

# Irving Fisher Committee on Central Bank Statistics

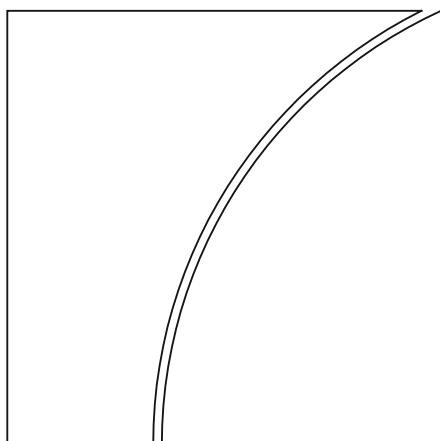
## IFC Report

No 14

## Sustainable finance data for central banks

2021 survey conducted by the Irving Fisher  
Committee on Central Bank Statistics (IFC)

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**BANK FOR INTERNATIONAL SETTLEMENTS**

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The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC and its members and the other institutions mentioned in this report.

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## Executive summary and recommendations

Public authorities in general and central banks in particular are paying more and more attention to sustainable finance, defined as the integration of a wide range of environmental, social and governance (ESG) aspects when making investment decisions. This **increased interest in sustainable finance** reflects widespread concern about the impact of climate change, inequality and various factors that can undermine economic resilience, as highlighted recently by the Covid-19 pandemic. Likewise, it is also a recognition of the special role that the financial sector can play in sustainable development, both directly through its own actions and indirectly through its financing of external activities.

In this context, the Irving Fisher Committee on Central Bank Statistics (IFC) conducted a survey on sustainable finance statistics among its members. It received 63 answers, with detailed information provided by 28 advanced economies (AEs) and 31 emerging market economies (EMEs). The purpose was to **identify ESG data needs, availability and gaps from the perspective of the central banking community**. This work, organised in close coordination with other international statistical initiatives, led to the establishment of a list of almost 80 ESG metrics considered of particular relevance by central banks when pursuing their policy objectives. The exercise was complemented by a stocktake of core documentation references on ESG data issues identified by IFC members, which is available as a complement to this Report on the [IFC website](#).

One main message from the survey is that **statistics on sustainable finance are in growing demand from central banks in pursuing their core mandates**. The primary focus is on green finance, as a means to limit carbon emissions and address climate change risks: a large number of IFC members are already facilitating stakeholders' awareness of the risks associated with climate change and of the need to decarbonise the economy. Developing "green" capital markets and identifying sustainable investment are additional policy objectives reported in this context. As a consequence, central banks have become crucial consumers of relevant sustainable finance data to support their policies, financial stability (including macroprudential policy as well as microprudential supervision for those central banks that are directly in charge of eg banking supervision), asset and reserve management activities, the conduct of monetary policy (including collateral policies) and financial inclusion measures, as well as specific in-house risk assessment and statistical exercises in the context of these policies.

A second insight is the **abundance of data to be considered in the area of sustainable finance**. Of key importance are the indicators needed to properly support progress assessment, in particular on sustainable financial instruments as well as environmental indicators related to physical risk, emission trading and energy use pricing. However, as many indicators are backward-looking, it is useful to complement them with forward-looking data to track commitments towards a greener economy. Leading indicators considered useful by central banks in this context are climate target indicators, followed by indicators on firms' scenario analyses and on transformation and enabling efforts. Yet, while these forward-looking metrics have become a new area of focus, and many jurisdictions plan to use them, actual implementation work is often still lagging in practice.

A third lesson is that **central banks are also making significant contributions to setting up statistical frameworks for sustainable finance**; for instance, they have been instrumental in facilitating the development of green taxonomies. They are also closely associated with other key stakeholders involved in climate-related data work, including government authorities (in the areas of eg environment, finance and economic affairs), regulatory institutions and national statistical offices (NSOs). The primary focus reported in the survey is on establishing statistical definitions, developing related taxonomies and conceptual work, setting up reporting requirements, and dealing with data quality aspects and confidentiality issues (including those related to the impact of technology innovation).

However, while the availability of green finance data is in general on the increase, there are **substantial differences across jurisdictions**. In particular, a large number of AE central banks report that they already have in place standardised definitions and taxonomies (or are close to implementation), while such work is still at an early stage in many other jurisdictions, especially in EMEs. This disparity reflects a number of factors, including the diversity of central banks' mandates as well as different implementation stages in terms of taxonomies, conceptual work, reporting requirements, and data quality/confidentiality management processes.

Unlike for environmental indicators, the use of **social and governance indicators** remains fairly limited, although central banks are gradually showing more interest in these areas too. The social indicators that are deemed the most relevant relate to financial inclusion as well as working conditions and human rights. As to governance indicators, transparency and disclosure on the one hand and board diversity on the other are considered to be top priority, mainly to support macroprudential supervision.

All in all, the survey results underline the **growing recognition of the important role played by the large number of ESG data providers located outside the traditional perimeter of official statistics** (such as commercial data providers as well as big data-based sources). Hence, a key objective for central banks is to improve cooperation among the various stakeholders involved in sustainable finance data work. Another goal is to support ongoing international statistical initiatives that aim at promoting a shared understanding of statistical needs (also by developing more unified taxonomies and regulations), developing conceptual aspects (eg how to assess financial stability risks arising from climate change) and addressing the related operational aspects of data management (eg data quality assurance processes, reporting requirements, and dealing with confidentiality/privacy issues).

Last but not least, the findings of the survey point to the following **three main recommendations** that would usefully guide central banks' work on sustainable finance statistics:

#### (i) Intensify the identification of data needs to pursue relevant policy objectives

One precondition for developing sustainable finance is to identify the data needed by central banks to support their policy objectives. This requires proper statistical definitions and taxonomies to be established as a key first step. In Europe, for example, a common taxonomy has become an important benchmark against which to measure environmental issues. Intensifying this "methodology" work calls for:

- **leveraging on the ongoing international initiatives** undertaken to develop overarching conceptual frameworks. The central banking community is already playing a leading role in such initiatives – especially those led by the 26th United Nations Climate Change Conference (COP26), the Financial Stability Board (FSB), the Network for Greening the Financial System (NGFS), the Group of Twenty (G20),<sup>2</sup> the network of central banks and financial supervisors, and various financial standard-setting bodies (SSBs), including the Basel Committee on Banking Supervision (BCBS) and the Committee on Payments and Market Infrastructures (CPMI);
- **developing strong in-house research and analytical capabilities** on sustainable finance in central banks; and
- **enhancing the underlying statistical infrastructure** to support related data collections; one important aspect from this perspective is to define clear data standards for supervised institutions and to establish sound reporting processes.

<sup>2</sup> Including through the foreseen new Data Gaps Initiative (DGI) to address data issues that relate to various ESG topics such as climate change, human wellbeing and inequalities, financial inclusion and data access (FSB and IMF (2021)).

## (ii) Cooperate with traditional and new stakeholders to close data gaps, especially at the micro level

Closing data gaps can be achieved through **greater cooperation among the various stakeholders involved in sustainable finance data** – ie central banks and financial supervisors, NSOs, government agencies, international organisations, commercial vendors as well as new providers of alternative data sources. Such cooperation should cover pure statistical tasks but also more conceptual work as well as operational aspects. It would ideally be complemented by arrangements to facilitate data access and sharing, at least to facilitate the exchange of data within the central bank community with a sufficient level of disaggregation.

Specific **attention should be paid to micro-level sustainable finance statistics**. Many macro indicators already exist in official sources, even though they may be available only for specific purposes and may eventually have to be enhanced in scope, timeliness and coverage to meet emerging data needs. In contrast, micro data are subject to important limitations, as they are often provided by third-party data providers and are thus not easily accessible to authorities or the public. A potential way of enhancing the disclosure of such information is to capitalise on the ongoing international initiatives to develop the use of granular identifiers and data standards and also to facilitate access to alternative data sources. Another focus would be to develop innovative approaches to collect information based on appropriate IT systems and data science techniques (eg artificial intelligence, machine learning, web-scraping).

## (iii) Lead by example by improving the usage of sustainable finance data

**Collecting data is not enough and should be complemented by efforts to make good use of them for policy purposes**, ideally by covering the large spectrum of central banks' policy tasks. This policy support should be complemented by greater dissemination to the general public, recognising the large and various community of stakeholders interested in sustainable finance statistics. The vigorous and innovative dissemination efforts conducted by central banks, especially through the use of "business intelligence" tools, has already greatly improved access to existing data. At the international level, the IMF has established a global dashboard on climate change indicators, while the NGFS is working towards a data repository for climate data. The IFC survey suggests that these efforts should be pursued actively, and the information annexed to this report represents an important step in this respect.

In addition, and as outlined above, particular attention should be paid to **facilitate access to micro-level sustainable finance data and promote their dissemination**. Central banks have already been leading various initiatives to improve the usage of (private) vendor data, including by addressing the related quality and confidentiality issues. Lastly, they have also been leading by example in reporting on their own green footprint.

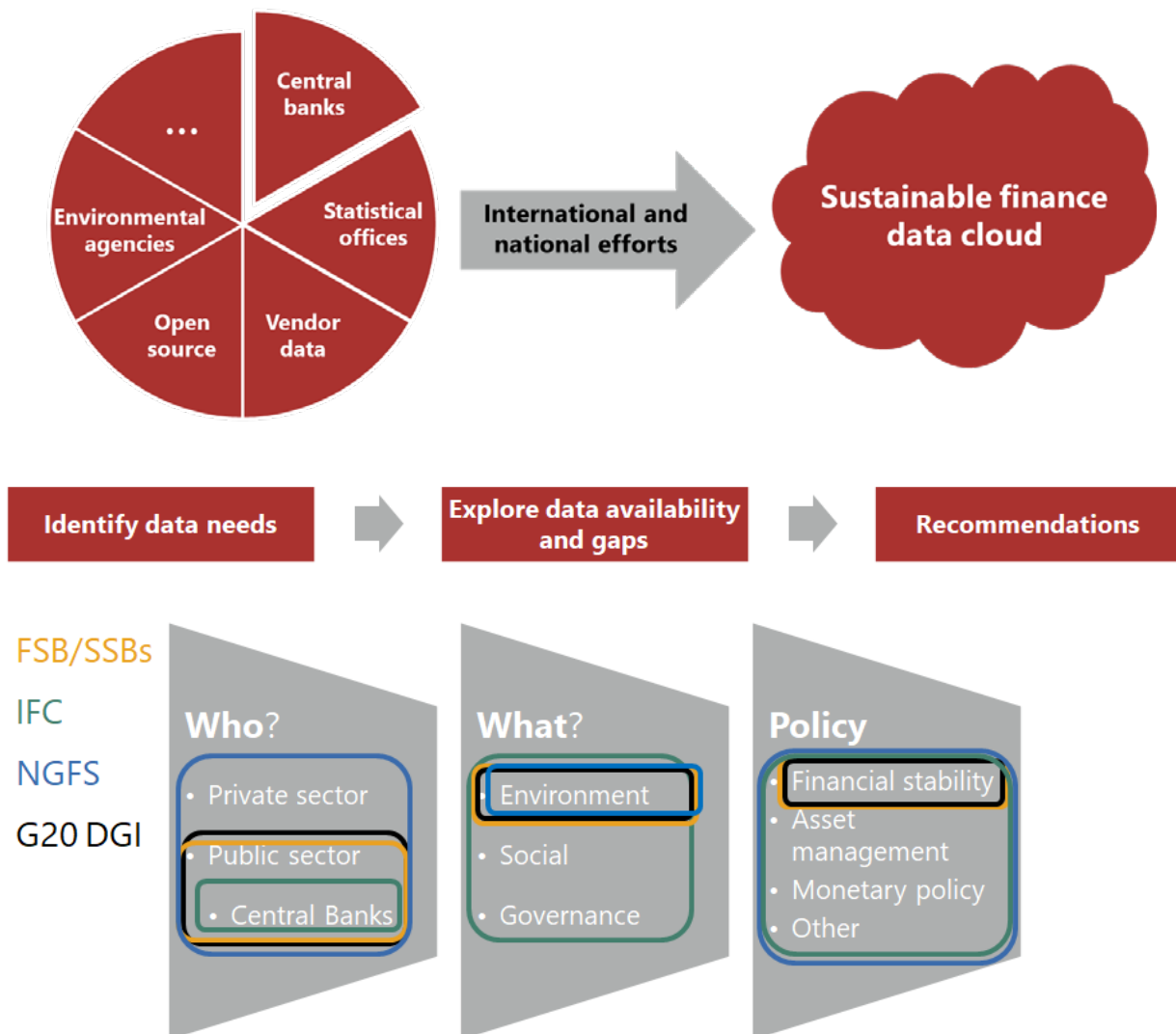
# 1. Introduction

**Sustainable finance has gained an increasing amount of attention in recent years, and the availability of relevant data has become a primary concern for policymakers, especially central banks.** Sustainable finance refers to the process of taking environmental, social and governance (ESG) considerations into account when making financing decisions, with the aim of fostering long-term investment in sustainable economic activities.

**A number of initiatives have sought to facilitate the availability of adequate data to support sustainable finance.** The majority of these national and international data initiatives (by eg the G20, G7, NGFS, IASB and FSB) focus primarily on climate change and its financial stability implications (Graph 1).

Overview of international initiatives on sustainable finance data

Graph 1



Source: IFC Working Group.<sup>3</sup>

<sup>3</sup> The members of the IFC Working Group on sustainable finance data are listed above page ii, representing the ECB and the central banks of France, Germany, Malaysia and Turkey.

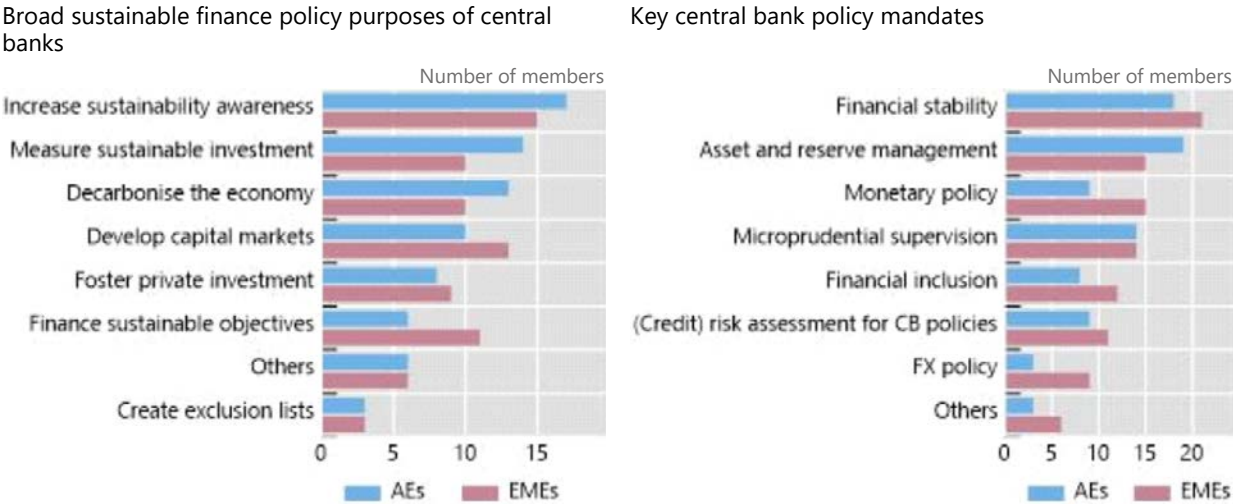
In this context, the IFC has conducted a survey on sustainable finance data issues among its members. **A key aspect of the IFC’s approach has been to undertake a broad stocktaking of central banks’ data needs and availability. Hence, the survey covers all ESG aspects,** with a focus on operational elements of importance to central banks’ statistical functions. The survey is based on answers received from 63 IFC members, with detailed information provided by 59 jurisdictions. It covers data needs and availability by considering the broad universe of central banks’ policy areas; provides a tangible overview of the specific ESG metrics deemed relevant by central banks; and sheds lights on operational aspects related to the compilation of sustainable finance statistics, such as those related to central banks’ reporting arrangements vis-a-vis financial institutions and other relevant stakeholders.

**This report is organised in three sections.** Section 2 outlines central banks’ sustainable finance objectives and central banks’ initiatives to establish relevant definitions and taxonomies. Section 3 provides an overview of the data needs and availability, along with the underlying governance arrangements. Section 4 reviews the main sustainable finance metrics of key interest to central banks, with more detailed information provided in Annex 1 as well as in the additional documentation available separately on the [IFC website](#) – including a separate file listing all the relevant metrics and a dashboard providing data visualisation or the compiled indicators, and a list of the relevant documentary sources identified by IFC members.

## 2. Sustainable finance: objectives, definitions and taxonomies

**The key purpose reported by central banks when pursuing sustainable finance policies is to increase stakeholders’ risk awareness of climate change and spur their contribution to the decarbonisation of the economy** (Graph 2, left-hand panel). Measuring sustainable investment, developing capital markets and fostering private sector financing are also important goals, as highlighted by the survey. Other objectives include the development of green taxonomies (including green bond guidance); the disclosure of ESG information and integration of this information in investment decisions; climate risk supervision; the strengthening of general environmental awareness in today’s societies; the efficient allocation of capital; and the promotion of a sustainable development of the financial system.

Central banks’ key interest in sustainable finance relates to financial stability Graph 2



Note: AE: Advanced Economies; EME: Emerging Market Economies.  
 Source: IFC Survey on Sustainable finance for central banks (2021).



## Importance of sustainable finance data in supporting central bank work

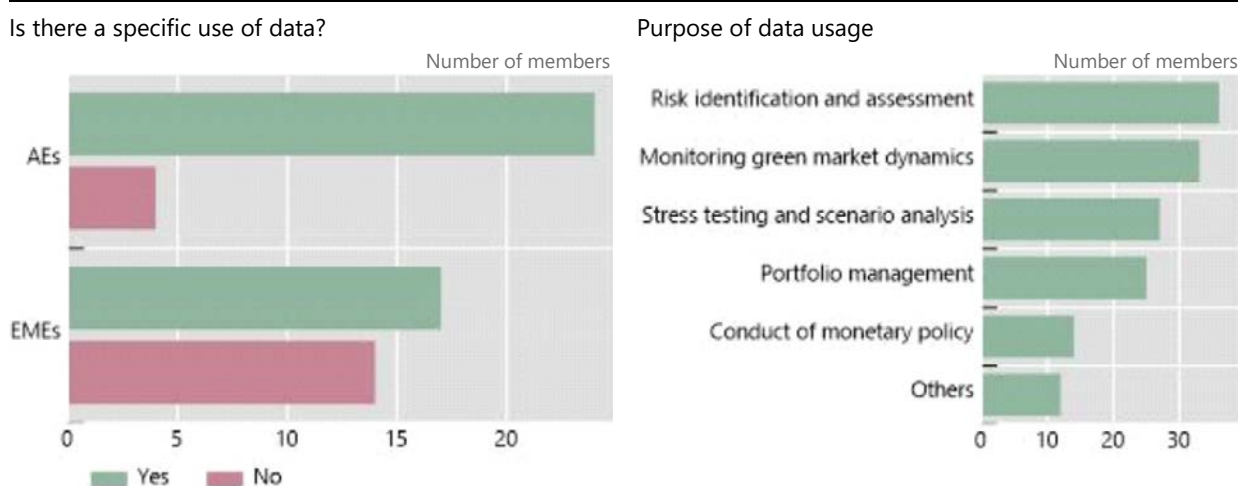
The objectives listed above are important in supporting the broad range of central banks' mandates. But the primary policy focus is on financial stability, covering both micro- and macroprudential supervision (Graph 2, right-hand panel). Other points of attention relate to central banks' work in the areas of asset and reserve management, monetary policy (including collateral policies), and financial inclusion as well as specific in-house risk assessment exercises conducted in the context of these policies – to support collateral policies, central banks' own funds investment decisions, and micro supervision, for example.

Reflecting the interest reported above, sustainable finance data are already effectively used to support central banks' actions in the majority of jurisdictions, but especially among AEs (Graph 3, left-hand panel). The focus is primarily on environmental indicators, while data on social and governance issues appear less in demand, at least at present. Usage is reported to be primarily for risk identification and credit assessment exercises, the monitoring of "green" finance market dynamics, stress testing and scenario analyses, and the management of central banks' portfolios and reserves (right-hand panel). In contrast, although monetary policy is considered important from a sustainability perspective, the use of sustainable finance data for this purpose appears relatively limited to date.

One important case when using sustainable finance data for financial stability policy relates to the assessment of both the physical and transitional risks faced by the financial system and the macroeconomy at large. That is, the risks related, respectively, to the impact of climate change on the economy (eg environment hazards) and to the transitioning from a fossil energy-reliant to a low-carbon economy (BCBS (2021a)). Adequate statistics are needed to build climate change scenarios that can be used to project these impacts. In France, for example, a recently introduced law established a minimum green funding threshold, subject to mandatory reporting by financial firms to the central bank. The data, available from public sources and financial market vendors, are used to estimate the climate impact of reserves and monetary policy operations, which is used, in turn, to inform macroeconomic modelling and scenario analyses at the central bank.

Use of sustainable finance data by central banks

Graph 3



Source: IFC survey on Sustainable finance for central banks (2021).

## The need for a sustainable finance statistical framework

**The survey emphasises the importance of an adequate statistical framework to make proper sense of the data collected on sustainable finance.** Establishing consistent definitions and/or taxonomies is key from this perspective, not least to identify the perimeter of ESG issues and enhance (market) transparency. For instance, sustainable finance instruments need to be clearly defined and allocated to categories based on a proper classification system (“taxonomy”).

**A common starting point for an adequate design for this statistical framework is to first identify ESG sustainability goals and what defines “sustainable finance”.** Consistency across jurisdictions is also an important precondition, for instance to help market participants reach a common understanding on green objectives for the economy and the financial system. The European Union (EU) taxonomy<sup>4</sup> is an important benchmark from these two perspectives. It was defined in the context of the EU sustainable finance strategy that aims at promoting financial support of economic growth while reducing pressures on the environment and taking into account social and governance aspects.<sup>5</sup>

**There are also a number of initiatives to improve coordination at the global level,** as advocated by the G20 for those jurisdictions intending to pursue a taxonomy-based approach (G20 (2021)). In the latter context, the International Platform on Sustainable Finance (IPSF), launched in 2019 by public authorities in charge of developing environmentally sustainable finance policies, is one concrete example of these global efforts to facilitate the harmonisation and consistency of taxonomies across multiple jurisdictions.<sup>6</sup> Another one is the ongoing work of EU and Chinese regulatory authorities to develop a “Common Ground Taxonomy” aiming at identifying areas of commonality between their taxonomies (IPSF (2021)).

**As regards definitions of sustainable finance, the survey shows that many IFC members are already making important progress.** More than half of AE reporters have established standard definitions for sustainable finance or report progress towards that end (Graph 4, left-hand panel). Yet, European members are overrepresented among these adopters (right-hand panel), and progress has been much slower among EMEs – most of them have still to establish standard definitions of sustainable finance.

**Turning to the work on taxonomies, only a fairly small number of respondents have set up an adequate classification defining eligibility conditions for sustainable finance instruments. However, progress is being made in many places** (Graph 5), especially in AEs in general and EU countries in particular – with notable implementation efforts led by the European Commission in coordination with national stakeholders including central banks.<sup>7</sup> Starting from a low level, progress is also being made in EMEs, with effective institutional setups being implemented in several jurisdictions to facilitate sustainable finance policies (see Boxes 1 and 2 for the examples of Indonesia and Costa Rica, respectively).

<sup>4</sup> See EU taxonomy ([EU taxonomy for sustainable activities | European Commission \(europa.eu\)](https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/international-platform-sustainable-finance-factsheet_en.pdf)).

<sup>5</sup> Other benchmark definitions cited by survey participants relate to the OECD (OECD (2020)) and the German Federal Financial Supervisory Authority (BaFin (2020)), with a focus on the potential (financial stability) risks of E(SG) changes for the solvency or reputation of supervised entities.

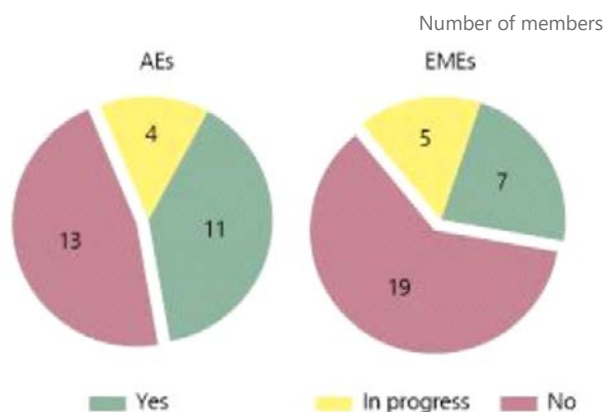
<sup>6</sup> Cf [https://ec.europa.eu/info/sites/default/files/business\\_economy\\_euro/banking\\_and\\_finance/documents/international-platform-sustainable-finance-factsheet\\_en.pdf](https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/international-platform-sustainable-finance-factsheet_en.pdf); in addition to the G20, other global initiatives include those developed by the United Nations Development Programme International Network of Financial Centres for Sustainability (FC4S Network), the IMF, the International Organization of Securities Commissions (IOSCO), the International Organization for Standardization (ISO), the NGFS, the OECD, the United Nations Department of Economic and Social Affairs (UN-DESA), and the World Bank Group and the Sustainable Banking and Finance Network of its International Finance Corporation (IFC-SBFN).

<sup>7</sup> The Bank of France, for example, took part in the work on the EU taxonomy via the NGFS, and the NGFS Secretariat is an observer at IPSF.

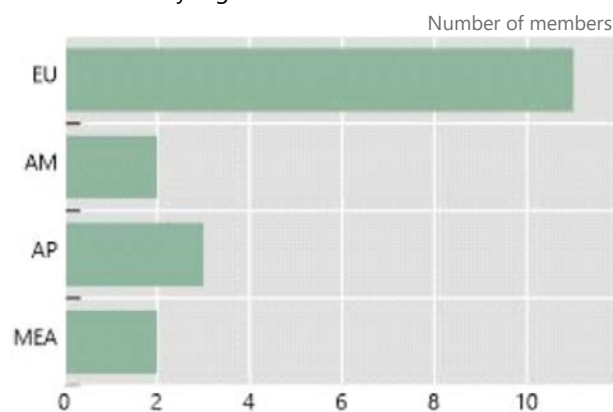
## Central banks' progress in establishing definitions and taxonomies for sustainable finance

Graph 4

### Established definition of sustainable finance



### "Yes" answers by region



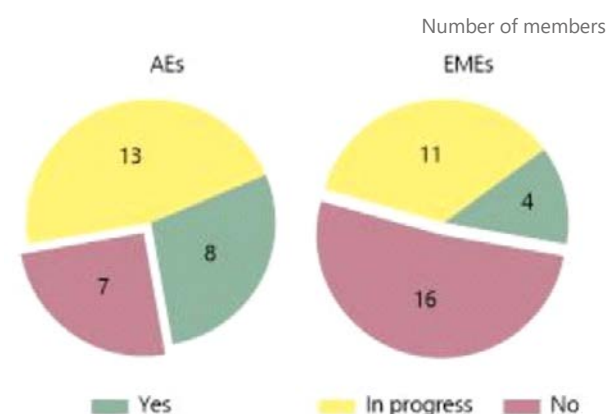
Notes: AP: Asia Pacific; AM: Americas; EU: Europe; MEA: Middle East and Africa.

Source: IFC Survey on Sustainable finance for central banks (2021).

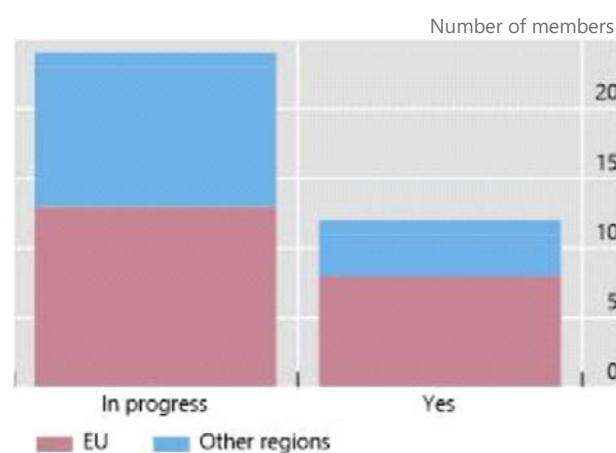
## Limited and uneven adoption of taxonomies across jurisdictions

Graph 5

### One third of AEs and only few EMEs have a taxonomy



### Adoption of taxonomies by region



Source: IFC survey on Sustainable finance for central banks (2021).

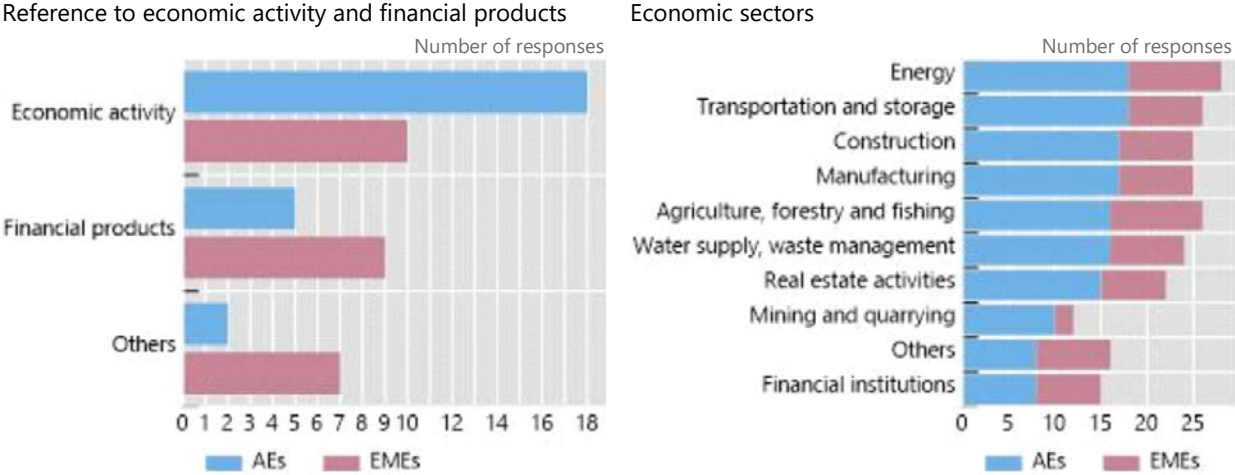
**The survey shows that there are two main approaches when designing sustainable finance taxonomies** (Graph 6, left-hand panel). The most common one is to refer to the type of economic activity being financed: the five main economic sectors covered by the taxonomies in this context are energy, agricultural activities, transportation, construction and manufacturing (right-hand panel). A second approach is to refer to the type of financial instrument involved: for instance, environmental taxonomies (ie for classifying green loans) will typically refer to loans, bonds and investment funds, while equities appear to be slightly less considered.

There are notable differences across regions. In particular, **taxonomies adopted in AEs are based mainly on the type of economic activity, in contrast to EMEs, where the two approaches are often combined**. This broad picture is, however, evolving rapidly: in Europe, for instance, financial products are not covered in the EU taxonomy regulation, but there is an ongoing process for publishing

an EU Green bond standard (GBS),<sup>8</sup> which captures information on how the proceeds of the funds are invested.<sup>9</sup>

Most taxonomies are based on economic activity

Graph 6



Source: IFC survey on Sustainable finance for central banks (2021).

Box 1

Box 1: Green finance policies in Indonesia

Bank Indonesia launched green financial policies in 2010 and became in 2012 one of the founders of the national Sustainable Banking Network (SBN), along with the publication of green lending model guidelines for one mini hydro power plant project. In response to the transfer of banking supervision responsibilities to the Financial Services Authority of Indonesia (OJK) at the end of 2013, Bank Indonesia handed over to the OJK various studies related to green banking policy and the membership in SBN.

OJK has initiated the formulation of a national green taxonomy through the establishment of a task force involving Bank Indonesia and various related ministries and agencies. This national green taxonomy is planned to include the development of 11 environmental-friendly business activities, which may be eligible for green bond issuance in accordance with the standards set in Indonesian regulation (No. 60/POJK.04/2017). These activities include (1) renewable energy; (2) energy efficiency; (3) pollution prevention and control; (4) sustainable management of living natural resources and land use; (5) conservation of terrestrial and aquatic biodiversity; (6) environmentally friendly transportation; (7) sustainable water and wastewater management; (8) climate change adaptation; (9) products that can reduce the use of resources and produce less pollution (eco-efficient); (10) environmentally friendly buildings that meet national, regional or international recognised standards or certifications; and (11) other environmental friendly business activities.

As regards the challenges faced in collecting sustainable finance data, they primarily relate in Indonesia to confidentiality issues, data availability, data reliability, methodological challenges, and open issues on definition and taxonomy.

References and background information

- POJK No 51/POJK.03/2017: financial services institutions, issuers and public companies are required to submit a sustainability report to OJK.

<sup>8</sup> See [European green bond standard | European Commission \(europa.eu\)](https://ec.europa.eu/economy_finance/eu-green-bond-standard/).

<sup>9</sup> The European Commission also works on an EU ecolabel for retail financial products.

- PBI No 20/8/PBI/2018 (last amended by PBI No 23/2/PBI/2021): banks are required to submit reports on credit/financing of environmentally sound property and vehicles to Bank Indonesia.
- Roadmap on sustainable finance II: includes OJK plan to establish a sustainable finance information hub for the period 2021–25.

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Box 2

## Box 2: Institutional framework on climate change in Costa Rica

In 2017, the Central Bank of Costa Rica (BCCR) conducted a risk assessment that concluded that climate change would have an impact on the potential achievement of its strategic objectives; namely, maintaining inflation within its target range and promoting a stable, efficient and competitive financial system. The study also identified the risk of outcomes outside the tolerance ranges defined by the BCCR, recognising that most of the factors that could mitigate these tail risks laid outside its decision perimeter.

Noting that climate change is a cross-cutting issue for the central bank and requires collaboration with other stakeholders (at both the national and international levels), the BCCR has developed three key initiatives over the past years:

1. In 2019, the BCCR established the Group for Strategic Analysis of Climate Change (GAECC), comprising representatives of its different departments to address the impacts and risks related to climate change on the central bank's main objectives. Each member of the Group is tasked to address those issues that are pertinent from a given department's area of expertise. The GAECC also serves as a liaison between the BCCR and external stakeholders regarding climate change matters. Over the past two years, the Group has strengthened its relations with international organisations such as the IMF, the World Bank and the Inter-American Development Bank (IDB) on climate-related topics.
2. Recognising the need to coordinate with other policy efforts to green the financial sector, the BCCR joined the NGFS in 2019 to exchange experience and share best practices with other central banks and support the transition to a sustainable global economy.
3. The BCCR has developed a roadmap, linked to its Strategic Plan 2020–23, to integrate climate change considerations into the design of monetary and financial policies. This roadmap is centred on the following four building blocks:
  - a. **Establishing reliable and comparable data.** The BCCR is taking stock of the data required to adequately analyse the impact of climate change, as well as to identify suitable indicators that can serve as a reference to measure and monitor climate-related risks.
  - b. **Strengthening modelling and analytical capacity for scenario analysis.** With support from the IDB, the BCCR has developed an integrated economic and environmental model to conduct an impact analysis of climate-related policies. The aim is to develop by the end of 2024 operational analyses of different climate scenarios, combined with various mitigation measures and adaptation policies.
  - c. **Promoting climate change risk management in the financial system.** The BCCR is assessing the interlinkages between climate-related and macro-financial variables as well as the risks to the financial system arising from climate change. This work focuses on stress-testing methodologies and on the pricing of climate risk to be integrated into prudential regulation.
  - d. **Greening international reserves.** The BCCR is moving to create an investment portfolio for its international reserves that is environmentally friendly and increasingly exposed to those issuers with the best environmental performance. The implementation of this strategy is based on a twofold investment strategy (in assets with prime green ratings and in green funds directly).

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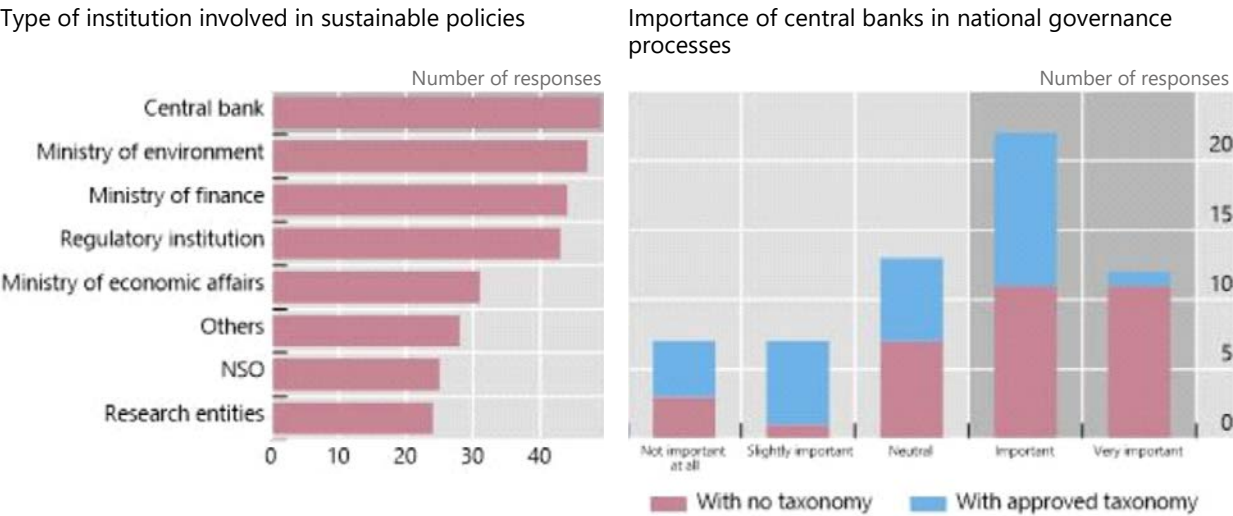
### 3. Central banks' interest in sustainable finance data and underlying governance arrangements

#### Important role played by central banks

**Central banks consider themselves as key players in sustainable finance policies, along with relevant ministries and regulatory institutions** (Graph 7). Other important stakeholders include research entities, non-profit organisations, as well as the financial sector through its associations. In contrast, the survey underscores the absence of a nation-wide sustainable finance oversight committee in most AEs and EMEs.

Involvement of different actors in sustainable finance policies

Graph 7

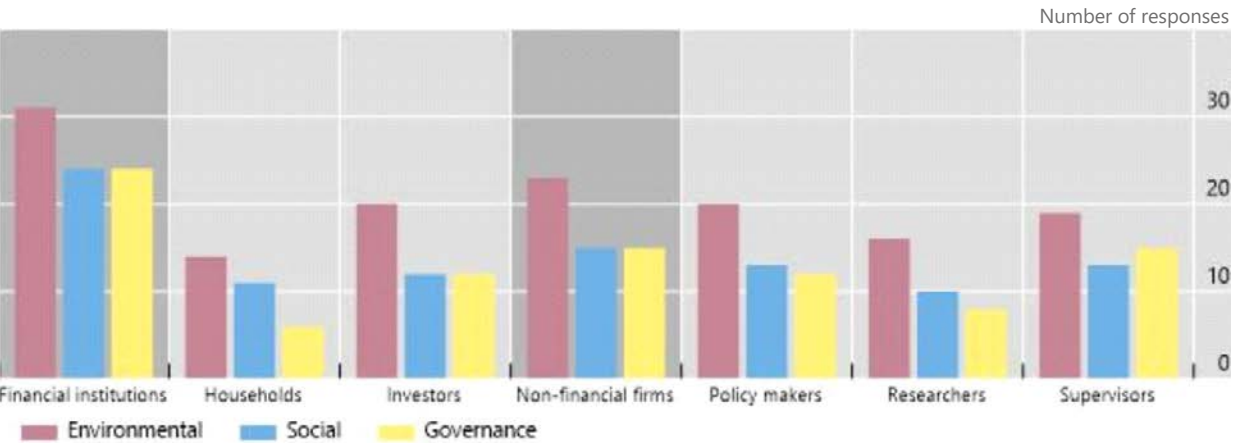


Source: IFC survey on Sustainable finance for central banks (2021).

**For most central banks, both in AEs and EMEs, the main target groups of their sustainable finance policies are financial and, to a lesser extent, non-financial firms** (Graph 8). A key reason is that both types of institutions play an important role when analysing the impact of these policies in terms of investment and risk.

Target groups of central banks' sustainable finance policies, by ESG topic

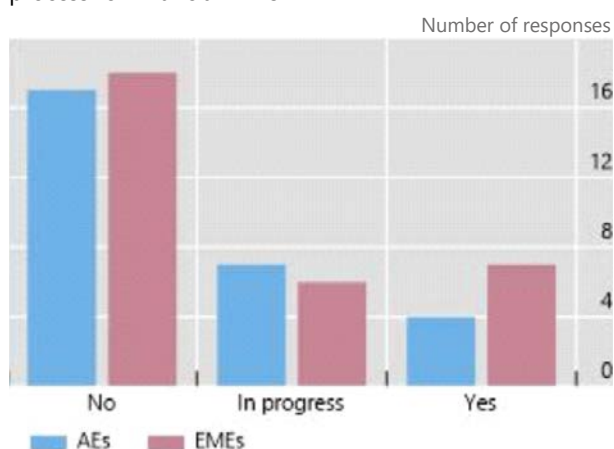
Graph 8



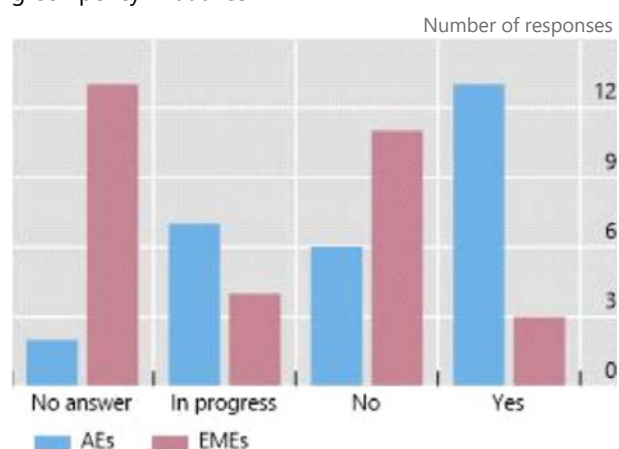
Source: IFC survey on Sustainable finance for central banks (2021).



Only few members have an established reporting process for financial firms



About half of the central banks report on their own green policy initiatives



Source: IFC survey on Sustainable finance for central banks (2021).

## Sources of sustainable finance information for central banks

However, **formalised frameworks organising the reporting of sustainable finance information from financial institutions are only at an early stage**. Although a number of initiatives are progressing gradually, they are starting from a low level. As a result, the majority of IFC jurisdictions (around 60% of AEs and 50% of EMEs) still have no established process for the reporting of sustainable finance data to central banks or other relevant stakeholders (Graph 9, left-hand panel). For the limited number of AEs and EMEs which have either established a process or are in progress of doing so, this reporting is typically mandatory for financial institutions, eg banks are required to disclose their approaches in managing sustainability and/or climate change. Other relevant elements that can be subject to reporting requirements include data to identify and assess risks related to sustainability (eg for stress testing and scenario analyses) as well as to monitor green markets as part of central banks' asset management activities.

**In contrast, formalised reporting processes have been already established in many AEs jurisdictions to document central banks' own activities related to sustainable finance.** Half of AE central banks report on their own sustainable data and/or their green policy initiatives, a share which drops to almost zero for EMEs (Graph 9, right-hand panel). When disclosed, the information is published mainly in central banks' annual reports or in separate sustainability reports. It typically includes data on sustainability commitments and on the principles adopted to support national climate-related strategies (for instance in terms of investment goals), as well as indicators to assess progress/performance of ongoing sustainability initiatives.<sup>10</sup>

In view of the limitations observed in terms of dedicated reporting processes, as analysed above, how do central banks manage to get the information they need to support their work in the sustainable finance area? The survey shows that the **main data sources are government agencies and government-linked corporations, NSOs and, when the central bank is tasked to conduct micro surveillance, supervised financial institutions (eg banks)** (Graph 10).

<sup>10</sup> See references on the [IFC website](#) for such initiatives, eg for Austria, Australia, Belgium, Germany, France, Greece, Italy, Kuwait and Norway.

Other mentioned information sources include international bodies, research institutes, credit registers, private rating agencies and commercial data vendors. Incorporating all these stakeholders more closely in national data frameworks related to sustainable finance is considered a priority for a vast majority of central banks. Interestingly, a number of respondents highlighted the opportunities provided by innovative IT techniques (eg data-mining, web-scraping) to collect data, despite the limitations faced in terms of IT equipment and adequate staff skills.

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Central banks rely on sustainable finance data provided by various external stakeholders

Graph 10

Number of responses



Source: IFC survey on Sustainable finance for central banks (2021).

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## Challenges in collecting sustainable finance data

**The survey shows that the availability of sustainable finance data faces a number of challenges for central banks** (Graph 11). These challenges reflect the generic lack of data available as such, their limited reliability, the difficulties to access comprehensive databases and, as reported above, the frequent absence of standardised reporting frameworks for financial and non-financial firms, even for supervised institutions.

**Yet, the most important difficulties seem related to statistical methodological challenges**, such as the absence of robust definitions (ie harmonisation and standardisation, taxonomies). Other reported deficiencies hampering central banks' statistical work reflect confidentiality issues, limited sustainable finance expertise among staff, data collection costs, IT infrastructure aspects (management of the related databases) and imperfect coordination among the relevant stakeholders involved.





Source: IFC survey on Sustainable finance for central banks (2021).

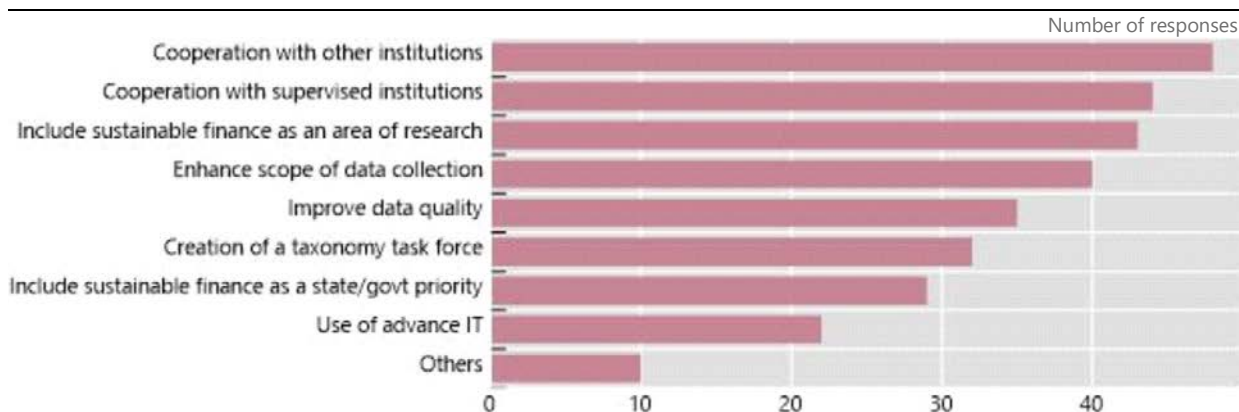
One key issue identified by central banks is **the lack of awareness and knowledge of existing sustainable finance reporting standards**. This appears to be a main reason for the difficulties faced by supervised institutions when trying to comply with data reporting requirements. In particular, private firms need to have a good understanding of what authorities expect in terms of climate-related disclosure in order to adequately integrate ESG considerations into their risk management frameworks.<sup>11</sup> This is crucial to properly evaluate the environmental impact of their portfolios (to assess, eg, their emissions or carbon footprint, their green investment and the physical risk taken) as well as to measure the credit quality of their financial instruments (eg private claims used as collateral).<sup>12</sup>

### Initiatives to close data gaps

**As a result of the challenges listed above, central banks are actively engaged in initiatives to close data gaps**, with a particular focus on establishing proper definitions and taxonomies. The initiatives considered the most promising aim to (i) promote cooperation with other domestic public agencies (eg NSOs), (ii) organise joint work with supervised institutions (especially on the development of taxonomies and data reporting); (iii) establish sustainable finance as an area of specific research; and (iv) enhance the scope of data collection – eg to cover additional, including “alternative” data providers (Graph 12). Other potentially useful initiatives are the creation of a taxonomy task force (in cooperation with other national agencies) and actions to support the inclusion of sustainable finance into national policy priorities.

<sup>11</sup> International consistency on public disclosure of ESG information is facilitated by the IFRS Foundation, which has initiated the development of sustainability reporting standards (IFRS Foundation (2020)). A number of private companies have already taken steps to disclose ESG information to the public, such as the 95 members of the industry-led, UN-convened Net-Zero Banking Alliance as regards climate change and related commitments by financial institutions (UNEP FI (2021)).

<sup>12</sup> To address these issues, a number of central banks are creating dedicated units to better coordinate data work on climate issues with reporting institutions. For instance, the ECB has taken actions to promote related disclosures and facilitate the understanding of climate-related risks, considering that current prudential rules require banks to identify, manage, and disclose all material risks to which they are exposed.



Source: IFC survey on Sustainable finance for central banks (2021).

The survey also points to the potential usefulness of advanced IT techniques to **overcome information gaps**, at least as a supplementary means. **Some promising techniques (eg tagging, web-scraping) are already used by a number of central banks to collect sustainable finance data** in this manner. For instance, the Bank of Spain has launched a project to extract such indicators through data mining and web-scraping from company reports. These types of approach are likely to expand further with ongoing progress in the digitalisation of information. In Europe, for instance, the Corporate Sustainability Reporting Directive (CSRD) developed by the EU Commission will provide a common and standardised mandatory reporting framework requiring large and listed companies to digitally “tag” their data to be machine-readable (European Commission (2021)).

## 4. Sustainable finance indicators used by central banks

### Almost 80 key indicator subcategories of interest

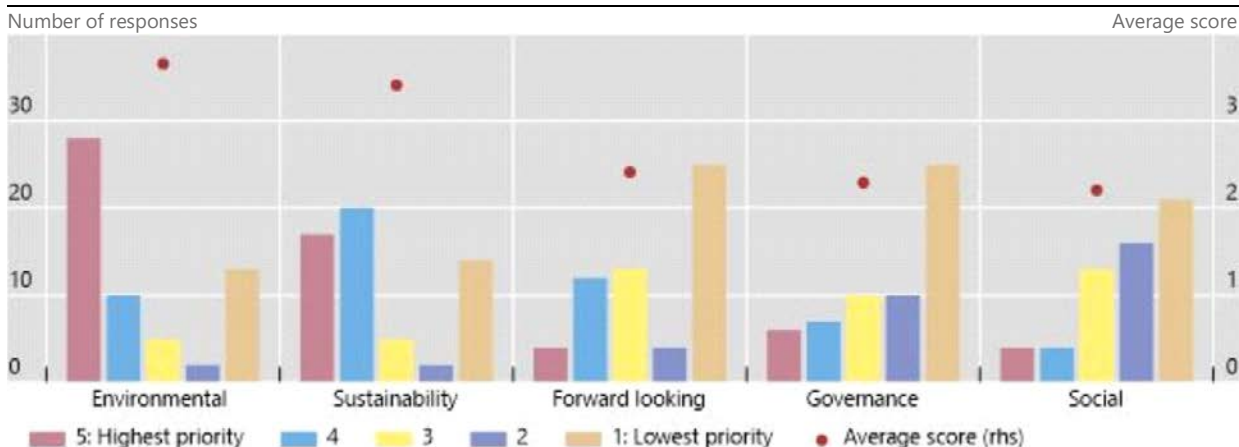
**There is a large number of indicators that can shed light on the wide range of ESG-related policy issues. Based on the survey, almost 80 sustainable finance indicator subcategories are currently considered in at least one jurisdiction** (see Annex 1). 57 of them, arguably the most important ones, are currently used by central banks in at least 10 instances.

**Among the sustainable finance indicators, those falling into the environmental category are identified to be the most important** (Graph 13). More than two thirds of the respondents assign top priority to those, followed by general sustainability indicators (ie indicators covering the broad spectrum of ESG issues). In contrast, forward-looking, social and governance indicators are considered of a lower priority by a vast majority of central banks. This different degree of interest is reflected in the use of the 57 most important subcategories listed in Annex 1: 24 of them relate to environmental issues, compared to 12, eight, seven and six for, respectively, social governance, sustainability and forward-looking indicators.<sup>13</sup>

<sup>13</sup> The degree of priority reported by central banks is generally consistent with their intentions to benefit from the use of the indicators considered going forward, even if they have not yet developed a related metric.

Environmental aspects are considered the most important

Graph 13



Source: IFC survey on Sustainable finance for central banks (2021).

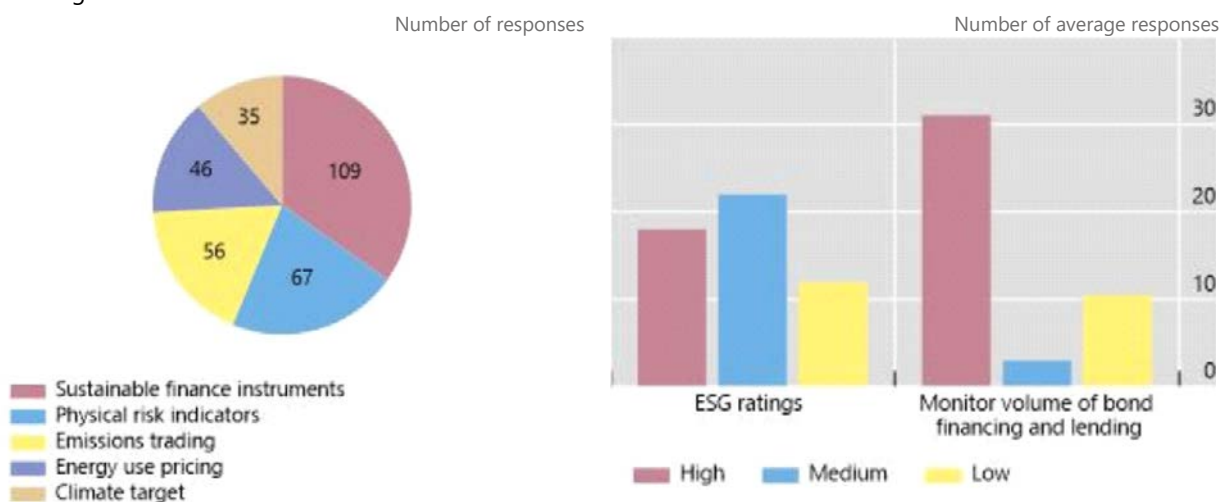
**Looking more specifically among environmental indicators, financial instruments are used the most**, followed by data on physical risk and emission trading; energy use pricing as well as climate target indicators are also referred to frequently (Graph 14, left-hand panel). Turning to sustainability indicators, both ESG ratings and volumes of bond financing and lending are widely used and considered high priority (right-hand panel).

Indicators assigned the highest priority by central banks

Graph 14

Top five (actively used) environmental indicator subcategories

Sustainability indicators by assigned priority

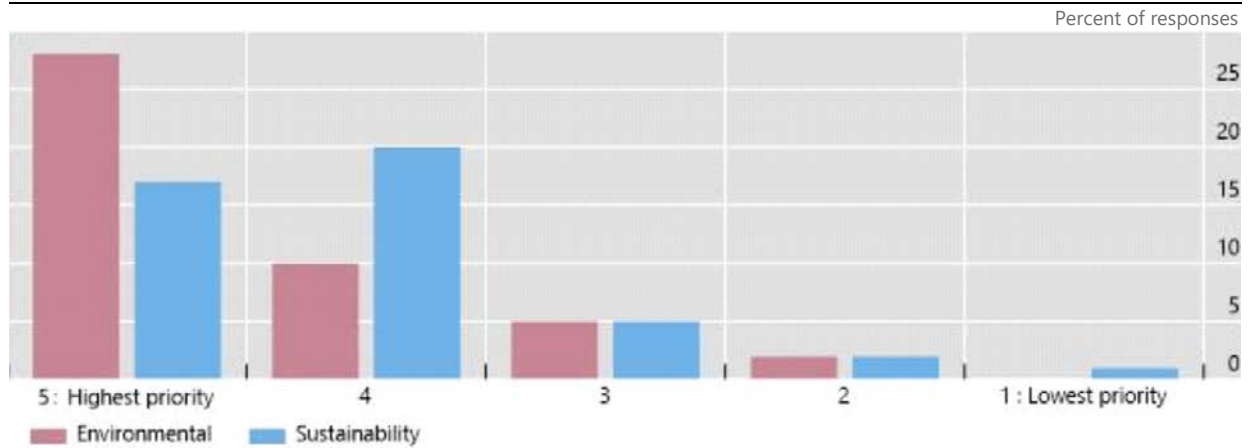


Source: IFC Survey on Sustainable finance for central banks (2021).

**The survey does not point to a trade-off in central banks' interest between the different groups of sustainable finance indicators:** in particular, the importance devoted to social and governance issues appears to be highly correlated with the one put on environmental matters (Graph 15).

Central banks' interest is highly correlated among the different types of sustainable finance indicators

Graph 15



Note: those central banks assigning medium to highest relevance to forward looking, social and governance indicators predominantly also identify environmental aspects as the highest priority, while sustainability as a whole is assigned the second highest priority.

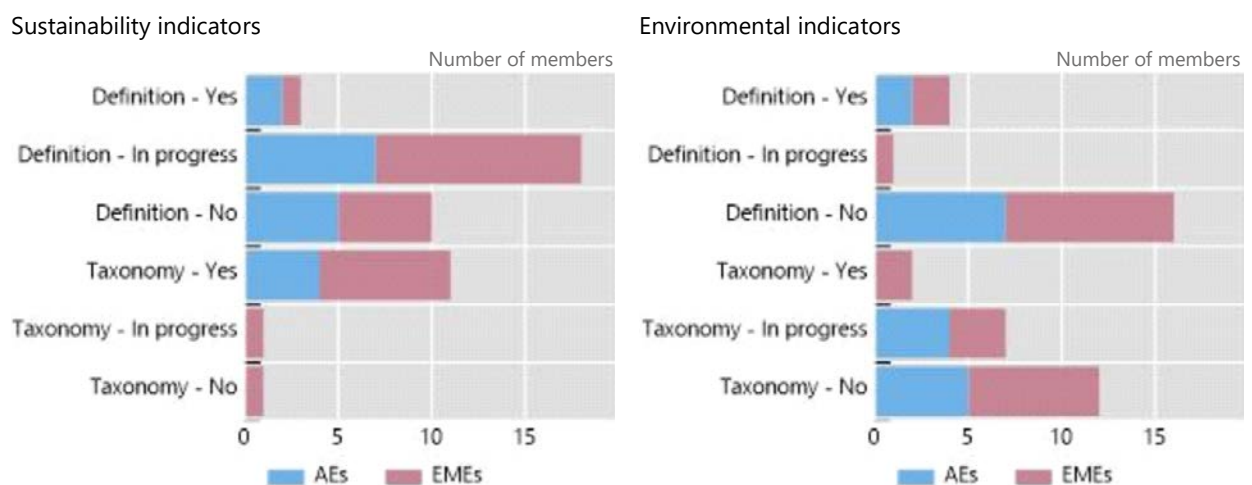
Source: IFC survey on Sustainable finance for central banks (2021).

**The interest in ESG data is higher in those countries that are most active in developing sustainable finance policies.** As expected, the interest is particularly high when a standard definition and/or a taxonomy of sustainable finance exist. In contrast, the vast majority of the central banks showing limited interest (ie assigning only a medium to low priority to such information) in both sustainability (Graph 16, left-hand panel) and environmental (right-hand panel) indicators tend not to have sustainable policies in place (eg absence of related definitions or taxonomies). Consistent with this, the use of the 80 ESG subcategories documented in Annex 1 is concentrated in AEs, especially among European central banks.

Central banks who assign medium to low priority to sustainability and environmental indicators do not have sustainable policies in place

By existence of taxonomy and standard definition of sustainable finance in their jurisdiction

Graph 16



Source: IFC Survey on Sustainable finance for central banks (2021).

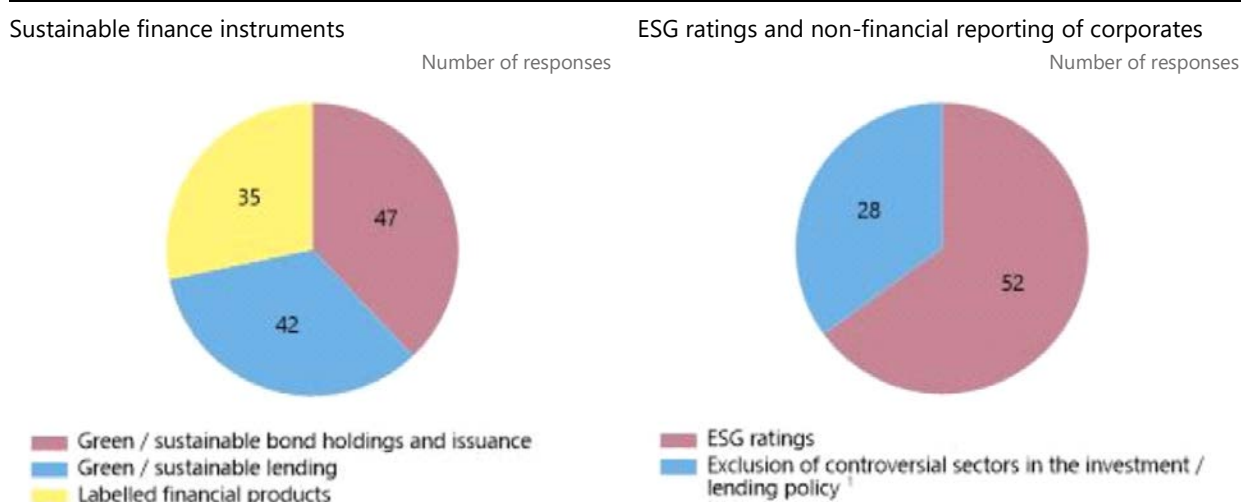
## Main use cases: focus on environmental and sustainability indicators

The survey also shed light on the policy purpose of central banks when using the following main types of ESG metrics:

- Sustainable financial instruments are used primarily for financial stability purposes and supervision**, being collected at the micro level (ie institution-level, asset-level). The most important metrics cover (i) green/sustainable bond holdings and issuance; (ii) green/sustainable lending; and (iii) labelled financial products (Graph 17, left-hand panel). EU central banks appear most advanced in using such indicators, especially those derived from granular data sets covering the holdings or issuance of securities and possibly combined with commercial data sources (Graph 18). However, in other regions limited data availability and/or the lack of a relevant taxonomies/regulations have, so far, limited central banks' use of such metrics, despite strong reported demand. For the same reasons, some central banks prefer not to use data from private data sources, either because of limited market coverage, uncertainty on the compilation methods and sources or elevated expenses.
- Broad sustainability indicators are mostly used for asset management / investment purposes**, and mainly at the micro level (ie institution-level). Indicators of key interest include ESG ratings and ESG eligibility for investment and lending policies (Graph 17, right-hand panel), as obtained from vendor data. However, their use is currently limited by the lack of (reliable) data and relevant taxonomies; for instance a number of European central banks have decided to delay compilation until more clarity is provided – eg adoption of the related EU directive, European Banking Authority (EBA) clarification of reporting requirements.
- Environmental data of core interest covers physical risk indicators along with emission data** (Graph 19, left-hand panel). One notable feature is that physical risk indicators are often not yet available (right-hand panel), whereas data on emissions are more widely accessible. Another one is that the ultimate use of these data will depend on the ongoing international efforts (especially by COP26, the FSB, the NGFS and various SSBs) to enhance underlying concepts. Nevertheless, many central banks are already working on establishing adequate metrics based on environmental data for supporting policy work – eg to run stress tests (see Box 3) and measure the carbon footprint of bank lending (see Box 4).

Types of sustainability indicators of main interest

Graph 17

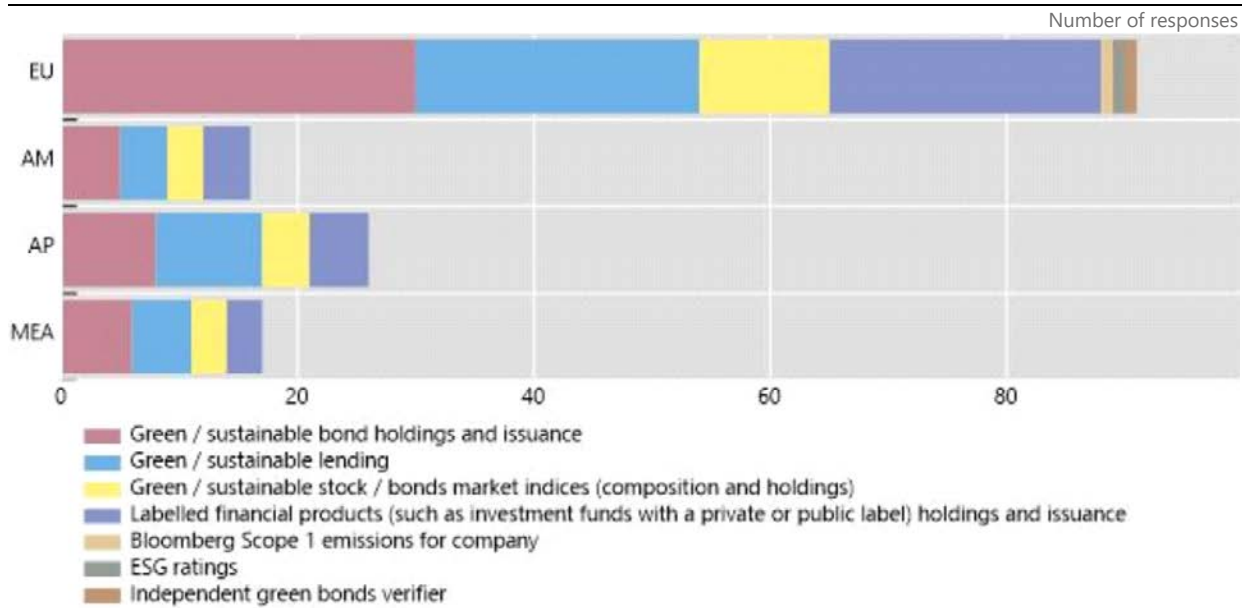


Source: IFC Survey on Sustainable finance for central banks (2021).

## Geographical use of sustainable finance instruments

By region

Graph 18



Notes: AP: Asia Pacific; AM: Americas; EU: Europe; MEA: Middle East and Africa.

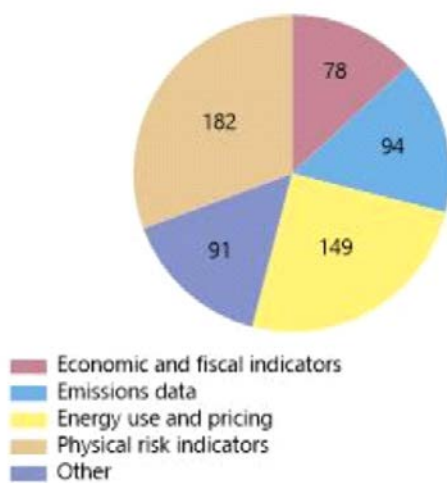
Source: IFC Survey on Sustainable finance for central banks (2021).

## Most commonly used environmental indicators

Graph 19

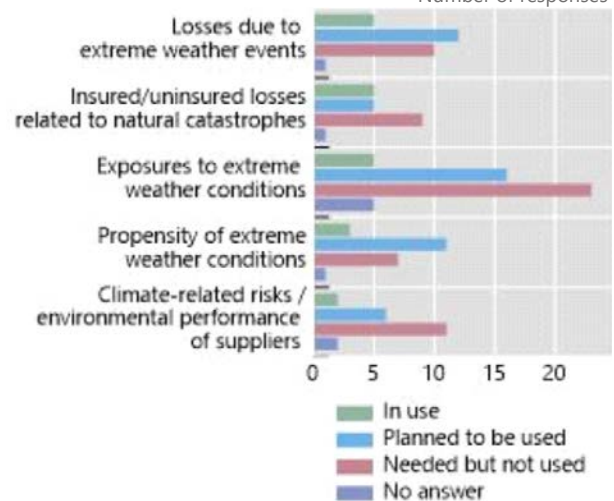
Environmental indicator subgroups

Number of responses



Top five environmental metrics on physical risk

Number of responses



Source: IFC Survey on Sustainable finance for central banks (2021).

- Physical risk indicators are reported to be particularly useful for financial stability assessments and microprudential supervision.** For some indicators, valuable data are readily available at the national level: for instance, the propensity of extreme weather conditions can be derived from publicly-available meteorological databases (see Box 5). However, data on exposures and potential losses related to natural catastrophes/weather events are typically subject to (costly)

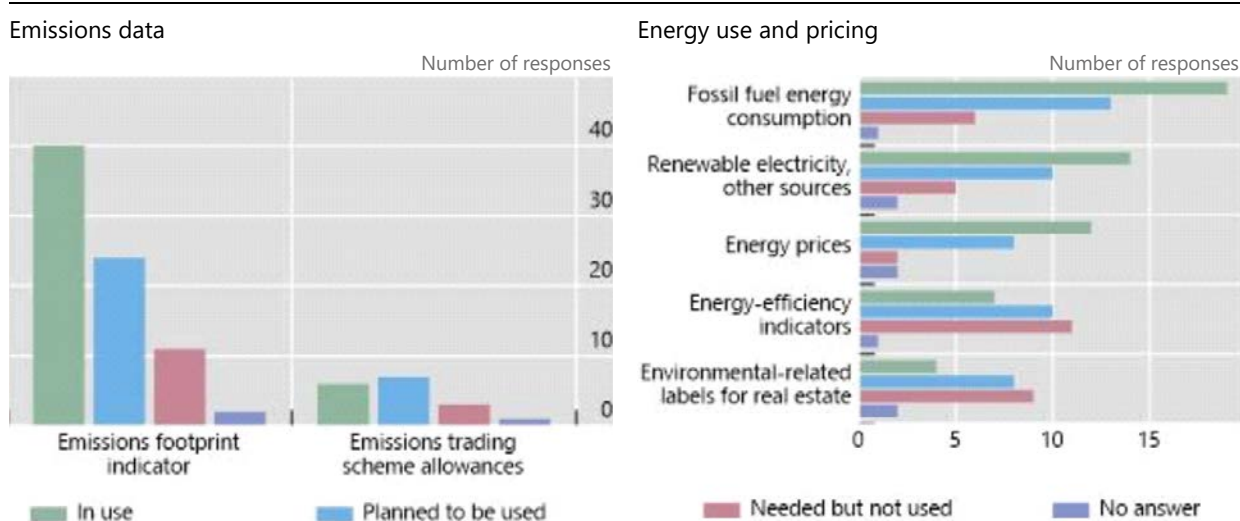


subscriptions to private vendors, an important factor limiting in-depth risk analysis (such as stress testing) among central banks in practice.

- **Emission footprint indicators at the micro level** are used for portfolio management and monetary policy implementation (often available from private data providers subject to a subscription fee), while country<sup>14</sup> and sector-level data are more widely available and can be used for financial stability purposes (Graph 20, left-hand panel).
- Data on **energy prices as well as fossil fuels and the share of renewable energy sources** are used for a large range of purposes, from financial stability to monetary policy (Graph 20, right-hand panel).

Core indicator subgroups for emission footprint

Graph 20



Source: IFC survey on Sustainable finance for central banks (2021).

## Forward-looking, social and governance indicators

While central banks reported that their main use cases of sustainable finance metrics primarily relate to environmental and sustainability indicators, there is also ongoing work on forward-looking, social and governance indicators.

In general, **forward-looking metrics seem to be a newer area of analysis** for many central banks, with their actual use remaining limited so far. Among these metrics, **climate target data** (both at the country and firm level) are by far of the highest priority (Graph 21, left-hand panel). Particular attention is put on firms' scenario analyses and transformation and enabling efforts in this context.

**Social indicators are much less used than climate-related data, even for those central banks ranking this topic as a high priority** (Graph 21, right-hand panel). The lack of data as such, limited standardisation/harmonisation of the underlying concepts/rules, and quantification challenges explain this limited usage. The most relevant indicators identified by central banks relate to working conditions and human rights. In particular, data on employment issues – including employee consultation and/or participation, employment and working conditions – are used for monitoring (eg in Sustainability Reports)

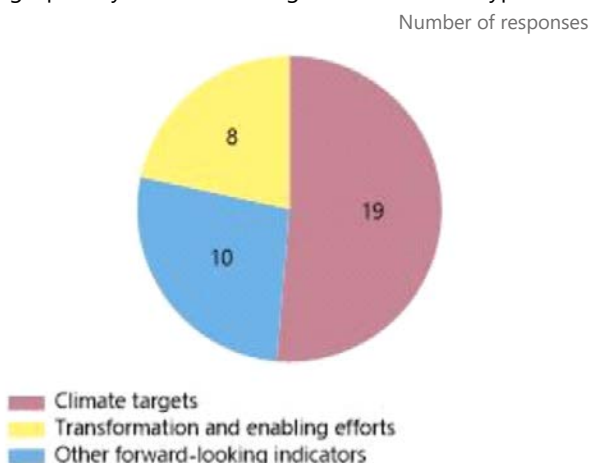
<sup>14</sup> Eurostat recently released time series of quarterly green gas emissions by economic activity since 2010.

and portfolio management purposes (when based on ESG criteria). The sources involved are mainly company reports, from which data can be extracted through data mining and web-scraping techniques (as currently explored in Spain).

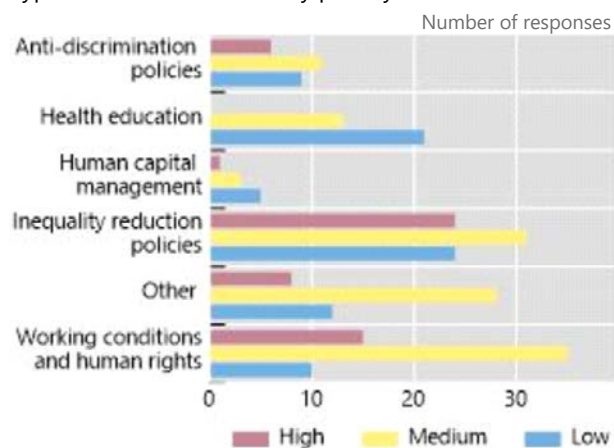
Key forward-looking and social indicators

Graph 21

High-priority forward-looking indicators: main types



Types of social indicators, by priority



Source: IFC survey on Sustainable finance for central banks (2021).

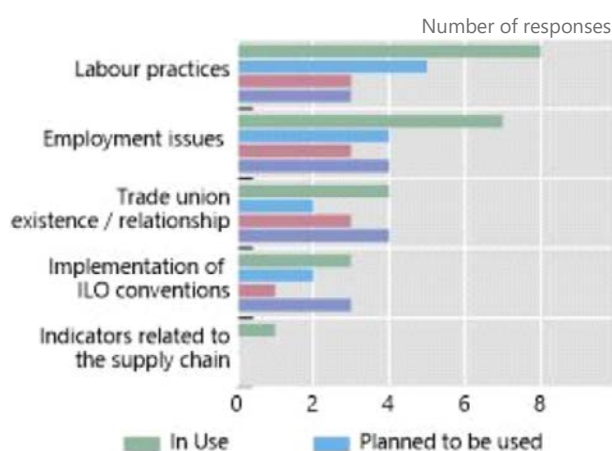
Another set of important indicators relates to central banks’ objectives in terms of **reduction of inequalities/protection of vulnerable population**. Data on financial inclusion as well as banking fees and microcredit information are the most commonly considered indicators in this context (Graph 22). They are used for microprudential supervision, general statistical compilations and financial inclusion measures. The information is collected mainly at the micro (ie individual banks/households) level, with the main sources being national/supervisory reporting exercises, followed by company reports and data collections organised by international organisations.

A third set of indicators relate to **anti-discrimination policies**. The indicators considered by central banks focus mainly on diversity issues such as gender diversity and equal treatment in employment and occupation.<sup>15</sup> The primary policy use cases include statistical compilation and monitoring, followed by asset management and financial stability purposes. Data sources often include company reports, private data providers and NSOs/public institutions.

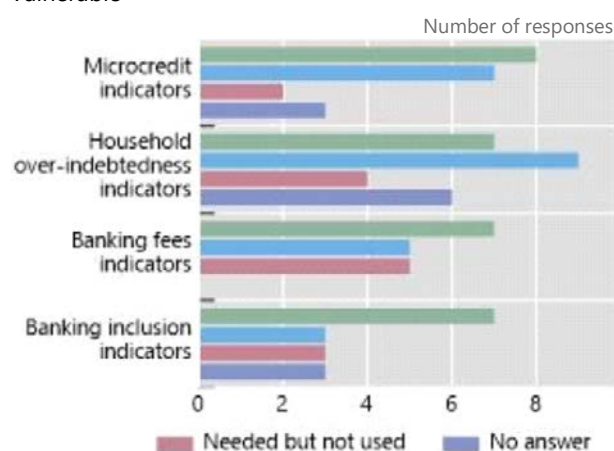
<sup>15</sup> Including age, gender, sexual orientation, religion, disability, ethnic origin and other relevant aspects.



Indicators of working conditions and human rights



Indicators of inequalities reduction/protection of vulnerable



Note: ILO: International Labour Organization.

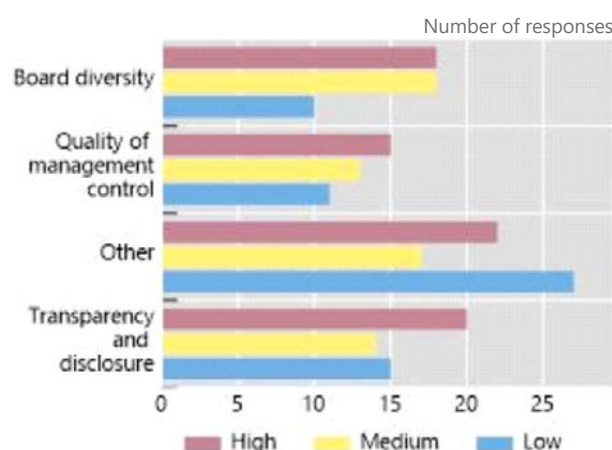
Source: IFC survey on Sustainable finance for central banks (2021).

**Turning lastly to governance indicators, these are also not very commonly used, with two exceptions related to transparency and board diversity (Graph 23).**

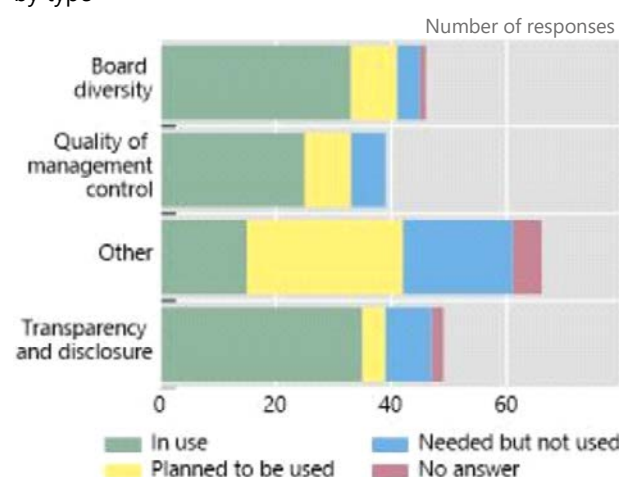
Regarding **transparency and disclosure**, the most commonly used indicators by far are the quality of financial communication and transparency of executives' compensation (Graph 24, left-hand panel). This information is primarily used to support (banking) supervision, followed by asset management and statistical activities. The main sources considered are national statistical/supervisory reporting exercises followed by external data providers and company reports.

Overview of the use of governance indicators

Types of governance indicators, by level of priority



Number of governance indicators used by central banks, by type



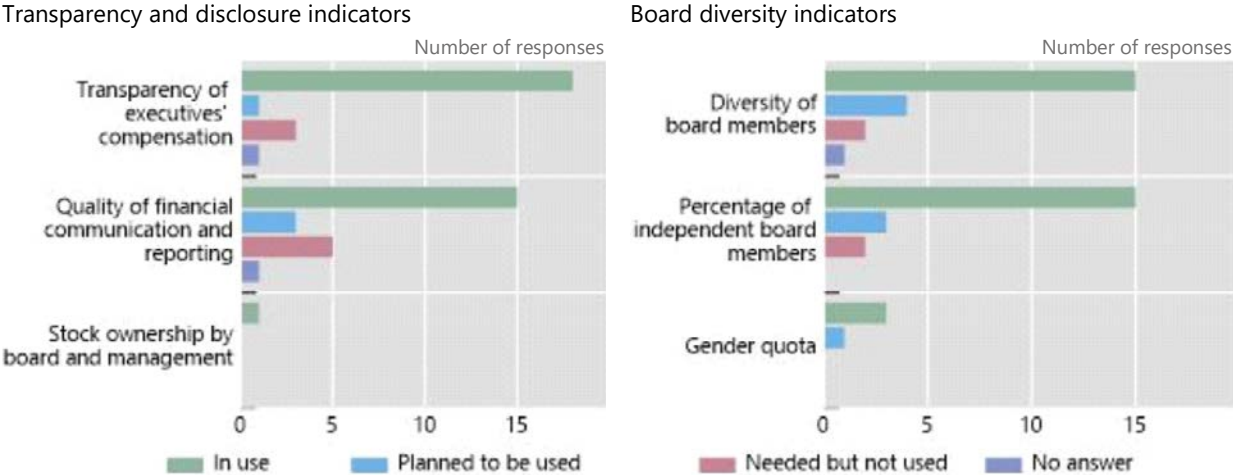
Source: IFC survey on Sustainable finance for central banks (2021).

**Board diversity indicators** are also commonly used: 17 central banks use them already and three central banks plan to do so. The two key indicators include (i) diversity in terms of age, gender, educational and professional backgrounds and geography; and (ii) the percentage of independent board members

(Graph 24, right-hand panel). In terms of purpose, this information is mainly used to support micro supervision, followed by asset management, statistics and macro financial stability tasks. The main data sources are company reports and supervisory reporting.

The most commonly used governance indicators relate to disclosure and transparency as well as board membership

Graph 24



Source: IFC survey on Sustainable finance for central banks (2021).

### Box 3: European initiatives to improve credit registers and securities holding statistics to support the compilation of sustainable finance data

The European Central Bank (ECB) has developed an economy-wide top-down climate stress test to assess the resilience of non-financial corporations (NFCs) and euro area (EA) banks to climate risks under various assumptions regarding future climate policies. This stress-testing framework comprises three main pillars: (i) climate-specific scenarios to project climate and macroeconomic conditions over the next 30 years; (ii) a comprehensive and highly granular set of backward- and forward-looking climate and financial data for millions of European companies and almost all monetary financial institutions in the EA; and (iii) a novel set of climate-specific models to capture the direct and indirect transmission channels of climate risk drivers for firms and banks.

A key contribution of the ECB framework was to extend the focus on granular counterparty-level data, since previous climate stress-testing efforts had concentrated on the sector-level impact of climate policies. Using firm-level information enabled the framework's users to estimate the full distribution of climate risk to which NFCs are exposed, and to account for heterogeneity across them, both in terms of the size of the firms and the location of their assets. This granularity is particularly important for physical risk, as the impact of natural hazards can widely differ even within a few kilometres.

The data set brings together four comprehensive streams of regulatory and private data sources:

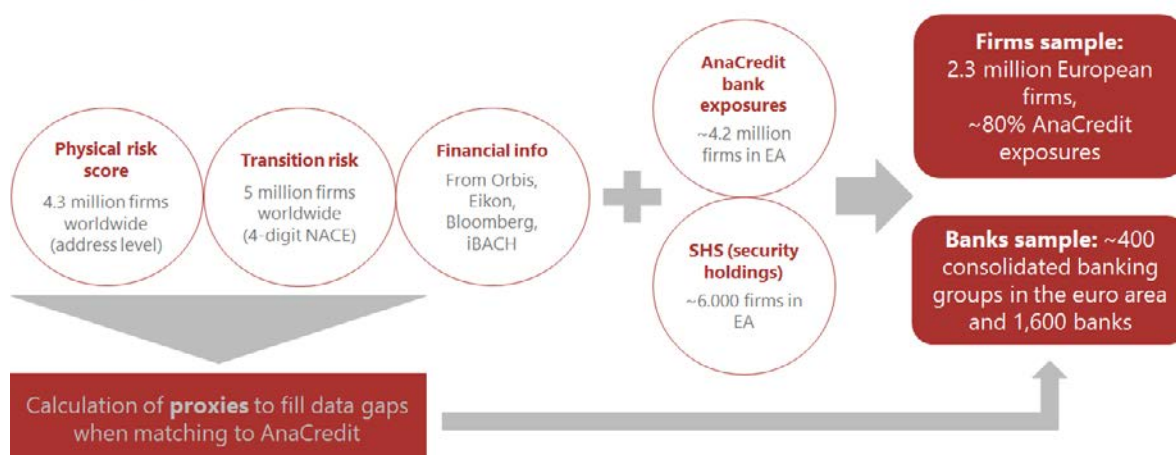
- (1) balance sheet data on banks' NFC counterparties (drawing from several sources, ie Orbis complemented by Eikon, Bloomberg and iBACH);
- information on climate risk, with two components on (2) firms' transition risk – with data on firms' emissions from Urgentem, comprising both backward- and forward-looking greenhouse gas emissions (the so-called Scopes 1, 2 and 3);<sup>20</sup> and on (3) physical risk – measured using forward-looking physical-risk scores on firms' vulnerability to future extreme weather events (taking into account their frequency and severity and estimated at granular level ie postal address), obtained from Four Twenty Seven; and
- (4) information on banks' individual loan exposures (extracted from AnaCredit) and on the corporate bond holdings of banks (derived from the Securities Holdings Statistics), in order to assess banks' financial resilience in the face of potential climate risks.

Graph 3.1 illustrates how these various sources of data have been brought together to conduct the stress test. Overall, the mapping provided complete financial and climate risk data for a total of 2.3 million European firms and 1,600 EA banks, covering around 80% of total loan exposures reported in the AnaCredit database.

Overview of ECB top-down climate stress test framework

Graph 3.1

#### Integrated data infrastructure



Source: ECB.

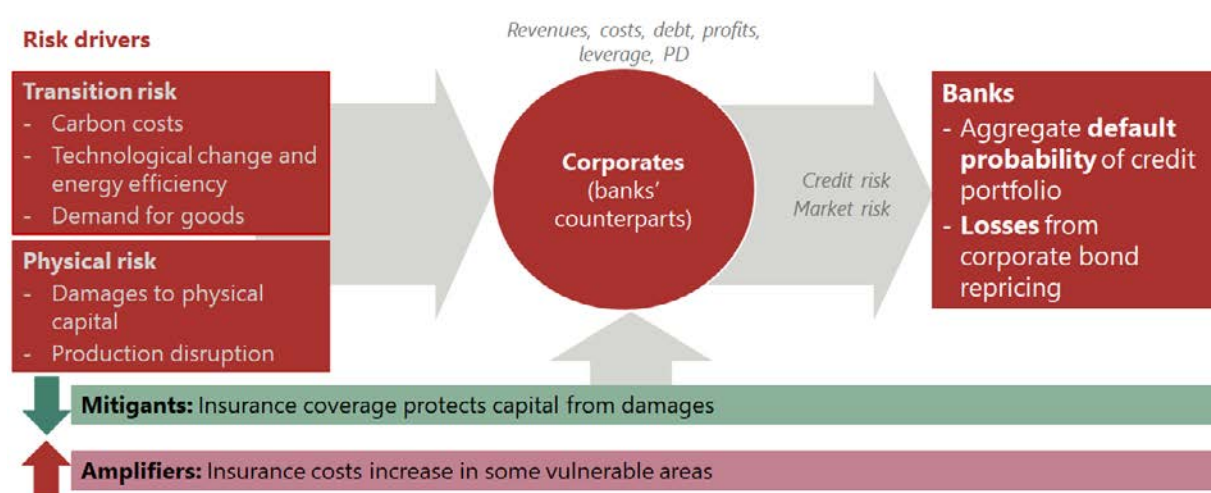
The matching process of the various data sets faced a number of challenges. As regards transition risk, most firms do not disclose information on their emissions. Especially, Scope 3 emissions were missing, which are highly important for capturing transition risk since Scope 3 emissions represent more than 85% of the world's overall carbon footprint. For this purpose, model-based estimations of firm-level emissions from Urgentem were used.

Regarding physical risk, a first issue was that precise data on firms' location were not always available. In order to assign risk scores to firms' facility locations, granular geographical proxies of physical risk scores were used for firms with missing addresses. Moreover, firms' physical risk needed to be translated into actual losses in terms of their physical capital. Expected losses were calculated by accounting for firms' exposure to both the direct and indirect impact from natural hazards. For the indirect impact, regional-level expected physical damages as a share of GDP were used, which were obtained from the NGFS scenarios. To do so, however, aggregate NGFS projections of physical damages had to be decomposed by country and year.

Schematic overview of the climate risk modelling framework

Graph 3.2

## Novel models to derive counterparty PDs



Source: ECB.

Granular data on forward-looking financial and climate information of European NFCs allowed several risk drivers of climate change to be measured, with estimations of their impact on firms' balance sheet and financial risk. The transmission of transition risk was modelled with the projected changes in carbon costs, technological progress and energy efficiency. Physical risk was captured with the future damage to firms' physical capital and production disruptions expected from natural hazards. Furthermore, climate risk mitigants were included through corporates' insurance coverage that may protect physical capital from damage. Climate risk amplifiers were accounted for by increasingly high insurance costs, especially in certain vulnerable areas.

Graph 3.2 presents a schematic overview of this climate risk modelling framework. Key advantages include the homogeneity of the models used, the consistency of data, the transparency of methodologies, and the comparability and replicability of results. The integration of NFC-level analysis into banks' credit and market risk exposures permitted to translate firm-level climate impacts into financial impacts on the EA banking system – with the calculation of portfolio-level probabilities of default and expected losses and the repricing of financial securities portfolios.

① This box benefited from the support of Tina Emambakhsh and Spyridon Alogoskoufis (ECB).

② Carbon emission reporting currently distinguishes between three scopes of emissions: (1) emissions from owned or controlled resources of a firm; (2) emissions that are indirect emissions from the generation of purchased energy; and (3) emissions including all other indirect emissions that occur in a firm's value chain. The broadest scope of a firm's emissions is then the sum of Scopes 1, 2 and 3; see Ehlers et al (2020).

## Box 4: Measuring the carbon footprint of bank loans to domestic non-financial corporations in Finland

The ECB has initiated a comprehensive action plan and a roadmap to incorporate additional climate change considerations into its policy framework, including carbon footprint indicators of the portfolios of financial institutions. In this context, the Bank of Finland's statistical function launched in 2021 an experimental project to compile carbon footprint indicators for banks' loans to NFCs.

The data compilation process was broken down into five steps, as described below:

1. The statistical business register (SBR) was used to define the target population of Finnish NFCs to be considered.
2. Corporate-level emission trading system (ETS) data from the Finnish Energy Authority were merged with firm-level loan data from the national analytical credit database (AnaCredit). The ETS data includes CO<sub>2</sub> emissions data from 123 debtor NFCs and it covers 77.5% of total CO<sub>2</sub> emissions of debtor NFCs for the year 2019.
3. Unavailable corporate-level emissions data were estimated using industry-level emission totals, derived from Statistics Finland's air emission accounts, and corporation-level information on staff size from the SBR.
4. Data on loans and balance sheet totals at the corporate level were acquired from AnaCredit and used to compile carbon footprint indicators for each of the domestic NFCs having loans.
5. Since national Air Emission Accounts are published with a long delay, National Accounts and ETS data were used to estimate air emission accounts for the most recent years.

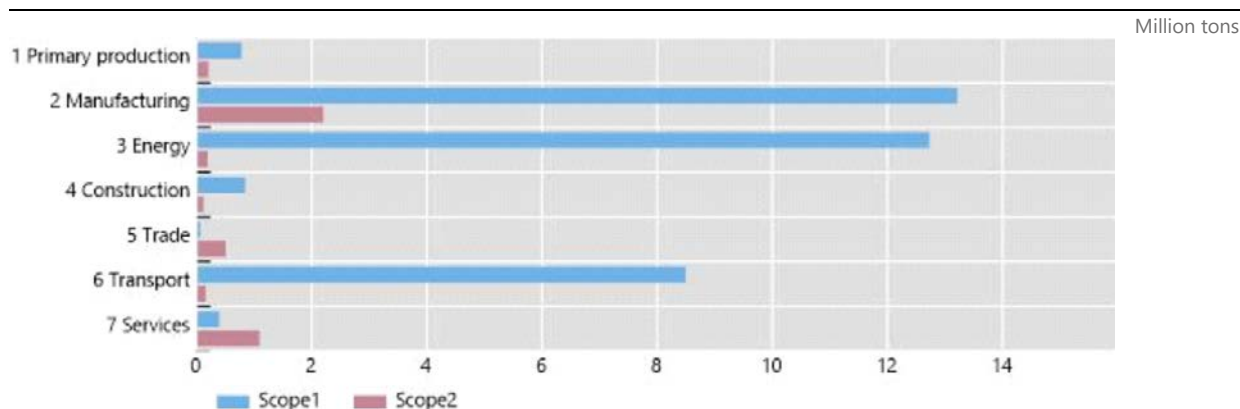
An important challenge with the granular approach followed was data availability. Indeed, verified data on emissions are available only for limited number of companies and have to be estimated otherwise. Other challenges include the fact that firms can receive financing from non-bank sources. Moreover, national-level analyses cannot capture the emissions of a corporation that are taking place outside national borders.

Estimating the carbon footprint of banks' stock of loans to NFCs can serve two main purposes:

- (i) The first one is to measure and monitor transition risks for the banking sector based on counterparty risk. For this, the approach needs to capture the broadest scope of firms' emissions (see Box 3). Scope 1 emissions are not sufficient for analysing transition risk when a firm has little direct emissions and is highly dependent on energy or other intermediate products with high CO<sub>2</sub> intensity. Therefore, Scope 2 and even Scope 3 emissions should also be considered. As shown in Graph 4.1, this is particularly important for those economic sectors in Finland such as trade and services for which the exposure to transition risk is distributed in a very different way between Scope 1 and Scope 2 emissions. Hence, one needs to estimate the intermediate inputs from the energy sector, eg using input-output tables, to define industry-level coefficients for Scope 2 emissions.

Scope 1 and Scope 2 emissions of domestic NFC loans financed by Finnish banks

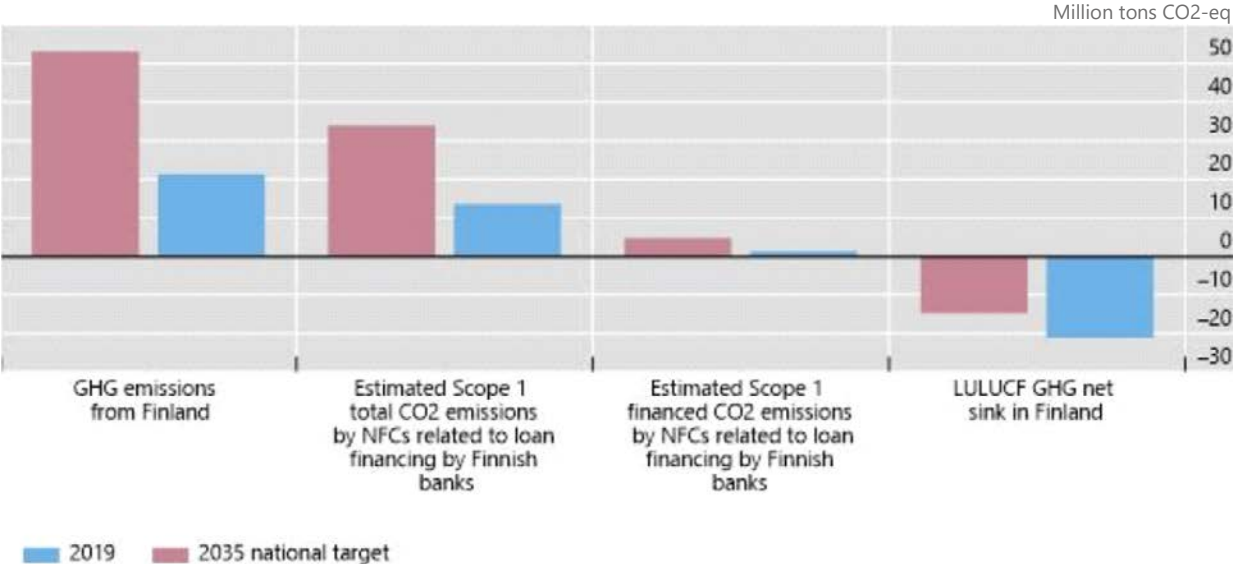
Graph 4.1



Source: Bank of Finland calculations.

(ii) The second purpose is to assess the contribution of the Finnish banking sector in pursuing the national net zero emissions goal by 2035. According to the Greenhouse Gas Inventory statistics, total country emissions were 53.1 million tons of CO<sub>2</sub> in Finland in 2019 and need to be reduced by 60%, to 21 million tons by 2035 to ensure net zero emissions (Graph 4.2). Moreover, estimates suggest that domestic NFCs financed by Finnish banks' loans emit a large share (64%) of the country's total Scope 1 emissions. These emissions would need to be reduced to 13.6 million tons of CO<sub>2</sub> in 2035 to be in line with the national net zero emission goal.

Emissions by the domestic debtor NFCs and Finland's national climate target Graph 4.2



Notes: GHG: Greenhouse Gas; NFC: Non-financial corporations; LULUCF: Land-use change and forestry.

Sources: Bank of Finland, Statistics Finland.

© This box benefited from the support of Ville Tolkki (Bank of Finland).



## Box 5: Sustainable finance data on physical risk: the case of Colombia

Colombia is significantly exposed to climate-related risks, with large-scale riverine floods being the main source of physical risk. In the past few decades, such events have led to major damage to real estate and other capital goods, with the 2010–11 floods leading to losses of USD 8.6 billion (equivalent to 2.5 % of GDP). However only a minor fraction (between 2 and 4 %) of such damage is typically insured. With climate change, adverse events are expected to increase in frequency and severity, with annual economic damage expected at USD 23 and 25 billion by 2030.

In 2019, the Financial Superintendence of Colombia (SFC) called for a better understanding of climate-related financial risk as a priority in its 2019 action plan related to climate change. This plan focuses on four key areas, including (1) taxonomy; (2) ESG integration and disclosure; (3) climate risk identification, assessment and transparency; and (4) capacity-building. For climate risk assessment, the SFC, with the World Bank's (WB) help, developed two approaches to conducting basic physical and transition risk vulnerability analyses. The aim was to understand the new tools and methodological methods involved, map data gaps, identify potential impacts and raise awareness. The analysis focused on three main channels through which climate-related risks impact Colombian banks' balance sheets: the impact on credit risk in their loan portfolio, the impact on the market value of their government bonds holdings, and the impact on their exposures through investments in other financial institutions.

For physical risks specifically, a stress test was developed at the municipal level to investigate the vulnerability of banks towards severe riverine floods. To conduct this exercise, the WB proposed three approaches particularly well suited for an EME: (1) to model climate risk in the absence of nation-wide probabilistic disaster scenarios; (2) to estimate the impact of floods-related economic damages on banks using spatial panel data on loan provisions; and (3) to extend a basic stress test model with spatially disaggregated credit risk and sovereign credit risk channels, in order to estimate the potential impact of floods on banks' profitability and solvency.

To explore the vulnerabilities of banks to specific scenarios, the analysis was built on quantitative data derived from a range of sources – the SFC, the Central Bank of Colombia (BR), the National Planning Department (DNP), the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), and the National Statistical Department (DANE) – complemented with ad hoc research and a review of the international literature.

### *Data sources used in the vulnerability analysis: the step-by-step approach*

The first step taken by the SFC to conduct the physical risk exercise was to identify the most material domestic physical hazards that could be caused by potential extreme events. This was done by analysing disaster events that had occurred in Colombia in the last decades, using data from the International Disaster Database ([www.emdat.be/](http://www.emdat.be/)). This information showed that earthquakes and floods had been the most economically damaging events since 1970 – especially the volcanic eruption of 1985, the earthquakes of 1999, and the Niña-related floods in 2010–11 – and also confirmed that only a minor fraction of the losses related to these damages were insured. To analyse risk at the geographical level, information on the areas prone to flooding (including past economic damage observed at municipal level) was combined with SFC regional data on credit exposures and loan loss provisions.

The second step was to identify three flood scenarios based on IDEAM's information, ie the Colombian Environmental Information System (SIAC) that comprises various data sets and analyses regarding environmental issues (see <http://www.siac.gov.co/>). These scenarios cover three periods, ie 2011–40, 2041–70 and 2071–2100, and include information on temperature and precipitation at regional levels. They were used to better understand the effects of climate change in Colombia by identifying the geographical locations that would probably experience flooding in the future.

For the third step (assessment of economic damages), probabilistic riverine flood models were used based on information from the WRI Aqueduct database, which provides estimates on economic damages at a national level, combined with other sources to estimate flood risk at municipal level.

For the fourth and final step, financial losses were estimated through two channels: (a) an increase in loan loss provisions; and (b) an increase in the sovereign credit spread. Combined with SFC's data on municipal loan exposures, sovereign bond exposures, and balance sheets per institution, this allowed to estimate the effect of each scenario on the capital position of the banks.

① This box benefited from the support of Mariana Escobar, Juan O Manrique, Daniel E Osorio and Carlos J Varela (BR).

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## Annex 1: Overview of key ESG metrics identified by central banks

The summary table below provides an overview of 1,403 ESG indicators identified as relevant by IFC central banks working on sustainable finance. These indicators refer to five broad types – *Environmental (Env.)*, *Forward Looking (FL)*, *Governance (Gov.)*, *Social (Soc.)* and *(broader) Sustainability (Sus.)* – and are classified into 73 consistent subcategories. For instance, the Env. type comprises 28 subcategories (green area below), covering indicators on “*Emissions footprint*” (used in 76 cases, noting that one country could use several distinct indicators belonging to this same subcategory) to “*Register of ecologically unsustainable companies*” (used in only one case).

The table provides statistics on the use of these indicators, grouped by subcategories, including a geographical breakdown by region and country type, the priority level assigned by countries and their degree of use. For instance, 12 (respectively 18) of the 76 indicators in the “*Emissions footprint*” subcategory are used in the Asia Pacific region (respectively in EMEs); 48 of them are considered of high priority by the survey respondents; and 41 are already currently used to support central bank activities.

More information on the indicators, including on the specific metrics used by members and their respective policy purposes, can be found in a separate Excel file published alongside the report. In addition, a dashboard available on the [IFC website](#) provides a data visualisation for the compiled indicators and their main characteristics.

Cat.	Indicator subcategory	Total	Region <sup>16</sup>				Country type <sup>17</sup>		Priority <sup>18</sup>			Usage <sup>19</sup>			
			EU	AM	AP	MEA	AE	EME	Hi	Me	Lo	Used	Plan	Need	N/A
Env.	Emissions footprint indicators	76	56	4	12	4	58	18	48	17	11	41	22	11	2
Env.	Exposures to extreme weather conditions	48	31	4	10	3	30	18	15	13	20	5	15	23	5
Env.	Fossil fuel energy consumption (oil, coal, gas)	39	26	5	7	1	25	14	14	14	11	20	12	6	1
Env.	Renewable electricity (wind, solar, hydro), other sources	31	17	5	5	4	15	16	11	8	12	14	10	5	2
Env.	Environmental taxes and subsidies	28	18	3	4	3	17	11	8	7	13	10	8	10	0
Env.	Energy-efficiency indicators	27	15	3	7	2	16	11	7	11	9	7	10	9	1
Env.	Losses due to extreme weather events	27	17	3	4	3	17	10	10	5	12	5	11	10	1

<sup>16</sup> Region: EU = European Union; AM = Americas; AP = Asia Pacific; MEA = Middle East and Africa.

<sup>17</sup> Country type: AE = Advanced Economy; EME = Emerging Market Economy.

<sup>18</sup> Priority: Hi = high; Me = medium; Lo = low.

<sup>19</sup> Usage: Used = currently used; Plan = planned to be used; Need = needed but not used; N/A: no answer.

Cat.	Indicator subcategory	Total	Region <sup>16</sup>				Country type <sup>17</sup>			Priority <sup>18</sup>			Usage <sup>19</sup>		
			EU	AM	AP	MEA	AE	EME	Hi	Me	Lo	Used	Plan	Need	N/A
Env.	Energy prices	23	13	3	5	2	12	11	6	9	8	11	8	2	2
Env.	Environmental-related labels for real estate	23	18	1	3	1	16	7	5	10	8	5	7	9	2
Env.	Propensity of extreme weather conditions	21	13	2	5	1	13	8	8	6	7	3	10	7	1
Env.	Green public investment, fiscal expenditures	20	14	2	3	1	13	7	7	4	9	3	6	10	1
Env.	Indicators related to supply chains or climate-related risks	20	10	3	5	2	10	10	7	4	9	2	5	11	2
Env.	Insured and uninsured losses related to natural catastrophes	20	12	1	6	1	14	6	8	4	8	5	5	9	1
Env.	Indicators related to chronic physical risks	18	12	2	3	1	12	6	5	5	8	7	6	4	1
Env.	Indicators related to circular economy	18	11	2	4	1	10	8	1	9	8	6	7	2	3
Env.	Emissions Trading Scheme allowances	17	12	1	2	2	10	7	8	2	7	6	7	3	1
Env.	Indicators related to water management / consumption	17	10	3	4	0	8	9	3	7	7	7	6	2	2
Env.	Insurance and re-insurance prices (ie premium)	15	7	2	4	2	6	9	6	2	7	4	3	6	2
Env.	Household expectations about climate change	14	10	1	2	1	9	5	2	4	8	0	2	11	1
Env.	Historical private and public aid provided after natural catastrophes	12	8	1	2	1	7	5	6	2	4	1	3	6	2
Env.	Indicators of climate-related risks / environmental performance of suppliers	12	8	2	2	0	7	5	1	5	6	2	3	6	1
Env.	Indicators related to biodiversity	12	8	1	3	0	7	5	1	4	7	2	5	3	2
Env.	Insurance coverage levels (ie insurance gap)	11	8	1	2	0	6	5	4	1	6	0	4	5	2
Env.	Indicators capturing technological innovation	10	6	0	3	1	6	4	1	5	4	1	1	4	4
Env.	Other indicators related to transition risk	6	2	1	3	0	2	4	1	4	1	1	2	1	2
Env.	Indicators related to deforestation / reforestation	3	2	1	0	0	2	1	0	2	1	2	1	0	0
Env.	Loan exposures to carbon-intensive industries	1	0	0	1	0	1	0	0	1	0	1	0	0	0
Env.	Register of ecologically unsustainable companies	1	1	0	0	0	0	1	1	0	0	0	1	0	0
FL	Climate targets for companies	25	18	2	3	2	16	9	12	8	5	3	12	9	1
FL	Climate targets related to GHG emissions, water usage, energy usage, etc.	25	18	2	4	1	16	9	11	7	7	9	12	3	1
FL	Climate targets of countries (eg climate neutrality by 2050)	20	12	2	5	1	11	9	10	5	5	4	9	5	2
FL	Indicators reflecting transformation and enabling efforts	20	13	1	5	1	13	7	9	4	7	2	7	8	3

Cat.	Indicator subcategory	Total	Region <sup>16</sup>					Country type <sup>17</sup>			Priority <sup>18</sup>			Usage <sup>19</sup>		
			EU	AM	AP	MEA	AE	EME	Hi	Me	Lo	Used	Plan	Need	N/A	
FL	Companies' scenario analyses (key aspects)	17	10	2	2	3	10	7	10	2	5	3	7	5	2	
FL	Specific measures over the next 15 years and intermediate targets	16	6	3	5	2	6	10	4	3	9	1	6	6	3	
FL	Climate Value at Risk (VaR)	4	4	0	0	0	4	0	2	1	1	1	3	0	0	
FL	Forward-looking climate scenarios	3	0	0	3	0	2	1	0	3	0	0	1	2	0	
FL	Action plan to promote women's participation and advancement in the workplace	1	0	0	1	0	1	0	0	1	0	1	0	0	0	
Gov.	Adequate management control	36	19	3	7	7	16	20	13	12	11	22	8	6	0	
Gov.	Quality and transparency of financial communication and reporting	25	14	3	4	4	11	14	12	5	8	16	3	5	1	
Gov.	Diversity of board members	23	13	2	4	4	12	11	7	9	7	15	5	2	1	
Gov.	Transparency of compensations of executives, employers and employees	23	12	3	5	3	10	13	8	8	7	18	1	3	1	
Gov.	Percentage of independent board members	21	12	2	4	3	10	11	9	8	4	16	3	2	0	
Gov.	Inclusion of ESG objectives in the policy of the company	18	12	3	3	0	9	9	5	6	7	5	7	5	1	
Gov.	Executives' involvement in ESG issues	15	10	2	3	0	8	7	6	3	6	3	4	5	3	
Gov.	Training of employees and executives on ESG matters	14	7	3	3	1	6	8	6	2	6	1	7	5	1	
Gov.	Variable compensation of executives integrating ESG criteria	9	7	1	1	0	6	3	3	3	3	1	5	3	0	
Gov.	Dependence of the company on a managing director	6	3	1	2	0	3	3	2	1	3	3	2	1	0	
Gov.	CEO and board duality / size	4	4	0	0	0	4	0	1	3	0	4	0	0	0	
Gov.	Stock ownership by board and management	1	1	0	0	0	1	0	0	1	0	1	0	0	0	
Soc.	Diversity issues	31	23	2	5	1	20	11	9	12	10	15	8	4	4	
Soc.	Quantitative and socio-demographic indicators on household over-indebtedness	26	15	1	7	3	12	14	8	11	7	7	9	4	6	
Soc.	Microcredit indicators such as number of microcredits	20	9	5	5	1	7	13	7	7	6	8	7	2	3	
Soc.	Labour practices	19	12	1	5	1	10	9	4	13	2	8	5	3	3	
Soc.	Employment issues	18	11	0	3	4	11	7	6	9	3	7	4	3	4	
Soc.	Health-related indicators	18	10	4	3	1	7	11	0	7	11	11	1	3	3	
Soc.	Banking fees indicators	17	8	2	5	2	7	10	5	8	4	7	5	5	0	

Cat.	Indicator subcategory	Total	Region <sup>16</sup>				Country type <sup>17</sup>			Priority <sup>18</sup>			Usage <sup>19</sup>		
			EU	AM	AP	MEA	AE	EME	Hi	Me	Lo	Used	Plan	Need	N/A
Soc.	Banking inclusion indicators (eg women's, youths', low-incomers' banking rates)	16	6	3	5	2	5	11	4	5	7	7	3	3	3
Soc.	Human capital indicators	16	9	2	3	2	7	9	1	5	10	8	4	3	1
Soc.	Community relations	15	11	1	3	0	10	5	2	9	4	6	5	2	2
Soc.	Existence of a collective bargaining agreement and trade union relationships	13	9	0	2	2	8	5	3	7	3	4	2	3	4
Soc.	Indicators related to the supply chain	10	7	1	2	0	6	4	2	5	3	3	3	1	3
Soc.	Government expenditure on education, total (% of GDP)	9	4	2	1	2	3	6	0	4	5	6	1	1	1
Soc.	Implementation of fundamental conventions of the ILO	9	5	1	2	1	4	5	2	5	2	3	2	1	3
Soc.	Consumer relations, including consumer satisfaction, accessibility	6	4	1	1	0	4	2	2	3	1	1	2	2	1
Soc.	Policy of sharing results with the company's employees	6	5	0	1	0	4	2	1	4	1	2	3	1	0
Soc.	Responsible marketing and research	5	4	0	1	0	3	2	1	3	1	1	2	2	0
Soc.	Percentage of salaried administrators	4	3	0	1	0	2	2	0	3	1	1	1	1	1
Soc.	Funding of non-profit solidarity companies	3	2	0	1	0	2	1	0	2	1	1	1	0	1
Sus.	ESG ratings	52	37	3	8	4	28	24	18	22	12	26	12	9	5
Sus.	Green / Sustainable bond holdings and issuance	47	30	5	8	4	30	17	34	3	10	26	12	6	3
Sus.	Green / Sustainable lending	42	24	4	9	5	21	21	28	3	11	11	15	12	4
Sus.	Labelled financial products holdings and issuance	35	23	4	5	3	21	14	28	2	5	19	6	7	3
Sus.	Exclusion of controversial sectors in the investment/ lending policy	28	16	1	7	4	17	11	8	11	9	10	7	9	2
Sus.	Green / Sustainable stock / Bonds market indices (composition and holdings)	23	11	3	6	3	10	13	14	2	7	8	4	9	2
Sus.	Consumer preferences for sustainable products / services	13	8	1	3	1	7	6	3	3	7	0	1	11	1
Sus.	Global reporting frameworks used by corporates in their non-financial reporting	5	4	0	1	0	4	1	3	1	1	1	3	1	0
Sus.	Independent green bonds verifier (developed by VEB.RF)	1	1	0	0	0	0	1	1	0	0	1	0	0	0

## Annex 2: List of IFC jurisdictions that responded to the survey

1. Albania
2. Algeria
3. Australia
4. Austria
5. Belgium
6. Bolivia
7. Canada
8. Chile
9. Colombia
10. Cyprus
11. Czech Republic
12. Estonia
13. European Union
14. Finland
15. France
16. Germany
17. Greece
18. Hungary
19. Indonesia
20. India
21. Ireland
22. Israel
23. Italy
24. Japan
25. Korea
26. Kuwait
27. Latvia
28. Lebanon
29. Lithuania
30. Luxembourg
31. Macao SAR
32. Malaysia
33. Mexico
34. CEMLA
35. Montenegro
36. Morocco
37. Netherlands
38. New Zealand
39. Nigeria
40. North Macedonia, Republic of
41. Norway
42. Peru
43. Philippines
44. Poland
45. Portugal
46. Romania
47. Russia
48. Saudi Arabia
49. Serbia
50. Singapore
51. Slovakia
52. Slovenia
53. South Africa
54. Spain
55. Sri Lanka
56. Sweden
57. Switzerland
58. Timor-Leste
59. Turkey
60. Ukraine
61. United States
62. Uruguay
63. Vietnam