EPRA International Journal of Environmental Economics, Commerce and Educational Management
Journal DOI: 10.36713/epra0414 |ISI I.F Value: 0.815|SJIF Impact Factor (2025): 8.57 ISSN: 2348 – 814X
Volume: 12 | Issue:6 |June 2025

FROM BROWN TO GREEN: ADVANCING SUSTAINABILITY THROUGH GREEN FINANCE AND INVESTMENT

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ABSTRACT
Weather variations and global heating, are the serious issues of the time that make us think about how to preserve our environment for generations to come and what type of projects can benefit society, if any business initiatives are being taken and, nowadays, even financial institutions are paying attention to green finance projects or environment-friendly projects as sustainable investment is the order of the day. This paper sightsees the involvement of green finance in transforming the traditional resource-consuming economy into an economy of green energy generation and consumption with a focus on developing countries by examining important financial instruments, investment strategies, and policy frameworks that facilitate the achievement of sustainable development objectives. It explores the potential and challenges various stakeholders face, including authorities, financial institutions, and individual investors, to unify capital for a sustainable environment. The report also emphasizes the increasing importance of innovative financial products, including green bonds, carbon credits, and Environmental, Social, and Governance (ESG) investments, in transforming global financial markets. The findings show that there have been crucial advancements on the subject; however, there are still considerable obstacles associated with regulatory loopholes and uneven market maturity in realizing the full potential and benefits of green finance. This study adds to the burgeoning dialogue surrounding sustainable finance and offers practical recommendations for policymakers and investors trying to align financial resource allocation with climate and environmental objectives.

KEYWORDS: *Green Finance, Sustainability, Investment, Renewable Energy*

INTRODUCTION

The present era focuses on progressive developments in every field, but the condition of our environment continuously reminds us about the sustainability goals. We all are free to make progress, but it should not be at the cost of degraded quality of environmental status. Developing and underdeveloped economies are always concerned with new projects that can enhance the individual as well as the country's income for which the financial institutions sanction funds also however banks and financial institutions nowadays choose and accept those projects on priority which have some sense of responsibility towards the environment.

The global economy faces an unprecedented challenge in addressing climate change and environmental degradation while sustaining economic growth. The changeover from brown to green economy demands considerable funds in renewable energy, sustainable infrastructure, and low-carbon technologies. The urgency to mitigate weather variation and changeover towards a sustainable nation has brought green finance and sustainable investment to the forefront of global discussions. This paper explores the concept, significance, and status of green finance and sustainable investment to facilitate the move from brown (carbon-intensive) to green (low-carbon and sustainable) economies. We analyze global trends, challenges, and policy frameworks that support this transition, focusing on the pivotal role of financial institutions, governments, and private investors in enabling sustainable development.

Green Finance: Green finance comprehends a variety of financial instruments and mechanisms created to promote ecological sustainability. These include green bonds, climate funds, sustainability-linked loans, and carbon markets. Green finance addresses climate risks, fosters innovation, and ensures resource efficiency by channeling the capital towards environmentally beneficial projects. The key components of Green Finance are Green Bonds, Sustainability-Linked Loans, and Carbon Trading Markets.

1. **Green Bonds**: Green bonds are the debt securities dispensed to finance projects with positive environmental impacts. As per the definition given by Investopedia, "A green bond is a fixed-income debt instrument earmarked to raise money for climate and environmental projects. It's typically asset-linked and backed by the issuing entity's balance sheet, so it usually carries the same credit rating as its issuers' other debt obligations."

As per the World Bank Import Report 2022, "the World Bank issued the first green bond for institutional investors. The World Bank is a major issuer of green bonds. In 2022, it reported $40.8 billion in bonds issued, $28.2 billion in funds disbursed, and $33.1 billion in new lending committed. Previously, the bank had reported issuing $14.4 billion in green bonds from 2008 through 2020. The funds went to projects for energy and efficiency (33%), clean transportation (27%), and agriculture and land use (15%). One of the bank's first green bond sales financed the Rampur Hydropower Project, which provided low-carbon hydroelectric power to northern India's electricity grid. Financed by issuances of green bonds, it produces almost 2 megawatts per year, preventing 1.4 million tons of carbon emissions. In 2022, its combined projects lowered carbon emissions by 8.4 million tons."

2. **Sustainability-Linked Loans**: Credit facilities tied to borrowers' ESG performance metrics. As per the definition taken from S&P Global, "Sustainability-linked loans are any type of loan instruments and/or contingent facilities (such as bonding lines, guarantee lines, or letters of credit) that incentivize the borrower's achievement of ambitious, predetermined sustainability performance objectives."
3. **Carbon Trading Markets**: Platforms for trading carbon credits, incentivizing emissions reduction. Carbon credits are bought and sold in carbon markets, which are trading platforms. Businesses and individuals can use carbon markets to buy carbon credits from organizations that eliminate or cut greenhouse gas emissions to make up for their emissions. A tradable carbon credit is comparable to one tonne of carbon dioxide or the same quantity of another greenhouse gas that has been avoided, sequestered, or decreased.

LITERATURE REVIEW

Green finance is a relatively new concept that provides a different financing avenue for people, businesses, and governments who wish to finance and engage in low-carbon or green initiatives (Huang et al., 2019). By funding both public and commercial green investments and public policies that encourage green efforts, green finance signifies a positive change in the global economy's shift towards sustainability (Berensmann & Lindenberg, 2016). Internalizing environmental externalities and decreasing risk perceptions are the two major goals of green finance to promote investments that is rewarding for the environment. The substantial funding gap impeding the widespread adoption of low-carbon technologies is noted by Geddes et al. (2018). They contend that by promoting private investment in low-carbon ventures, state investment banks can significantly contribute to bridging the financing gap. Mudalige (2023) specified that green finance is an interdisciplinary field that examines the linkage between various environmental issues and finance. It is a fragment of sustainable finance, that emphasizes on financial strategies and investments with favourable environmental effects and produce financial gains. The IMF report which was taken by Eyraud et al. (2011) in their study refers to green investment as "investment necessary to reduce greenhouse gas and air pollutant emissions, without significantly reducing the production and consumption of non-energy goods." Croce et al. (2011) concluded that governments have a responsibility to make sure pension funds and institutional investors have access to appealing opportunities and tools so they may access this source of funding. Network infrastructure, including communications, transportation, water, and power networks, must get particular attention to achieve a greener growth trajectory. Guo et al. (2023) found that green finance has emerged as a crucial component of twenty-first-century environmental preservation. Chowdhury et al. (2013) demonstrated that green financing, which has become a unifying tool to battle climate change by supporting low-carbon industrialization, is used by both industrialized and developing countries to control the environment. The substantial impact of green finance on sustainable industrialization was validated by Jawadi et al. (2025), however, their findings varied by nation or region for distinct reasons. Despite the conflict between environmental preservation and economic growth, many developing nations now have green financing and sustainable industrial development as their top priorities. Indeed, whether at the municipal, national, or regional level, emerging nations confront a wide range of difficulties (Kamble et al., 2018).

OBJECTIVES OF THE STUDY

- To examine the status of the green finance scenario at the global level.
- To understand the sustainable investment scenario for individual and retail investors.

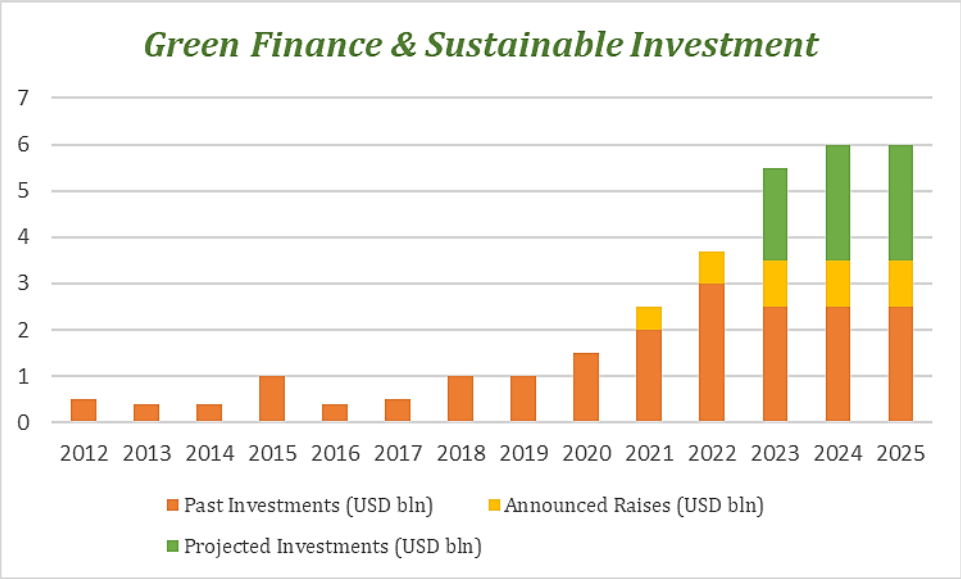
RESEARCH METHODOLOGY

It is a conceptual study in which two variables green finance and sustainable investment were explored and the status of brown to green transition was analyzed by available reports. It's a working paper and in the future, the stated variables will be analyzed by compiling secondary data and tests by E-views.

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FINDINGS

The findings of the study, stated some facts about data obtained for past investments, announced raises, and projected investments by surveying market participants. Analysis of 400+ public declarations of capital raises for low-carbon funds and modeled investment for over 7,000 projects, both registered and prospected.



Source: MSCI Carbon Markets (Data as of June 30, 2023)

INITIATIVES BY DIFFERENT NATIONS

1. The European Green Deal

The European Union's comprehensive plan aims to achieve carbon neutrality by 2050, mobilizing €1 trillion in green investments. As per the KPMG Report, "Europe aims to become the world's first climate-neutral continent by 2050. To achieve this ambitious target in the fight for climate change, the European Commission (EC) pledged to reach detailed targets by 2030 like a minimum 55% cuts in greenhouse gas emissions, above 32% share of renewable energy, and at least 32.5% improvement in energy efficiency."

2. China's Green Bond Market

China leads in green bond issuance, driven by government support and ambitious renewable energy targets. As per the report of the World Bank Import Report, the World Bank issued the first so-labeled green bond for institutional investors in 2008 and amount of $14.4 Billion issued since 2008 with 164 Green Bonds across 22 currencies. According to the World Resources Institute, "China is currently the biggest emitter of greenhouse gases by volumes." There is the expectation that CO_2 emissions in China to peak by 2030 and that's why it set the targets to become carbon neutral by 2060 with a fully established green, low-carbon and circular economy, as per the State Council, the top administrative body.

3. India's Solar Energy Initiative

India's focus on solar energy, supported by green financing mechanisms, highlights the potential for emerging economies to transition sustainably. It includes the Jawaharlal Nehru National Solar Mission (JNNSM) and the PM Surya Ghar Muft Bijli Yojana launched in 2010 and 2024 respectively. As per the report of Invest India, "India stands not as a mere spectator but as a prominent player in the global solar revolution. India currently stands 4th globally in solar power capacity. India's commitment to solar energy is the Solar Park Scheme, designed to establish 50 Solar Parks of 500 MW and above with a cumulative capacity of ~38 GW by 2025-26. Schemes such as PM-KUSUM — aimed to achieve solar power capacity addition of 30.8 GW by March 2026 — are transforming India's agricultural sector by setting up decentralized solar power plants, replacing agriculture diesel pumps with solar agriculture water pumps, and solarising existing grid-connected agriculture pumps. Rooftop Solar Programme for the residential sector and making solar energy accessible by providing subsidies."

CHALLENGES IN GREEN FINANCE AND SUSTAINABLE INVESTMENT

- **No Uniformity** – No global standard states what constitutes an avenue of green finance; hence, it is challenging for investors and consumers to determine the level of commitment and identify that whether companies are misleading customers by using green finance or not.

- **Data Availability** – Green finance is a comparatively new phenomenon, with the first green bonds emerging in November 2008 – reliable data on green finance is limited and it is hard to quantify which firms are doing better in terms of green finance.
- **Risk Assessment** – The inherent absence of standardization and data accessibility makes pricing for green finance difficult.
- **Uncertainty about Financial Performance** — Some investors will be wary of Green Finance because they do not yet understand how traditional and green finance differs. This is due to the fact that though green finances have turned out profitable in the long run, we can't say the same for a short-term investment.
- **Governing Concerns** – Considering green finance is mostly shaped by government policies and norms, in such situations, the people who are investing may worry that future environmental rules could make similar investments lose their appeal.
- **Transition Risks** – The move to a low-carbon economy will necessitate multiple businesses to modify the way they operate, which could affect investor's portfolios. Apart from that, the client's needs may change, and the trends of technological development may not meet the need for green finance. That could have additional implications for investor portfolios.
  Overall, achieving green finance goals are poses multiple challenges, and among them uniform background and transparent system are more crucial.

POLICY RECOMMENDATIONS FOR THE BROWN TO GREEN TRANSITION

The brown economy, characterized by reliance on fossil fuels and resource-intensive practices, poses significant environmental risks. Transitioning to a green economy entails a paradigm shift towards renewable energy, sustainable urban development, sustainable agriculture, and circular economic models. It requires technological innovations by using renewable energy sources, providing environmental subsidies, creating the demand for sustainable products and services among consumers, corporate commitments for Net-zero pledges and ESG integration in corporate strategies.

CONCLUSION

Green finance and sustainable investment represent indispensable tools in addressing the global climate crisis and enabling the transition from brown to green economies. By fostering collaboration among stakeholders, overcoming challenges, and scaling innovative financial instruments, the world can achieve a sustainable and inclusive future. Overall, it's little bit hard to explore and process for doing sustainable investment as an individual. The retail investors are more in number in comparison to individual investors for adopting green finance or sustainability bonds as the organizations are trying to mitigate the carbon emissions done by them in the production process and have the responsibility towards CSR activities and betterment of the environment. For individual investors, the temptation of more return and awareness of the sustainability initiatives should be targeted in policy formation by which we will achieve the brown to green transition with a longer favourable environmental impact.

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