International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 6, 2025
https://theaspd.com/index.php

Banking on Sustainability: A Cross-National Study of The Financial Sector's Role in Advancing the Circular Economy

Kaza, Sushma[1], Tarun Sai Raavi[2]
[1]Professor, Department of Business Economics, GITAM School of Business, GITAM University. Hyderabad, India.
skaza@gitam.edu
[2]Assistant Professor, Department of Business Analytics, Vishwa Vishwani Institute of Systems and Management, Hyderabad, India, raavitarun5@gmail.com

Abstract

Purpose - *The aim of this paper is to discuss how the global banking sector could find a new purpose in supporting sustainability and the shift to a new way of production, i.e., a circular economy. It will assess the extent to which the world leading banks are actually striving to climate-compatible operations and the role they can play in the circular economy by enhancing financing decisions. The result refined into recommendations is the proposal of a three-fold Climate Action Plan Framework of Action, Measurement, and Disclosure in an effort to steer banks toward more sustainable business practices and open up sustainability reporting.*

Design/Methodology/Approach *- The paper uses qualitative, comparative method examining disclosures on ESGs and sustainability activities in 15-20 on the major banks of the U.S., Europe and India in the years 2019 - 2023. It dwells on cross-sectional and time series data of the bank reports to determine the following: (1) the pattern of lending to the carbon-intensive sector, (2) sustainable revenue generation patterns, and (3) the best practices of the pursuit of being compatible with the global initiatives like the Net-Zero Banking Alliance (NZBA).*

Findings- *The paper concludes that despite the efforts made by most banks to scale back their fossil fuel exposure and boost their operations in renewable energy industries, including nuclear energy, significant issues persist in the industry, especially, in the control of Scope 3 emissions and greenwashing risks and the proper application of KPIs to sustainability. Banks possess varying maturity in the sustainability process and this varies at both national and institutional levels considerably.*

Practical Implications*Climate Action Plan Framework as suggested in this paper would act as a strategic guide amongst the financial institutions, regulators and policymakers. It is best that banks operationalize the sustainability goals by bringing measurable indicators and improving the norms of disclosures so they increase accountability and help build a regenerative economic system. It also offers a roadmap on how to enhance the climate aligned lending and transition finance which is reflected in the findings.*

Social Implications*As financial institutions shift from linear to circular models, their role extends beyond profit to environmental and societal impact. The study highlights how transparent and responsible banking practices can foster trust among stakeholders, empower community-driven sustainability efforts, and accelerate the flow of capital toward inclusive, low-carbon growth. A strengthened banking commitment to circularity has the potential to generate long-term social value.*

Originality/Value *This research offers a unique cross-national perspective on the banking sector's alignment with circular economy and climate goals. Unlike traditional financial analyses, it emphasizes sustainability indicators, ESG performance, and the strategic role of banks in enabling systemic transformation. By synthesizing qualitative insights from multiple geographies, the study contributes a fresh, actionable framework for integrating sustainability into core banking operations.*

Social Implications*When financial institutions move out of the linear models to circular models, it is no longer only about attracting profit but about impacting the environment and society. The paper raises the issue of transparent and responsible principles within the banking sector as contributing to gaining more trust by the stakeholders, spurring the community-led sustainability, and the speeding up of capital to be allocated to low-carbon-level growth, as a factor of inclusivity. An enhanced banking commitment to circularity will create a long-term social value.*

Originality/Value*- This study provides a rare cross-national insight into the circular economy/climate matching with the banking sector. In contrast to the commonly accepted models of financial analysis, it focuses on the sustainability indicators and the ESG performance, as well as the strategic contribution of banks focused on bringing the systemic change. The integration of qualitative findings in different geographies allows the study to add a new practical model of incorporating sustainability into the core banking processes.*

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 6, 2025
https://theaspd.com/index.php

Keywords: *Green Banking, Sustainable Finance, Circular Economy, Climate-Aligned Finance, ESG Integration, Net-Zero Banking Alliance (NZBA), Scope 3 Emissions, Banking Sector Sustainability, Climate Risk Disclosure, Sustainable Revenue Metrics, Green Financial Instruments, Carbon-Intensive Lending, Cross-Country Banking Analysis, Climate Action Plan Framework, Transition Finance.*

1 INTRODUCTION

Banks play a singular role as providers of financial credit in a circular economy and can first bank companies and then finance the building of the transition to the circular economy. They may do this indirectly through moderating exposure to polluting sectors/ industries of their loans. Banks have stayed updated with the changing world, and gradually and progressively transitioning towards renewable energy funding.

A report published by S&P Global Commodity Insights shows that in 2022 price dropped to 55.4 % of CO2 emissions, compared to 55.2 % in 2020 and 6.6 % on absolute terms. There are approximately $1.35 trillion worth of exposures to fossil fuel assets in the form of credit exposures on 60 biggest banks worldwide as estimated by Finance Watch.

Over 60 largest private banks in the world funded fossil fuels at 6.9 trillion since the Paris Agreement was signed between 2016 to the year 2023. Moreover, more than $1.8 trillion banks was attributed to U.S. banks including JPMorgan Chase, Citi, Bank of America, Wells Fargo, Goldman Sachs, and Morgan Stanley banks. More than 4,200 fossil fuel companies are offered lending and underwriting facilities by the 60 biggest banks in the world. These are 28 globally systemically important banks (G-SIBs) plus the 22 largest EU banks by assets. At the end of 2021, these banks had assets of 92 265 billion USD, which is more than 50 percent of banking assets in the world, and net income equaled 643 billion U.S. dollars.

In the year 2023, JPMorgan Chase ranked first in a list of the top 10 financiers of fossil fuels (Banking on Climate Chaos (BOCC)). The bank raised its funding by offering an additional $38.7 billion in 2022 to $40.8 in 2023. Mizuho ranked second in global banks to lead its fossil financing by an amount of 35.4 billion, and 37 billion between the years 2022 and 2023 respectively. The M&A in the oil and gas sector saw an up hike in financing of the acquisitions to the tune of $63.3 billion in 2023 the highest since 2020. European banks and asset managers have imposed tighter targets, though, than their North American counterparts. Example; Majority of the largest banks in Europe increased to meet the demands of the situation and cut exposure to the oil and gas sector financing by less than half to 55b in 2021 versus 106b in 2020. These consist of HSBC, Barclays, and BNP Paribas among others. Moreover, a report by S&P indicated that 90 percent of the European banks were using the more aggressive unit of measurement of absolute emissions which they used in lending to the oil and gas sector whereas 20 percent of the US banks had done so.

On this backdrop, calls are increasing on bringing down fossil fuels projects, even before they attain economic life. Those banks that have major exposure in this sector will need to be regulated closely to avoid catastrophic losses as a result of disorderly transition. The absence of prudential regulation is causing adverse selection and moral hazard of banks. Moreover, it is a quasi-subsidy to the industry as well as it underprices the credit risk.

Nevertheless, banks are reacting to those demands. In its 2023 Banking on Climate Chaos report 2, a cumulative reduction in bank financing to the oil and gas sector (between 2016 and 2022) was measured at 9%. In addition, expenditure on expansion activities reduced significantly by a percentage of 33%.

2 REVIEW OF LITERATURE

The literature regarding the role that the banks play in the financing of fuels and why there should be a regulation over funds that are fueled is well to do and articulate. Some of the various writers have indicated that banks play a critical advantageous role in facilitating a circular economy.

2.1. Green Policies and Practices of Banking

Mir and Bhat (2022), reviewed the issue in a wide manner, focusing on the potential of transforming green banking. In claiming that banks can play a significant role in environmental impact, they maintain, sustainability integration should be present in credit analysis procedures, investments, along with risk analyses. According to their review, banks will need to withdraw lending to the high-emission sectors and

lend to those sectors that are low-carbon. Such a transition entails commitment to green policies by institutions, capacity building and sound use of environmental data in lending activities.

Taneja et al. (2024), used a bibliometric analysis to plot the green banking strategies in the world. According to their work, a few broadly deployed sustainable efforts include green buildings, green powered ATM, digital banking environments, and fashioned green type of loans. In addition, they point out new themes such as carbon audits and green branding, which means that banks are growingly observing their operational and strategic plans to integrate them with climate goals. The research also becomes a master plan to the bank managers and policy players.

2.2. The Bank in Supporting the SDM Responding to the Circular Economy

Kumar et al. (2024), offer a review of the literature that examines the dynamic between green finance and the circular economy initiatives. The research paper affirms that financial institutions particularly the banks are important players in closing the capital gap in circular projects. The review, however, identifies some obstacles to progress including: poorly articulated policy frameworks, a lack of consensus in defining green and circular finance, a lack of awareness among investors and a lack of incentives. It comes to a conclusion that banks require less ambiguous mandates and financial mechanisms that match the special character of circular business models.

Ozili and Opene (2022), introduce a conceptual review outlining the transformative role that banks need to undertake in facilitating the circular economy. According to the authors, banks should implement specialized credit paradigms that effectively assess business risks in circles. Some of the recommendations provided entail issuing circular lending guidelines, setting specific credit lines to circular enterprises and developing internal capacities to learn about CE-related risks. Their article highlights the necessity of alignment between the activities of a bank and the CE objectives by training, governance and innovation in policies.

2.3. Cross national comparative studies of bank sustainability

Rahman et al. (2023), the authors give a comparative analysis between India and Bangladesh efforts in the sphere of green banking. According to their study, implementation of the State Bank of India in ESG initiatives and renewable energy financing is good but the regulatory agencies in Bangladesh are less elaborate in this implementation. Although both countries have attached themselves to Sustainable Development Goals, the findings indicate disparate institutional capabilities, which require improvement in regulatory standards and rewards.

Beebeejaun and Maharoo (2024) find a point of comparison between Mauritius and other nations by using green banking laws. They discover that Mauritius does not have an extensive green finance legislation in a country such as Bangladesh and the UK. The main gaps are that mandatory green disclosure has not been established, inadequate legal frameworks to assess climate risks and no public policy to support it. In the study therefore, there is support towards a well-regulated national green finance policy that is legally binding to meet the standard sustainability needs of the world.

2.4. Reviews Green Banking Combined with Circular Economy

Yameen et al. (2024), reviewed the green finance literature in detail and with an industry-wide focus on the banking sector. The article identifies 22 major variables affecting the uptake of green finance by banks, such as internal culture, regulatory pressure, customer demand and the availability of ESG data. They stress that international banks are changing in the ways they integrate sustainability into their credit ranking systems, risk models and products. Nonetheless, the existence of uncoordinated policies and poor performance monitoring systems inhibit systemic adoption.

Rahman et al. (2022), provides specific but comprehensive review concerning Bangladesh. They discuss 53 research papers and identify an increasingly large set of green finance instruments that include green bonds and climate insurance product. These are lending behavior, credit rating systems and energy efficiency indicators which form part of their taxonomy of variables of green finance. Although there is a lack of research on performance outcomes and compatibility with other countries, this review points out how even economic environments are developing a diverse and rich ecosystem of sustainable banking even at the developing economies.

Aslam and Jawaid (2023) focuses on the issue of the absence of outcome-based measures within the existing green banking literature, recommending that the future research should pay attention to actual impact, rather than the direction of the policies. The PRISMA protocols are reviewed, regarding the

studies concerning the green banking adoption. Based on this they determine the literature is not very established yet with only 51 considerable papers being identified. According to the review, there is a high emphasis on the use of technology and the perceived advantage by the stake holders. Nonetheless, little researches have been done to evaluate the actual environmental and economic impact of green banking projects. Future studies that need to be conducted on their work are on outcome-oriented evaluation as well as the study of how and whether sustainability can become a systematized part of the core banking activities.

Ozili (2022) gives an extensive review of green finance literature in different countries. He lists some of the obstacles to green finance such as the lack of awareness, mismatched terms, and splitting regulatory frameworks. Ozili advises that a closer global coordination among the regulators, better definition of vehicles of green investment as well as developing of a set of harmonized green finance reporting standards. Such a review shares the view that international financial organizations should unite around common principles of sustainability in order to achieve relevant advances.

Ajaz Akbar Mir and Aijaz Ahmad Bhat (2022) believe that banks should play an important role in the present-day environment by helping in building a successful and resilient low-carbon economics. When issuing credit lines and setting up investments, they ought to use environmental data. It should also be accompanied by banks decreasing the amount of sensitive firms such as high emission firms and shifting to renewable energy firms. Through the stated green banking policies, the said sustainable development will be fostered.

Gulzar R, et.al (2024) look at the effect of green banking practices on environmental performance of banks. The presented study used partial least squares structural equation modelling (PLS-SEM) and conducted a survey of 500 employees of a bank. Different factors of green banking are discussed in the study with factors including the significance of employee-based practices, operation procedures, customer interaction, and follow-up on policies. It also concludes that marketing green finance results in increasing positive externalities on the side of banks.

Overall, the literature in the domain calls for strong policy action and increased responsibility and due diligence by banks in playing their role in promoting sustainability.

3 METHODOLOGY

The study applies a Multi-dimensional analytical approach based on actual world disclosures in order to examine the changing performance of the global banking sector in terms of sustainability. Based on Environmental, Social, and Governance (ESG) reports of 15-20 of the most significant banks operating in the United States, Europe, and India, the analysis concentrates on the enterprises that are believed to have been the first to pioneer sustainable banking.

The study covers a five years period (2019-2023) and is set up around three main elements:

1. Time-Series Analysis - Study trends in loan originations to carbon-intensive and polluting industries on an annual basis in order to evaluate the speed and regularity of decarbonization interventions of banks.
2. Sustainable Revenue Patterns - Charting the growth path of the revenues derived on green and circular economy-related products and services, which makes apparent the focus area of financial convergence of banks to the aspects of sustainability ambition.
3. Strategic Action Plan Framework - The three prongs of a strategic action plan framework -Action, Measurement, and Disclosure- would help the banks transform their circular economy intentions into operations and to improve transparency by developing strong and sound sustainability metrics.

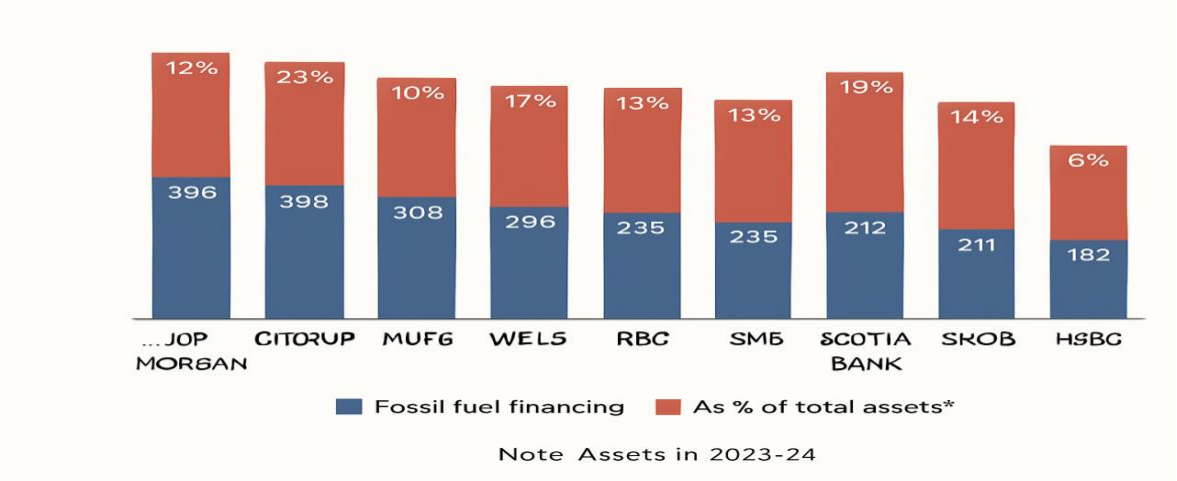
The presented methodology will result in a cross-national, comparative interpretation of the processes of transitioning the major banks to climate-aligned finance and what practical measures may be used to strengthen their contribution to the scenario of the future of the economy as a circle.

3.1 Bank fossil financing trends – Global

In 2016, JPMorgan Chase surpassed all other global investors to fund oil and gas production in the Arctic biome, and it has spent over 122 million dollars in 2023. In 2023, JPMorgan Chase was once again the largest financer of fossil fuel globally with a sum of $40.8 billion. Citi is the highest funder at 204 billion dollars that, since 2016, has funded pipelines, oil rigs, gas terminals among others.

In addition, banks have been reversing their policies which had been rather weak. An example is the third largest funder of fossil fuels in 2023, the Bank of America. It made muted exclusions of the direct funding of Arctic drilling, coal mining and coal-based power plants. In early 2024, four of the major U.S. banks have dropped the Equator Principles: Bank of America, Citi, Chase and Wells Fargo. That will not auger well with sustainability.

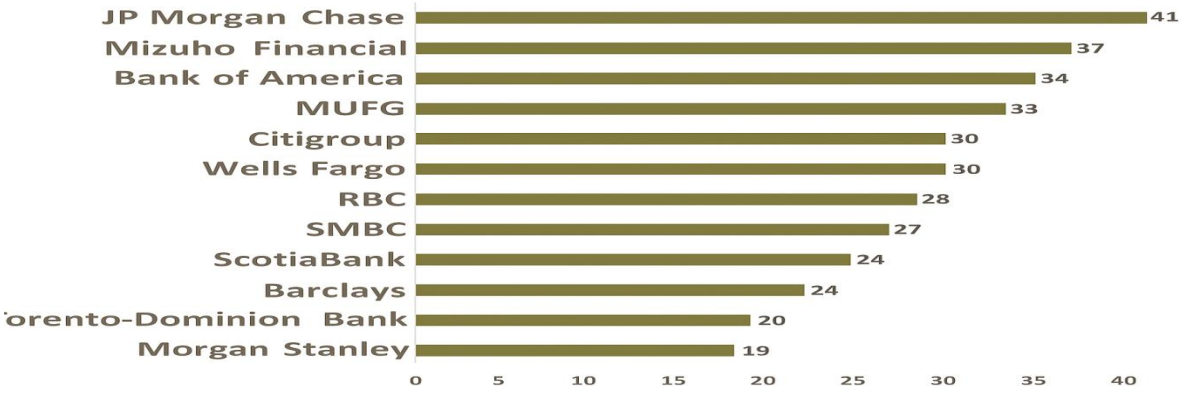
Figure 1: Top 12 Banks Fossil Finance & as % of Assets



Source: https://www.bankingonclimatechaos.org/?bank=JPMorgan%20Chase#fulldata-panel

As per the BOCC report, CIBC, RBC, Scotia bank, Toronto-Dominion Bank and Mizuho are the largest financiers of tar sands mining in 2023. The Mitsubishi UFJ Financial Group (MUFG) loaned 512 million of the ultra deepwater offshore drilling, 6 billion to JP Morgan Chase financed fracking and 7,6 billion to coal mining to CITIC. UniCredit is $265M to Arctic drilling and Bank of America is at $162M to oil and gas production in Amazon biome, both in sensitive biomes (figure 1& 2). More methane escapes fines related to coking coal mining than collected through gas pipelines and LNG sites combined but it is not reported in steel production. (See Appendix 1)
According to the Banking on Climate Chaos 2024 Fossil Fuel Finance Report, the amount of funding that oil companies in the oil and gas industry received in 2022 had dropped by 9 percent compared to the funding received in 2016 thereby reducing the amount of funding allocated to expansionist projects by 33 percent. These numbers represent a small change across the globe in how banks finance with less carbon-intensive processes.

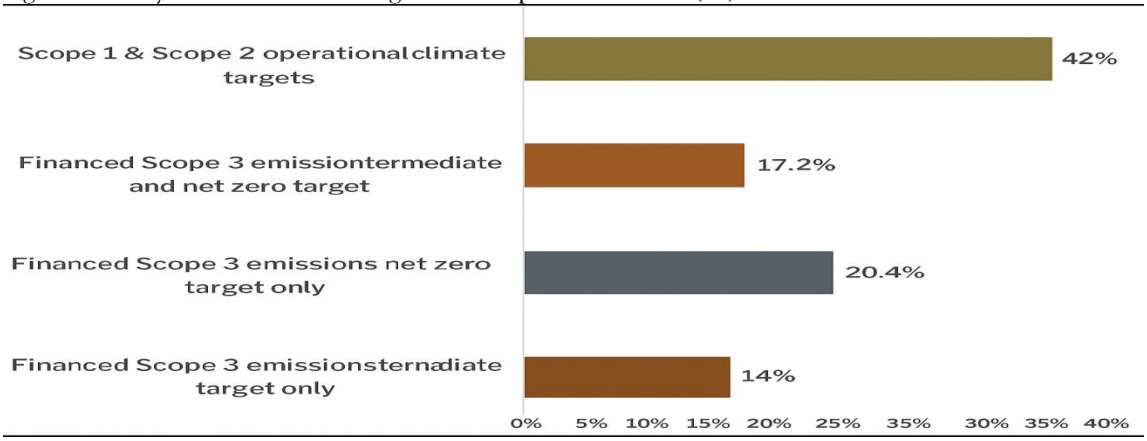
Figure 2 Banks with most fossil financing in 2023 ($bn)



Source: banking on climate chaos 2024

A Fed Reserve International Finance Discussion Paper concluded that although significant steps have been taken by the large Systemically Important Banks that are globally active on climate change considerations, still much remains to be done both in form of measurement and disclosure of climate-related risks as well as ensuring that those banks ensure alignment of the activities of financing with their net-zero goals. Additionally, the paper concluded that even in recent years as green financing has immensely expanded, the financing of fossil fuels continues to be significant. Green financing, as it progressed so far, is still not quite in the recommended direction of transition to net-zero.

Figure 3: only few FIs extend targets to Scope 3 emissions(%)



Source: S&P, "Will Oil and Gas Producers Lose Access to External Financing as Lenders Decarbonize", November 2023

Many US and European bank signatories to the Net-Zero Banking Alliance (NZBA) Scope 3 or due to their own corporate policies have established intermediate targets to cut financed emissions in the context of their oil and gas lending portfolios. (figure 3)

Conversely, there were also deals where very large amounts of loans were made in the case of companies that include Phillips 66 and The Williams Cos gage of Scope 1 and 2 emission intensity (measured in metric tons of CO2 equivalent/$million of revenue) is below that of their peers. In addition, the absolute emission of the two companies was greater in 2022 compared with 2020.

3.1.1 The European Scenario

In Europe, BNP Paribas and ING Groep tightened its curb on lending and underwriting oil and gas trade finance financing.

European Central Bank Working Paper Series Report:Business as usual: bank climate commitments, lending and engagement

But shockingly in an eye-opener the European central bank published a working paper, which incredibly did not see much evidence of divestment by climate-aligned banks of targeted areas or even related industries like mining.

According to the report, attempts to move away from fossil finance were coming under a stronger pressure, and as such, the banks have been reacting by taking part in various climate-related initiatives. ECB tested the consequences of what European banks have voluntarily pledged against climate change on their lending by having the following hypothesis: First, an alignment to climate change will see the movement of the financing of polluting firms to less diabetic ones. Second, banks will be able to interact with polluting heavy corporations in a bid to persuade them to clean up their forms of exit. Third, green undertakings have insignificant influence on invested emissions.

The analysis of the ECB is based on the following two administrative data points: a) FinRep - Fine grained European firm credit register of bank lending to the European firms since 2018 b) AnaCredit - Database of European banks global lending by sector.

1) Interestingly, banks that are entering green initiatives are bigger and in the process of lending larger amount of money to brown sectors like mining. Their concentration in lending to the mining has a comparable share to other banks in the euro area but their global portfolios have

the setting of the substantially high share to the brown sector which is power generation, oil and gas as well as transport.

2) Second, the research revealed no signs of divestment by climate-aligned banks in the target sectors or even divestment across other proxies of high-emissions firms, that includes firms in mining industry and firms non-engaged in environment-friendly activities. Instead, climate-aligned lenders are just a little more likely to initiate new relationships with companies in high-emissions targeted industries but less of an influence on exit. Also, the research did not detect a transformation in rates charged on climate-acting financial institutions to high-emission corporations. The results presented in the study provided a very strong negative evidence concerning the divestment hypothesis.
3) Third, companies that obtain financing with NZBA banks do not have much greater propensity to themselves introduce a decarbonization target.

On the whole, the findings of the ECB study put in doubt the effectiveness of voluntary climate pledges to limit financed emissions by means of divestment or engagement. This case study shows that there must be a stronger govt. intervention in the net zero commitments, considering the poor voluntary efforts of the privates.

3.1.2 Fossil financing trends in Asia and India

India has the third-highest amount of greenhouse gas emissions on a global scale, and an ambition of achieving a net zero status by 2070. In August 2023, loans granted by Indian banks in carbon-emission activities like petroleum, coal and nuclear fuels stood at 1.20 trillion rupees ($14.42 billion) but lending in infrastructure-related aspects was 12.40 trillion rupees.

Fossil Fuel Finance Report 2023 ranked the State Bank of India (SBI), India as the sole lender to the state; the funds disbursal by the bank were less than 5 years at just over 1 billion dollars. The new fossil fuel expansion projects of the SBI between 2016-22 totaled to 9.49 billion. The crisis will be augmented by the desire of India to mine more commercial coal.

Interestingly, according to the survey done by Climate Risks horizon of 34 banks, the Indian banking system is not much equipped against upheavals of climate change.

According to the BankTrack report, Asian coal financing has been done through funds of nine big banks, three of which are in India. These comprise Indian banks, State Bank of India, Axis bank and Bank of Baroda, Indonesian banks such as Bank Mandiri, Rakyat, and Negara and Japanese banks including Mizho, SMBC, and MUFG. [9]

Likewise, according to a report by Delhi-based non-profit financial think tank Centre for Financial Accountability (CFA) of the total number of loans given by Indian banks, 25-35 percent of loans were vulnerable to carbon intensive sectors, one of them being coal. A survey conducted by the RBI has found that most of the banks have answered no to the question as to whether they have been able to align their financial disclosures pertaining to sustainability with any recognized international framework.

The Reserve Bank of India (RBI) and the association of lenders have requested to identify the risks in the bank books of local banks related to climate. Bank that are already in the process of measuring their financed emissions include ICICI Bank, Axis Bank and Federal Bank where as, Union Bank of India, IndusInd Bank, Indian Bank and Bank of India are in the process of measuring.

4. Banks respond to sustainability pressures

The S&P Global Corporate Sustainability Assessment (CSA) 2022 found that 42 percent of banks, financial-services firms and insurers have publicly pledged to cut down on emissions or attain net zero linked with Scope 1 emissions (direct operations) and Scope 2 emissions (indirect emissions caused by a bought entity). But on Scope 3 emissions which have been associated with the lending activities of financial institutions to the oil and gas industry, only slightly more than 20 per cent of the financial institutions have committed themselves. (Appendix 2)

The implication of the inability of the lenders to quickly and easily deal with Scope 3 emissions is based on the fact that it relies on the ability of their clients to reliably quantify their own emissions, to develop transition-paths and to target. Some of the organizations that assist the financial

institutions on setting these targets include the Science-Based Targets initiative (SBTi). On the same note, the Glasgow Financial Alliance for Net Zero (GFANZ) under the United Nations and having more than 650 members representing 150 trillion AUM is helping in establishing intermediate (2030) targets. Nevertheless, recently some large FIs exited such institutions.

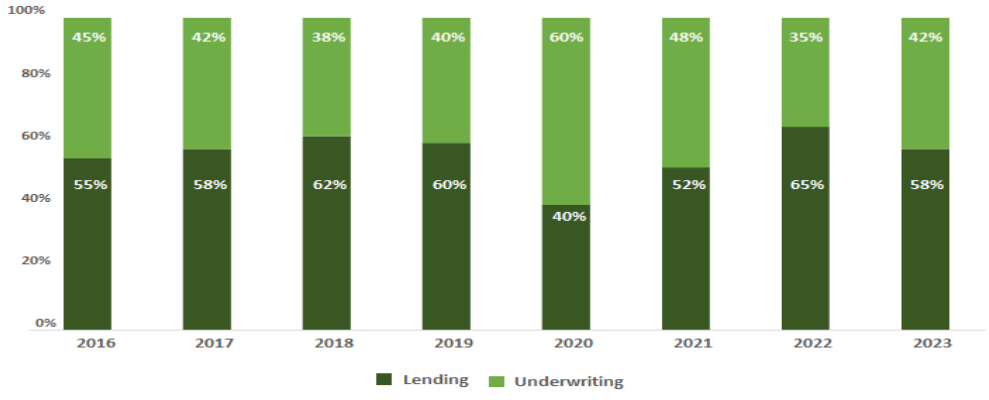
Also, a tactic in the US Securities and Exchange Commission (SEC) draft proposal in March 2022, "Enhance and Standardize Climate-Related Disclosures for Investors", involves enforcing firms to report their Scope 3 emissions. In the European continent, Scope 3 disclosures required by the European Banking Authority will start at December 2023. Most probably, FIs will limit exposure to those companies that have not yet launched a process of reducing their Scope 1 and Scope 2 emissions by 2030.

The average reduction in corporate lending to the oil and gas industry between 2019-2022 was 32 percent among JPMorgan, Wells Fargo and Bank of America (BofA). Whereas BofA renegotiated restrictions, JPMorgan was modified in emissions goals and Wells Fargo established its initial goals. The three contributed to 17 percent in financing fossil fuel in the last 16 months. On taking the year 2019 as a baseline year, the emission targets are accomplished by 2030 as the lending is projected to increase.

Fossil Companies and banks side step climate restrictions - Banks have avoided the sector though they have side looked climate restrictions. Recently, although the price of the emerging oil and gas companies has caused record profits of 4 trillion to the oil and gas companies, the ensuing flooding cash flows decreased the necessity of cash borrowing in banks, by enabling the companies to avoid the bank restrictions. In addition, banks may proceed to make transactions in some other areas such as commodity trade finance as there is no limit placed on capital requirements.

Norh American and European banks are embracing a weighted-average target at the level of the loan portfolio. As per this, those companies, which have not yet achieved their emission cutoff, will also be able to get funding provided they are fulfilling their total group portfolio objectives. In addition, setting on banks targets are using emissions intensity (e.g., CO2 emissions per unit of energy produced or revenue), which may enable increasing absolute emissions. In addition, NZBA guidelines restrict the present-day banks only in the area of their lending and investment, but not in the area of capital market practices, e.g., advisory and underwriting.

Figure 4: Lending and Underwriting 2016-23



Source: Banking on climate chaos.org, "Fossil Fuel Finance Report", May 2024

In Africa, banks are collaborating with the private credit managers as the regulations are rather strict in Europe. A few major banks ditch Africa prompting the country to be experiencing an annual deficit of $80 billion in trade financing especially affecting the small and mid-sized companies. Moreover, asset managers have an asset value of $880 billion invested in fossil fuel companies as compared to $309 billion invested in green companies.

It is interesting to note that profitability issues appear to matter more with the investors compared to the environment issues. An example would be that in the period 2010-2023, the investment-grade and speculative-grade public bonds issued in North America were of amount $476.7 billion and

$377.8 billion respectively compared to the same amount on the European region of $446.5 billion and $82.3 billion respectively.

In a positive step however, the fourteen largest banks of the world is committing to give more investment to nuclear energy. Banks like Bank of America, Barclays, BNP Paribas, Citi, Morgan Stanley and Goldman Sachs as part of the COP28 climate pledges promised to triple the capacity of nuclear energy in the world by 2050, to help in the shift to low-carbon power. That may involve more direct lending and project finance, issue of bonds and underwriting.

Historically, the development of nuclear projects used to be hampered by high costs of financing. Concerns of whether nuclear energy will be able to achieve organizational environmental, social and governance standards remain in doubt as well. Barclays, however, reveals that combining nuclear and the intermittent wind and solar energy would have a potential remedy. As an example, Guggenheim Securities is financing the three small modular nuclear reactors of Oracle data center.

Moreover, HSBC in the UAE is providing green mortgage to the property in the environment friendly on flexible conditions.

5. Cross-Regional Lending towards Polluting Sectors (2016 - 2023)

Questions concerning the financing of polluting industries by banks have received growing attention over the past few years, especially as the global economies seek to decarbonize. Comparative study of India, Europe and the U.S shows denser lending by banks in carbon intensive industries and activities, including fossil fuels, cement, and steel.

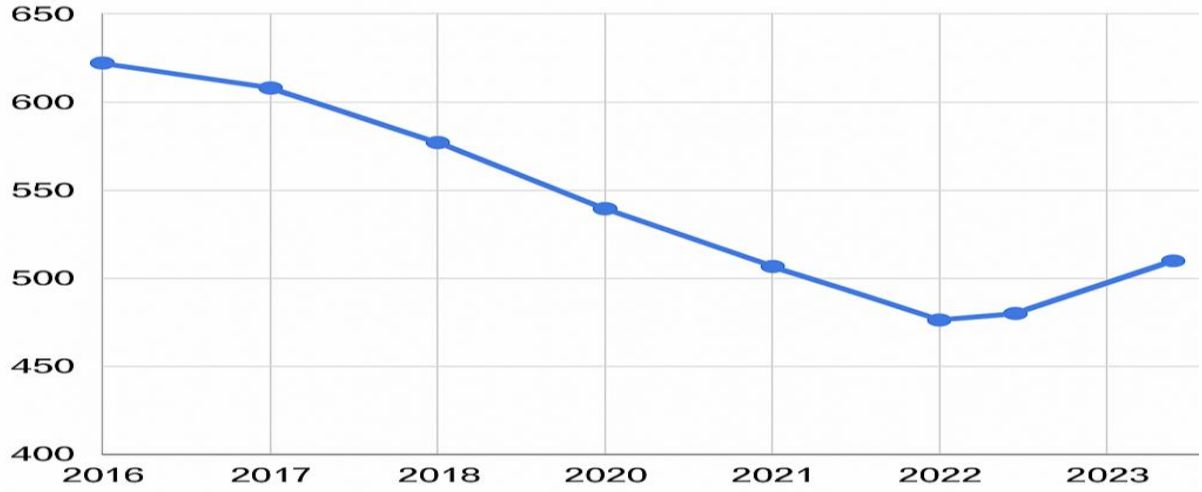
5.1 United States: Between 2016 and 2023, banks like JPMorgan Chase, Bank of America, and Citigroup were still three of the largest banks funders of fossil fuel projects around the globe (Rainforest Action Network, 2023). In spite of ever-increasing pressure on the sector by investors and climate advocacy organizations, lending to oil and gas at a colossal level was still enormous especially until 2019. There was a visible change after the U.S. re-signed the Paris Accord as well as introduced climate-oriented initiatives with the coming of a Biden administration. Net-zero commitments are also made by many banks who joined the Net-Zero Banking Alliance (NZBA) and started phasing out coal exposures (BankTrack, 2022). But the banks in the United States were slower to align their portfolios than European ones and behind in terms of reporting Scope 3 emissions, as compared to their counterparts (Ceres, 2023).

In spite of such pledges, much investment in transition activities, such as natural gas and carbon capture continued to be funded by many institutions with their activities being presented as transitional solutions. Through the United States banking sector, sustainability-linked finance was prioritized, yet it was accused of greenwashing because funding fossil fuel growth was occurring at the same time (ShareAction, 2023).

5.2 Europe: The European banks were more regulatory in line and quicker in their coal exit plans. Banks like BNP Paribas, Barclays, Deutsche Bank lowered their exposure to coal-related business and social investments between 2016-2023 and more of their green bonds and transition finance products as well (European Banking Authority, 2022). The introduction of the EU Sustainable Finance Taxonomy (SFDR (Sustainable Finance Disclosure Regulation) and the European Central Bank, brought climate stress tests that introduced mandatory frameworks that provided incentives to divest the carbon-intensive sectors.

At the end of 2023, the European institutions were implementing sophisticated ESG integration in credit allocation such as the use of science-based targets and financed emissions reporting using PCAF (Partnership for Carbon Accounting Financials) standards (EIB, 2022). However, a number of banks were noted as engaging in greenwashing in loaning oil majors that retained robust fossil expansion strategies in the face of their net-zero commitments (Reclaim Finance, 2023).

Figure 5: Analysis in Time Series Data of Loans Advanced to Polluting Industries/ Sectors



Source : ESG disclosures and lending data from 15–20 major banks in the US, Europe, and India during 2016–2023. Data corroborated by BOCC reports, S&P Global, and RBI releases.
2016–2022: Steady decline in loans advanced to polluting sectors (from ~625 to ~475 units), suggesting **a** decarburization shift by the banking sector.
2022–2023: A reversal in the trend, with loans increasing again (~510 units), indicating a potential revival in fossil financing or lag in transition efforts.

5.3 India: In the given sector and period under discussion (20162020), Indian banks (State Bank of India (SBI), Punjab National Bank, HDFC Bank, and ICICI Bank) showed close relations with the coal-based power and heavy industries. That was to a large extent due to country focus on energy access and expansion of infrastructure (Climate Policy Initiative, 2021). During the time when global peers to the international banks started their shifts to sustainability, the Indian banking sector was lagging behind in their time on adopting ESG metrics or fossil-fuel lending restrictions. Beebeejaun and Maharoo (2024) discuss Mauritius and reveal that legal mechanisms play a decisive role in the willingness of banks to disinvest in the polluting industry.
This situation changed in 2022 when the Reserve Bank of India (RBI) issued a discussion paper on climate risk and sustainable finance, indicating the desire to move the banks towards sustainability (RBI, 2022). Yet, the use of ESG integration is mostly voluntary, and the majors of the disclosures consist of the use of the annual reports described qualitatively. Business Responsibility: The reporting on the Business Responsibility and Sustainability Reporting (BRSR) made by SEBI encouraged the listed firms, even those banks, to start reporting on ESGs by 2023, yet there is a lack of consistency.
Indian banks have stepped up the issues of green bonds in recent years, particularly by HDFC and SBI, but the overall volume is little as compared to the exposers of fossil fuels (India Climate Collaborative, 2023). The majority of the banks still emphasize on compliance instead of integration of sustainability in core lending decisions.

- European banks have led in adopting binding ESG frameworks, reducing coal exposure, and aligning lending portfolios with sustainability goals.
- U.S. banks show dual-track behavior: making climate commitments while maintaining high fossil fuel investments.
- Indian banks are in a transitional phase, with green finance gaining traction but core lending still dominated by high-emission sectors.
- Across all regions, Scope 3 emissions accounting, clear ESG KPIs, and regulatory enforcement are critical for ensuring genuine alignment with climate goals.

As noted by Yameen et al. (2024), who review parameters influencing the green finance embrace by banks, streamlined metrics need to be used to determine the achievement of sustainability.
6. Indian banks gear up

The released sectoral deployment of credit by the Reserve Bank of India (RBI) shows that the credit extended by banks to the petroleum, coal products and nuclear fuels declined by 13 and 1 percent (YoY) and month-on-month (MoM) to Rs 1.31 trillion in January. Also, credit to mining and quarrying, inclusive of coal declined at 7% YoY and 5% MoM to Rs 54,123 crore.
SBI has started weighing borrowers depending on their ESG rating. Nonetheless, this information is not employed in the computation of interest rate but simply to create awareness to borrowers so that they are knowledgeable of their positions. SBI reports its Scope 3 emission under the Securities and Exchange Board of India. Nevertheless, the thermal contribution to the total power generation remains at 75% at the present.
The Reserve Bank of India (RBI) has permitted up to Rs 30 crore of the green energy projects that include wind and solar as priority sector lending (PSL). According to the RBI norms, under the loans of Rs 10,000 crore of loans, banks are to make sure that the PSL will be Rs 4,000 crore. At least 2.5 percent of GDP or 85 billion dollars annually will be required as green financing by India until 2030.

.1 An alternative approach - assessing banks sustainable revenues
Corporate Knights (CK) second annual sustainable banking revenues ranking ranks the banks on sustainable revenue as a fraction of all revenues based on investments, underwriting and project adviser services (Table 1) and (Appendix 3). The CK report unlike other reports concentrates on green energy financing that will experience long-term secular uptick, as opposed to fossil fuel financing.

Table 1: Corporate Knights sustainable Banking Revenues Ranking 2023

2023 Rank	2022 Rank	Bank	Country	2022 Sustainable Revenue (%)	2022 Total Sustainable Revenue (PPP milions)	2022 Total Outstanding Sustainable Loans (PPP millions)	2022 Total Sustainable AUM (PPP millions)	2022 Total Sustainable Bond Underwriting & Project Advisory Volume (PPP millions)
1	1	Vancity	Canada	24.3	189	5	-	-
2		Procredit Holding AG & Co. KGaA	Germany	22.2	124	1,898	-	-
3		Triodos Bank NV	Netherlands	21.3	123	4,541	-	-
4	3	Amalgamated Bank	USA	18.8	53	1,482	-	-
5		Turkiye Sinai Kalkinma Bankasi (TSKB)	Turkey	17.5	382	5,268	-	-
6		The City Bank Limited	Bangladesh	16.1	126	1,744	-	-

7		Banco Pichincha C.A.	Ecuador	15.8	230	2,044	-	-
8	2	SpareBank 1 Østlandet	Norway	14.9	68	2,088	-	-
9		UOB	Singapore	12.8	1,822	44,676	-	-
10		Nykredit A/S	Denmark	12.2	344	16,140	-	-

Source: The Banker.com, "Sustainable Banking Revenues Ranking 2023", Oct 2023

Nonetheless, the allegations of green washing techniques are leveled against banks because of its inability to disclose and there is no sufficient and standardized reporting.

As well, FinTech Magazine lists the 10 most ethical banks of 2023, in terms of ESG initiatives. These are: BNP Paribas ranked first with an aggressive ESG program in place; Standard Chartered ranked second, implementing a sustainability framework clients that targets helping them attain a low to insignificant risk rating of climate risks; Citi Bank ranked third, with plans to invest US$1tn in renewable and clean energy; with a target of attaining net zero by 2050; HSBC ranked fourth with an umbrella of sustainable policies which includes forestry and agricultural commodities policies, equator principles, and chemicals industry policies; and finally, JPMorgan is ranked the

Barclays is ranked sixth owing to its Barclays Rise that tries to establish appropriate circumstances in the financial services sector; 7 th position is held by Bank of America; DBS Bank ranked at 8 th completed carbon neutrality in its own operations by 2022, whereas it established targets on sustainable lending; Deutsche Bank measures the fossil activities of its customers shrewdly, and it minims its exposure to the recreant ones; Lloyds Bank ranked at 10 th, has set a target of sustainable finance of its own corporate and institutional clients by 202

6A Climate Action Framework for Banks

To determine how their activities affect the sustainability of climate, banks should consider taking a three-dimensional approach a) action b) measurement and c) disclosure. This is the proposed course of action of the banks.

There are three points on the framework of banks sustainability adoption as outlined as follows:

1) Action: Shifting to green business practices- With the stakeholders, including households, corporations, small-to-medium businesses, and governments mounting pressure on going net-zero in carbon emissions, green financial products and services are more in demand than ever. The Inflation Reduction Act in the United States in 2022 established a Green Bank fund that provided $27 billion to aid in sustainable practices and clean energy endeavours.

Value streams are also created due to green banking. As an example, the issuance of sustainability-linked debt products increased more than 300 percent between 2017-20. Additionally, a switch to green banking activities reduces climate risks expose of banks. In the EU, to give another example, 15 percent of the balance sheets of banks will become threatened by climate change. The shift towards becoming green banks will lower the resultant volume of non-performing assets (NPA) and increase profit potential of banks.

On top of that, the opportunities of emerging technologies data analytics and AI/ML can be used to redesign a sustainable customer journey through the addition of sustainability capabilities to existing products. Those are providing conducive rates of interest as a credit card to buy sustainable products, providing mechanisms of counterbalancing the carbon footprints and the establishment of a deposit account in green with specially designed accounts towards sustainable investments.

2) Disclosure- Fossil finance incomes- The Net Zero Banking Alliance (NZBA) was started in April 2021 by the UN as a component of COP 26 (the 2021 United Nations Climate Change Summit). Members

will volunteer to work towards capping temparature on the globe becomes no higher than 1.5 degrees Celsius so that by 2050, the global economy is shifted to achieve net zero which is supposed to align with the signatories of the Paris Agreement.

NZBA demands its member banks to have credit and investment portfolio goals within one and a half years of joining the alliance. These will be targets on the financed emissions in 2030 and 2050 and intermediary targets will be established every 2030 and onwards. Its early first-round targets that should be achieved within 30 years of their joining in 2030 should look at majority of the nine sectors that cause greenhouse gases including; agriculture, aluminum, cement, coal, real estate, iron and steel gas, oil and gas, power generation as well as transport.

The objectives ought to map how the bank intends to minimize its financed emissions, and the way it will achieve the Paris accord objectives. Within four years of joining the alliance, NZBA members are supposed to have their targets validated by a third party. An example is the Science-Based Targets Initiative (SBTi) which tracks the progress of the banks as against their proclaimed targets.

North American and European banks have established footing financed emissions standards at the loan portfolio degree. Then, on a weighted-average basis, a company that is not performing well enough in its emissions-cutting effort might not be eligible to get financing funds, even as the group level portfolio goals are achieved - because the portfolio goals are based on intensity reduction (e.g., CO2/unit energy produced/k $ revenue) which allows the firms in the portfolio aggregate as a whole to experience growth in absolute emissions provided concomitant gains in efficiency. This is however surprising not to apply in the case of individual firms in the group.

Moreover, NZBA regulations can be used on emissions goals of the lending and investment practices of banks, but not their capital market practices, which includes advisory and underwriting services. Nevertheless, the situation needs to shift in the future, when NZBA guidelines will be extended to encompass capital market activity.

3. Measurement sustainable revenues-This is regarding analyzing the level of overall revenue of the banks that is being earned via sustainable lending, investments and underwriting. This, however, is rather a ratio and a percent of all revenues but not the total sustainable revenues. An example of this can be seen in the objectives of Lloyds Bank in achieving sustainable transactions of 15bn (US$18.2bn) through its corporate and institutional customers by 2024 as part of its response to the enhanced corporate responsibility (ECR). Also, sustainable loans and advances and debt securities as a percentage of the total assets can be used as an essential indicator of sustainability. In this regard, AI applications are quickly becoming valuable solutions that would help investors analyze the financial viability of companies coupled with ESG (environmental, social and governance) considerations.

But there are numerous challenges with measuring sustainability.

Figure 6: 3-Point Framework for Bank Sustainability Action Plan

Source: Created by Authors

These include:

- No uniform framework: It has data but no uniform format that could be used to make cross sectional and longitudinal comparisons hence calling their reliability and worth into question.
- Lack of common measurement structure: The industry does not have a common industry measurement structure. Current systems such as BEI (business environment index) and TCFD (task force on climate-related financial disclosures) are not commonly accepted. The ESG reporting has no standard mechanism as compared to financial reporting that has predetermined parameters.

Data Collection and Management: Most of the institutions do not have an approach to fully integrate the data on sustainability with current reporting.

7. CONCLUSION

The paper focused on the trend analysis in timeseries data of the loans given by the banking institutions to the polluting industries/sector, sustainable revenue trends, and lastly suggested a framework of climate action plan the banks should pursue in ensuring that it plays a crucial role in ensuring the realization of a circular economy. Empirical evidence was analyzed critically in the study in order to determine whether the Giraff shared that banks in accordance with their NZBA commitments are fossil financing reduced.

Although the present evidence, irrefutably points towards the fact that leading banks still are heavily invested in fossil finance enterprises, however, there is a bright lining on the horizon. The 2023 Banking on Climate Chaos report 2 states that the funding of the oil and gas sector by banks had declined in 2022 by 9 percent compared to that in 2016. Moreover, there was a substantial decrease of 33 per cent in funding of expansion projects.

In another encouraging step, fourteen major banks of the world are committing to capitalism in nuclear energy. In the COP28 climate commitments, banks including Bank of America, Barclays, BNP Paribas, Citi, Morgan Stanley and Goldman Sachs promised to increase the global nuclear energy capacity by threefold by the year 2050.

In addition, the number one financier of fossil fuels J P Morgan Chase (BOCC list) is committing to finance and enable more than 2.5 trillion over 10 years (2021-30), towards long term climate solutions and sustainable development. This will comprise $1 trillion on green projects.

Similarly, the 2022 S&P CSA report displayed that 42 percent of FIs have attempted publicly to state their desire to reduce or achieve a net-zero scenario with respect to Scope 1 and Scope 2. Nevertheless, they underperform mostly in Scope 3.

REFERENCES

1) Altberg, M., et al. (2023). *Will oil and gas producers lose access to external financing as lenders decarbonize?* S&P Global. https://www.spglobal.com/content/dam/spglobal/corporate/en/images/general/special-editorial/spgmi_rl_oilandgas_energytransition_d4.pdf

2) Banking on Climate Chaos. (2024). *Fossil Fuel Finance Report*. https://www.bankingonclimatechaos.org/?bank=JPMorgan%20Chase#fulldata-panel

3) Mir, A. A., & Bhat, A. A. (2022). Green banking and sustainability – a review. *Arab Gulf Journal of Scientific Research*, 40(3), 247–263. https://doi.org/10.1108/AGJSR-04-2022-0017

4) Gulzar, R., Bhat, A. A., & Mir, A. A. (2024). Green banking practices and environmental performance: Navigating sustainability in banks. *Environmental Science and Pollution Research*, 31, 23211–23226. https://doi.org/10.1007/s11356-024-32418-7

5) Rajesh, S. (2022). Green banking practices in India: Opportunities and challenges. *Asian Journal of Management and Commerce*, 3(1), 161–165. https://doi.org/10.22271/27084515.2022.v3.i1c.253

6) Beltan, O. D., et al. (2023). *What are large global banks doing about climate change?* Board of Governors of the Federal Reserve System. *International Finance Discussion Papers*, 1368. https://www.federalreserve.gov/econres/ifdp/files/ifdp1368.pdf

7) Sastry, P., Verner, E., & Marques-Ibanez, D. (2024). *Business as usual: Bank climate commitments, lending and engagement*. European Central Bank Working Paper Series No. 2921. https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2921~603e225101.en.pdf

8) Verma, M. (2023, May). India's top bank has cut oil and gas lending—but isn't turning down risky projects. *Quartz*. https://www.yahoo.com/tech/indias-top-bank-cut-oil-145500079.html
9) Choubey, J. (2024, February 3). Perils of banking on fossil fuels. *The Indian Express*. https://www.newindianexpress.com/xplore/2024/Feb/03/perils-of-banking-on-fossil-fuels
10) Parmar, J. (2024, January). Bank lending to renewable energy falls significantly, shows RBI data. *Moneycontrol*. https://www.moneycontrol.com/news/business/bank-lending-to-renewable-energy-falls-significantly-shows-rbi-data-11983141.html
11) Lele, A. (2024, June). Lenders seek better terms to increase green and sustainable financing. *Business Standard*. https://www.business-standard.com/finance/news/lenders-seek-better-terms-for-increasing-green-sustainable-financing-124061400929_1.html
12) Global Energy Monitor. (2024). *Global Coal Project Finance Tracker*. https://globalenergymonitor.org/projects/global-coal-project-finance-tracker/