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THE INSPIRE SUSTAINABLE CENTRAL BANKING TOOLBOX
Policy Briefing Paper 03

Central banks and climate-related disclosures: applying the TCFD's recommendations

May 2022

Summary

Central banks are increasingly exploring how climate-related financial risks and opportunities impact their price and financial stability mandates, as well as their own operations. They are also beginning to consider how their own actions, and those of the financial institutions they supervise, may contribute to and exacerbate climate change risks and opportunities.

Measuring and reporting – or disclosing – climate-related risks and opportunities is a key step in addressing these issues, for both individual institutions and the financial system as a whole. With this recognition, the Task Force on Climate-related Financial Disclosures (TCFD) was established, to guide financial institutions to make effective climate disclosures. The development of high quality, reliable, comparable and transparent climate disclosures can support decision-making and enable better understanding of the implications of climate change for central banks. Further, central banks can lead by example by demonstrating lessons learned from their own climate-related disclosures to other financial institutions and by using their influence over the financial rulebook to build the broader system architecture.

This paper reviews key elements of the recommendations made by the TCFD – first released in 2017 – and their application by central banks to date. The paper also considers potential enhancements for central banks' climate disclosures and their possible implications for the wider financial system. The fact that definitions, data, and methodologies for assessing climate-related issues are constantly evolving means that efforts to develop climate-related disclosures will need to follow a progressive approach, with the quantity and quality of disclosures improving in parallel with the progress made in these areas. A flexible framework also suits the distinct operational models and different mandates of central banks.

The recommendations made in this paper can be applied to the different central bank portfolios, including monetary and non-monetary and credit facilities, as well as financial stability and physical operations. They are designed to support a wider and more practical application of the TCFD recommendations by central banks.


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This paper is part of a toolbox designed to support central bankers and financial supervisors in calibrating monetary, prudential and other instruments in accordance with sustainability goals, as they address the ramifications of climate change and other environmental challenges. The papers have been written and peer-reviewed by leading experts from academia, think tanks and central banks and are based on cutting-edge research, drawing from best practice in central banking and supervision.

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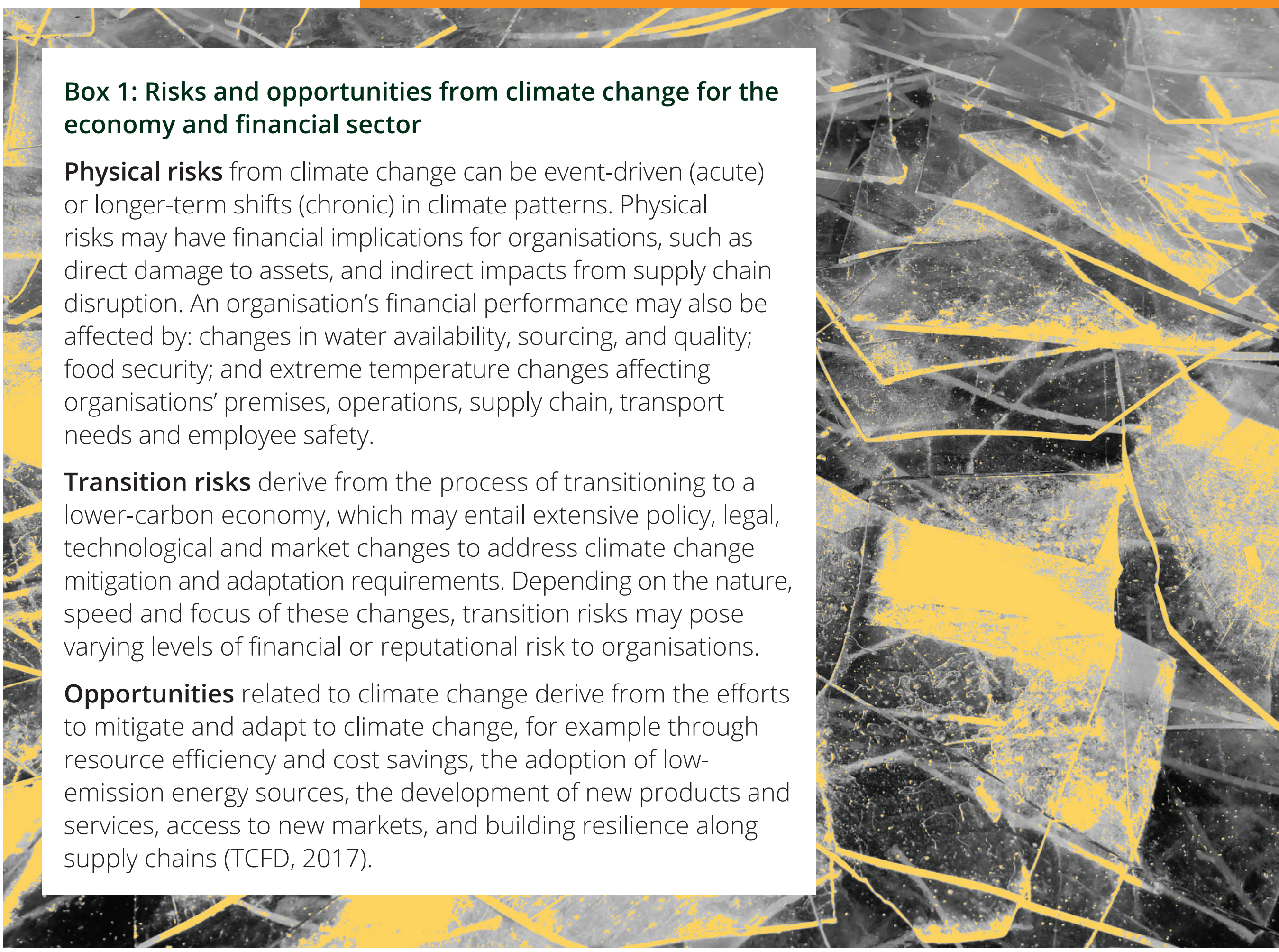
1. Introduction: Why is climate change relevant to central banks and why should they provide climate-related disclosures?

Central banks play a major role in the financial system, making them well placed to act as catalysts in addressing climate change. Their global view of climate-related risks and opportunities for the economy and the financial sector (see Box 1), and their capability to perform complex modelling and long-run analysis, makes them particularly qualified to steer market behaviour. Climate-related risks are a source of financial risk (NGFS, 2019), which may affect the ability of central banks to deliver on their price and financial stability mandates. Such risks can also have an impact on central banks' assets, the credit facilities they offer and their physical operations.

Transparency is a key prerequisite for informed decision-making and capital allocation, including over climate change issues. Where climate-related issues are concerned, many national governments and public sector organisations formally support the recommendations of the Taskforce on Climate-related Financial Disclosures (TCFD) as the preferred framework for disclosures.[1] The Network for Greening the Financial System (NGFS) emphasises the importance of a robust and internationally consistent climate and environmental disclosure framework and its members are among those organisations that have pledged their support for the TCFD's recommendations.

[1] As indicated by the global supporters of the TCFD recommendations and the alignment of official reporting requirements in several jurisdictions globally (including Brazil, EU, UK, Switzerland, Hong Kong, Japan, Singapore and New Zealand).



Box 1: Risks and opportunities from climate change for the economy and financial sector

Physical risks from climate change can be event-driven (acute) or longer-term shifts (chronic) in climate patterns. Physical risks may have financial implications for organisations, such as direct damage to assets, and indirect impacts from supply chain disruption. An organisation's financial performance may also be affected by: changes in water availability, sourcing, and quality; food security; and extreme temperature changes affecting organisations' premises, operations, supply chain, transport needs and employee safety.

Transition risks derive from the process of transitioning to a lower-carbon economy, which may entail extensive policy, legal, technological and market changes to address climate change mitigation and adaptation requirements. Depending on the nature, speed and focus of these changes, transition risks may pose varying levels of financial or reputational risk to organisations.

Opportunities related to climate change derive from the efforts to mitigate and adapt to climate change, for example through resource efficiency and cost savings, the adoption of low-emission energy sources, the development of new products and services, access to new markets, and building resilience along supply chains (TCFD, 2017).

Climate-related disclosures by central banks can be beneficial in the following ways:

- **Placing the spotlight on climate and raising awareness:** Disclosures can help central banks to raise awareness among the public and within the financial system of the risks and opportunities from climate change.
- **Leading by example:** Central banks are in a position to promote best practice on disclosing climate-related financial risks and opportunities against the TCFD framework, and provide a template or pathway for other financial institutions through their own disclosures. As a growing number of central banks and financial supervisors are moving towards recommending or expecting mandatory TCFD disclosures by the entities they supervise, leading by example is becoming all the more important.
- **Enhancing supervision:** The experience of preparing their own TCFD disclosures – establishing the necessary framework, policies, procedures and capabilities – will build knowledge within central banks, helping them to better relate to and guide the financial institutions they supervise in this area.
- **Reducing data gaps:** Disclosures will help to address the limitations of current climate-related data, which is often of inadequate quality, availability and consistency, by creating datasets that can be tracked over time. In turn, improved data allows central banks to conduct meaningful surveillance of climate-related risks in the financial sector.
- **Communicating future pathways:** Disclosures are a means for central banks to communicate to the public their plans for aligning their strategy and operations with pathways for reducing greenhouse gas emissions. This helps to mitigate potential risks, notably reputational risks. The disclosures may also indicate to the users of disclosed information, including the financial sector, how these issues may be embedded in their monetary policy implementation framework, to support decision-making.

"As a growing number of central banks and financial supervisors are moving towards recommending or expecting mandatory disclosures, leading by example is becoming all the more important."

2. The TCFD recommendations and response from central banks

2.1. An overview of the TCFD recommendations

The TCFD was established in 2015 by the Financial Stability Board in order to develop recommendations for more effective climate-related disclosures that could "promote more informed investment, credit, and insurance underwriting decisions", enabling stakeholders to "understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks" (TCFD, n.d., a). In 2017, the TCFD released climate-related financial disclosure recommendations that aimed to help companies and other organisations to provide useful information that would support informed decisions and efficient capital allocation.

The TCFD recommendations are voluntary and are intended to not contradict any existing disclosure requirements for entities, like the public disclosure requirements on financial institutions' risks and capital adequacy (see Pillar 3 in Table 1 below). The TCFD encourages companies issuing public debt or equity, as well as financial institutions, to apply these recommendations and include the disclosures in their annual financial statements, while applying appropriate controls and governance throughout the reporting process. They are structured around four interlinked pillars that represent an organisation's main operating elements: governance; strategy; risk management; and metrics and targets (Table 1).

Among the TCFD recommendations, the disclosure of information and results of climate-related scenario analysis (recommendation [c] under Strategy) is a key tool for organisations to be able to understand the strategic implications of climate-related risks and opportunities and to identify indicators to use for monitoring the external

Table 1. TCFD pillars and supporting recommended disclosures

TCFD pillars	Recommended disclosures
Pillar 1: Governance Disclose the organisation's governance around climate-related risks and opportunities.	a) Describe the board's oversight of climate-related risks and opportunities. b) Describe management's role in assessing and managing climate-related risks and opportunities.
Pillar 2: Strategy Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning where such information is material.	a) Describe the climate-related risks and opportunities the organisation has identified over the short, medium and long term. b) Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning. c) Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.
Pillar 3: Risk management Disclose how the organisation identifies, assesses and manages climate-related risks.	a) Describe the organisation's processes for identifying and assessing climate-related risks. b) Describe the organisation's processes for managing climate-related risks. c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organisation's overall risk management.
Pillar 4: Metrics and targets Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	a) Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process. b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas emissions, and the related risks. c) Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets.

Source: TCFD (2021c).

"The TCFD's 2021 status report revealed the largest ever annual increase in disclosures aligned with its recommendations."

environment. The outcome of this exercise may provide early warnings for central banks to reassess and adjust their strategies.

2.2. Central banks' adoption of the TCFD recommendations

In terms of central banks, their application of TCFD recommendations to date has been limited, but more are making commitments to increase their climate-related disclosures and apply the recommendations.

The TCFD's 2021 status report revealed the largest ever annual increase in disclosures aligned with its recommendations and that more than 2,600 organisations had endorsed them (TCFD, 2021a). However, there are varying degrees of application of the recommendations. Entities face challenges in implementing some of them, especially in quantifying and evaluating the effects and risks of climate change. [2]

An NGFS survey of 40 central banks in 2020 found that only 10 per cent were applying the recommendations, but another 30 per cent said they were considering doing so in the future (NGFS, 2020). Some are providing climate-related disclosures in annual governors' reports and sustainable investment reports.[3] Further illustration of increasing commitment is the declaration in February 2021 by the Eurosystem central banks of a common stance for applying sustainable and responsible investment principles for non-monetary policy portfolios, which also promotes disclosures of climate-related risks.[4] (Examples of central bank climate-related disclosures are provided in Section 4 below.)

[2] While quantity and quality of disclosures have improved significantly, only 50 per cent of the companies reviewed by the TCFD provided disclosures aligned with at least three of the 11 recommended disclosures.

[3] These reports may cover a wide range of objectives, strategies and investment practices, with objectives ranging from addressing sustainability risks to generating a positive impact, and the scope varies from climate-specific to broader environment, social and governance (ESG) approaches (NGFS, 2020).

[4] In July 2021, the European Central Bank (ECB) announced in its action plan for climate-related issues that it will introduce disclosure requirements for private sector assets, as an eligibility criterion or as a basis for a differentiated treatment for collateral and asset purchases (ECB, 2021).

Additionally, at COP26, the United Nations climate change conference of November 2021, the NGFS released the 'Glasgow Declaration' in which its members committed to supplementing the set of NGFS practical guides with guidelines on TCFD-aligned reporting for central banks (NGFS, 2021b). COP26 also saw a large number of central banks, financial supervisors and regulators from around the world publishing individual pledges or strategies on climate-related issues.[5]

Apart from the TCFD recommendations, central banks may also provide sustainability-related disclosures as part of the application of the UN Principles for Responsible Investment or they may provide specific disclosures on their sustainable and responsible investment practices – such as the carbon footprint of their investment portfolios. Central banks already provide disclosures on their governance and organisational structure, strategies and risk management. All these may be a useful basis from which to develop disclosures under the TCFD recommendations.

"The actions of central banks shape markets, so the system-wide implications of their actions need to be considered."

3. Applying the TCFD recommendations

3.1. Methodology: How should central banks enhance disclosures? What are the data and metrics needed?

The TCFD recommendations and principles for effective disclosures are appropriate for central banks. However, central banks are different from other financial institutions insofar as their main mandate is usually to safeguard monetary and financial stability; nor are their operations commercially driven. The actions of central banks shape markets, so the system-wide implications of their actions need to be considered. These peculiarities call for more specific guidance for central banks on their TCFD disclosures, as we outline in this paper.

Central banks should consider the following overarching principles to develop disclosures in a way consistent with one another:

- **Apply a 'materiality approach'** to understanding, identifying, measuring and managing climate-related issues with most emphasis given to the most relevant issues – particularly in financial terms – relating to the central bank's mandate, internal and external business and operational environment.
- **Adopt a holistic approach** (commonly referred to as a 'double materiality approach') for identifying and addressing the issues that need to be disclosed, considering the impact of climate change on the central bank and vice versa. This includes the climate impact of central banks' monetary and prudential policies and their investing and operating activities (which in turn may become material if they start to affect the central bank's activities).
- **Provide disclosures for each of the bank's main activities:** for example, monetary policy, asset management,[6] financial stability and physical operations.
- **Accompany disclosures regarding estimates with detailed explanations of the limitations** and the assumptions used (to avoid information being misinterpreted)[7] and declarations of any data sourced from third parties.

The following paragraphs provide a non-exhaustive description of the specific areas in which central banks may provide disclosures for each thematic area of the TCFD recommendations. Figure 1 then summarises these points.

Governance

One of the key elements in central banks' disclosures is information about the climate-related objectives of the central bank and the interplay between climate-related issues and the bank's legal mandate. This information aids understanding of the role of a central bank in addressing climate-related issues and how such issues may affect its ability to deliver on its mandate.

[5] Examples include the European Central Bank, Bank of England, Bank of Canada, US Federal Reserve, Banco Central do Brasil, Reserve Bank of Australia, People's Bank of China, Bank of Japan. The NGFS has a full list of central banks and regulators on its website at https://www.ngfs.net/sites/default/files/ngfs_contribution_to_cop26_contributing_members.pdf.

[6] Monetary policy operations may include the provision of lending facilities to counterparties by central banks for collateral. Asset management may include central bank portfolios for implementing their monetary policy (such as securities portfolios of asset purchase programmes) and non-monetary policy portfolios (such as own funds and pension portfolios). Banks may also hold foreign exchange reserves for monetary and non-monetary purposes (NGFS, 2021a).

[7] In the case of estimates, there is a high risk of misinterpretation of information due to the high level of uncertainty embedded and the several assumptions, proxies and complex models used.

Disclosures should address how climate change risks and opportunities have been embedded in governance structures. Embedding responsibilities for climate change issues in a central bank's oversight and management functions signals that these are being addressed. Disclosure of the ways in which policies, procedures and frameworks have been amended to address climate-related issues is also key, as well as a description of the roles and responsibilities that have been assigned for addressing them. This may also be supported with disclosures about the frequency and form of relevant discussions in the meetings of a central bank's boards, committees, senior management and decision-making bodies.

Strategy

In disclosing their strategy for addressing climate risks and opportunities, central banks ideally should include the following elements:

- **Materiality:** A description of how materiality considerations have been applied to identify and address climate-related risks and opportunities relevant to the strategy, including a description of the physical and transition drivers that pose a material financial impact on the central bank.
- **Action taken:** An explanation of how the central bank has amended strategies and operational frameworks across different areas of operations,[8] including information on what has guided the selection of priority areas. For example, central banks may disclose any targets and plans for the reduction of financed greenhouse gas emissions in their credit facilities and investment portfolios and/or alignment with emissions reductions pathways.
- **Scenarios:** Details on the impact of a range of different climate-related scenarios on a central bank's portfolio, using different assumptions for the evolution of key parameters contributing to physical and transition risks (such as carbon prices or average temperature outcomes) and time horizons (short, medium and longer term). Scenarios could include those where the rise in global temperature is limited to 2°C above pre-industrial levels or lower (including net-zero scenarios where the bank's jurisdiction has committed to net-zero) and scenarios where no policy action is implemented and there is a failure in limiting global temperature rise. The NGFS scenarios may be used with appropriate tailoring to a central bank's specificities and reporting objectives. These disclosures could provide additional insights into how the strategy of a central bank may perform in different possible future circumstances and the resilience of the bank's mandate, strategy, plans, actions and financial performance against climate-related risks and opportunities.
- **Process:** Use of disclosures to cover key lessons learned from the process of embedding climate-related issues into a central bank's strategy and activities, including information on how the bank has used or plans to use any external data providers and whether it plans to develop additional competencies based on the outcomes of the estimates performed.

"The NGFS scenarios may be used with appropriate tailoring to a central bank's specificities and reporting objectives."

Risk management

The material climate-related issues identified by central banks for strategic purposes, including responses to them and the methods and data to be used, can inform their risk management processes. Central banks should explain how they have incorporated these issues into their risk management framework and how these issues influence changes to existing metrics or the development of new ones. They should also specify whether climate-related risks are treated as a standalone risk or as drivers of existing types of risks.

[8] Subject to confidentiality considerations, central banks may disclose information on their sustainable and responsible investment strategy, such as which portfolios and activities are included, the main elements of the strategy and how this strategy interacts with their existing risk management framework.

Central banks should disclose the process and approaches they have used to identify climate-related risks and their estimated impact under different scenarios and assumptions and across different time horizons. Where materiality considerations differ to those identified for strategic purposes, additional disclosures may be helpful to explain the reasons for that.

Disclosures need to cover how central banks manage these risks and the materiality principle applied for this purpose. This applies across banks' credit operations, investment portfolios and physical operations, as well as across sectors and geographies, as relevant. Disclosures should differentiate between the estimated impacts of physical risks and transition risks, and the sub-components of each (such as acute and chronic risks for the former and policy, technology and market preferences for the latter). All material risks ideally should be assessed together (rather than separately), as climate-related risks are interdependent and interact with one another.

A combination of backward-looking and forward-looking methodologies should be used as appropriate to the availability of data and type of assessment performed.[9] However, it is important that the estimates used are consistent and comparable across time and that any differences are sufficiently explained.

Considering that not all central banks will be at the same level of advancement in their practices, a progressive approach may be more feasible, by performing more backward-looking and/or qualitative assessments, first focusing on the higher priority portfolios and activities. However, there will be an increasing need to implement more forward-looking approaches over time, to address the uncertainty of the evolution of climate-related risks.

"There will be an increasing need to implement more forward-looking approaches over time, to address the uncertainty of the evolution of climate-related risks."

The disclosures should explain the types of data used, their sources and their limitations. In the understanding that the quality and availability of data is still being improved, it is important that central banks disclose any proxies and methodologies they have used and any sources and tools from third parties. As the estimates are likely to cover the bank's portfolios and activities only partially, it may be useful also to disclose which share has been included.

Metrics and targets

Different metrics may be disclosed for physical and transition risks and opportunities, and for performing backward- and forward-looking assessments, possibly with more than one used in each case. Central banks may also disclose their methodologies for calculating any metrics provided and include a trend analysis of the performance of these metrics.

On target-setting, central banks need to disclose how they have set, applied and monitored any targets for emissions reduction, for which portfolios and operations, and for which physical and transitions risks, as well as opportunities. Targets may be linked to the metrics used previously for monitoring risks and opportunities, be specific and time-bound with intermediate targets, and have a base year for comparison, to demonstrate externally the bank's progress over time. This may also help the bank to monitor its progress and adjust its targets, strategy and risk management accordingly to meet its objectives.

Setting metrics and targets can be a challenging exercise, as attested to by the Bank of England's Executive Director for Financial Stability Strategy and Risk, Sarah Breeden: "We found identifying useful metrics to set targets for risk management the most difficult aspect" (Breeden, 2020).

[9] Backward-looking methodologies could include analysis of exposures' vulnerability to climate change, concentration analysis of exposures across high-emitting sectors and exposures in vulnerable geographies. Forward-looking methodologies could include scenario analysis, stress testing and reverse stress testing. Reverse stress tests aim to identify combinations of different climate-related risk factors that may cause a defined critical financial loss for the central bank.

Figure 1. Summary of TCFD disclosures by central banks under the four pillars

Governance

Oversight of climate change risks and opportunities:

- How climate-related topics are included in objectives, decisions, actions, plans.
- Process and frequency of discussions.
- Performance of monitoring and updates to meet objectives and targets.

Management of climate change risks and opportunities:

- Assignment of specific roles and responsibilities.
- Reporting lines to the board and other decision-making bodies.
- Amendments to and creation of additional policies, procedures and frameworks.

Strategy

- Description of the materiality approach to identify key issues.
- Identification of relevant physical and transition risks and opportunities.
- Use of different time horizons and scenarios to assess impact.
- Targets and plans for the reduction of greenhouse gas emissions and alignment to emissions reduction paths.
- Summary of lessons learned and follow-up actions from understanding, identifying and estimating impacts.

Risk management

- Assessment of how climate-related issues from strategic response are embedded in risk management: whether treated as a standalone new risk or embedded in existing risks.
- Process and approaches to identify, estimate and manage the impact of material climate-related risks under different scenarios and across different time horizons.
- Assumptions and limitations of methodologies and estimates.
- Types of data used, sources and limitations.

Metrics and targets

- Different metrics to be used for different assessments across different business areas.
- Methodologies for calculating metrics and any changes made since previous reporting.
- Trend analysis of the performance.
- Targets set for achieving strategic objectives.
- Regular monitoring of targets and updates made as needed.

Source: Compiled by authors.

Table 2 below includes some indicative (but not exhaustive) examples of metrics and targets that may be disclosed by central banks.

3.2. What is the expected impact on the real economy?

Momentum is building among financial supervisors to make climate-related disclosures mandatory. Ultimately, climate-related disclosures will support the scaling-up of sustainable finance and the resilience of the financial system in the face of climate change risks as more and better data and information drives more informed decision-making, improved risk management, and a greater allocation of capital towards financing the transition to a net-zero emissions economy and climate change adaptation plans.

"Momentum is building among financial supervisors to make climate-related disclosures mandatory."

Table 2. Examples of climate-related metrics and targets by area of disclosure

Area of disclosure	What to disclose	Possible breakdown
Physical risks and opportunities	*Backward-looking:* • Exposures and collaterals in areas of physical hazards. • Income from activities exposed to physical risk. • Historical losses from catastrophic events. • Assets aligned to a taxonomy. • Assets to limit damages from climate change (e.g. adaptation financing). *Forward-looking:* • Targets for reducing exposure to investments highly exposed to physical hazards. • Targets for achieving risk mitigation measures for investments exposed to high physical risk. • Possible impacts of different scenarios of physical risks.	• By hazard, splitting between acute and chronic risks. • By spatial granularity required for accurate projections. • By type of CB activities (e.g. own investments, policy portfolios). • Across sectors and geographies. • In amount or share of assets (for exposures and collaterals) or share of income (for revenue and losses). • For forward-looking metrics, by scenario used, time horizon, key assumption used.
Transition risks and opportunities	*Backward-looking*: • Exposures and collateral vulnerable to transition risk. • GHG emissions of exposures. • Financed emissions for credit and investment portfolios (weighted average carbon intensity by counterparty[1]). • Income from investments in high emitters. • Assets aligned to a taxonomy. • Assets (e.g. adaptation financing) to manage adverse impacts from the transition. *Forward-looking:* • Implied temperature rise[2] of portfolios. • Future emissions of exposures for different transition pathways. • Possible impact of different scenarios of transition risks. • Targets for reducing the financing of high emitting activities. • Targets for increasing the share of investments in sustainable instruments and activities.	• By driver of transition risk (e.g. policies, technology, preferences). • By type of CB activities (e.g. own investments, policy portfolios). • Across sectors and geographies. • Amount or share of assets (for exposures and collaterals) or share of income. • For forward-looking metrics, by type of scenario used, time horizon, key assumption used.
Physical operations and governance	*Backward-looking:* • Scope 1, 2 and 3 emissions.[3] • Value of own property exposed to physical risk. • Damages from catastrophic events. • Measures to mitigate and/or adapt to climate change. • Number of full-time equivalent (FTE) posts dedicated to climate-related issues. • Number of climate-related training courses provided. • Investment in data, tools, systems. • Share of remuneration of executive management linked to climate-related issues. *Forward-looking:* • Targets for decreasing emissions. • Targets for increasing the number of FTE posts, training courses, investments in data, tools and systems; share of remuneration linked to climate-related issues.	• By type of physical operation. • In amount or share of assets (for property) or share of income (for losses). • Amount or share of damages insured. • For resources, training courses, data/tools and remuneration: by type of CB activities.

Notes:

1. *May be defined as the product of: i) share of credit facility or investment in the bank's portfolio and ii) emissions of counterparty to the revenue of counterparty of the credit facility or issuer. For sovereigns, revenue to be replaced by the GDP of the issuer.*
2. *An implied temperature rise metric attempts to estimate a global temperature rise associated with the greenhouse gas emissions of one or more entities. GHG = greenhouse gases; CB = central bank.*
3. *Example Scope 1 emissions include from consumption of resources such as gas and fuel. Example Scope 2 emissions include from consumption of electricity purchased. Example Scope 3 emissions include from business travel of personnel or office supplies. Activities may relate to assets owned, operations and cash production and they may include those from procurement and public tenders.*

Source: Compiled by authors.

As far as central banks are directly concerned, enhanced TCFD disclosures may help to identify and reduce climate-related risks in their own portfolios, limit their exposure to political and reputational risks, and safeguard their credibility, all in the interest of fulfilling a central bank's mandate and supporting the financial system – and ultimately the economy. To achieve these outcomes, the disclosures must be transparent and useful for decision-making, as well as consistent with the mandate and legal obligations of the central bank.

The process of developing the disclosures may help a central bank to broaden its understanding of climate risks and opportunities and be able to improve how it manages risks in its portfolios and balance sheet. The same applies to others who prepare these disclosures, including financial institutions and corporates, ultimately creating benefits to the wider public, the financial system and the economy.

4. Examples of where climate disclosure has been applied, and the benefits and challenges of disclosure

4.1. Application

While the number of central banks providing climate-related disclosures is limited, interest is intensifying and a growing number have stated their intention to start disclosing in the future. Institutions in the earlier stages can learn from their central bank peers already embarking on this process, as well as from other financial institutions outside the central banking community.

To date, central banks' climate-related disclosures have varied in both the frequency and the form in which they are published. Some have included them in reports they already publish, such as sustainable and responsible investment reports or annual reports, some produce dedicated reports on climate-related issues, and others publish these disclosures on dedicated sections of their websites. The granularity and comprehensiveness of disclosures also varies across the four TCFD pillars and the operations that they cover. Table 3 below illustrates the varied nature of climate-related disclosures across selected central banks.

In embarking on the process of disclosure, it is typical for central banks to follow an approach in stages, either with regard to the pillars of the TCFD recommendations disclosed or the disclosures provided within a pillar. For example, the Eurosystem central banks announced in February 2021 that they will provide climate-related disclosures for euro-denominated non-monetary policy portfolios, starting with metrics and targets as a minimum. An example of a staged approach within one of the pillars is shown by De Nederlandsche Bank, which reports on Scope 1 and Scope 2 emissions for its own-account investments and plans to add Scope 3 emissions in a few years, once data availability has improved. Similarly, in its first report published in 2020, the Bank of England included Scope 1 emissions for the calculation of the implied temperature rise, but following a refinement of the provider's methodology, Scope 2 and Scope 3 were included in its 2021 report.

Given the currently limited set of examples from the central bank community in applying the TCFD recommendations, central banks can also look to learn from the wider financial sector. While there will be important differences (such as supervisory duties being solely in the purview of central banks), there are also some commonalities with some other types of financial institutions (e.g. public pension funds or asset managers) that are also exploring climate-related risks and opportunities in their portfolios.

Table 4 on page 12 summarises, for selected financial institutions, reasons for developing the TCFD disclosures, the process they have used and lessons learned from both the benefits and challenges encountered.

"Developing the disclosures may help a central bank to broaden its understanding of climate risks and opportunities."

Table 3. Selected examples of climate-related disclosures by central banks

Central bank	Categories	TCFD aligned?	Output	Description
Banco Central do Brasil	• Governance • Risk Management	Yes	Report on social, environmental and climate-related risks (Sept 2021) and Integrated Risk Management Policy	Governance chapter describes purpose, structure and engagement, and how these risks are embedded in strategic risk evaluation.
Banque de France	Governance	Yes	Annual Report and Responsible Investment Report (since 2019)	Responsible Investment report presents the bodies in charge of implementing the strategy, and how the Bank's general governance fits with the responsible investment strategy.
Bank of England	• Governance • Strategy • Risk Management • Metrics and Targets	Yes	Disclosure Report (since 2020)	Comprehensive report covering all four areas and following the TCFD recommendations, including a scorecard approach for measuring physical risk exposures for specific assets.
De Nederlandsche Bank	• Governance • Strategy • Risk Management	Yes	Annual Report	Annex to the 2020 Annual Report includes 'First report on financial climate-related risks and opportunities', which covers how climate priorities are integrated into its work and which internal bodies are responsible for shaping policies (including role of governing board in prioritising).
Risksbank	Metrics and Targets	Yes	Sustainability Strategy and Economic Commentary	Disclosure of carbon footprint of own portfolio and of assets in foreign exchange reserves.
Bank of Finland	Governance	No	Blog	Information on working groups on responsible investment.
Norges Bank	• Governance • Risk Management	No	Annual Report and GPEF Responsible Investment Report	Governance pertaining to the identification of, and actions taken on, climate-related opportunities for various CB functions.
Monetary Authority of Singapore	Governance	No	Sustainability Report	Report describes the role of management and board and the formation of a distinct management forum to coordinate green finance and sustainability efforts.
Bank Negara Malaysia	Governance	No	Annual Report	Describes roles and accountabilities regarding climate-related risk.

Sources: Banco Central do Brasil (2021a, b); Banque de France (2020); Bank of England (2021); De Nederlandschse Bank (2021a, b); Risksbank (2020); Bank of Finland (n.d); Norges Bank Investment (2020); Monetary Authority of Singapore (2021); Bank Negara Malaysia (2021); NGFS (2021a); Authors' research.

4.2. Side effects, unintended consequences and implementation challenges

The implementation of broad and internationally consistent climate-related disclosures by central banks undoubtedly delivers a number of important benefits. However, as can be expected from a new and evolving field, and as is the case for financial institutions as shown in Table 4, some constraints and challenges can also be identified.

Differences in application

It is unsurprising that there are observable differences in the application of the TCFD recommendations across central banks (e.g. in the scope, means and detail of disclosures) given the fact that the recommendations are voluntary in nature (although a growing number of jurisdictions are making TCFD disclosures mandatory). The principles-based approach for making public disclosures as taken by central banks may allow for divergent application given the different mandates, frameworks and approaches.

> "In embarking on the process of disclosure, it is typical for central banks to follow an approach in stages."

Table 4. Examples of selected financial institutions' experiences in implementing TCFD disclosures

Institution	Reasons for reporting	People and process involved	Tools and data needed	Key lessons[1]
abrdn plc. (asset manager)	Regulatory, Commercial, Financial	Appointed dedicated Senior Climate Change Analyst in Responsible Investing team. Established a climate change working group with representatives from different asset classes. Chief Information Officer as executive sponsor, later appointed Head of Climate Change Strategy.	Launched 'Enhancing ESG programme' with resources and budget to deliver a carbon footprinting and climate scenario analysis tool at asset and fund level. Partnered with Trucost, Planetrics and PowerBI for data, scenario analysis and reporting.	*Challenges:* data and methodologies; decision-making. *Benefits:* helped develop governance and strengthen processes and data; commercial value of understanding impact on investments.
Barclays (banking group)	External forces (regulators, shareholders, clients); Internal (leadership and below).	Sustainability and ESG team advises senior management and board. Eventually created dedicated Climate Risk team.	Some externally sourced (inc. climate scenarios), using variety of external data providers to cross check and increase accuracy of models. BlueTrack™ proprietary methodology complementing existing ones (PACTA and PCAF).[2]	*Challenges:* inherent imperfection of tools available; need to change way of thinking (e.g. shift to long-term horizons, new ways of measurement and analysis). *Benefits:* increased transparency with stakeholders.
Federated Hermes (International Business) (asset manager)	External (political momentum and scientific consensus) and Internal (duty to act).	Board and ExCo review climate management approach; Head of Responsibility and Head of Policy and Advocacy: climate coordination. Eventually set up formal Climate Change Working Group in 2019. EOS stewardship team.	Proprietary carbon tool (measures carbon footprint relative to benchmark); dedicated tools and approaches for private equity and real estate; engagement with PCAF (Chairing the UK chapter).	*Challenges:* accessing reliable investee data (particularly for private markets, small companies and emerging markets); lack of standardised metric methodologies among investees and investors; lack of transparency in third-party tools. *Benefits:* concrete results through informed engagement with investees.
AP2 (pension fund)	For sake of own learning and to credibly engage in dialogue with investee companies.	AP2's Executive Management, the Fund's chief strategist and senior sustainability analyst are responsible for the strategic sustainability work and for implementation and follow-up. All senior executives (inc. CIO and Head of Performance and Risk Management) have a responsibility for taking climate issues into account according to their various roles.	The Fund has developed a tool (through Power Business Intelligence) to make climate data available to the internal portfolio managers of listed equity mandates. The fund also uses data from MSCI ESG Manager. ESG data are available in the Fund's risk system to enable analyses of the sustainability performance of the Fund's portfolio. Carbon footprint data have also been available since 2019 on a daily basis for the internally listed equity mandates.	*Challenges:* data availability; finding relevant metrics; identifying appropriate way to perform scenario analysis. *Benefits:* TCFD recommendations are well structured and easy to work with, framework helped provide an external view of AP2's climate work and helped identify gaps in its work and suggestion for next steps.

Notes:

1. Benefits and challenges noted by the institutions

2. PACTA = Paris Agreement Capital Transition Assessment, from 2° Investing Initiative (2DII); PCAF = the industry-led Partnership for Carbon Accounting Financials.

Sources: Financial Conduct Authority (2021); AP2 (n.d.); TCFD (n.d., b); Authors' research.

Misinterpretation of information

There is a risk of disclosed information being misinterpreted by stakeholders, especially for complex and uncertain estimates, providing incorrect signals to the public (for example about the possible evolution of climate change and the assumptions used in the scenarios, which do not aim to reflect the most likely outcomes). This should be explained sufficiently in the disclosures.[10]

Poor quality and availability of data

The risk of misinterpretation may also be exacerbated by the poor quality and availability of data, which could lead to disclosing information and estimates of lower granularity and accuracy than desired, hence any conclusions extracted from these disclosures should be treated carefully. In general, other stakeholders including investors face similar challenges to central banks with regard to the availability and quality of climate-related data. However, central banks are in a good position to improve the situation, for example, by requesting market participants generate and disclose this data.

It should also be highlighted that central banks' disclosures are not intended to provide direct inputs to the financial markets to inform the pricing of risks, but are required to provide accountability to the banks' stakeholders.

Challenges in developing methodologies and policies

For certain disclosures, such as the forward-looking estimates of the impact of climate-related issues under different scenarios, there are challenges in developing the necessary methodologies, policies and processes, in addition to obtaining high-quality, sufficiently granular data. But these challenges should not constrain entities (including central banks) from providing these disclosures. Instead, they may provide accompanying explanations of any limitations while continuing to advance their practices and address these challenges. Along with the improvement of data and clear communication around the limitations of the disclosures provided, these challenges will be addressed as more advanced practices on climate-related issues are developed by central banks.

Demands on resources

Making disclosures is a resource-intensive process. In small or short-staffed central banks that have limited capacity in particular, additional disclosure requirements may draw resources away from other vital activities. The production of disclosures requires a high number of in-house and external synergies and increased coordination between several departments. A dedicated unit or staff to coordinate this work could be useful. It would likely be more demanding in the initial stages of disclosures as they would be learning by doing.

Implementing the TCFD recommendations entails a steep learning curve for central banks in the early stages, but as they gain more understanding and experience, it is likely that this will translate into an improvement in the quality and granularity of disclosures with comparatively less effort required.

"Steering the financial community towards the application of the TCFD recommendations is a central motivating factor for central banks' action on disclosures."

5. Conclusions and recommendations

Providing robust climate-related financial disclosures is key to addressing climate-related risks, but it comes with certain challenges. At the same time, steering the financial community towards the application of the TCFD recommendations is a central motivating factor for central banks' action on disclosures: the Bank of England's Sarah Breeden highlighted that the Bank had issued its TCFD-aligned climate disclosure report "because we expect as much from ourselves as we do of the firms we regulate" (Breeden, 2020). In a separate conversation with the Official Monetary and Financial Institutions Forum (OMFIF) she stated that "our aim is to practice what we preach" (OMFIF, 2021).

[10] For example, in the case of forward-looking estimates, some highly uncertain assumptions may be used for making projections over a long-term time horizon, together with complex modelling techniques, which have their own limitations.

The following recommendations highlight specific elements that central banks should consider when developing the TCFD disclosures. These have been formulated keeping in mind the distinctive features of central banks in comparison with banks and asset managers (e.g. central banks' legal mandate, public accountability, the composition of their balance sheet and their resources), and also the differences that exist among central banks themselves.

- **The TCFD recommendations are principles-based and allow for flexibility** in their application (instead of requiring a 'one-size-fits-all', rules-based approach). **This means that central banks should apply them in a tailored manner**, based on their own mandates and financial and operational framework to address the most relevant and material areas of their work.
- **A materiality approach should be applied throughout the process of developing the disclosures** across a central bank's main activities in a holistic manner.
- **A progressive approach should be adopted in terms of the type and level of granularity of the information disclosed**, recognising that data and methodologies will improve over time.
- **Disclosures regarding estimates should be accompanied by detailed explanations of the limitations**, the assumptions and the data used.
- **An appropriate balance between transparency and confidentiality should be struck**, as central banks handle sensitive information.[11]
- **Collaboration across different departments and business units within central banks is vital**, to increase understanding, ensure consistency of actions and avoid overlaps, given the cross-cutting nature of climate-related topics.
- **Central banks need to develop the necessary technical expertise and resources** (such as systems and data) to provide climate-related disclosures.
- **A robust and inclusive internal governance process** should be in place with appropriate controls and validation processes, as is the case for any type of disclosure.
- **Sufficient time must be allowed to develop the disclosures**, considering that the issues may require cross-functional collaboration and that additional data and new methodologies may need to be used.
- **Support and buy-in from senior stakeholders** within the central bank are important to the process. For example, the Bank of England involved senior executives, Governors and the Court (board).
- **Central banks should identify the data and methodology gaps for providing disclosures** and design and implement a plan to address them.
- **The disclosures ideally should be easily accessible beyond the central bank and published with regular frequency:** for example, be included in annual reports, in a dedicated public report or on the central bank's website.

Looking ahead, central banks should act boldly and lead by example with high-quality disclosures that improve market transparency and support the net-zero transition. This will also help them to develop a better understanding of the process that supervised institutions go through, enhancing the quality of their supervision.

It is anticipated that the understanding of climate-related issues will improve further, in tandem with the relevant data, methodologies and practices. In this respect, the relevant current and future work of international bodies will be important, in

"Central banks should act boldly and lead by example with high quality disclosures that improve market transparency and support the net-zero transition."

[11] Some information may be more sensitive across a central bank's portfolios and operations, such as third-party portfolios managed by banks on behalf of another party (such as government).

particular that of the NGFS on sharing best practice and developing guidance for the application of the TCFD recommendations by central banks.

Central banks' monitoring of their own practices as well as those of their peers and the broader financial sector in applying the TCFD disclosures could provide useful insights for improving effectiveness and consistency.

Central banks should help to drive coordination and convergence not only internally but also internationally by applying the TCFD recommendations and supporting the NGFS to develop relevant guidance. This can extend beyond climate-related issues to include disclosures around other environmental issues (biodiversity loss, pollution and water management) consistent with existing work, such as that of the Task Force on Nature-related Financial Disclosures (TNFD).

"Central banks should help to drive coordination and convergence not only internally but also internationally."

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Acknowledgements

The authors would like to thank their anonymous reviewers for their comments on an earlier draft, as well as the INSPIRE programme for supporting this work. The authors are responsible for any remaining errors.

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Editing and production

Georgina Kyriacou (Managing Editor), Natalie Pearson and Zoe Kay, with support from Lea Reitmeier.

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The International Network for Sustainable Financial Policy Insights, Research, and Exchange (INSPIRE) is a global research network and designated research stakeholder of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) in its work to manage climate risk and mobilise finance to support the transition to a sustainable economy. The INSPIRE secretariat is co-hosted by the Grantham Research Institute on Climate Change and the Environment and the ClimateWorks Foundation, and is guided by an Advisory Committee who provide domain expertise independently but in close interface with the work priorities of the NGFS. Philanthropic support for INSPIRE is provided by ClimateWorks Foundation. **www.inspiregreenfinance.org/**

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