Navigating Climate-Driven Financial Risks: The Strategic Role of Green Finance in Shaping a Sustainable Global Economy

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Abstract

Climate change poses unprecedented systemic risks to the global financial system, potentially affecting economic stability, investment forecasts, particularly the solvency of financial institutions. Green finance has served as a strategic catalyst, effectively mobilizing funding for initiatives that provide environmental advantages while facilitating the transition to a low-carbon, sustainable economy. This study examines the role of green finance in mitigating climate-related financial risks and in establishing a resilient financial system. This study used a qualitative, secondary research methodology to compile information regarding the effectiveness of green financial instruments, including as green bonds, sustainability-linked loans, and ESG integration, in mitigating physical, transition, and systemic risks. Empirical findings indicate that, in contrast to conventional investment, green financing enhances financial performance and asset quality while minimizing default risks. However, significant obstacles persist, including regulatory stockpiling, conflicting ESG criteria, greenwashing, and data deficiencies, which hinder its scale and credibility. The research underscores the importance of robust policy frameworks, including the EU Taxonomy and national green financing plans, in enhancing transparency and cross-sectoral coherence. Policy recommendations include the harmonization of standards, establishment of green banks, integrating financial instruments, promotion of technology-driven solutions, enhancement of adaption finance, and development of institutional capacity. A principal conclusion of the study is that the integration of green finance necessitates coordinated efforts by policymakers, financial institutions, and stakeholders to tackle institutional and market obstacles, ensuring that growth is both equitable and resilient to climate change.

Keywords: green finance, climate risk, sustainable economy, financial instruments, policy frameworks.

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1. Introduction and Background

Climate change is now one of the most important systemic risks confronting the global economy, with far-reaching effects on financial stability, economic growth, and human welfare. The financial sector is exposed to both physical risks (i.e., severe weather events, rising sea levels, and persistent environmental decline) and transition risks, which result from the world's transition to a low-carbon economy as a consequence of regulatory adjustments, technological developments, and shifts in market preferences (European Central Bank [ECB], 2022; ECB, 2021). Such risks may disrupt asset prices, worsen the credit risk environment, and undermine the solvency of financial institutions, highlighting the need for the financial system to develop and implement adaptive strategies (ECB, 2022; Remittances Review, 2024).

Green finance has developed in response to these climate-related financial risks, seeking to make available capital for projects and activities that generate environmental benefits and support the transition to a sustainable, low-carbon economy (UNFCCC, n.d.). Green finance incorporates a variety of financial instruments and tools, including green bonds, sustainability-linked loans, and the consideration of environmental, social, and governance (ESG) criteria in investment decisions (Covington & Burling LLP, 2020). Green measures, by contrast, are explicitly used to fund green projects such as those listed above, and sustainability-linked loans positively induce a continued borrower action to meet predetermined sustainability goals by providing a beneficial loan (Covington & Burling LLP, 2020). While these instruments contribute to shifting investments towards renewable energy, energy efficiency, and climate adaptation infrastructure, they also contribute to insulating the financial sector by allowing it to reduce its exposure to high-risk, carbon-intensive assets (ECB, 2022).

Evidence has shown that green finance positively correlates with financial performance and mitigates financial risk. In the Pakistani context, for instance, green lending has been seen as having a significant impact on banks' return on asset (ROA) and return on equity (ROE), as well as reducing non-performing loans (NPLs) and credit risk (Khan et al., 2024). This means that in ceteris paribus, the default risk to banks of green projects

is lower than that of traditional investments, leading to higher quality assets for financial institutions. Therefore, it can be said that the merger of ecological aspects into the model for making financial decisions does not, in the process, only contribute to environmental goals but, at the same time, enhances the financial position and constancy of banks and other financial players (Khan et al., 2024).

Despite its increasing significance, the green finance landscape encounters several barriers that prevent it from being effective and scaled up. Key among these are the absence of standardized ESG metrics, greenwashing risks, transition costs, and regulatory concerns (Digital Defynd, 2025). A lack of standardized systems for ESG reporting results in difficulty in comparing the sustainability performance across industries, which may be misinterpreted and inefficient in capital allocation for investors and stakeholders (Digital Defynd, 2025). Greenwashing, or exaggerating and/or lying about sustainability claims, makes the sector even less credible and warps the value of ESG investments (ECB, 2022; Digital Defynd, 2025). These issues can be overcome by adopting stringent disclosure standards, regulatory convergence, and using third-party ESG ratings agencies to certify corporate sustainability statements (ECB, 2022; Digital Defynd, 2025).

Policymakers and regulators increasingly know the need for a framework to facilitate green finance's growth while preserving its integrity. Legal frameworks such as the EU Taxonomy Regulation, Corporate Sustainability Reporting Directive, and international standard-setters, the International Sustainability Standards Board (ISSB) and the Task Force on Climate-related Financial Disclosures (TCFD) are part of a significant effort to increase transparency, comparability, and accountability in sustainable finance (ECB, 2022; Digital Defynd, 2025). By encouraging ESG disclosures consistent over time and reliable and aligning financial sector practice with climate goals, these measures are meant to address systemic risks, curb greenwashing, and support the scaling up of sustainable investments worldwide (ECB, 2022).

2. Research Question and Objectives of the Study

This study aims to investigate the key role of green finance in dealing with the financial risks of climate change and contributing to a sustainable global economy. The research will offer a holistic insight into current climate change management trends and issues by addressing critical questions concerning mitigating risk, ensuring the efficacy of policy interventions, and utilizing green finance instruments. The aims are to methodically investigate these issues and offer policy advice to enhance the effect of green finance globally.

Primary Research Question

How does green finance help address financial risks resulting from climate change, and how can it contribute to supporting a sustainable world economy?

Sub-questions

1. What are some key financial risks of climate change for governments and markets?
2. What are the primary tools and vehicles of green finance in use worldwide?
3. How well do existing green finance policies and regulations address climate-related financial risks?
4. What are the opportunities, challenges, and approaches to scaling green finance in different regions and sectors?

Objectives of the Study

1. To assess the risks to the global economy from climate change and how they can be identified and managed.
2. To investigate important instruments and mechanisms of green finance and evaluate their performance in dealing with climate risks.
3. To assess global and national policy frameworks supporting green finance.
4. To pinpoint institutional and market-related obstacles to the promotion of green finance projects.
5. To recommend policy-based suggestions to strengthen the role of green finance for climate-resilient economies.

3. Methodology of the Study

The paper takes a qualitative, secondary research approach to investigate green finance's strategic relevance in addressing climate impact on finance and enabling a sustainable global economy. Secondary research, or desk research, entails systematically acquiring and analyzing existing data and literature by other researchers, institutions, and organizations (Indeed, 2025). This approach is well suited for integrating a diversity

of viewpoints, empirical evidence, and policy advancements pertinent to this fast-changing domain of climate finance and sustainable   economic development.

The research   methodology involved an initial academic literature search, peer-reviewed journal articles, books, and conference proceedings discussing climate change, financial risk, and green finance. Police reports and policy papers of credible international organizations such as the UN, WB, and ECB , as well as state institutions and boards, were reviewed to provide a comprehensive view of the issues. Here are the sources that helped me   understand green finance-related instruments, regulatory frameworks around them, and global strategies for deploying them.

Data were collected according to the sources' relevance, credibility,   and validity. The review included only reputable and recognized institutions   to ensure the credibility of the results (Indeed, 2025; Kumara, 2022). The study also included electronic databases, online libraries, and institutional repositories to identify recent research   and policy developments.

The data were analyzed   through qualitative content analysis. This process included a comprehensive literature review to identify emerging themes, trends, and gaps in climate-related financial risks, the effectiveness of green finance instruments, and the challenges and opportunities to scale up green finance more widely globally. The thematic coding and synthesis method helped   structure the findings, which referred to the research questions and aim. Where available, quantitative data from secondary sources such as statistical reports and econometric studies are integrated to provide empirical context and support qualitative insights.

To improve the study's validity , the findings were triangulated across different sources, and the credibility and objectivity of each source were evaluated (SAGE Journals, 2023). The research study notes the limitations that it is based on secondary   data sources, which might have a data gap and cannot control information collection. The information could be outdated (Kumara, 2022). Nevertheless, the overall goal of the research will be to provide a strong, balanced view regarding the strategic importance   of green finance in meeting climate-related financial risks through precise triangulation between different and credible sources of information.

Ethical issues Ethical issues were taken seriously throughout   this study. All data in this article are available in the public   domain, and adequate academic referencing was followed to respect transparency and intellectual integrity.

4. Findings of the Study

4.1 Nature and extent of financial risks posed by climate change on the global economy

Climate risk presents a vast and complex set of risks to the global financial system, and two dominant risk categories have been repeatedly described in the   literature: physical and transition risks. Physical hazards are the immediate consequences of climate-related events (e.g., floods, hurricanes, droughts, and wild/forest fires),   which may lead to considerable damage to infrastructure, supply chain disruptions, and a decrease in value of physical and financial assets (European Central Bank [ECB], 2021; Financial Stability Board [FSB], 2020). For instance, flooding in South Asia drives billions of dollars in economic losses, directly affecting banks' creditworthiness and   growing delinquency rates in diverse sectors, including agriculture and real estate (Khan et al., 2024). The ECB (2021) stresses that such physical risks are also not equally shared among regions and industries, with some regions or industries being subjected to greater exposure due to their geographical location or   sectoral reliance, accentuating systemic fragilities. Transition risks stem from   the move to a low-carbon economy. These range from the financial implications of new climate policies to technological innovations and shifts in consumer preferences that may drive sudden re-evaluations of carbon-intensive assets and generate stranded assets in sectors like fossil fuels and heavy industry (Battiston et al., 2023; FSB, 2020). As a result, firms that lag the market in responding to changes in emissions regulation and carbon pricing are more likely to experience greater credit and market risk (IMF, 2019), which can be transmitted through financial markets with implications   for global stability.

In addition, the combined effect of the physical and transition risks could   increase financial instability. For example, the delayed policy response to climate change can imply more pronounced physical damages and an abrupt and   disorderly transition with sharp repricing of assets and increased market volatility (FSB, 2020; ECB, 2021). The complexity and uncertainty of when and the extent of such risks pose a severe problem for financial institutions in managing these risks   (Bua et al., 2022).

Central banks and regulators increasingly integrat e climate risk into their supervisory frameworks, as physical and transition risks could threaten financial institutions' solvency and the financial system's stability (ECB, 2021; IMF, 2019). Stress tests and scenario analyses are being developed to fully explain the exposure of banks and insurers to these risks, underlining the need for more granular data and forward-looking tools in risk assessments (FSB, 2020; Bua et al., 2022). The evidence of the study is crystal clear: climate-related financial risks are systemic, interconnected, and highly uncertain (ECB, 2021; Khan et al., 2024; Battiston et al., 2023), and concerted action from policymakers, regulators, and financial institutions is necessary to maintain resilience and stability in the context of accelerating climate change.

4.2.1 Important Instruments and Mechanisms of Green Finance and Their Impacts on Climate-related Risks

4.2.1 Green Bonds

Green bonds represent debt securities designed for environmentally friendly projects (e.g., renewable energy production, infrastructure based on energy efficiency, climate-resilient agriculture) (Neufin, 2023). These bonds raise capital from institutional and retail investors and channel it toward the low-carbon economy. It is further empirically established that the issuance of green bonds is related to a decrease in total and direct (Scope 1) carbon emissions, mainly when the proceeds are used to finance new projects--as opposed to refinancing preexisting ones (European Commission, 2020). For example, green bond issuers had between 7% and 10% lower emissions intensity levels than those who issued regular bonds (European Commission, 2020). However, green bonds are only effective if backed by solid certification standards , greenwashing, and transparency (UNEP, 2018).

4.2.2 Sustainability-Linked Loan (SLL)

Sustainability-linked loans (SLLs) link the borrowing cost to the delivery of predetermined sustainability performance targets (SPTs), e.g., the reduction of greenhouse gas emissions or enhancement of energy efficiency (Hamlins, 2024). Moreover, whereas green loans limit the use of the funds, SLLs reward borrowers with interest rates based on how the money is used. So, for instance, meeting SPTs may reduce interest rates by 10–25 basis points, and failure may increase them likewise (Hamlins, 2024). However, weak KPIs, conflict of interest (COI), and limited transparency of SPTs compromise their trustworthiness. More than 50% of SLLs were found to have weak KPIs in a 2022 review, giving rise to greenwashing concerns (Hamlins, 2024).

4.2.3 Credit and Investment in Green

Credit mechanisms, such as loans and equities, provide preferential financing or funding support to green projects such as renewable energy and clean technology. In doing so, these instruments serve the adaptation and mitigation goals of the Paris Agreement by defunding carbon-intensive sectors (MDPI, 2024). In India, green finance programs have also supported community enterprises through micro-credit, enhancing climate change resilient capacity in climate change-prone areas (UNEP, 2018). However, developing countries' uneven regulations and high conversion costs reduce scalability (Climate Policy Initiative, 2022).

4.2.4 ESG Integration

Environmental, Social, and Governance (ESG) integration incorporates sustainability factors into financial decision-making, allowing businesses to holistically consider climate risks and opportunities. Another significant development is using sophisticated techs like AI and big data analytics to enhance the accuracy of ESG reporting, thereby empowering firms to perform climate stress tests and scenario analysis (LinkedIn, 2024). For instance, banks with robust ESG frameworks experienced 15% fewer non-performing loans (NPLs) than their counterparts, as sustainable projects have fewer default risks (Khan et al., 2024).

4.2.5 Efficacy in Mitigating Climate Risks and Challenges

The findings suggest that green finance effectively manages climate risks on physical, transition, and systemic dimensions. For physical risks, instruments such as green bonds finance climate-resilient infrastructure, including, for example, flood-resistant agriculture projects in South Asia that can help mitigate economic loss from catastrophes and reduce credit risk for financial institutions (Khan et al., 2024). Concerning transition risks, mechanisms such as sustainability-linked loans (SLLs) and ESG integration reward de-carbonization, which allows companies to prevent stranded assets; companies in energy-intensive sectors that issued green bonds after the Paris Agreement experience faster emissions reductions spurred by ambitious climate management

targets (European Commission, 2020). For systemic risks, common standards such as the EU Taxonomy also increase confidence in the marketplace by clarifying what is "green" and thus reducing volatility and misallocation of capital (UNEP, 2018). Nonetheless, there remain considerable challenges: greenwashing, due to rubber-stamp verification and encryption KPIs, undermines confidence in green instruments (Hamlins, 2024); regulatory fragmentation, due to a lack of harmonizing sustainability definitions, raises barriers to cross-border investment (Climate Policy Initiative, 2022); and data lacunae, with just 1 in 5 companies reporting climate risk exposures, impeding efficient capital allocation and risk pricing (LinkedIn, 2024). Overcoming these obstacles is essential to scaling green finance and its contribution to creating climate-resilient economies.

4.3 International and National Policy Context for Green Finance

4.3.1 Assessment of Global Policy Frameworks on Green Finance

Global policy architectures are critical in promoting green finance by aligning with standards, channeling capital, and addressing climate risks. The Sustainable Finance Framework of the European Union, based on the European Green Deal, seeks to raise €1 trillion in sustainable investments by 2030, using tools such as the EU Taxonomy Regulation (spelling out what is environmentally sustainable), the Sustainable Finance Disclosure Regulation (SFDR) (requiring ESG disclosure), and the Corporate Sustainability Reporting Directive (CSRD) (increasing accountability for sustainability effects) (European Commission, 2020; European Commission, 2023). They have boosted market confidence by "greening" investment and directing capital towards low-carbon projects, though the incomplete rollout across EU states is a concern (KPMG, 2024). The OECD Climate Adaptation Investment Framework seeks to correct market failures by fostering public-private collaboration and redirecting financial flows toward climate resilience objectives, especially in high-risk sectors such as agriculture (OECD, 2024). In Southeast Asia, the AFPI is adapted to local requirements through the ASEAN Green Bond Standards – a copycat of the Green Bond Principles – and admits cross-border green investment while excluding fossil fuel projects. However, uneven enforcement restricts their regional influence (ICMA, 2020). The Marrakech Pledge in Africa aims to leverage green capital markets with sovereign bonds and issuer incentives, yet implementation has slackened because of a lack of funding and institutional capacity (Marrakech Pledge, 2018; ICMA, 2020). Together, these frameworks highlight the significance of consistent definitions, openness, and cross-sector cooperation, but obstacles such as regulatory patchwork, data deficiencies, and greenwashing stand in the way of realizing their power (LinkedIn, 2024; Hamlins, 2024).

4.3.2 National Policy-based Frameworks to Facilitate Green Finance

Each country has adopted the appropriate policy mechanism to support green finance according to its economic and environmental priorities. China's Green Financial System has the mobilization of capital for renewable energy at its core through a re-lending operation by China's central bank, green bond standards, and a kind of mandatory environmental disclosure for listed firms, making China one of the world's leading green finance systems (Green Finance Platform, n.d.). Renewables accounted for 40% of China's GDP growth in 2023, with over $890 billion in investments in clean energy paid off (China Briefing, 2024; EY, 2025). In the USA, the Inflation Reduction Act (IRA) earmarks USD 1.2 trillion for clean tech and renewable energy, with tax credits, grants, and loans supporting private sector investments and intended to become a lodestar of global green finance by 2031 (EY, 2025; Sciences Po, 2025). However, the earlier volatility of politics and dependence on corporate tax credits threaten sustained implementation down the line (Sciences Po, 2025). Across the EU, for example, France's Green OAT Bonds have raised €69.9 billion for renewables, the most significant such issuance by a sovereign state internationally (Crédit Agricole CIB, 2024), and Germany's Sustainable Finance Strategy incorporates ESG criteria into both public procurement and the conducting of banking operations, whereby federal investments are channeled to sustainable projects and transparency is improved using sustainability labeling (Green Finance Platform, 2021; World Bank, 2020). They flag the importance of policy in scaling green finance, which faces funding gaps, legal complexity, and political uncertainties.

4.4 Institutional and Market Barriers to Green Project Financing Institutional and Market Constraints Limit the Development of Green Finance Projects.

4.4.1 Institutional barriers

The development of green finance is severely constrained by institutional barriers, with the most pressing challenges presented by regulatory fragmentation and inconsistencies; there are divergent definitions of 'green' activities across regions and sectors that are confusing stakeholders, which results in the uneven implementation of green criteria and risks of greenwashing, particularly in emerging markets with varying taxonomies and disclosure requirements (IFC, 2023; Mishra & Singh, 2020). Further, constrained institutional

capabilities, particularly in developing countries where financial institutions lack the knowhow to evaluate environmental risks or incorporate ESG criteria into their decision-making, plague specific markets such as India where banks find it difficult to appraise green projects effectively and hence are unable to efficiently allocate credit (Gupta & Jain, 2021; Green Policy Platform, n.d.). Furthermore, the lack of comprehensive government transition strategies, for example, a clear long-term energy transition plan, harmonized carbon pricing, and emission targets, deter investor confidence and hinders the shift of capital, as policy uncertainty prevents sustained investment in sustainable initiatives (IFC, 2023; European Commission, 2025). The institutional void calls for synergized regulations, skills development initiatives, and total policy regimes to help green finance fully realize its potential.

4.4.2 Market Constraints   the Green Finance Projects, Actions, or Measures

Market-based barriers also add to the challenges of scaling up green financing, with data gaps and difficulties in determining the risk associated with a clear set of constraints; as there is limited information on the outcomes of green projects, an accurate price for risks factors cannot be determined, while investor interest is held back by incomplete and fragmented data that surrounds the outcomes of green projects (Busch et al., 2016; LinkedIn, 2024). Adding to these concerns are the high costs and low benefits of green investment associated with clean techs, upward sunk costs, and short-run profitability, which is vital but uncertain, as is also evidenced in Bangladesh, where micro-green ventures are obstructed by high transaction costs and technological risks, making them unviable (Green Policy Platform, n.d.; European Commission, 2025). Further, transition risks and policy volatility discourage investment since stranded assets could occur in the presence of sudden regulation or technology shocks – for instance, India's inconsistent policy support is a barrier to private sector participation in sustainable finance, challenging long-term orientation (Mishra & Singh, 2020; Battiston et al., 2017). These hurdles highlight the importance of better data transparency, cost-sharing tools, and stable policy environments to buy the market vast climate goals.

4.5 Policy Suggestions for Promoting   the Function of Green Finance

4.5.1 Regulatory Regimes Strengthening   Standards Harmonization

Strengthening the role of green finance in climate adaptation Policymakers need to use binding green finance targets that force financial institutions to dedicate a share, or a minimum amount, of their portfolios to climate-resilient projects. For instance, Bangladesh released a requirement for banks to channel 5% of funded loans into green projects, illustrating that structural, manageable targets can be achieved (Bangladesh Bank, 2020). At the same time, a convergence of green taxonomies between regions is indispensable to prevent fragmentation. A strong example is the EU Taxonomy Regulation, which establishes the criteria for environmentally sustainable activities, re-orientating investments, and preventing greenwashing (European Commission, 2023; OECD, 2024). Standardizing criteria worldwide can help politicians increase transparency, lower the cost of following regulations, and direct capital to low-emission schemes, promoting uniformity in the green finance space.

4.5.2 Establishing Green Banks and Leverage of Public Financial Institutions

To ramp up green finance, policymakers should establish specialized green banks that provide private investments via blended finance, technical support, and concessional loans. They can also direct capital to high-impact projects like renewable energy or climate-resilient infrastructure by taking the hit on initial losses or making low-interest loans. Climate Policy Initiative (2025) highlights the role of independent green banks in developed countries and "green windows" in existing financial institutions in emerging countries, providing dedicated products for sustainable projects. In parallel, public development banks must include climate resilience criteria in lending, such as ADB's $9.8 billion commitment to climate adaptation in Asia, focusing on energy transition and disaster-resilient infrastructure (ORF, 2025). By marrying the green banks' specialized expertise with the scale of public development banks, governments can close funding gaps, increase risk-sharing, and align financial flows with long-term climate goals.

4.5.3 Improving Public-Private Partnership (PPP)/ Blended Finance

Public and private capital needs to be combined in blended finance arrangements that give government s access to sources of low-cost capital, and these countries are given financial instruments to enable them to implement climate-resilient investments at scale. The Just Energy Transition Partnership (JETP) mobilized USD 8.5 billion to phase out coal in South Africa by combining concessional loans, guarantees, and private-sector co-investments, providing a replicable model for coal-intensive economies to shift gears (ORF, 2025; World Bank, 2020). Moreover, for adaptation projects to help cities protect themselves against climate

consequences — for instance, flood-resistant infrastructure or drought-resistant agriculture — priority should be given to the issuances of resilience bonds by sovereign or municipalities. Such bonds link public financing to the most pressing requirements for adaptation in vulnerable areas like Southeast Asia and Africa, where climate impacts do not yield livelihood damages equitably (ORF, 2025). By growing blended finance (BF) and resilience bonds (RB), policymakers can help fill financing gaps, increase private-sector engagement, and see that climate investment contributes to environmental and social objectives.

4.5.4 Embed Technology and Data-Driven Solutions

We must harness technology and data-driven solutions to advance green finance and climate-resilient economies. Applying AI and blockchain technologies can drastically enhance climate risk assessments and transparency in green finance transactions. Data analytics driven by AI uses real-time weather data, satellite images, and geospatial maps to improve the scoring of climate-exposed sectors and predict risks such as floods and droughts. In short, it enables better risk pricing (dltledgers, 2025; LinkedIn, 2024). As evidenced by the recent digital green bond issues, blockchain technology guarantees the traceability and immutability of the proceeds (Socie'te' Generale, 2023; FEPBL, 2024; MDPI, 2024), laying transparent and secure transaction records to build trust on the side of investors, regulators, and ben- efficacies. Finally, there is a need to develop centralized green finance platforms and databases to track climate exposures and project outcomes to address unresolved gaps in data, which ultimately hinder risk pricing and capital allocation (Bangladesh Bank, 2020; LinkedIn, 2024). It is also at the same platforms that central banks and financial authorities are using to consolidate high-frequency data, track green financial instruments, and direct national climate policies, which is, in turn, advancing technology in the green finance ecosystem (LinkedIn, 2024). AI, blockchain, and centralized data system integration Through the use of AI, blockchain, and centralized data systems, the financial services industry can add increased transparency, accountability, and efficiency to sustainable investment, which helps to bring us closer to a climate-resilient world.

While Artificial Intelligence (AI) and blockchain technologies have immense potential to revolutionize green finance by enhancing transparency, efficiency, and decision-making, several drawbacks and complexities warrant critical consideration. Firstly, the environmental cost of these technologies is paradoxically significant. Blockchain, particularly systems using proof-of-work mechanisms like Bitcoin, is energy-intensive and contributes to carbon emissions. This undermines the very goals of sustainability in green finance. Although greener alternatives like proof-of-stake exist, their adoption remains limited. Secondly, AI systems heavily rely on large datasets and computational power, which also demand high energy consumption. Additionally, the environmental benefits predicted by AI in green finance depend on the availability of accurate, unbiased data. However, data collection and integration from diverse environmental, social, and financial sources remain fragmented and inconsistent, leading to risks of algorithmic bias and flawed decision-making.

4.5.5 Priorities for Climate Adaptation Finance

The urgency of investing in climate adaptation finance should be a priority to build economic resilience in susceptible economies. However, adaptation finance is just one-twelfth of the commitment of current climate finance, leaving huge gaps in assistance to the most vulnerable communities at risk from climate impacts (ORF, 2025; IMF, 2024). This imbalance could be addressed by earmarking a minimum of 30% of climate finance to dedicated adaptation projects, into which national budgets should invest in projects that enhance the capacities of societies to cope with extreme weather and long-term environmental changes (ORF, 2025; IMF, 2024), such as coastal protection, flood defenses, and climate-smart agriculture. In addition, scaling up parametric insurance schemes that deliver fast, pre-agreed payouts during climate disasters can safeguard livelihoods while relieving governments of fiscal pressure. Successful pilots in Bangladesh and Small Island Developing States (SIDS) have shown that these insurance models can effectively ensure prompt financial relief and facilitate quick recovery from climate shock (ORF, 2025).

4.5.6 Enhance Institutional Strengthening and Stakeholder Partnership

The development of green finance needs to be supported with stronger capacity building and practical stakeholder cooperation. Initiatives to develop curriculums on green finance can teach the financial actors how to design climate-resilient products and how to assess climate risks, for example, banks and credit agencies, taught by the World Bank's (2020) toolkit, which emphasizes the capacity building of both policymakers and bankers if sustainable finance opportunity space is to be navigated by financial institutions. Moreover, establishing national green finance task forces with regulators, business leaders, and civil society organizations provides a means to ensure that plans are rooted in local needs and lived experiences. The case of

Bangladesh's Sustainable and Renewable Energy Development Authority (SREDA) and the Department of Environment (DoE) provides an example of how multi-stakeholder engagement can help promote more inclusive, relevant, and practical green finance measures (Bangladesh Bank, 2020).

5 Conclusion:

In sum, this paper makes the case that green finance is critical in addressing climate-induced financial risks and helping drive the global economy towards a sustainable, resilient future. By mobilizing capital using innovative instruments such as green bonds, sustainability-linked loans, and ESG integration backed up by strong international and national policy frameworks, green finance effectively reduces physical, transition, and systemic risks related to climate change." However, despite its promise, the realization of green finance is still held back by institutional and market barriers, such as regulatory fragmentation, data deficiencies, weak institutional capacity, and continuing concerns about greenwashing. Policy recommendations around harmonizing green taxonomies, creating green dedicated banks, using blended finance, bringing technology to the table, prioritizing adaptation, supporting capacity building, and stakeholder cooperation help overcome such challenges. The final analysis will take collective action among the governments, the financial sector, and civil society to scale green finance, close the gap on adaptation, and help ensure that 21st-century economic growth is inclusive and climate-resilient.

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