



SUSTAINABLE FINANCE AND GREEN ECONOMY: PATHWAYS TO ENVIRONMENTAL AND ECONOMIC RESILIENCE

ABSTRACT

This study investigated sustainable finance and green economy as pathways to environmental and economic resilience. This arose from the increasing urgency to address climate change and environmental degradation which has spurred significant interest in sustainable finance and the green economy. Given this, the paper explores the interconnections between sustainable finance, green economy principles, and their combined potential to foster environmental and economic resilience. This study utilized descriptive statistics methods including tables and graphs to demonstrate how green economy and sustainable policies shaped the path for the realization of economic and environmental resilience using retrospective data and case studies of other countries. By examining policy frameworks, financial instruments, and case studies, this research outlines effective pathways to integrate sustainable practices into economic systems, driving long-term sustainable development.

Keywords: *Green economy, sustainable finance, economic resilience, environmental resilience, retrospective data.*

JEL: Q57, Q54, Q01, G20, C81

1. Introduction

Global economies face unprecedented challenges due to climate change, resource depletion, and socio-economic disparities. Sustainable finance and the green economy offer viable solutions to these challenges by promoting environmental stewardship and economic resilience. In recent years, the global community has increasingly recognized the pressing need to address environmental challenges, socio-economic inequalities, and the vulnerabilities of traditional economic models. The convergence of these issues necessitates a transformative approach to economic development, one that ensures long-term sustainability and resilience. This is where sustainable finance and green economy principles come into play, offering a pathway to harmonize economic growth with environmental stewardship and social well-being. The principles of sustainable finance and the green economy are crucial for building a resilient and sustainable future.

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By aligning financial flows with sustainable development goals and redefining economic prosperity through environmental stewardship, resource efficiency, and social inclusivity, we can create a more equitable, resilient, and sustainable world. The collaboration of governments, businesses, financial institutions, and civil society is essential to realize these principles and achieve lasting positive change. This paper investigates the synergies between these concepts and provides policy recommendations for sustainable development.

2. Literature Review

2.1 Conceptual Issues

2.1.1 Sustainable Finance: Sustainable finance refers to the practice of integrating environmental, social, and governance (ESG) criteria into financial decision-making processes. This approach aims to support sustainable development by directing capital towards projects and activities that generate positive environmental and social outcomes, alongside financial returns. The core principles of sustainable finance include: Environmental Stewardship which involves investing in initiatives that protect and restore the natural environment, such as renewable energy projects, conservation efforts, and sustainable agriculture. Social Responsibility, this focuses on investments that promote social equity, human rights, and community well-being in the aspect of housing, healthcare, education, and initiatives that support marginalized populations. Good Governance, emphasizing transparency, accountability, and ethical practices in financial operations. Companies and institutions adhering to good governance principles are more likely to make decisions that align with long-term sustainability goals.

2.1.2 Green Economy: An economic system aimed at reducing environmental risks and ecological scarcities, while promoting sustainable development and social equity. The green economy concept revolves around creating an economic system that prioritizes sustainability, reduces environmental risks, and promotes social equity. A green economy is characterized by low carbon emissions, efficient resource use, and inclusive growth. The principles of a green economy encompass:

2.1.3 Economy Resilience:

Economic resilience is a dynamic and evolving concept that refers to the ability of an economy to withstand, adapt, and recover from shocks and stresses, including financial crises, natural disaster, or pandemics. Resilience of an economy is vital to preserving stability and encouraging sustainable growth. To attain resilience, it requires a holistic approach, including guaranteeing financial stability, diversification of economy,

infrastructural development, and responsive policy frameworks. Therefore, measuring economic resilience of a country entails estimating three capacities which include; absorptive, adaptive, and restorative capacity. Absorptive capacity involves the ability of an economy to absorb shock without noteworthy disruption. This can be achieved with the availability of formidable social safety nets, a strong financial system and diversified economies activities. Adaptive capacity entails the ability of economy to adjust and transform in response to changing conditions. This involves innovation, flexibilities in labour markets, and the capacity to reallocate resources efficiently. The restorative capacity therefore, involves the ability of an economy to recover quickly from adverse events. This includes effective governance, availability of financial resources for recovery efforts, and timely policy intervention. This concept has gained significant attention, especially in the wake of global crises such as the 2008 financial crisis and the COVID-19 pandemic (Adger,2000; Balland et al.,2015; Bristow & Healy,2018; Grabner, 2021)

2.2 Empirical review

2.2.1 Sustainable finance and economic resilience

Zhao , Ghao and Hong (2024) explores the relationship between Environmental, Social, and Governance (ESG) ratings and corporate debt financing costs among China's A-share listed companies from 2010 to 2021. Their findings indicate that higher ESG ratings correlate with significantly lower debt financing costs, especially in enterprises with lower pollution levels and state ownership. Their study highlights the financial benefits of robust sustainability practices. In another study, Zairis, Liargovas, and Apostolopoulos(2024) did a systematic review and examined 80 studies on sustainable finance and ESG importance. The review identifies four main thematic areas: a shift in value creation, green bonds, ESG ratings and performance, and sustainable finance, banking, and financial risks. Their findings emphasize the need for more research on how ESG factors influence financial performance and sustainability. A study on theoretical and empirical analysis of sustainable finance analyzes the existence of a "greenium" (a premium for green bonds) in the corporate green bond market. It compares green bonds to conventional bonds and finds no significant pricing difference between them. Therefore, the study suggests that investors do not necessarily require higher returns for green bonds, indicating market acceptance of sustainable finance instruments (Lopes, 2022) . Therefore, unveiling the economic resilience, Oyadeyi, Ibukun, Arogundade, Oyadeyi, and Biyase(2024) revisit previous studies on economic and environmental vulnerability and explores how financial systems impact economic resilience. Their study generates indices to analyze the results and provides insights into building resilient economies.

2.2.2 Green Economy and Economic Resilience

A green economy is defined by the United Nations Environment Programme (UNEP) as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. While the economic resilience refers to the ability or capacity of an economy to adapt, absorb and restore back quickly after the occurrence of adverse events such as pandemic and financial crises in an economy. Recent empirical studies have highlighted the positive impact of green economy initiatives on economic resilience (World Bank, 2024; Smith et al., 2023; Garcia & Martinez, 2023; Johnson & Lee, 2022). According to the World Bank, investment in green roofs and urban forests has alleviated the impact of natural disasters on urban areas. To World Bank, these measures not only reduce immediate economic losses but facilitated faster recovery by maintaining ecosystem services. The circular economic practices such as reusing materials or recycling enhances economic resilience as it reduces resources dependency and creating new business opportunities and innovation especially in the recycling sector (Garcia & Martinez, 2023). Sustainable agricultural practices such as agroforestry and organic farming were established to enhance food security and income stability of the rural communities (Johnson & Lee, 2022). To them, these practices increase biodiversity and ecosystem resilience.

Though, there is always a synergy between Sustainable Finance (SF) and Green Economy (GE). A study examining the coordination between green finance and the green economy in China found that regions with higher coordination degrees exhibited stronger economic resilience. The study used a comprehensive index system and an integrated approach to evaluate the coupling coordination between green finance and the green economy, showing positive trends in economic resilience (Liu et al., 2020). Another study on financial inclusion and green innovation in developing countries found that green innovation and financial inclusion significantly promote green economic growth. The study used data from 12 developing countries and found that green innovation and financial inclusion had positive and significant impacts on green economic growth (Abbas et al., 2024).

3. Materials and Methods

This study conducts a thorough review of existing literature to understand the current state of knowledge, and identify the way forward to actualising economic and environmental resilience. It develops a theoretical framework that links sustainable finance, green economy, and environmental and economic resilience. This framework guided the research design and analysis. Retrospective data on sustainable finance indicators (green

bonds, sustainable investment funds) and green economy indicators (renewable energy investments, carbon emissions) were collected from various secondary sources. Descriptive statistics using tables and graphs were used to demonstrate how green economy and sustainable policies shaping the path for the realization of economic and environmental resilience.

3.1 Research Design

This study employed case studies design of specific countries or regions and utilized retrospective data to provide in-depth insights into how sustainable finance and green economy initiatives are implemented and their impacts on economic and environmental resilience.

4. Results and Discussions

4.1 Policy framework analysis of Pathways to Sustainable Finance and Economic Resilience

Sustainable finance aims to integrate environmental, social, and governance (ESG) considerations into financial decision-making. This approach seeks to promote long-term economic growth while ensuring environmental sustainability and social well-being. Empirical studies have highlighted several pathways to achieve sustainable finance.

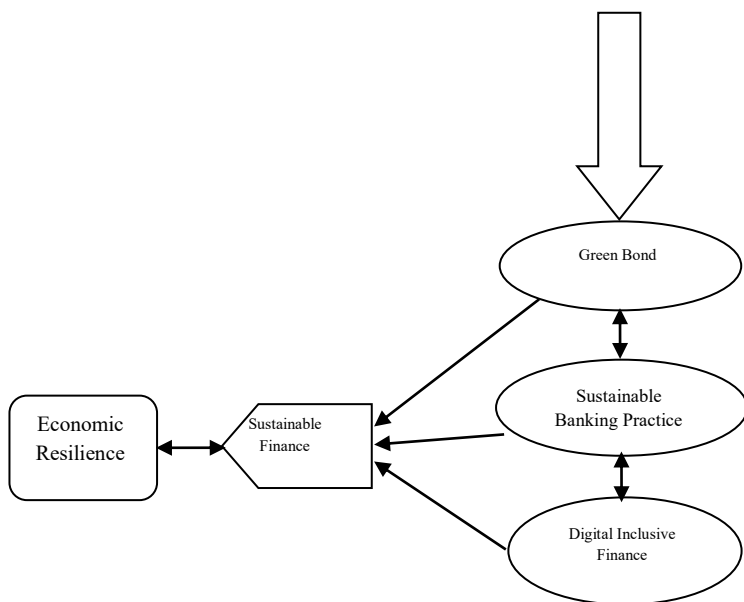


Figure 1, the pathway to sustainable finance and economic resilience.

Figure 1 demonstrated the pathways in which an economy must tread to attain sustainable finance, thereby promoting resilience of an economy.

4.1.1 Green bond investments:

Green bond investments are financial instruments specifically earmarked to raise funds for projects with environmental benefits, such as renewable energy, energy efficiency, and pollution prevention. These bonds help to Channel private capital into sustainable projects, thereby reducing reliance on public funding. Again, green bond investments lower the cost of capital for green projects, making them more financially viable. Besides, green bonds Enhance investor confidence by providing transparency and accountability through reporting on the environmental impact of funded projects.(see Xing et al., 2024; Solis,2024)

Table 1. Evidences of some countries’ green bond investments and economic resilience

Country	Green Bond Investment (USD)	Key Projects/Initiatives	Economic Resilience Measures
Sweden	\$184 million	Biodiversity projects, reforestation, energy efficiency, railway maintenance.	Recovery and resilience plan, green transition, digital transformation, social and territorial cohesion.
Germany	\$10 billion	Renewable energy, public transport, energy-efficient buildings.	Economic stimulus packages, labor market reforms, digital infrastructure investments.
France	\$8 billion	Sustainable agriculture, clean transportation, green buildings.	Economic recovery plan, support for SMEs, investment in digital and green sectors.
United States	\$50 billion	Renewable energy projects, green infrastructure, sustainable water management.	CARES Act, Paycheck Protection Program, infrastructure investments.
China	\$30 billion	Clean energy projects, pollution control, green transportation.	Economic stimulus packages, support for innovation and technology, regional development initiatives.

Sources: Riksgalden(2020); EU(2024); EPRS(2024).

In this table, the relative scales of green bond investments by country are demonstrated. Sweden has relatively smaller investments compared to larger economies like the United States, China, Germany, and France. However, the investments are significant in terms of their focus on biodiversity projects, reforestation, energy efficiency, and infrastructure.

4.1.2 Sustainable Banking Practices:

Sustainable banking involves integrating environmental, social, and governance (ESG) criteria into banking operations and decision-making processes. This practice encourages responsible lending by prioritising loans to businesses and projects that adhere to sustainable practices. Sustainable banking practices mitigate financial risks associated with environmental and social issues, thereby enhancing the long-term economic stability of the financial system. Importantly, the practice of sustainable banking encourages innovation in financial products and services that support sustainable development goals. (see Solis,2024).

Table 2. Evidence of sustainable banking practices and economic resilience in selected countries

Country	Sustainable Banking Practice	Impact on Economic Resilience
Sweden	Green bonds, renewable energy financing	Enhanced investment in sustainable projects, improved economic stability
Germany	ESG (Environmental, Social, Governance) criteria	Strengthened financial sector resilience, increased investor confidence
France	Sustainable agriculture financing	Diversified economy, reduced dependency on fossil fuels
United States	Green infrastructure loans	Job creation, improved infrastructure resilience
China	Pollution control financing	Reduced environmental risks, promoted sustainable industrial growth

Source: World Bank (2021)

4.1.3 Digital Inclusive Finance:

Digital inclusive finance leverages technology to provide financial services to underserved populations, promoting financial inclusion. This includes the move toward expansion of access to financial services for individuals and small businesses, particularly in remote or rural areas. This also involves the facilitation of efficient and transparent transactions, reducing costs and increasing trust in the financial system. Again, it supports economic resilience by enabling broader participation in the economy and fostering entrepreneurship. By leveraging fintech solutions, financial institutions can reach remote and marginalized communities,

providing them with access to credit, savings, and insurance. This helps to reduce poverty and inequality, contributing to a more inclusive and resilient economy (see, Xiao et al., 2024).

Table 3. evidence of digital inclusive finance practice and its impact on economic resilience in selected countries

Country	Digital Inclusive Finance Practice	Impact on Economic Resilience
Sweden	Digital payment systems, financial inclusion programs	Enhanced financial access, improved economic stability
Germany	Digital banking services, financial literacy programs	Strengthened financial sector resilience, increased investor confidence
France	Mobile banking, digital financial services	Diversified economy, reduced dependency on traditional banking
United States	Online lending platforms, digital wallets	Job creation, improved infrastructure resilience
China	Digital payment platforms, rural financial inclusion	Reduced poverty, promoted sustainable rural development

4.1.4 Combined Impact on Economic Resilience:

By integrating green investments such as green bond, sustainable banking, and digital inclusive finance, economies can build a more resilient and sustainable financial system that supports both environmental and social well-being. This integration not only helps in mitigating the adverse effects of climate change and social inequality but also fosters innovation and competitiveness that will promote the overall resilience of the economy. In general, green investments encourage the development of new technologies and business models that are aligned with sustainable development goals. Moreover, it creates a more inclusive financial ecosystem where all segments of society can participate and benefit, leading to a more balanced and equitable economic growth. This holistic approach ensures that economic progress is not achieved at the expense of environmental degradation or social disparity, thereby promoting a more sustainable and resilient future for all.

4.1 Policy framework analysis of pathways to green economy and environmental Resilience

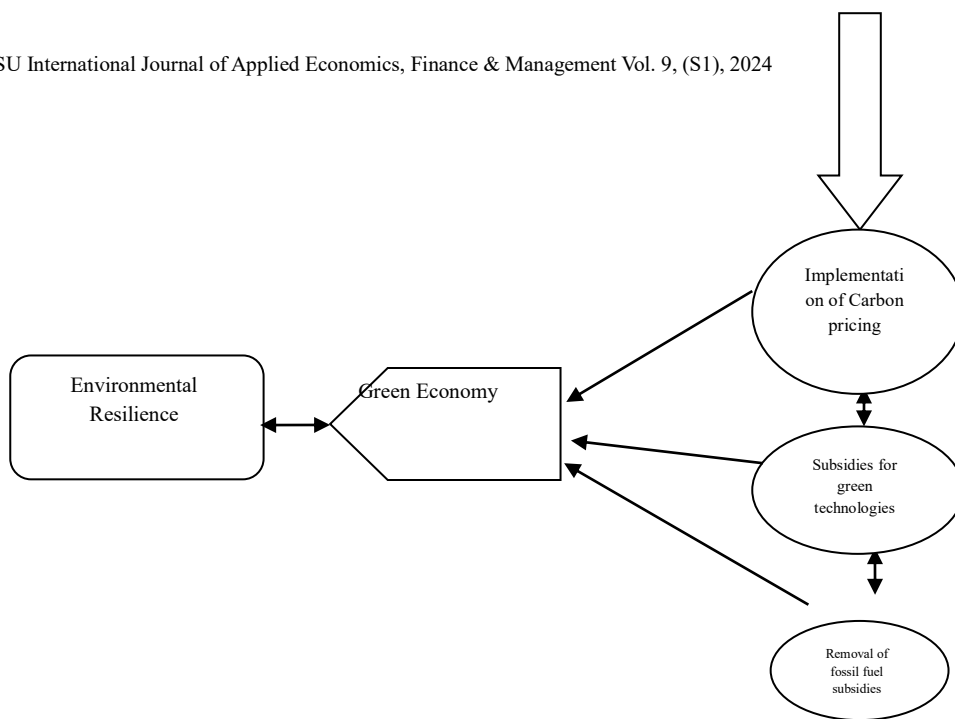


Figure 2. Pathways to a Green Economy and Environmental Resilience

4.2 Carbon pricing green economy policy and environmental resilience

Carbon pricing, which includes carbon taxes and cap-and-trade systems, makes carbon-intensive activities more expensive. This incentivizes businesses and individuals to reduce their carbon emissions and invest in cleaner technologies. By internalizing the cost of carbon emissions, carbon pricing helps reduce greenhouse gas emissions, which is crucial for mitigating climate change and enhancing environmental resilience. Though, the imposition of expensive tax may discourage carbon emission activities thereby achieving clean environment devoid of carbon. However, it may be capable of inflating the prices of goods and services since it is common in microeconomic analysis of firm’s behaviours on shifting the burden of tax to final consumers. This affects the consumer’s welfares. Therefore, to actualize the benefit of carbon pricing green economy policy, optimal taxes are required that is capable of mitigating shifting of tax burdens to the consumers.

4.2.1 Evidence based Impact of Carbon Pricing in Sweden

Sweden was one of the first countries to implement a carbon tax in 1991. The impact has been significant as evidence from the reduction in emissions presented in table4 and figure 3.

Table 4. Carbon price and emission in Sweden

Year	Emissions(MtCo2)	Carbon price (SEK/tCo2)
1991	80	0
1995	75	50
2000	70	100
2005	65	150
2010	60	200
2015	55	250
2020	50	300

Source: Sweden’s Carbon tax- Government .se,

Retrieved from <https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/>

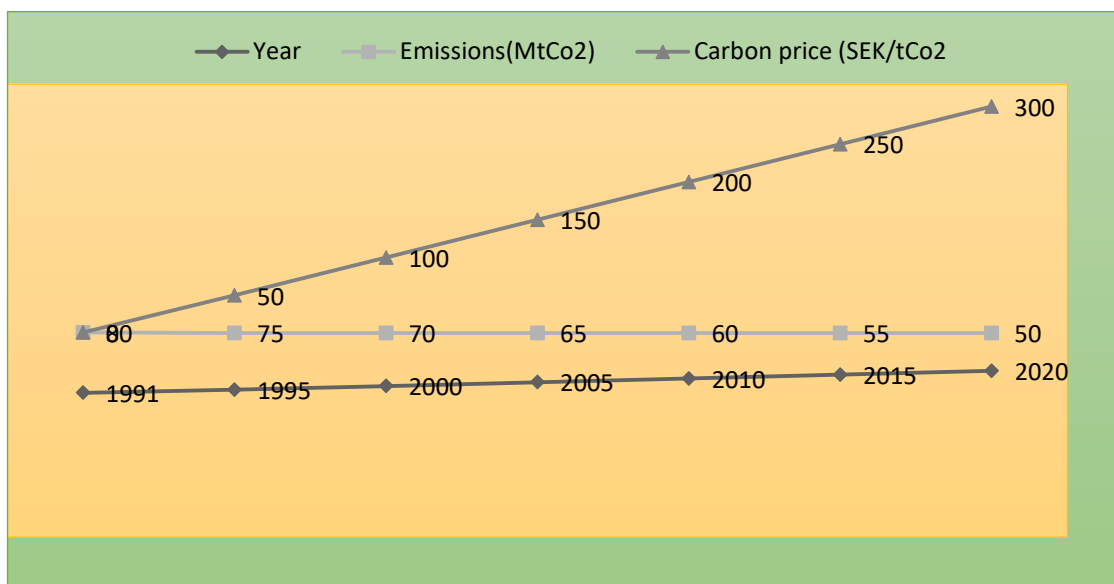


Figure 3 showing the nexus between Carbon price and emission in Sweden

Source : Authors computations ,2024

The data available in Sweden demonstrated that carbon price green economy policy exhibited efficiency. The data covered 1991 to 2020 with five years interval. It was revealed that as the carbon prices increases the level of emission decreases. For instance, when the carbon price was zero in the year 1991, the emission was 80MtCo2 reaching the peak in the years of observation. In the year, 1995 when carbon price was 50SEK/to2, emission decreases by 5MtCo2 to reach 75MtCo2. After five years that is from the year 1995 to 2000 there was increase in carbon price from 50SEK/to2 to

100SEK/to2 and decline emission from 75 to 70 MtCo2. This inverse relationship between carbon price and emission was noticed through 2020 when carbon price attain peak of 300 SEK/to2 and emission nose dive to 50MtCo2 as the lowest value for the period of data availability. This indicates the effectiveness of carbon price green economy policy which can be replicated in other countries globally to achieve sustainable clean environment, mitigate climate change effects and realizing environment resilience.

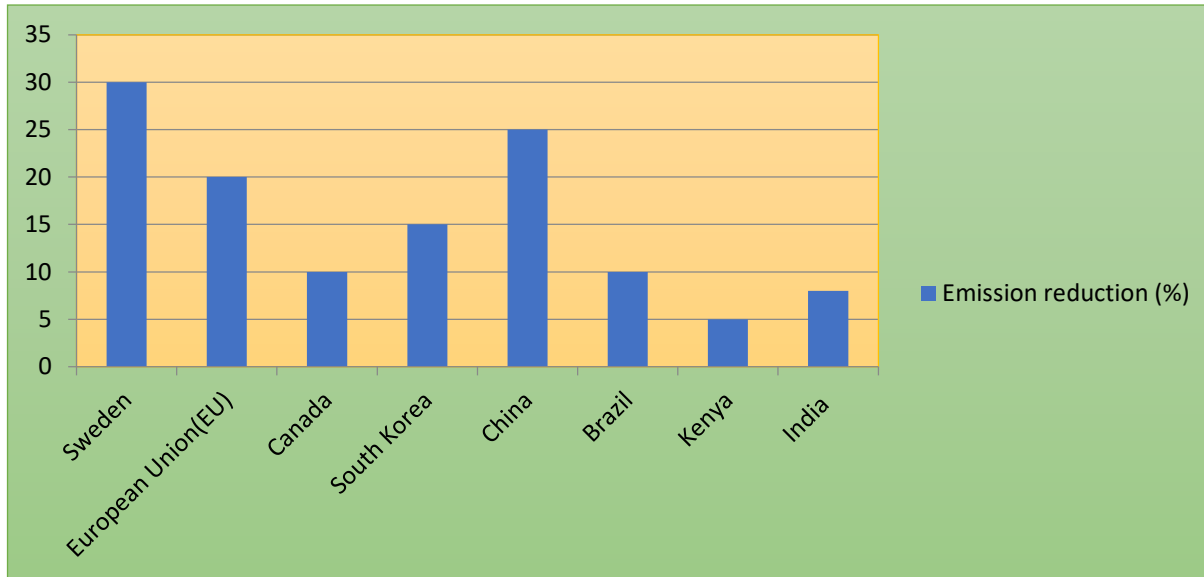


Figure 4. Countries's Emission Reduction (%) through green economy policy

Source: Author’s design, 2024.

It was revealed from figure 4 that Sweden assumed the highest performer of emission reduction as it achieved the highest emission reduction at 30%. This success can be attributed to stringent carbon pricing policies, investments in renewable energy, and efficient public transport systems. Besides, Sweden is one of the earliest adopters of a carbon tax, implemented in 1991, which has driven significant emission reductions. This was followed by the European Union (EU) with 20% emission reduction which is attributed to comprehensive environmental regulations and the Emissions Trading System (ETS), which caps and reduces emissions from various industries. The significant investments in renewable energy sources have also played a key role. Canada’s 10% reduction is partly due to provincial carbon pricing and federal environmental policies. However, challenges remain due to the country’s large oil and gas sector. The South Korea has focus on green growth strategy and transitioning to a low-carbon economy as well as investment in green technology this makes it to achieve substantial progress of 15% emission reduction. Significant emission reduction of 25% was recorded in China owing to its mammoth investment in

green technology and promotion of renewable energy. In Brazil, the hydropower and bioenergy play significant roles in Brazil’s energy mix thereby achieving 10% emission reduction. In African, it impressive to note that among the committee of nations was able to achieve impressive feet of 5% emission reduction. This Kenya’s 5% reduction reflects early efforts in embracing renewable energy, particularly geothermal and wind. 8% in emission reduction was recorded in India pointing out the country move for rapid expansion of solar and wind energy projects. These data points illustrate the positive impact of green economy policies on reducing emissions and enhancing environmental resilience.

Table 5 summarizing evidence-based analyses of green economy policies in various countries, focusing on carbon pricing, subsidies for green technologies, and the removal of fossil fuel subsidies.

Country	Policy Implemented	Impact on Emissions Reduction	Environmental Resilience
Sweden	Carbon Tax	30% reduction (1991-2015)	High
EU	Emissions Trading System	20% reduction (2005-2020)	Moderate
Canada	Carbon Tax	10% reduction (2018-2023)	Moderate
South Korea	Emissions Trading System	15% reduction (2015-2020)	Moderate
China	Subsidies for Renewable	25% reduction (2010-2020)	High
Kenya	Feed-in Tariffs	5% reduction (2010-2020)	Low
Brazil	Sustainable Urban Planning	10% reduction (2010-2020)	Moderate
India	Rural Ecological Infrastructure	8% reduction (2010-2020)	Low

Source: retrieved from Our World in data (<https://ourwordindata.org/co2-dataset-sources>)

4.2.2 Subsidies for green technologies and environmental resilience

Subsidies for green technologies lower the cost of developing and deploying renewable energy sources, energy-efficient appliances, and other sustainable technologies. This encourages innovation and adoption of green technologies, leading to a reduction in environmental impact and promoting a more sustainable economy. By fostering green technology innovation, these subsidies contribute to a more resilient environment by reducing dependency on fossil fuels and mitigating pollution.(see Cai, et al., 2023). . Additionally, the funds saved from subsidy removal can be redirected towards environmental conservation and climate mitigation efforts.

Table 6. Evidences of Countries' *Subsidies for green technologies and environmental resilience*

Country	Subsidy Program	Amount (USD)	Focus Area	Year
Sweden	2021 Klimatklivet	1.5 billion	Climate adaptation, renewable energy	
Sweden	2021 Klimatbonus	0.8 billion	Low-emission vehicles	
U.S.	2023 IRA	400 billion	Green technologies, job creation	
China	2023 Industrial Subsidies	200 billion	Green technologies	
EU	2024 Green Deal Industrial Plan	150 billion	Clean investments, net-zero industry	
Australia	2023 Renewable Energy Target	2 billion	Renewable energy	
Canada	2023 Clean Technology Fund	1 billion	Clean technology	

Sources: Swedish Environmental Protection Agency. (2024). *Klimatklivet*. *Svenskfordonsladdning.se*, *Statistics Sweden*(2024), and *BKtech Group*. (2024). *Klimatklivet*. *BKtechgroup.com*. *worldBank*(2024), *US department of energy*(2024). *European Commission*(2024).

4.2.3 Removing fossil fuel subsidies and environmental resilience

Removing fossil fuel subsidies reduces the financial support for fossil fuel production and consumption. This can lead to a decrease in greenhouse gas emissions, as fossil fuels are the primary driver of climate change. Studies suggest that eliminating fossil fuel subsidies could significantly reduce global CO2 emissions. By making fossil fuels more expensive, the removal of subsidies encourages the transition to cleaner energy sources, enhancing environmental resilience. (See, De Bruin & Yakut,2023; Hubber,2024;). It is important that these green economy policies collectively contribute to reducing greenhouse gas emissions, promoting sustainable practices, and fostering innovation in green technologies. This, in turn, enhances environmental resilience by mitigating climate change and reducing pollution.

5. Conclusion

The integration of sustainable finance and green economy principles is crucial for building a resilient and sustainable future. By fostering green investments, regulatory frameworks, and technological innovations, societies can mitigate environmental risks and promote inclusive economic growth. Therefore, for policy implications, this paper underscores the importance of coordinated efforts across sectors and regions to achieve these goals.

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