also helped Vietnam reduce resource loss, decrease the reliance on imported fuel by 60%, and mitigate risks from fluctuations in world fuel prices.

In terms of society, Vietnam leads Southeast Asia in renewable energy development and is among the top 5 countries with the largest number of jobs in the solar photovoltaic (Solar PV - Photovoltaic) sector, with a total of about 126,300 jobs in 2020. Of these, 99,700 jobs are in the rooftop solar energy sector, concentrated in the production and installation components in the value chain, with about 25,000 jobs. The rest work in the operation and maintenance component. Investing in renewable energy also "promises to

create more than 465,000 new jobs in the future, providing development opportunities for local businesses and people across the country". In 2020, the International Renewable Energy Agency (IRENA) estimated that Vietnam had about 3,500 jobs in the wind energy sector. With approximately 4 GW of wind projects approved and under construction, it is expected to create about 21,000 jobs. With the goal of increasing the share of renewable energy to over 10% in the power planning, it will create an opportunity to increase 315,000 jobs per year, with about 25% of jobs being for highly skilled workers.

In terms of the environment, developing renewable energy also has positive impacts, such as reducing air pollution, greenhouse gas emissions, and contributing to protecting the ecological environment and combating climate change. This is especially important for Vietnam, a country with high levels of environmental pollution, as it is a timely action to improve the quality of life. Developing renewable energy also helps reduce toxic and dangerous factors such as coal dust, smoke, noise, and toxic gases in the coal-fired power industry. The risk of occupational diseases is also much lower than in the coal-fired power industry, thanks to reduced carbon emissions and less water use than thermal power. The table below shows the level of carbon emissions from different power sources, demonstrating the positive impact of renewable energy development on improving environmental quality.

Table 1: Carbon emissions from electricity sources

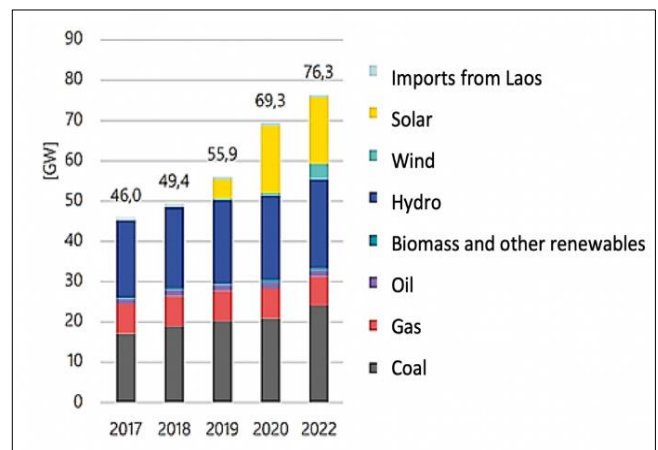
Power Sources	Carbon emissions
Onshore Wind	9
Offshore Wind	16
Hydropower	28
Nuclear	33
Solar	75
Gas	450
Coal	1,050

(Kadellis, 2017)

Since 2017, with policies promoting the development of renewable energy, especially since 2019, the period of strong development of solar power and wind power has begun, leading to a significant decrease in the emission factor (calculated in tons of CO₂ converted - tons of CO₂/MWh of electricity) of the grid. According to the report of the Department of Climate Change - Ministry of Natural Resources and Environment, from 2017 to 2021, thanks to the promotion of renewable energy development, the emission factor of Vietnam's grid has decreased significantly, contributing to improving environmental quality and minimizing the impact of environmental pollution. In 2017, the emission factor was 0.8649 tCO₂/MWh, and in 2021, it decreased to 0.7221 tCO₂/MWh. It is evident that compared to traditional energy sources, renewable energy is more effective and environmentally friendly, as shown by the lower emission factor (tons of CO₂/GWh). The average emission level of wind power is 26 tons of CO₂/GWh, while solar power is 85 tons of CO₂/GWh. In contrast, thermal power sources such as coal, oil, and gas range from 733 to 1054 tons of CO₂/GWh.

3.2.2. Challenges of renewable energy development for Vietnam's green growth

Despite its positive impacts, renewable energy development in Vietnam also presents challenges for sustainable development in economic, social, and environmental aspects. In terms of the economy, while renewable energy development initially contributes to economic efficiency, it is not yet stable and faces overlapping interests. The transition to renewable energy can also create opposition from interest groups related to fossil fuels, resulting in conflicts in policies and development strategies. Since 2017, policies promoting renewable energy development have led to significant changes in the industry in Vietnam. By 2019, there was an explosion of wind and solar power projects.

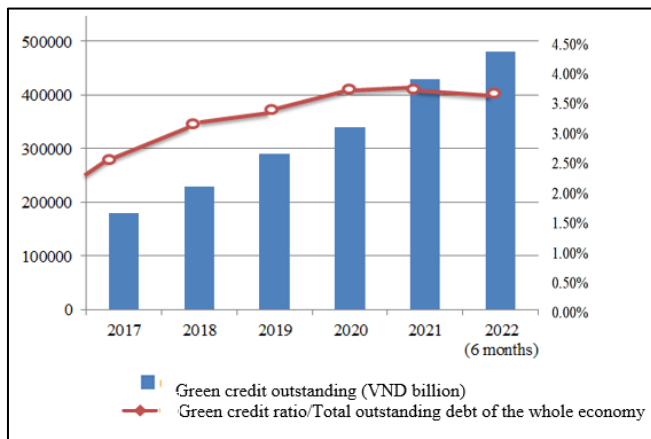


(Vietnam Electricity, 2020)

Fig 1: The growth in installed power capacity from 2017 to 2022

With the attention of the Government, renewable energy projects in our country have increased rapidly. In 2017, there was almost no investment and development in solar and wind power, but by the end of 2019, "Vietnam had surpassed Malaysia and Thailand to become the country with the largest installed capacity of solar panels in Southeast Asia". Currently, there are 149 solar power projects and 95 wind power projects in operation throughout the country, with a total designed capacity of nearly 9,047 MW. The majority of these projects are concentrated in the South, with only two provinces, Ninh Thuan and Binh Thuan, accounting for more than 42% of the total capacity. While this rapid development is a positive sign, it has also led to inadequacies in the operation of the power system, affecting the interests of all parties. Additionally, the concentration of solar and wind power projects in certain areas has created pressure on the power transmission system.

In terms of economic efficiency, the increase in outstanding loans for green credit projects from banks to hundreds of thousands of billions of VND has caused difficulties for many wind and solar power enterprises. With loan levels of up to 70-80% of capital, many enterprises in the wind and solar power sector are facing challenges due to large bank debts and increasing lending interest rates. Figure 2 below shows the outstanding debt of renewable energy projects in Vietnam from 2017 to 2022.



(Tuyet, 2023)

Fig 2: Green credit in Vietnam in the period 2017 - 2022

The changes in electricity purchase policies and the prolonged impact of the COVID-19 pandemic have also prevented these projects from generating revenue from selling electricity, while still having to pay interest on loans. This situation poses a risk of bankruptcy for projects and leaves bad debts for the banking system. According to a report from the Department of Credit for Economic Sectors (State Bank), shown in figure 2: "By mid-2022, the outstanding credit for green projects had reached more than 474,000 billion VND, accounting for 4.1% of the total outstanding debt of the entire economy". This is an increase of 7.08% compared to 2021, with the majority of outstanding debt in the renewable energy sector (accounting for 47%). This outstanding debt reflects the fact that investment in renewable energy in our country is increasing, but the value it brings to the entire economy is not sustainable.

The development of renewable energy in Vietnam has been hindered by economic and technical barriers, preventing economic entities from fully realizing their interests. Due to factors such as weather, terrain, and climate, the potential for renewable energy sources is concentrated in certain provinces and localities, which often have small on-site consumption loads. However, the power grid system is not yet equipped to handle the transmission of this energy. As a result, the strong development of solar and wind energy has caused difficulties in operating the power system, leading to losses for all parties involved. While the renewable energy industry in Vietnam has seen significant growth, there is a lack of sustainable connections between entities and a value chain has not been formed. Most suppliers of renewable energy machinery and equipment are from abroad, and domestic technology suppliers have not yet fully participated in the value chain. Additionally, investors face challenges in securing loans for their projects and there is no mechanism in place for direct buying and selling of electricity from renewable energy power plants to consumers, resulting in losses when capacity must be reduced to the grid. Other difficulties, such as compensation for site clearance, risks of land conflicts, and ensuring livelihoods and jobs for local people, also contribute to the instability and unsustainability of economic benefits in renewable energy development.

Planning is often not synchronized with each other: The development of renewable energy is closely linked to other plans, such as those for traditional energy sectors (coal, oil, and gas), socio-economic development, urban space, and industrial development. The deployment of offshore wind

power in our country faces numerous challenges, including limited development experience, complex technology and engineering, complicated investment processes, and large investment scale. Difficulties in marine space planning also add to the challenges. In particular, the goal of building a capacity of 7,000 MW by 2030 presents a significant challenge. Furthermore, the lack of specific guidance on transitional provisions and unclear assignment of responsibilities among ministries and branches have resulted in delays and prolongation in the implementation and supplementation of plans for renewable energy projects. The construction in the period of 2021-2022 has caused a waste of resources and has negatively impacted the interests of investors and the socio-economic development of the country.

Currently, EVN is responsible for paying the price subsidy for renewable energy on behalf of the State. However, as the proportion of renewable energy increases, so does the cost of the price subsidy, greatly impacting the production cost and overall price of the electricity industry. This can also lead to reduced economic benefits for enterprises involved in renewable energy projects. Technical barriers have hindered the implementation of economic benefits for entities investing in renewable energy. This is due to factors such as natural conditions and geographical location, as well as the current grid system not meeting the requirements for power transmission. The integration of unstable power sources, such as wind and solar power, can significantly increase investment costs. Additionally, energy storage devices and smart grid systems still have many limitations.

In terms of society, renewable energy is seen as a potential source of green jobs in Vietnam. However, it also poses a high risk of job losses as the country transitions from fossil fuels to renewable energy. While the number of trained workers in Vietnam is increasing, it remains low compared to the total workforce. The shift towards renewable energy will likely result in unemployment in the traditional energy sector. Jobs in the renewable energy industry require workers at all levels, from manual labor to high-tech and technical positions. However, Vietnam has a shortage of highly skilled experts in this field, with most coming from countries with advanced renewable energy development.

In terms of the environment, the rapid growth of solar power projects in Vietnam has also raised concerns about the negative impacts of solar panels. While environmental impact assessments are required before project approval, they often only focus on the ecological environment and the impact on local livelihoods and working conditions. The impact of solar panels during operation and at the end of their life cycle is not fully assessed, as suppliers have committed to supporting the collection of waste panels. However, this poses a risk if the manufacturer stops operating or cannot be contacted during the 20-30 years lifespan of the panels. Furthermore, simply transferring the environmental pollution to another location does not solve the problem. Without proper management plans, Vietnam may face environmental issues in the future.

3.3. Solutions for developing renewable energy towards green growth in Vietnam by 2030

Growth in Vietnam by 2030 Globalization is a strong and inevitable trend for the development of countries. In the context of international integration and the fourth industrial revolution, the renewable energy industry in Vietnam has

great opportunities to apply scientific and technological advances in production and business processes. However, there are areas for improvement in the current state of renewable energy development in Vietnam. In order to promote green growth and achieve sustainable development, the following key solutions should be implemented:

Linking renewable energy development with national energy security and environmental protection renewable energy development must be closely linked with Vietnam's national energy development strategy, promoting the use of renewable energy sources at reasonable prices while ensuring operational safety and overall economic efficiency of the power system. It is also important to prioritize the development of renewable energy sources for on-site consumption, rather than selling excess energy to the national grid. This includes encouraging the development of rooftop solar power and solar power at production and business establishments for self-consumption.

Promoting the development of biomass, cogeneration, and waste-to-energy in order to utilize agricultural and forestry by-products, wood processing, and promote afforestation, there should be a focus on developing biomass power, cogeneration power, and power produced from waste and solid waste. This will not only increase energy efficiency but also contribute to environmental treatment.

Maximizing hydropower potential while ensuring environmental protection Vietnam has a significant potential for hydropower, but it is important to ensure the protection of the environment and water security. This can be achieved by promoting the development of pumped-storage hydropower, hydropower on irrigation lakes and reservoirs, and utilizing hydropower resources to regulate loads and reserve capacity. Diversifying energy ownership forms and business methods in order to promote the development of renewable energy, it is necessary to quickly build a competitive and transparent energy market, diversify ownership forms and business methods, and apply market prices to all types of energy. This will encourage entities, especially the private sector, to participate in renewable energy development and eliminate subsidies, monopolies, unfair competition, and lack of transparency in the industry.

Investing in science and technology development investment in science and technology development is crucial for the advancement of renewable energy. This includes promoting research and cooperation to develop renewable energy and resource-saving production technology, as well as investing in restoring ecosystems and improving environmental quality.

Localizing the production of renewable energy equipment to reduce dependence on imported equipment and lower costs, it is important to localize the production of renewable energy equipment. This will also enhance the independence, autonomy, and capacity of the economy. Establishing clear regulations and standards for renewable energy projects the Government and regulatory agencies should establish clear regulations and standards for the implementation of renewable energy projects, including environmental and social protection measures. This will help minimize potential negative impacts and ensure the responsible management of renewable energy projects.

Conducting environmental and social impact assessments before implementing renewable energy projects, it is important to conduct environmental and social impact assessments to identify and minimize potential negative

impacts. This will also help to ensure the sustainability of renewable energy development. Strengthening education and awareness about renewable energy educational activities and awareness campaigns about renewable energy and its benefits, as well as environmental protection measures, should be strengthened. This will help to increase public understanding and support for renewable energy development projects.

4. Conclusions

Green growth, energy transition towards equity, sustainable development, towards carbon neutrality in the world has had a great impact on the renewable energy industry. Vietnam's contribution to the global goal has affirmed: "Vietnam is a country with advantages in renewable energy, Vietnam will build and implement strong measures to reduce greenhouse gas emissions with its own resources, along with the cooperation and support of the international community, especially developed countries, both in finance and technology transfer, including implementing mechanisms under the Paris Agreement, to achieve net emissions of "0" by 2050". Research results show that, in order to promote the development of renewable energy towards green growth, the process of energy transition and renewable energy development in Vietnam needs to ensure unity and combination of three factors: economy (ensuring energy supply to serve social needs, developing clean energy and promoting sustainable growth); environment (ensuring sustainable energy production and consumption, conserving marine resources, protecting, regenerating and promoting sustainable use of terrestrial ecosystems); society (hunger eradication, poverty reduction, job creation, income increase, quality of life improvement, ensuring social stability and strengthening national defense and security).

5. References

1. Anh Tuyet. Warning of financial stress from renewable energy projects. *Vietnam Economic Times*. 2023;(14):28-31.
2. Cuong NH. Renewable energy policies of some countries in the world and lessons for Vietnam [PhD thesis]. Hanoi: Vietnam Academy of Social Sciences; 2017.
3. Dap ND. Solutions for green growth. *Banking Review*. 2022;(4):2-8.
4. Dung TV. Legal and policy framework for renewable energy and energy efficiency development in Vietnam. *Vietnamese Journal of Legal Sciences*. 2020;1(1):33-47.
5. Ha PTT. Developing renewable energy markets in Vietnam. *Vietnam Trade and Industry Review*. 2020 Sep 12.
6. Paliwal H, Dave V, Kumar S. Pathways of renewable energy sources in Rajasthan for sustainable growth. In: *Renewable Energy Technologies: Advances and Emerging Trends for Sustainability*. Scrivener Publishing LLC; 2022. p. 21-61. doi:10.1002/9781119827634.
7. Huang F. How does trade and fiscal decentralization lead to green growth; role of renewable energy development. *Renewable Energy*. 2023;214:334-41. doi:10.1016/j.renene.2023.05.116.
8. Huong HTT. Current status of renewable energy in Vietnam and sustainable development direction. *Vietnam Energy*. 2014.

9. Kadellis N. Life cycle energy and carbon footprint of offshore wind energy - Comparison with onshore counterpart. *Journal of Renewable Energy*. 2017.
10. Ky LH. Difficulties and obstacles in converting and developing clean energy. *Journal of Nuclear Science and Technology Information*. 2022;(71):9-13.
11. Mai NTT. Vietnam's renewable energy policy and some barriers. In: *Proceedings of the International Scientific Conference on Energy Transition, Towards Equity and Sustainable Development*. Hanoi: Academy of Journalism and Propaganda; 2022. p. 176-83.
12. Organisation for Economic Co-operation and Development (OECD). *Towards Green Growth*. 2011. Available from: <http://sostenibilidadyprogreso.org/files/entradas/towards-green-growth.pdf>.
13. Omar A, *et al.* Renewable energy resources: Current status, future prospects and their enabling technology. *Renewable and Sustainable Energy Reviews*. 2014;748-64.
14. National Assembly of the Socialist Republic of Vietnam. *Law on Environmental Protection*, No. 55/2014/QH13. 2014.
15. Truc HTT. International experience in promoting green growth. *Review of Finance*. 2023;(1):104-6.
16. Tuyet TT, Hoa NT. Employment opportunities associated with renewable energy development in Vietnam. *Journal of Human Geography*. 2022;(1):83-90.
17. United Nations Environment Programme (UNEP). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*. 2011. Available from: www.unep.org/greeneconomy.
18. Viet CH. Sustainable development of the energy sector: the world's electricity load balancing program and lessons for Vietnam. *Journal of Regional Sustainable Development*. 2017;(4):17-24.
19. Vietnam Electricity. *Annual operation report of the National Dispatch Center and rooftop solar power statistics of EVN*. Hanoi; 2020.
20. Vietnam Electricity. *Report on the implementation results of the 2022 Plan, Goals and tasks of the 2023 Plan*. Hanoi; 2022.
21. Xuan HT. *Developing renewable energy for sustainable economic development in some Asian countries and lessons for Vietnam [PhD thesis]*. Hanoi: Vietnam Academy of Social Sciences; 2022.
22. Xuan VTT. Building a green economy - the experience of the Federal Republic of Germany and lessons for Vietnam. *Journal of European Studies*. 2016;(4):38-46.