

The Impact of Green Finance on Enterprise Transformation

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Abstract: Climate finance has gained momentum in recent years, with global climate finance flows reaching \$1.3 trillion in 2021/2022, double that of 2019/2020. Despite this growth, climate finance accounts for only about 1% of global GDP and is unevenly distributed across sectors and regions. The growing role of private finance and green bonds highlights the need for innovative financial instruments to support the energy transition, especially in underfunded regions. Using a literature review and case study approach, this paper explores the role of green financial instruments in energy investment, in particular their effectiveness in overcoming barriers to financing renewable energy projects. The study focuses on tools such as green bonds, green banks and carbon pricing mechanisms, assessing their best practices and impact on promoting renewable energy. By analyzing the case of NextEra Energy, this study demonstrates the potential of green bonds to attract sustainable investment and advance the energy transition. The findings highlight the growing role of green finance in driving sustainable development and provide a framework for policymakers and investors to use these tools more effectively in support of global climate goals.

Keywords: Financial instruments, renewable energy, transformation, investment.

1. Introduction

Climate finance flows will average \$1.3 trillion in 2021/2022, double the 2019/2020 level. Despite the growth in 2021/2022, current flows represent only about 1% of global GDP. The rise in investment largely stems from enhanced funding aimed at climate change mitigation, particularly within the renewable energy and transport sectors. This year's profile also reflects a reassessment of the use of funds raised by green bonds, involving developments and improvements in areas such as agriculture, forestry, other land use (AFOLU) and fisheries, construction and infrastructure, and waste management. About 28% of the 2021/2022 growth (\$173 billion) is attributable to improved data. However, the availability and growth of funding vary across different sectors and countries. Adaptation funding has increased, but is still far below projected needs. Moreover, climate finance is unevenly distributed, with insufficient support for some of the developing countries most affected by climate change. Although private finance is growing, providing 49% of climate finance, it is not as high as expected.

The Global Landscape for Renewable Energy Financing 2023 addresses the need to channel funding to regions and countries with great untapped potential that are struggling to attract investment. Funding must be focused on supporting energy transition infrastructure, as well as

supporting policy frameworks that encourage investment and address ongoing socioeconomic inequalities.

According to Energy Investment in 2023, a key conundrum for investors investing in large, capital-intensive gas supply projects is how to reconcile strong short-term demand growth with uncertain and potentially declining long-term demand. This is a particular problem for Europe, given the continent's clear climate targets, and many importers have been reluctant to sign gas supply contracts. Favoring floating regasification terminals is one way to avoid locking in future emissions. The report also pointed out that fossil fuels have high short-term returns, yet escalating borrowing costs and debt pressures increasingly challenge investors.

Clean energy investments typically require higher upfront costs, making financing expenses crucial for investors, but over time, lower operating costs can make up for these initial expenditures.

This paper will explore the role of green financial instruments in energy investment through a literature review and case studies, focusing on innovative applications of these tools to assess the effectiveness and best practices of different green financial instruments in promoting renewable energy investment.

It aims to create a framework to identify how financial instruments can be innovatively integrated to surmount financing obstacles and promote climate solutions and entrepreneurship. By analyzing the application of green finance, the study will provide guidance to policymakers, investors and businesses, enhancing their capacity to effectively leverage financial instruments to support the achievement of the Sustainable Development Goals.

2. Green finance-related theories

2.1. Comparison between green finance and traditional finance

For the study of green finance-related theories, scholars have explored different directions by comparing the characteristics of traditional finance. First of all, the relevant research on traditional financial functions. Liu Ping believes that in terms of service mode, traditional finance mainly relies on physical outlets for business operations, so it has physical limitations. In terms of service objects, traditional finance provides loan services to the surrounding public, and the service objects are stable [1]. In terms of service cost, traditional finance needs to invest a lot of manpower, material and financial resources to maintain the network, so it is more inclined to cover the high net worth population to provide financial services. It is difficult to reach wide areas and populations, for example in rural areas, and the expected economic benefits are relatively modest. On the other hand, green finance provides loans to enterprises that are beneficial to the environment, because its low interest rate makes these energy-intensive enterprises choose to support green development. Green finance, for example, offers low interest rates on loans, encourages companies to develop green technologies, and trades carbon credits in carbon markets. The difference between traditional finance and traditional finance is that traditional finance is to manage people's money and finance, and to provide them with loans by evaluating the risk credit of enterprises. But green finance is financing for green development enterprises, through different methods to enable enterprises to carry out green development, research and development of green technology, and increase the sustainable development of enterprises.

2.2. Multi-dimensional coverage of green financial instruments

The application of green financial instruments covers multiple levels. Flammer, C. believes that green bonds can be used as a reliable signal of a company's commitment to the environment [2]. Because of their binding nature, green bonds allow companies to guarantee and improve their environmental footprint. Second, greenwashing will misleadingly show that the company appears to

be changing the environment, but in fact, it is not washing properly. Finally, if green investors are willing to exchange finance for social benefits, they will buy green bonds to obtain cheaper financing. According to a report by McKinsey & Company, green banking plays a key role in promoting private sector investment in clean energy projects, especially in developing countries and emerging markets [3]. According to Bolton et al.'s article, according to the Bank for International Settlements, supply-side shocks may also cause resources to shift from investment in productive capital and innovation to adaptation to climate change, and these impacts have become more obvious in recent years, so NGFS was established in 2017 to further resist climate risks [4]. The Oxford Institute for Energy Studies pointed out that the first phase of the EU ETS only covers CO₂ emissions from power generation and energy-intensive industries [5]. EU ETS Phase II changes the principles of Phase I, including but not limited to lowering the EU ETS, increasing the amount of fines, and allowing bank allowances to move from Phase II to Phase III. The third phase of the EU ETS changes central policies (such as the establishment of union registration) to improve the resilience and effectiveness of the system. The fourth phase aims to accelerate the pace of emissions reductions, develop more targeted rules on carbon leakage, and fund low-carbon innovation and modernization of the energy sector.

Energy transition is a complex and challenging process, and enterprises face multiple difficulties in the transition process. Research and development technology is difficult and costly. Coal is an important economic pillar, and the energy transition may pose operational safety risks. In addition, the energy transition may lead to an imbalance in social equity, as restructuring will require the introduction of new talent. At the same time, the assets of some high-carbon industries may lose value and therefore require more financial support, which may lead to instability in financial markets.

The research on the value role of green finance in energy transformation contains many aspects. Zhang & Broadstock believe that green finance reduces the capital threshold of renewable energy projects and promotes the wide application of new energy projects by supporting clean energy technology research and development and project financing [6]. Nofsinger & Varma's research found that the green finance mechanism can reduce the cost of enterprises in the process of energy transformation, provide financial support for renewable energy projects through government subsidies, tax incentives and other forms, and make enterprises more willing to invest in green technologies [7]. Scholtens has studied how financial institutions can influence the behavior of market participants through green financial products, particularly through the booming green bond market, directing more capital into the clean energy sector [8].

In the study on the influence path of green finance policies in energy transformation, Flammer analyzed the research on green bonds issued by enterprises and showed that policies promote the growth of the green bond market, which encourages more enterprises to obtain low-cost financing and increase investment in renewable energy and energy-saving projects [9]. Banga mentioned that carbon pricing mechanisms and carbon market policies are important components of green finance policies [10]. By putting a price on carbon emissions, the government sends a clear price signal to the market, encouraging companies to reduce their use of fossil fuels and increase investment in renewable energy.

Some studies have mentioned the role of green finance policies in the energy transition. The research of Zhang & Broadstock found that under the guidance of green finance policies, banks provided green credit and low-interest loans, which greatly reduced the financing cost of enterprises in renewable energy projects [11]. In particular, China's green credit policy, which encourages commercial banks to provide high-quality loans to new energy enterprises, has promoted the transformation of the energy industry. Scholtens mentioned that the government has reduced the cost of clean energy projects for enterprises and investors by providing green tax incentives and

subsidies, especially in the early stage of technology development and application [12]. This policy incentive directly drives capital formation for renewable energy projects.

Bai, Zeng, & Li's research pointed out that green finance policy has become a core tool to promote energy transformation [13]. The study highlights the need for future policies to accelerate the development and application of low-carbon technologies by further regulating and promoting green finance markets and enhancing the supporting capacity of capital markets. Ellerman et al. 's research further shows that with the promotion of carbon trading system (ETS), carbon markets in different countries and regions may gradually interconnect in the future to form a global carbon market network, thus greatly improving the global balance of carbon emission costs and emission reduction efficiency [14]. Banga pointed out that green credit can help reduce the financial risks of investing in clean energy by setting more favorable loan interest rates and guarantee mechanisms, especially for the energy transition of emerging markets and developing countries [15].

Zhang & Broadstock's empirical study evaluated the long-term impact of China's green finance policies (such as green bonds and green credit) on the new energy industry through time series analysis [16]. The study found that green finance policies boosted investment in renewable energy and promoted a low-carbon transition to the economy over five years, but their effects varied significantly across regions. Ellerman et al. conducted a long-term empirical study on the EU Emissions Trading System (EU ETS) [17]. Studies have shown that the EU ETS has significantly reduced carbon emissions from the industrial sector in its first ten years. In particular, high-emission industries, such as power and steel, have shifted towards the application of low-carbon technologies.

3. Case study

In this case, NextEra Energy, one of the world's largest developers of renewable energy, especially wind and solar, was selected as the research object, committed to driving the global energy transition and reducing greenhouse gas emissions.

NextEra Energy issued a \$750 million green bond in 2022 with a maturity date set for 2029 and an interest rate of 7.25%. The funds raised are used to build and expand wind farms to increase the capacity of renewable wind energy. Development of solar photovoltaic power generation projects, including installation of new solar panels and construction of solar power stations. Upgrade and improve grid infrastructure to support the integration of renewable energy and ensure that renewable electricity can be efficiently and safely transmitted to users. Develop and invest in battery energy storage systems to improve the stability and reliability of renewable energy and help balance electricity supply and demand. The issuance of green bonds has attracted significant interest from institutional investors concerned with sustainable investing. NextEra Energy's reputation as a leader in renewable energy has made its bonds attractive to environmentally conscious investors. Following the announcement of the green bond and continued commitment to expanding its renewable energy portfolio, NextEra Energy's stock remained stable, reflecting positive market sentiment regarding its long-term growth potential in the renewable energy sector. As a result, NextEra Energy's investments in clean energy can be realized in the future. The successful issuance of green bonds and the project's alignment with the Sustainable Development Goals have enhanced NextEra Energy's credibility. This lowers future borrowing costs, as capital firms tend to prefer businesses that can grow over the long term.

General trends in the energy market, and in particular the increasing shift toward decarbonization and sustainable energy solutions, positively impacted NextEra's position. The company's aggressive approach to climate change echoes market trends, further bolstering investor confidence

NextEra Energy's successful experience shows that through green finance tools, it is possible to not only finance renewable energy projects, but also enhance corporate credibility, attract more investment, and stay competitive in a rapidly changing market environment.

4. Conclusion

This study explores the role of green financial instruments in energy investment, focusing on how these innovative tools can overcome financing barriers and promote the development of renewable energy. Through a literature review and case study of NextEra Energy, the study analyzes the effectiveness and best practices of various green financial instruments, such as green bonds, green banks, and carbon pricing mechanisms. The findings highlight the growing role of green finance in facilitating the energy transition, especially in regions where attracting investment is difficult but the potential is untapped. The study also provides a framework for policymakers, investors and businesses to use financial tools more effectively to achieve the SDGS.

However, there are some limitations to the study. It relies largely on literature reviews and single case studies without incorporating raw data through surveys or interviews with industry experts and key stakeholders. Furthermore, the study does not sufficiently account for regional disparities regarding the implementation of green finance policies. Future research could address these gaps by conducting field studies or expanding the analysis to different geographic regions to provide a more comprehensive insight into the global green finance landscape.

Looking ahead, the green finance sector has great potential. As the climate challenge intensifies, the need for innovative financial mechanisms that can accelerate the energy transition will increase. Future research could focus on improving the efficiency of green financial instruments, developing more inclusive policies to support emerging markets, and promoting global cooperation to create interconnected carbon markets. These developments will ensure that green finance continues to play a key role in mitigating climate risks and promoting global economic growth and sustainability.

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