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What are Large Global Banks Doing About Climate Change?*

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Abstract

We review the “climate action plans” of Global Systemically Important Banks (G-SIBs) and the progress they are making toward achieving them. G-SIBs have identified the drivers of climate risk and their transmission channels to credit and other risks. Additionally, some have started to measure and model these risks. While most G-SIBs have committed to fully offsetting their emissions by mid-century, they are only beginning to measure financed emissions resulting from their loans and investments, which comprise the vast majority of their emissions. G-SIBs have also committed to increase green finance and have started to do so. All told, despite some progress by large global banks to address climate change considerations, much work lies ahead to properly measure and disclose climate-related risks, and to better align financing activities with their net-zero targets.

JEL classification: G21, Q54, Q56

Keywords: climate change, banks, climate finance, environmental reporting

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1 Introduction

Since 2016, governments around the world have signed the United Nations’ Paris Climate Agreement, a watershed treaty in the fight against climate change that reaffirmed the commitment to limit global warming to well below 2°C compared to pre-industrial levels (UNFCCC, 2015). As a part of the effort to mitigate and adapt to climate change, the agreement seeks to align financial flows with climate goals. Since the Paris Agreement, there has been an increasing focus on how the financial sector can contribute to the transition to a climate-neutral global economy. It is perhaps not surprising that, given their global footprint, G-SIBs are looking ahead and starting to assess both the risks and opportunities associated with climate change.¹ G-SIBs are strategically positioning themselves and have publicly announced their strategies in the form of “climate action plans.”

This paper reviews these plans and the progress toward achieving them.² We conduct a stock-taking exercise by examining G-SIBs’ public disclosures to illustrate how they say they are adapting their business models, risk management practices, and lending practices to address climate change issues. G-SIBs’ climate action plans, if carried out, could potentially entail significant changes to their business models, lending practices, and risk management frameworks. As G-SIBs begin to implement these plans, borrowing costs and capital expenditures may shift across industries, which, in turn, may have implications for financial stability, growth, and inflation. For example, several European Central Bank (ECB) officials have noted climate change directly relates to their price stability mandate as the increasing frequency and severity of climate disasters will have implications for inflation. Furthermore, how G-SIBs engage with climate issues could hamper or enable the transition to a net-zero economy. Some studies argue that if the financial system plays a hampering role, the transition to a climate-neutral economy will be delayed, triggering disorderly adjustments that could threaten financial stability (Battiston, Monasterolo, Riahi, and van Ruijven, 2021).

Our paper is closely related to InfluenceMap (2022)’s report that finds a stark disconnect

¹G-SIBs are thirty global banks identified as institutions whose failure poses disproportionate risks to the global economy and whose assets represent nearly 63% global banking assets as of year-end 2021. See Appendix Table A1 for a list of G-SIBs as of year-end 2021. Roughly three quarters of emissions come from the world’s largest economies that are also home to the G-SIBs: East Asia and the Pacific; Europe and Central Asia; and North America (U.S. EPA, 2021).

²This is not a supervisory exercise. Instead, it is an analysis using the public disclosures of all 30 G-SIBs, complemented with other publicly available data.

between the climate commitments made by the world’s largest financial institutions and their investment activities.³ In a similar report, [The Transition Path Initiative and The Institutional Investors Group on Climate Change \(2022\)](#) find that while large global banks made good progress in establishing board oversight over climate policies in recent years, they have a long way to go towards transition to net-zero. While these reports focus on banks’ efforts to decarbonize their portfolios, our paper takes a broader view by examining all aspects of banks’ climate strategies.

G-SIBs’ plans address both mitigation and adaptation efforts. On the mitigation front, most G-SIBs have committed to provide more green financing while some have indicated they would restrict financing to high-emissions industries. On adaptation, G-SIBs are developing more robust climate risk management practices and changing their business models to take advantage of new opportunities in sustainable finance. We present data on how G-SIBs disclose their climate-related emissions and activities, how they govern climate change issues, and we compare our results across G-SIBs in different regions.

In this stock-taking exercise, we find that:

- G-SIBs have reduced their direct emissions, and a few have started to measure financed emissions, which comprise the vast majority of total emissions.
- G-SIBs have committed to increase sustainable financing over the next decade and have started to do so.
- Despite the rapid growth in green financing in recent years, fossil fuel financing remains strong. Furthermore, the current level of green financing remains below what is needed for the transition to net-zero, as estimated by international bodies.
- G-SIBs have identified the drivers of climate risk and their transmission channels, and how they impact banks’ business models and risk more broadly. Additionally, some banks have indicated they are starting to measure and model these risks, while acknowledging this work is in its infancy.
- All told, G-SIBs have made some progress towards their climate action plans, but

³Our paper is also related to the more broader climate finance literature that has gained momentum in the recent years. [Hong, Karolyi, and Scheinkman \(2020\)](#) and [Giglio, Kelly, and Stroebel \(2021\)](#) provide excellent reviews of this literature.

progress has been uneven across banks in different regions and across different aspects of their climate strategies.

This paper proceeds as follows: Section 2 discusses some of the motivations for why G-SIBs are engaging in climate issues. Section 3 outlines the methodology for data collection of G-SIBs' climate commitments and actions. In Section 4, we summarize our findings related to G-SIBs' adaptation and mitigation efforts, with comparisons at the regional level. Finally, Section 5 concludes with a discussion on the challenges G-SIBs face in disclosing and implementing their climate action plans. We include a list of current G-SIBs and outline of the template used to collect data in Appendix Tables A1 and A2.

2 Why are G-SIBs engaging in climate issues?

The climate landscape is rapidly evolving from new regulations, changes in societal preferences, and technological advancements. This shifting landscape will, in turn, create winners and losers both within and across different industries. It is perhaps not surprising that, given their important role in allocating capital to the global economy, G-SIBs are looking ahead and starting to assess both the risks and opportunities associated with climate change.

Meanwhile, the regulatory landscape is shifting. Governments are imposing stricter emissions standards, including on vehicles, aircraft, industrial installations, and farm operations. Authorities are also starting to establish climate-related disclosure requirements. For example, in 2015, the Financial Stability Board (FSB) established the Task Force on Climate-Related Financial Disclosures (TCFD) with the goal of developing more effective climate-related disclosures.⁴ The TCFD recommends that organizations report their climate-related disclosures around four thematic areas: governance, strategy, risk management, and metrics and targets.⁵ Recently, the United Kingdom became the first G20 country to require Britain's largest companies and financial institutions to report on their

⁴As of March 2021, the TCFD had supporters from 859 financial firms, representing \$175 trillion in total assets (TCFD, 2021). All G-SIBs have signed on to the TCFD, and 25 have submitted a disclosure report as of year-end 2021. That said, there is not much information regarding the quality of these disclosures. Moreno and Caminero (2022) find that compliance with TCFD recommendations for climate-related disclosures has been improving based on their text mining analysis on 12 significant Spanish financial institutions, however their study reveals little about the quality of these disclosures.

⁵The Task Force on Nature-related Financial Disclosures (TNFD) released its first beta version in March 2022 and follows the same structure of the TCFD. It reports on nature-related risks with the aim of focusing global financial flows away from nature-negative outcomes and towards nature-positive outcomes.

climate-related risks and opportunities, in line with TCFD recommendations. In 2019, the European Commission adopted the Sustainable Finance Disclosures Regulations (SFDR), which requires financial market participants to disclose information to help investors assess the sustainability performance of financial products. The European Banking Authority (EBA) also recently published detailed and binding disclosure standards for Environmental, Social, and Governance (ESG) risks, which seek to enhance consistency and meaningfulness of institutions' disclosures and help establish international best practices. In the United States, the Securities and Exchange Commission (SEC) is considering new rules requiring large publicly traded companies, including banks, to disclose their climate-related risks and greenhouse gas (GHG) emissions.

Bank supervisors are also stepping up their efforts to assess climate-related risks. Many jurisdictions, including Canada, the European Union, France, Germany, Japan, the United Kingdom, and the United States are developing scenario analysis and stress testing exercises to gather information on banks' climate risks. In the United States, the Federal Deposit Insurance Corporation, the Office of the Comptroller of the Currency, the Federal Reserve, and the New York State Department of Financial Services have requested comments on their principles on climate-related risk management for large banks. In September 2022, the Federal Reserve announced pilot climate scenario analysis with the six largest U.S. banks to be conducted in 2023.

In addition to the evolving regulatory and supervisory landscape, societal preferences are changing, and consumers and investors are demanding more environmentally sustainable products and services, such as those associated with ESG investing and green finance. Further technological developments could make less environmentally friendly technologies obsolete. In recent years, climate groups for the financial system, including the Principles for Responsible Banking (PRB), the Glasgow Financial Alliance for Net Zero (GFANZ), and TCFD have been launched with the goals to better understand climate risks, develop best practices for related risk management, and align lending and investment portfolios with net-zero emissions by 2050.

3 Data Collection

All climate-related data are publicly provided by G-SIBs in their annual reports, TCFD reports, and other ESG reports as published on their websites.⁶ Most G-SIBs' climate disclosures cover similar thematic areas recommended by the TCFD framework: governance, strategy, risk management, and metrics and targets related to their own environmental footprint and climate risks. Within these categories, G-SIBs also disclose their sustainable financing activities as well as their participation in climate-finance groups. Accordingly, the template we developed for comprehensively recording this information includes the following categories:

1. **Sustainable finance:** Includes financial commitments to sustainable financing, as well as green loans outstanding and issued.
2. **Risk management:** Captures information on taxonomy for classifying climate risk for credit exposures, scenario analysis and stress testing. This category also identifies high transition risk sectors and G-SIBs' loans to these sectors, as well as prohibitions and restrictions on new financing for certain activities.
3. **Own environmental footprint:** Identifies the measurement of direct and indirect emissions, commitments, and progress towards net zero.
4. **Governance:** Focuses on the creation of dedicated groups for oversight of climate risk and whether ESG commitments are audited.
5. **Thought leadership and group membership:** Includes memberships to the Carbon Disclosure Project, Task Force on Climate-Related Financial Disclosures, UN Principles for Responsible Banking, Net Zero Banking Alliance, and others.

We supplement these disclosures with data on G-SIBs' financing activities from Bloomberg and other sources. All disclosure data presented in this paper are from G-SIBs' annual climate disclosures as of December 2021, except for the sustainable finance commitments which are as of May 2022.

⁶See Table A2 in the Appendix for the data collection template used to collect information from each G-SIB.

4 Findings

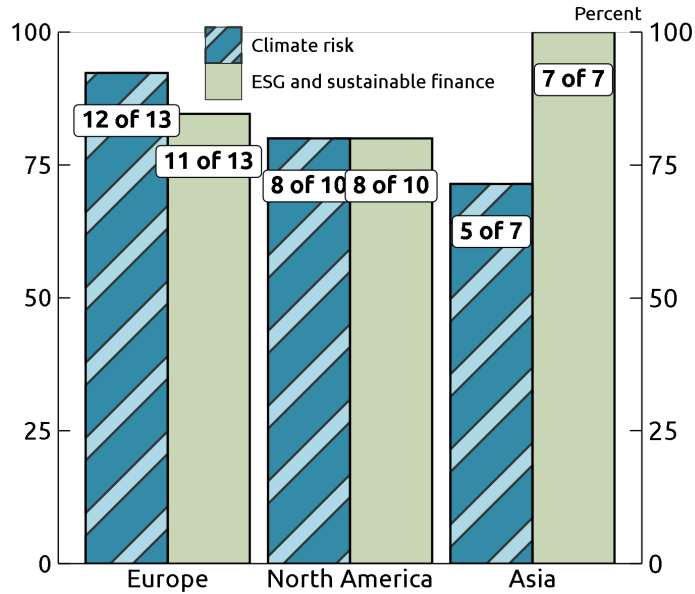
G-SIBs' current climate-related efforts can be broadly grouped into two categories: (1) efforts towards adaptation and (2) those towards mitigation. That said, the distinction between adaptation and mitigation efforts is not always clear-cut. Adaptation efforts include governance structures established to discuss or tackle climate change issues, climate-finance thought leadership initiatives, and the development of physical and transition risk models. These efforts help G-SIBs identify the risks and opportunities of climate change. Mitigation efforts mainly take three forms: measuring emissions and the source of these emissions, restricting financing for certain high-emitting activities, and financing or making commitments to green investments. G-SIB actions may not simultaneously promote all three objectives. For example, many G-SIBs concurrently finance or underwrite high-emitting industries while also looking for financing opportunities in green sectors. Climate-related efforts vary across G-SIBs in terms of their complexity, resource intensity, and the degree of guidance and oversight from regulatory authorities and governments.

4.1 *Adaptation Efforts*

G-SIBs are adapting their governance structures to address climate change issues.

One of the most widespread climate-related efforts of G-SIBs thus far is to embed climate-related groups into their governance frameworks. Oversight of climate issues occurs across multiple levels of their organizational structures, including the Board of Directors, the Chief Executive Officer, the Chief Risk Officer, management-level committees, and loan officers. In our analysis, we looked specifically for the existence of groups devoted to climate risk, as well as to ESG criteria and sustainable finance commitments. The vast majority of G-SIBs have governance groups with oversight over these two issues (Figure 1). The ubiquity of these governance groups suggests that G-SIBs are focusing on climate risks and opportunities. Still, according to the Carbon Disclosure Project (CDP), an international non-profit that helps companies and cities disclose their environmental impact, banks' climate assessments are largely one-directional. Specifically, banks have generally been quicker to assess the impact of climate change on their own activities rather than the impact of their activities on climate (Power, McDonald, Lefebvre, and Coleman, 2020).

Figure 1. Has a dedicated group with oversight over...



Source: Authors' estimates based on G-SIBs' climate disclosures.

G-SIBs have been quick to join climate-finance initiatives.

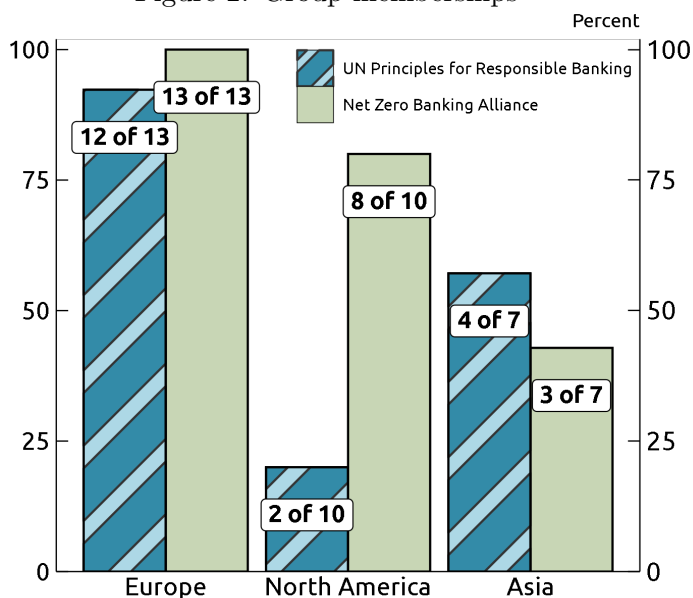
Since the Paris Agreement, the increasing focus on the role of the financial sector in combating climate change has prompted the creation of several sustainable finance groups at the international level.⁷ The Principles for Responsible Banking (PRB) was created in 2019 by the United Nations Environment Programme Finance Initiative in collaboration with the global financial sector. The PRB's fundamental ambition is to integrate sustainable finance and practices into banks' business models. The PRB emphasizes that signatories should align with the UN Sustainable Development Goals and the Paris Climate Agreement. As of December 2021, over 250 banks, representing over 40 percent of total global banking system assets, have signed onto the PRB (UNEP, 2021). The framework outlines six principles for signatories to embed into their business practices: (1) align business strategies with climate goals, (2) assess impacts on the environment, (3) work with clients and customers to encourage sustainable practices, (4) partner with relevant stakeholders to achieve climate goals, (5) implement effective governance, and (6) commitment to transparency. Banks have 18 months from signing to publish a self-assessment outlining their impact on societies, economies, and environments and to establish measurable targets for

⁷For further details on the Sustainable Development Goals, see <https://sdgs.un.org/goals>.

improving these outcomes. Signatory banks also must publish annual reports thereafter with updates on their progress and targets, which increase in scope and ambition. A number of banks released their initial report in 2021, and some released their annual update in 2022.

In April 2021, GFANZ was launched by Mark Carney, UN Special Envoy for Climate Action and Finance and the UK Prime Minister’s Finance Advisor for the UN Climate Change Conference in Glasgow (COP26). GFANZ is a global alliance that brings together seven initiatives formed between 2019 and 2021 to mobilize climate finance in one sector-wide strategic forum. One of the initiatives is the Net Zero Banking Alliance, which as of March 2022 has 106 member banks representing 38 percent of global banking assets. GFANZ members must align with the UN’s Race to Zero criteria: 1) use science-based guidelines to reach net-zero emissions across all emissions by 2050; 2) set 2030 targets that represent a fair share of the 50 percent decarbonization required; 3) set and publish a net-zero transition strategy; 4) commit to transparent reporting and accounting on progress against those targets; and 5) adhere to strict restrictions on use of offsets. The first emissions reductions targets for 2030 and 2050 do not have to be set until 18 months after joining.

Figure 2. Group memberships



Source: Authors’ estimates based on G-SIBs’ climate disclosures.

Many G-SIBs have been quick to join climate-finance initiatives including the PRB and

the NZBA. Because these initiatives are very recent and do not require any immediate changes from signatory banks aside from a commitment to the initiative’s stated goals, their impact remains to be seen. As of December 2021, 18 G-SIBs out of 30 in the sample are signatories of the PRB (although from North America there are only 2 out of 10) and 24 are members of the NZBA (Figure 2). Participation in these groups varies across regions, with European G-SIBs having the highest rate of membership.

G-SIBs have identified climate risks and are beginning to measure them.

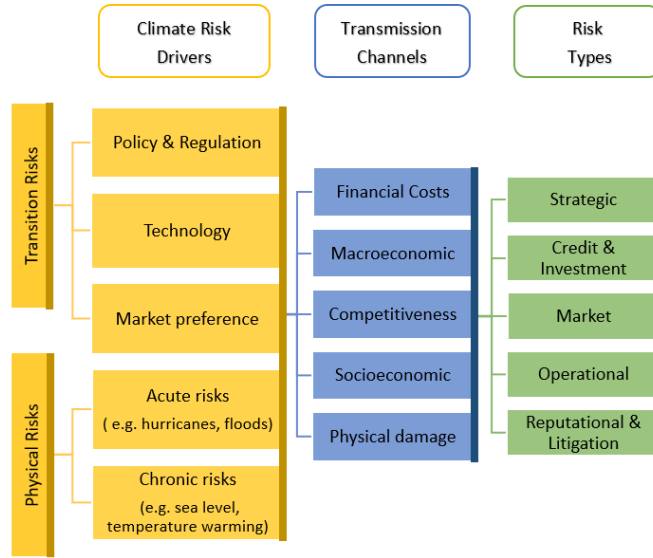
G-SIBs have identified climate risks and their transmission channels using frameworks that are similar to those of the Network for Greening of the Financial System (NGFS) and the Financial Stability Board. As shown in the first yellow column of Figure 3, physical risk and transition risk are the key climate-related financial risks that G-SIBs mention in their disclosures.⁸ As described in the next column, physical risks are divided into “acute” risks, such as hurricanes, and “chronic” risks, such as temperature warming. Transition risks stem from policy changes, technological developments, and changes in market preference. As outlined in the blue column, the transmission of these climate-related risks can come through a range of financial and economic channels, from financial costs to physical damage, which in turn, as shown in green, can impact credit, market, and other risks.

Climate-related risks can be difficult to assess as there are several challenges in measuring them (Brunetti et al., 2021). Measuring these risks requires investment in data procurement, as well as merging and cleaning climate-related data from different sources. Availability of sufficiently granular spatiotemporal and climate-related financial data is limited, including information on exposure to physical hazards or the emissions associated with particular investments.

Most North American and European G-SIBs have conducted some form of pilot study to assess physical and transition risks. As shown in Figure 4, a slightly greater share of North American G-SIBs relative to European G-SIBs is assessing physical risk, possibly reflecting the diverse nature of physical risks in North American G-SIB portfolios. Meanwhile, a

⁸According to Ceres (2020) and Ceres (2021), U.S. banks have sizable exposures to physical and transition risks. Ceres (2021) finds that the largest U.S. banks have a value at risk from physical risk of about 10 percent of syndicated loan portfolios even if adaptation measures are taken. Ceres (2020) reports that more than half of major U.S. bank syndicated lending is exposed to climate risk and banks are largely not considering transition risk of industries relying on fossil fuels.

Figure 3. Climate risk drivers and transmission channels

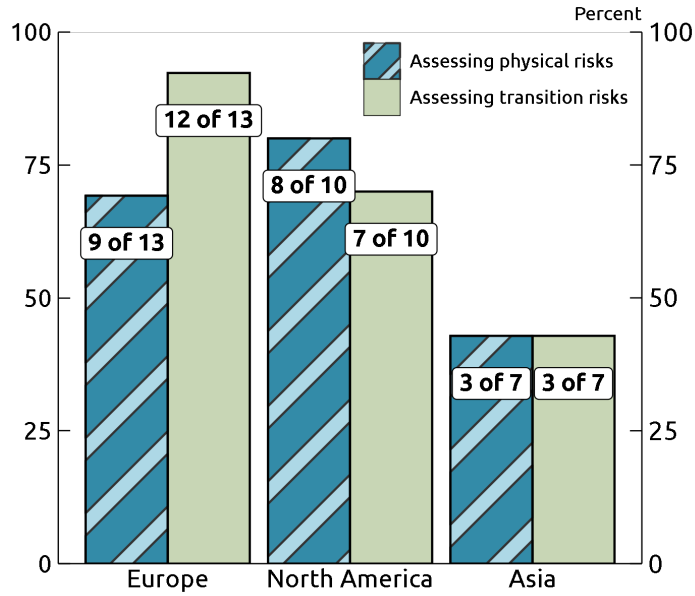


Adapted from [BIS \(2021\)](#) and G-SIBs' climate disclosures.

greater share of European G-SIBs than North American G-SIBs is assessing transition risk, which may be due to stress-testing exercises for green transition scenarios conducted by the European Central Bank and other central banks, including the Bank of England, Banque de France, and De Nederlandsche Bank. A smaller share of Asian G-SIBs are focused on assessing physical and transition risks.

Transition risks, such as those from new emissions regulations, are more likely to affect certain sectors, such as power and utilities, and oil and gas. In their climate disclosures, G-SIBs identify such sectors as “high transition risk” sectors. Although there is no taxonomy that currently defines high transition risk sectors, 24 of the 30 G-SIBs have begun identifying them. In the absence of a global standard or classification system of high transition risk sectors, these G-SIBs have taken their own approach, which has led to inconsistencies. Although over 80 percent of G-SIBs that make such classifications identified power and utilities, oil and gas, and metals and mining as high transition risk sectors, there is less agreement on other industries, such as automotive, chemicals, and construction (Figure 5). Different classifications make comparing transition risks across G-SIBs difficult and could potentially lead to underestimation of these risks for the banking sector as a whole.

Figure 4. G-SIBs have started...



Source: Authors' estimates based on G-SIBs' climate disclosures.

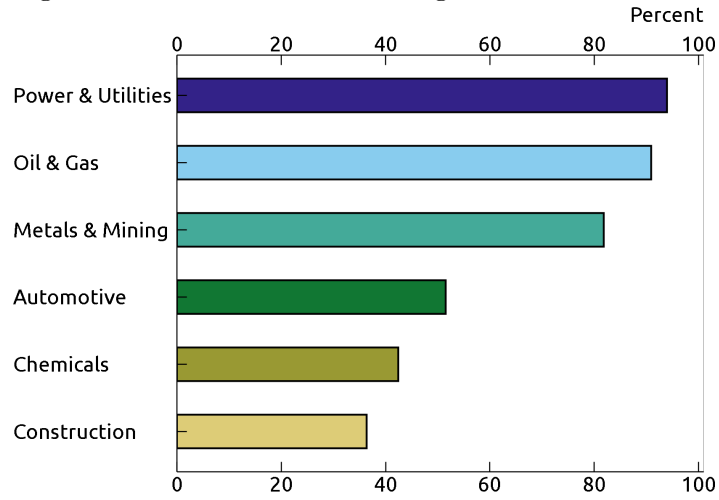
G-SIBs evaluate climate risks and emissions with sector-level data and client-level data, with the former more often used, likely due to data limitations primarily, as most small- and medium-sized companies are not required to report their direct emissions and most large companies are not required to report their indirect emissions. A larger share of European G-SIBs are using both sector-level and client-level data compared to North American and Asian G-SIBs (Figure 6). It remains to be seen if new policies governing the disclosure of GHG emissions, such as the rules proposed by the U.S. SEC in March 2022, will improve the consistency and availability of emissions data.

4.2 *Mitigation Efforts*

Some G-SIBs are beginning to measure scope 3 emissions.

Most G-SIBs have committed to reduce their direct and indirect emissions. According to the Greenhouse Gas Protocol, emissions are separated into three categories – scope 1, scope 2, and scope 3 – based on their source. Scope 1 emissions include direct GHG emissions from burning fossil fuels within a company-owned facility, such as gas water heaters or furnaces,

Figure 5. Sectors identified as ‘high transition risk’



Note: Figure only includes G-SIBs that identify at least one high transition risk sector. Six G-SIBs are excluded from this figure because they do not make any such classification.
 Source: Authors’ estimates based on G-SIBs’ climate disclosures.

Figure 6. Type of emissions data used to classify climate risks



Source: Authors’ estimates based on G-SIBs’ climate disclosures.

or by company vehicles. Scope 2 emissions are indirect GHG emissions from purchased electricity. These emissions will be larger when the firm uses more electricity and when this electricity is generated using fossil fuels. Finally, scope 3 emissions result from assets not directly owned or controlled by the company; that is, they result indirectly from activities up and down the company’s value’s chain. Scope 3 emissions are composed of distinct 15 categories, but not every category is applicable to banks. For banks, almost all of their scope 3 emissions are financed emissions, though scope 3 also encompasses business travel and other indirect emissions.

Although nearly all G-SIBs – 29 out of 30 – are measuring their scope 1 and 2 emissions, most are not measuring scope 3. The lack of scope 3 quantification is noteworthy because scope 3 emissions constitute the lion’s share of banks’ overall emissions. A CDP survey found that the finance sector’s scope 3 emissions were over 700 times larger than scope 1 and scope 2 emissions combined, for financial institutions that reported any of their scope 3 emissions (Power et al., 2020).⁹ Scope 3 emissions are difficult to measure because they require information on clients’ emissions which currently are not widely available.

Given these data limitations, only eight G-SIBs (five of them in North America)—less than a third of our sample—are measuring scope 3 emissions, and even those institutions are only doing so partially (Figure 7, striped bars).¹⁰ For example, some only include business travel, and others only measure financed emissions for some sectors. Despite measurement challenges, most G-SIBs have made public commitments to reduce emissions. Importantly, twenty-four G-SIBs have joined the NZBA and have thus committed to fully offsetting their scope 1, 2, and 3 emissions by mid-century (Figure 7, solid bars).

To better measure scope 3 emissions, many G-SIBs are sourcing emissions data from vendors such as S&P Global Trucost, MSCI, and Wood Mackenzi. Others are supplementing this information by surveying their largest clients about their emissions. According to the CDP’s 2020 Financial Services Disclosure Report, 75 percent of banks request climate-related information as part of their portfolio due diligence.

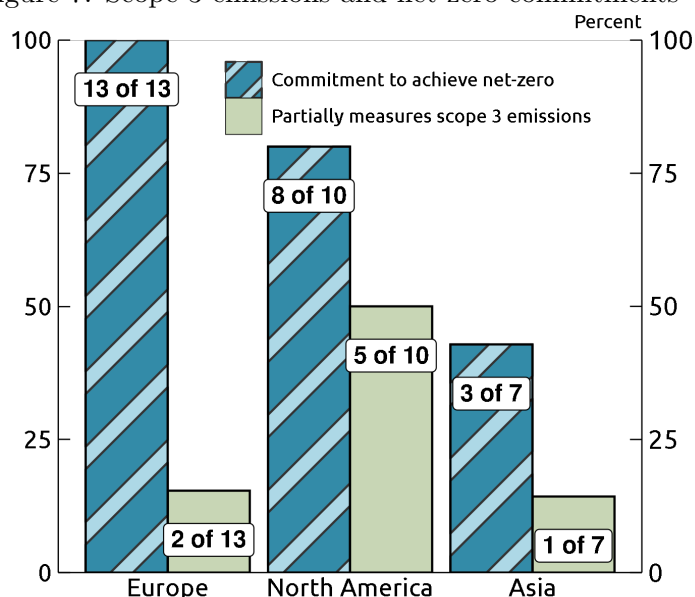
Additionally, G-SIBs may struggle to measure scope 3 emissions in the absence of clear

⁹The CDP’s figure is likely an underestimate of the relative size of scope 3 emissions, as the calculations used to sum financed emissions only cover part of their portfolio; the most common response indicated that calculations covered less than 10 percent of the portfolio.

¹⁰The CDP’s annual survey of financial institutions from 2020 found that half of financial institutions do not conduct any analysis of how their portfolio impacts the climate, and only a quarter of surveyed institutions report their financed emissions at all (Power et al., 2020).

emissions accounting standards. While there are green taxonomies, including the oft-cited EU taxonomy, which establishes a list of environmentally sustainable economic activities, there are not legally binding emissions accounting standards.¹¹ In 2020, the Partnership for Carbon Accounting Financials (PCAF), an industry-led initiative created in 2015 by Dutch financial institutions, published its Global Carbon Accounting Standard, which provides an approach to assessing and disclosing emissions associated with loans and investments. Institutions that join the initiative receive technical support in implementing carbon accounting.

Figure 7. Scope 3 emissions and net-zero commitments



Source: Authors' estimates based on G-SIBs' climate disclosures.

G-SIBs are increasing their sustainable finance commitments but a financing gap remains.

Leading international bodies estimate that a significant amount of climate financing is needed by 2050 to avoid the worst of climate change impacts, of which most (70 to 80 percent) is expected to come from the private sector (Boehm et al., 2021; IRENA, 2021).

¹¹The EU's taxonomy identifies business activities that make a "substantial contribution" to at least one of six environmental objectives, while also ensuring the activity does no "significant harm." In China, the PBOC has published a taxonomy defining the criteria that must be met for projects to qualify as green. China and the European Union have also launched a working group on taxonomies which produced the "Common Ground Taxonomy". The Bank of Japan, however, required banks to disclose their own climate-related standards (which may differ from each other), rather than mandate a particular taxonomy.

Estimates for the amount of new financing needed to transition the global economy to net-zero are on the order of \$100 trillion through 2050, which translates to roughly \$3.3 trillion per year. On the low end, the Intergovernmental Panel on Climate Change (IPCC) projects \$90 trillion is needed in new financing. Similarly, a recent report by McKinsey estimates \$105 trillion of new investments is needed for the net-zero transition.¹² On the higher end, the International Renewable Energy Agency (IRENA) estimate a financing need of \$130 trillion (IRENA, 2020).

Among G-SIBs, we find that they have pledged nearly \$9 trillion in sustainable financing through 2030, which includes both green financing and financing for social causes. These commitments vary in their time frame, with some only covering the next five years, and others extending commitments to 2030. Nearly all sustainable finance commitments are from North American (\$675 billion per year) and European (\$450 billion per year) G-SIBs, with commitments by Asian G-SIBs small; in particular no Chinese G-SIB (4 of 7 Asian G-SIBs in the sample) has explicitly made a sustainable finance commitment (Figure 8). Much of these commitments appear to have been in reaction to mounting public pressure for banks to do more to help in the net-zero transition. G-SIBs also cite the business and financial opportunities of investing and facilitating the net-zero transition. In response to the CDP’s Financial Services 2020 Climate Change Questionnaire, 76 percent of financial institutions said they see opportunities in offering sustainable finance products and services (Power et al., 2020). Indeed, bank fees earned for green financing eclipsed fees earned for fossil fuel financing for the first time in 2021 (Quinson, 2021).

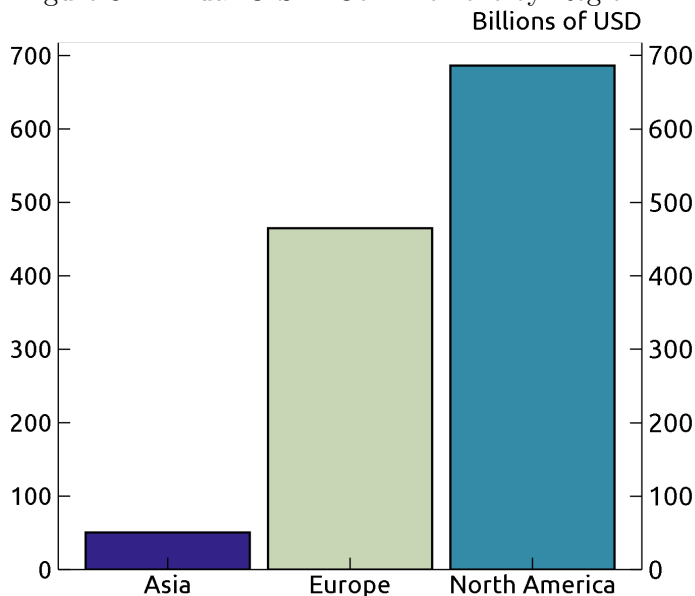
Based on current commitments over their respective time frames, we find that G-SIBs have committed on average \$1.2 trillion per year of new financing. Assuming G-SIBs maintain green financing at this average annual pace of \$1.2 trillion through 2050, total financing would reach \$33.6 trillion, which is only 26 percent of IRENA’s estimate of \$130 trillion needed to pivot to a net zero global economy, leaving a large financing gap.¹³ This gap is likely to be understated as this assumes all sustainable financing would go towards

¹²See Krishnan et al. (2022). The \$105 trillion figure is derived by taking McKinsey’s estimate of \$3.5 trillion per year in new investments in low-emission assets and enabling infrastructure, times 30 years. McKinsey also reports a much higher figure of \$275 trillion in total energy investments through 2050, which includes not only the new investments needed, but also current levels of investments in both low- and high-emission assets. For making the comparison to the IPCC estimate, we only used McKinsey’s estimate for new investments in low-emissions assets and enabling infrastructure.

¹³In the lead up to the UN’s climate meeting in November 2021, GFANZ announced that “financial sector commitments to net zero now exceed \$130 trillion.” However, this figure is not the sum of the individual commitments made by GFANZ members but rather the total assets of those members (GFANZ, 2021).

green activities. Moreover, sustainable and green finance are not precisely defined, which risks misuse of these labels.

Figure 8. Annual G-SIB Commitment by Region



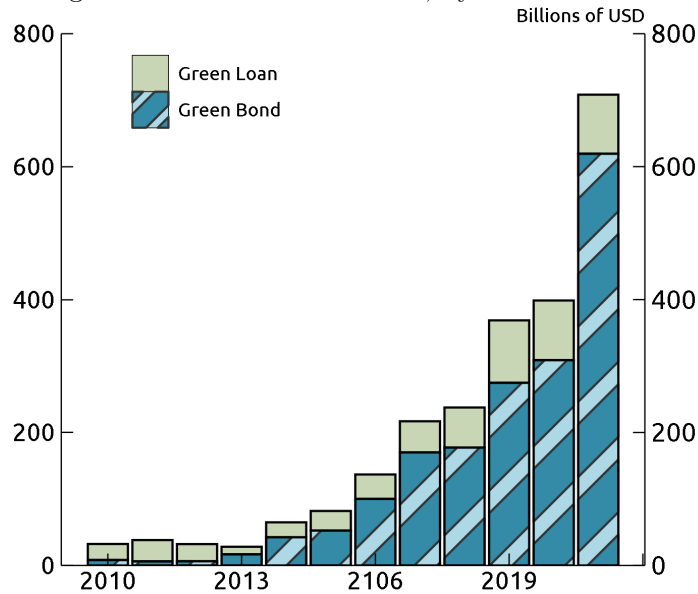
Note: Most recent commitment disclosed as of May 2022. Local currency unit values converted to USD using average 2020 exchange rates.

Source: Authors' estimates based on G-SIBs' climate disclosures.

As shown in Figure 9, issuance of non-financial corporate green debt globally from all sectors reached \$700 billion in 2021 (nearly 8 percent of total issuance of bonds and syndicated loans by non-financial corporations globally), mostly from green bonds.¹⁴ Nevertheless, according to the latest draft report from the IPCC “progress on the alignment of financial flows with low greenhouse gas emissions pathways remains slow.” Central banks and finance ministries in some jurisdictions are encouraging more green lending through various actions. For example, the Bank of Japan and the People’s Bank of China both recently launched climate-related financing facilities to incentivize green lending. The Monetary Authority of Singapore and the Hong Kong Monetary Authority also have grant schemes to cover costs of issuance and external reviews of green bonds and green loans. In Europe, both the Bank of England and the European Central Bank have incorporated climate change considerations into their monetary policy frameworks, both by tilting their corporate bond purchase programs and the collateral they accept for credit operations toward issuers with

¹⁴Using data from Refinitiv, we estimate that total global non-financial corporate issuance of bonds and syndicated loans totaled \$9.1 trillion in 2021.

Figure 9. Green debt issuance, by instrument



Note: The proceeds of green bonds and loans are specifically earmarked for climate- and environment-friendly projects.
 Source: Bloomberg Finance LP, staff calculations

better climate performance.¹⁵

G-SIBs have signaled financing restrictions for certain activities, but it is too early to assess how such restrictions will affect financing patterns across industries.

G-SIBs are also mitigating their climate impact by restricting financing to certain activities that are associated with high emissions. To date, most of these financing restrictions appear symbolic, seemingly to avoid reputational damage, as they are narrowly defined to prohibit financing to specific projects such as mountain-top coal mining, drilling in the Arctic Ocean, and Canadian tar sands projects.¹⁶ It is more common to see restrictions that entail additional screening processes or “enhanced due diligence” for financing certain activities at the sectoral level, such as coal. European G-SIBs have implemented the highest number of prohibitions or restrictions, with financing restrictions on coal mining and coal power being the most common. That said, both coal mining and the use of coal energy in

¹⁵The Bank of England changed its mandate in 2021 to explicitly include environmental and climate goals. The European Central Bank has made it clear that because climate change directly affects price stability, climate change is at the core of its primary mandate. Climate change is also important for meeting the ECB’s secondary objective of supporting the European Union’s general economic policy (Schnabel and Elderson, 2022).

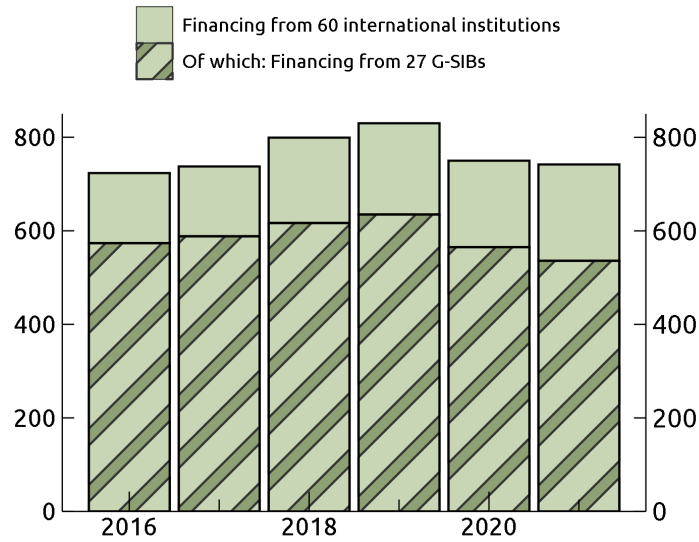
¹⁶According to the Rainforest Action Network, only 2.7 percent of bank financing for the largest coal mining and power companies is earmarked for specific projects (RAN, 2021).

Europe has declined notably since 1990, partially because coal use is already expensive due to the EU’s cap-and-trade system for emissions, so these restrictions on the coal industry may not entail meaningful additional change to financing activities.

It is too early to assess how such restrictions will affect financing patterns across industries over time. To date, as shown in Figure 10, financing for the fossil fuel industry continued to rise through 2019 and has only slowed somewhat since then, remaining at high levels overall (both for G-SIBs and many other international institutions). Russia’s war on Ukraine has added additional uncertainty for fossil fuel financing. In the short term, Europe has increased its reliance on coal to meet its energy needs following the disruptions to its energy supply from Russia. Germany, France, the Netherlands, and the UK have all taken steps to source more energy from coal. Global coal consumption is set to hit an all-time high in 2022 ([International Energy Agency \(IEA\), 2022](#)). In a report from September 2022, the NGFS warned that “the energy price crisis has already put us on a path towards a delayed and disorderly transition...partly because the constraints to increase low-carbon generation capacity in the short term have heightened the risks of a return to the use of coal to ensure energy security: this can strongly delay the promised carbon emission reduction, or even put the transition at risk” ([Network for Greening the Financial System \(NGFS\), 2022](#)).

In the longer-term, however, both climate and geopolitical considerations could accelerate the desire for energy diversification. Shortly after the Russian invasion of Ukraine, Germany announced \$220 billion in renewable energy investments in an effort to get to 100 percent renewable energy by 2035, 5 years earlier than planned, citing the need for energy sovereignty. Italy, the Netherlands, and the United Kingdom are also accelerating efforts to install wind power. The European Commission published a plan to reduce reliance on Russia for fossil fuels, with roughly two-thirds of the reduction being met by substituting imports from other countries and one-third from new renewable energy generation and energy conservation measures. In the United States, the Inflation Reduction Act was signed into law on August 16, 2022 and includes \$373 billion in climate and clean energy investments, the largest effort in U.S. history to combat climate change. Its focus spans clean energy tax credits, transportation, reducing methane emissions from oil and gas, reducing emissions from energy-intensive industries, environmental justice, agriculture and rural

Figure 10. Financing of fossil fuel production
Billions of USD



Note: Excludes Mitsui FG, State Street, and Bank of New York Mellon due to lack of available data. Totals exclude green financing to fossil fuel companies.
Source: Bloomberg Finance LP, staff calculations.

development, and natural resources.

5 Challenges for G-SIBs and Stakeholders

G-SIBs face several challenges associated with measuring, modeling, and disclosing their climate actions and potential risks and opportunities. Data limitations, a lack of uniform methodology for measuring scope 3 emissions, no globally accepted definitions for high transition risk sectors, and uncertainties around evolving taxonomies for defining environmentally-sustainable economic activities hinder G-SIBs’ ability to even measure their climate-related metrics consistently.

From a risk management perspective, it is challenging to model physical and transition risks given the uncertainty around climate risk drivers, such as changes in government policy aimed at reducing greenhouse gas emissions, the pace of technological change, and uncertainty around the transmission channels. A dearth of in-house modeling tools and reliance on third party vendors also hamper banks’ ability to properly understand and manage risks. The most recent Bank of England climate biennial exploratory scenario (CBES) noted that “banks varied in their ability to scrutinize and understand the strengths and weakness of third-party models, and adapt them appropriately to the CBES.” As a

result, projected losses for banks varied widely, suggesting a high degree of uncertainty about the magnitude of climate risks as well as a limited ability to accurately reflect such risks in business decisions.

G-SIBs face challenges with climate-related disclosure requirements evolving in different ways across the jurisdictions in which they operate. In the European Union, the EBA already has binding standards on disclosures of ESG risks, which seek to enhance consistency and meaningfulness of institutions' disclosures. These rules would also apply to global banks with operations in the euro area. In the United States, the SEC has proposed rules governing climate-related disclosures, which, if implemented, would require all publicly listed companies on U.S. exchanges to report scope 1 and scope 2 emissions. The proposed SEC rules would also require companies to report scope 3 emissions, if such emissions are included in their emissions targets or if they are material.¹⁷

The variation in disclosure practices we have outlined also makes it difficult for investors and other stakeholders to accurately and consistently compare banks. Moreover, “sustainable” and “green” finance are not precisely defined, which risks misuse of these labels.¹⁸ For disclosures that do exist, investors struggle with verifying their accuracy as most of them are not externally audited. Additionally, G-SIBs' climate disclosures are often scattered in different reports, including annual reports, ESG-linked reports, and climate action plans, which makes the information difficult to find and synthesize.

As climate-related disclosures become more comprehensive and comparable, several key trends will be important to follow. First, it will be necessary to understand how G-SIBs are refining their methodologies for measuring scope 3 emissions to gauge their progress in meeting their stated net-zero goals. Next, as G-SIBs continue to refine and develop their climate risk frameworks, more information should be available to compare climate risks across G-SIBs and regions. Finally, it remains to be seen how investors and stakeholders will use these disclosures in their decision-making as these disclosures become more meaningful. In sum, despite some progress by large global banks to address climate change considerations, much work lies ahead to properly measure and disclose climate-related risks, and to better align financing activities with their net-zero targets.

¹⁷The proposed rules would provide a safe harbor for liability from scope 3 emissions disclosure and an exemption from the scope 3 emissions disclosure requirement for smaller reporting companies.

¹⁸In May 2022, the Securities and Exchange Commission (SEC) fined BNY Mellon for misstatements and omissions about their ESG considerations in making investment decisions for mutual funds ([SEC, 2022](#)).

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Table A1. List of Global Systemically Important Banks as of November 2022

Name	Region	Country	Total Assets (Billions USD)
Agricultural Bank of China	Asia	China	4,576
Bank of China	Asia	China	4,207
China Construction Bank	Asia	China	4,762
Industrial and Commercial Bank of China	Asia	China	5,537
Mitsubishi UFJ FG	Asia	Japan	3,177
Mizuho FG	Asia	Japan	1,958
Sumitomo Mitsui FG	Asia	Japan	2,177
BNP Paribas	Europe	France	2,996
Groupe BPCE	Europe	France	1,724
Credit Agricole Group	Europe	France	2,643
Societe Generale	Europe	France	1,665
Deutsche Bank	Europe	Germany	1,506
UniCredit	Europe	Italy	1,043
ING Groep	Europe	Netherlands	1,082
Santander	Europe	Spain	1,815
Credit Suisse	Europe	Switzerland	829
UBS	Europe	Switzerland	1,117
Barclays	Europe	United Kingdom	1,874
HSBC Holdings	Europe	United Kingdom	2,958
Standard Chartered	Europe	United Kingdom	828
Royal Bank of Canada	North America	Canada	1,377
Toronto Dominion	North America	Canada	1,397
Bank of America	North America	United States	3,169
Bank of New York Mellon	North America	United States	444
Citigroup	North America	United States	2,291
Goldman Sachs	North America	United States	1,464
JPMorgan Chase	North America	United States	3,744
Morgan Stanley	North America	United States	1,188
State Street Corporation	North America	United States	315
Wells Fargo	North America	United States	1,948

Source: List of G-SIBs is released annually by the Financial Stability Board. Total Assets are year-end 2021 and come from S&P Capital IQ.

Table A2. Data Collected from each G-SIB

<p>SUSTAINABLE FINANCING</p> <p>Green loans outstanding as of year-end (billions of currency units)</p> <p>Green loan issuance during the year (billions of currency units)</p> <p>Commitment to increase sustainable financing (target amount)</p> <p>Commitment to increase sustainable financing (target year)</p>
<p>RISK MANAGEMENT</p> <p>Sectors identified as being ‘high transition risk’ (0=no, 1=yes)</p> <p>Oil and gas</p> <p>Power and utilities</p> <p>Metals and mining</p> <p>Chemicals</p> <p>Automotive</p> <p>Building and construction</p> <p>Total Wholesale Loans outstanding to ‘high transition’ risk sectors (billions of currency units)</p> <p><i>Of which, to:</i></p> <p>Oil and gas</p> <p>Power and utilities</p> <p>Metals and mining</p> <p>Chemicals</p> <p>Automotive</p> <p>Building and construction</p> <p>Total wholesale loan book (all sectors, used to scale exposures)</p> <p>Prohibitions or restrictions for new financing in (0=none, 1=some):</p> <p>Coal mining</p> <p>Coal power</p> <p>Oil and gas</p> <p>Metals and mining</p> <p>Power and utilities</p>
<p>Continued on next page</p>

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<p>Other restrictions or prohibitions (specify sector name)</p> <p>Taxonomy for classifying climate risk of credit exposures (0=no, 1=yes):</p> <p>Client-level emissions data</p> <p>Sectoral-level emissions data</p> <p>Transition scenario analysis (long-run horizon)</p> <p>Degree of implementation (0=not started, 1=pilot program, 2=comprehensive)</p> <p>Sectors covered (0=none, 1=high transition risk only, 2=all sectors)</p> <p>NGFS scenarios considered (0=no, 1=yes)</p> <p>Stress testing of loan exposures to physical risks from climate shocks (short-run horizon)</p> <p>Degree of implementation (0=not started, 1=pilot program, 2=comprehensive)</p> <p>Monitoring of physical risks (natural hazards) (0=no, 1=yes)</p> <p>Of own operations, for business continuity.</p> <p>Physical risks to clients, at country level</p> <p>Physical risks to clients, at city level</p>
<p>OWN ENVIRONMENTAL FOOTPRINT</p> <p>Electricity usage from renewable sources (% of total electricity usage)</p> <p>Electricity usage from renewable sources, target share (% of total electricity usage)</p> <p>Electricity usage from renewable sources, target year</p> <p>Scope 1 and Scope 2 emissions being measured, e.g. from own emissions and energy sourced from the grid (0=no, 1=yes)</p> <p>Carbon-neutrality achieved for scope 1 and scope 2 emissions (0=no, 1=yes)</p> <p>Scope 3 emissions (“financed emissions” from borrowers of the bank) being measured (0=no, 1=yes)</p> <p>Commitment to achieve carbon-neutrality for Scope 3 (financed) emissions (0=no, 1=yes)</p> <p>Commitment to achieve carbon-neutrality for Scope 3 (financed) emissions, target year</p>
<p>GOVERNANCE</p> <p>“Chief risk officer” is a member of the Board (0=no, 1=yes)</p> <p>“Chief risk officer” attends Board meetings (0=never, 1=sometimes, 2=regularly)</p> <p>Climate change risks discussed at Board meetings (0=never, 1=sometimes, 2=regularly)</p> <p>Dedicated group with oversight over climate risk (0=no, 1=yes)</p> <p>Dedicated group with oversight over ESG and sustainable finance commitments (0=no, 1=yes)</p>

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ESG commitments are audited (0=no, 1=yes)
THOUGHT LEADERSHIP, PARTICIPATION/MEMBERSHIP IN GROUPS:
Carbon Disclosure Project, submitted response (0=no, 1=yes)
Carbon Disclosure Project, score (letter grade)
Submitted TCFD (Task Force on Climate Related Disclosures) (0=no, 1=yes)
Publicly disclosed external review reports that meet Green or Sustainability Bond Principles issued by ICMA (0=no, 1=yes)
Signatory of UN Principles for Responsible Banking (0=no, 1=yes)
Member of Net Zero Banking Alliance