

Network for Greening the Financial System  
Technical document

# Guide on climate-related disclosure for central banks

December 2021



# NGFS

# Technical document

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## Joint foreword by Frank Elderson and Dr Sabine Mauderer



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**T**he impacts of climate change on households, businesses, and the global economy are not the problem of future generations but our own. The significant increase in extreme weather events reminds us how urgently we need to transform our economies to reach climate neutrality. To foster this transformation, the financial system needs to mitigate climate-related risks and mobilise capital for green investments. In this context, transparency about climate-related financial risks and opportunities is essential.

*In the first comprehensive NGFS report – “A call for action”, published in April 2019 – we emphasised the importance of a robust and internationally consistent disclosure framework. NGFS members also collectively pledged their support for the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). We reiterated this commitment in November 2021 with the NGFS Glasgow Declaration.*

*This “how-to” guide delivers on our commitment to promote climate-related disclosures among central banks. Based on the recommendations of the TCFD, this guide is an open invitation to all central banks – NGFS members and beyond – to lead by example by disclosing the climate-related risks and opportunities on their own balance sheets and relating to their physical operations. Climate-related disclosure by central banks should address key issues relating to governance, strategy, and risk management.*

*We hope this guide will reinforce the momentum on climate-related disclosures, a cornerstone for greening the financial system. While this is a crucial first step, we will not stop here: we are committed to building on this report and the experience gathered by NGFS members to expand our guidance in the future while tackling upcoming challenges with equal vigour.*

*One of these challenges is the loss of biodiversity. We must not forget how much of our well-being we owe to nature. However, aggravated by climate change, biodiversity is declining faster than ever in human history. Against this background, the principles proposed in this guide may be relevant for disclosing the exposure to environmental risks more broadly. In light of this, we very much welcome the work of the Taskforce on Nature-related Financial Disclosures, which will pave our way towards a nature-positive economy and increase transparency on this enormously important topic.*

*We are convinced that greater transparency will stimulate the necessary transformation of our economies. Recognising the central position NGFS members hold within the financial system, we take responsibility for, and are committed to, doing what is in our realm to ensure a world worth living in. United in our data-based convictions, determination, and actions. United in the Network for Greening the Financial System.*

# Table of contents

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<b>Executive summary</b>	<b>4</b>
<b>1. Introduction</b>	<b>6</b>
<b>2. Governance</b>	<b>9</b>
2.1 Disclosure of overall governance	10
2.2 Disclosure of governance structures around central bank functions	10
<b>3. Strategy</b>	<b>13</b>
3.1 Description of climate-related risks	13
3.2 Adaptation of areas and functions	14
3.3 Capacity building	16
<b>4. Risk management</b>	<b>18</b>
4.1 Identification of climate-related risks	19
4.2 Data	20
4.3 Integration into the prevailing risk management framework	20
4.4 Assessment of physical risks	21
4.5 Assessment of transition risks	23
4.6 Climate-related targets	27
<b>5. Looking ahead</b>	<b>29</b>
<b>6. References</b>	<b>30</b>
<b>7. Acknowledgements</b>	<b>32</b>
<b>8. Annex: Assessment methods</b>	<b>33</b>

## Executive summary

The Network for Greening the Financial System (NGFS) reiterates that climate-related and environmental disclosures are an important element in the transition to a net-zero economy. Disclosure of climate-related and environmental risks and opportunities is instrumental to ensure a better management of these forces and to scale up green finance. Broad and internationally consistent disclosure is a key component in the collective efforts to improve the resilience of the financial system.

This report is a first “how-to” guide for central banks on producing their own climate-related disclosures. The guide takes, as its starting point, the recommendations of the Financial Stability Board’s Task Force on Climate-related Financial Disclosures (TCFD). The focus of the guide is on climate-related financial exposures. Exposures related to internal physical operations are also considered throughout the guide. The principles proposed may furthermore be relevant for disclosures of environmental exposures.

It is important for central banks to seek to lead by example and to demonstrate accountability by disclosing climate-related risks and, where relevant, opportunities in a progressively wider scope and increasing detail. Different central banks operate under different circumstances, such as mandates, disclosure obligations, balance sheet composition, and resources. These differences will impact on their disclosures. As a result, there is no one-size-fits-all solution for climate-related disclosures among central banks. The scope and detail of their disclosures will improve over time as central banks build up internal capacities and data availability improves. Climate-related and environmental disclosures are being adopted across sectors of the economy. Recent progress in bridging data gaps, fostering standardisation in reporting processes and the development of robust scenario analyses, will further contribute to climate-related disclosure.

The guide is organised around three chapters: (i) Governance, (ii) Strategy, and (iii) Risk management. Key takeaways are highlighted for each chapter:

- **Governance:** Disclose the high-level approach to climate-related risks and opportunities and climate-related governance structures around monetary policy, asset management, financial stability, and internal operations.

- **Strategy:** Disclose strategies for identifying, assessing, and describing climate-related risks, as well as any adaptation of areas and functions to climate-related risks and opportunities.
- **Risk management:** Disclose the current state of climate-related risk management, including integration with non-climate-related risk management.

### Governance

**Central banks are recommended to disclose their high-level approach to climate-related risks and opportunities.** This could constitute the first step towards a more comprehensive disclosure of how governance structures have been adjusted to address climate change and the transition to a net-zero economy. Key disclosure items are the institutions’ high-level climate-related objectives and the implication of legal mandates for climate-related actions. Central banks could also disclose the form and frequency of discussions regarding climate-related risks and opportunities by board(s) and management. Central banks are generally recommended to ensure a holistic treatment of risks and opportunities, without prejudice to certain sources of risk or opportunity. With reference to this, central banks could describe the nature of this comprehensive framework and explain how they integrate climate-related materiality into processes and decision making at their institution.

**The guide recommends that central banks disclose how governance structures for monetary policy, asset management, financial stability, and internal operations encompass climate-related risks and opportunities.** Disclosures could cover the specific involvement and responsibility of the aforementioned functions to address climate-related risks and opportunities. With reference to monetary policy and asset management, disclosures would reflect that central banks hold different portfolios with various goals as part of their function.

### Strategy

**The guide recommends that central banks disclose their strategies for identifying and assessing the inward and outward impacts of climate-related risks.**

Inward risks are climate-related risks to central banks' balance sheets and internal operations. Outward risks arise because central banks indirectly finance greenhouse gas emissions when lending to, or investing in, countries or companies responsible for those emissions. Outward risks arise moreover as a result of central banks' own emissions. As part of this disclosure, **central banks should describe material risks** and state the time horizon they consider most relevant for managing these risks.

Where appropriate, **central banks might disclose any adaptation of areas and functions, as well as changes to operational frameworks, embedded in the strategies.** Relevant areas for disclosure include monetary policy, asset management, financial stability, and internal operations. Disclosures could encompass an evaluation of the resilience of strategies to alternative scenarios. Central banks could also disclose the processes that led to the adoption of a climate-related strategy.

Lastly, **central banks are recommended to disclose their strategies for capacity building around climate-related risks and opportunities.** For instance, they could disclose their use of external consultants and cooperation with external entities.

## Risk management

**Central banks could start by using backward-looking methodologies to identify, assess, and disclose their climate-related exposures associated with credit facilities and investment portfolios.** However, they should take into consideration that backward-looking methodologies would underestimate

potential future losses if climate-related risks intensify. **Forward-looking methodologies are therefore also relevant to identify, assess, and disclose exposures.** These methodologies are designed to account for increases in the frequency and severity of climate-related events. Forward-looking methodologies tend to be more complex and sensitive to the assumptions used in the calculations. In some cases, forward-looking methodologies may therefore not be practicable. Lastly, **central banks are recommended to disclose climate-related risks associated with internal operations.** One key metric for transition risks is the scope 1 and 2 greenhouse gas emissions from internal operations.

**The guide recommends disclosing the central banks' use of data, the sources of those data, their incorporation into risk analysis, as well as any relevant limitations of the data.** When possible, external data providers' methodologies could also be clarified.

**Central banks are recommended to describe how climate-related risks are integrated into their existing risk management frameworks.** As part of these disclosures, central banks could explain whether they take a top-down or bottom-up approach to integration. They could also clarify how discrepancies between climate-related and non-climate-related risk management are handled. Lastly, **central banks are recommended to make disclosures on target setting.** Options for physical and transition risk targets include limiting the exposure to specific hazards and targets for reducing financed greenhouse gas emissions, respectively. Central banks are moreover encouraged to set targets for the reduction of greenhouse gas emissions from internal operations, aligned to a net-zero pathway.

# 1. Introduction

**In its first comprehensive report, “A call for action – Climate change as a source of financial risk”, the Network for Greening the Financial System (NGFS) highlighted the importance of achieving robust and internationally consistent climate-related and environmental disclosures.**<sup>1</sup> It also pledged support for the recommendations of the Financial Stability Board’s Task Force on Climate-related Financial Disclosures (TCFD).<sup>2</sup>

Broad and internationally consistent climate-related disclosure by financial institutions delivers a number of important benefits. First, it is integral to an efficient capital market, as it can improve the pricing mechanisms for climate-related risks. Second, it enables market participants to identify and capitalise on climate-related opportunities, thereby contributing to the scaling up of green finance.<sup>3</sup> Third, disclosures require financial institutions to establish the necessary procedures, and build the necessary skills, to better identify and manage climate-related risks. Accordingly, preparation of climate disclosures can serve as a vehicle for internal “learning by doing” and impose discipline that ultimately leads to better risk management.<sup>4</sup>

## **Central banks should seek to lead by example by disclosing their climate-related exposures.**

Climate-related disclosure offers a number of benefits for central banks over and above those mentioned above. For instance, if central banks decide to disclose, this would promote disclosures by other market participants. Climate-related disclosures furthermore meet the growing public demand for transparency about climate-related risks on central bank balance sheets, as well as about central banks’ impact on climate change. In this way, disclosure provides central banks with the opportunity to demonstrate that they are managing their own operations in line with the need to reduce greenhouse gas emissions over time.

## **Some central banks have started making climate-related disclosures, while others have expressed their commitment to disclosure in the future.**

Nevertheless, further efforts are needed to achieve broad and consistent coverage of climate-related disclosures across the central banking community.<sup>5</sup>

**This report presents a “how-to” guide for central banks’ climate-related disclosures.** The guide focuses on climate-related risks associated with central banking mandates. The recommendations build on existing international practices, standards, and regulation, notably those advocated by the TCFD on (i) governance, (ii) strategy, (iii) risk management, and (iv) metrics and targets. The TCFD recommendations are summarised in Figure 2. Some aspects of the guide are tailored to central banks, reflecting the fact that they are different from private companies and other public sector institutions.

**The guide aims not to replace, but to complement, existing climate-related disclosure standards and regulation.** There is no one-size-fits-all solution to climate-related disclosures among central banks. The guide presents a range of disclosure options that central banks may choose to follow, depending on their specific circumstances (e.g. mandates, disclosure obligations, balance sheet composition, and resources). Data availability, internal capabilities, and possible unintended effects of policy implementation should also be considered when examining the disclosure options.

**The recommendations take a stepwise approach to disclosure.** This allows central banks to flexibly decide on the scope and depth of what they disclose. Disclosures can range from a broad overview to narrow and detailed descriptions. The guide is not meant to be exhaustive in terms of the issues that disclosure reports are expected to cover. The examples provided of existing central bank disclosure reports serve merely to illustrate some of the differences in format and scope of disclosures made by central banks to date.

1 See NGFS (2019a).

2 See TCFD (2017a, 2017b, 2021a, 2021b).

3 Opportunities for central banks in the transition to a net-zero economy include improved resource efficiency and market diversification through the emergence of new industries.

4 See NGFS (2018).

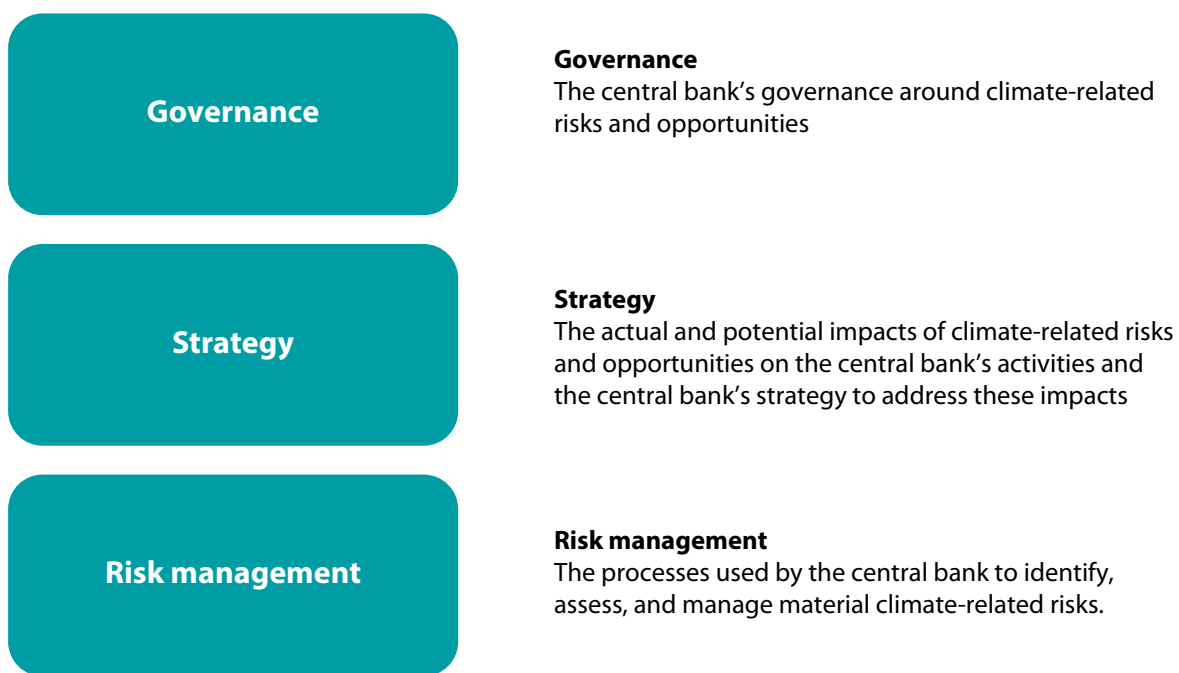
5 See NGFS (2020c).

**Central banks can choose the form and frequency of their disclosure reports.** Some central banks may decide to report separately, while others might add climate-related information to their overall reporting, e.g. in their annual report. Central banks can also use a dedicated section on their websites to disseminate climate-related information.

The report is organised as follows. Chapter 1 outlines options for the disclosure of governance structures, chapter 2

focuses on the disclosure of strategies, while chapter 3 is dedicated to the disclosure of the processes surrounding risk management. Each chapter begins with a table summarising its key recommendations. Some questions providing additional guidance are also presented. As part of the guidance, metrics and targets are proposed to inform and support the central bank’s governance, strategy, and risk management processes, also in line with TCFD recommendations.<sup>6</sup>

Figure 1. **Guide’s core elements of climate-related disclosures**



<sup>6</sup> For this first edition of the guide, the work has focused on defining metrics and targets for risk management, particularly in relation to central banks’ portfolios. Looking ahead, further work may include guidance on metrics for disclosure on climate-related governance structures and strategy.



Figure 2. Recommendations and supporting recommended disclosures of the TCFD

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

Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures

Source: TCFD (2021b), p. 15.

## 2. Governance

Table 1. Summary of disclosure recommendations on governance

Topics	Key takeaways
Disclosure of overall governance	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• Their high-level approach to climate-related risks and opportunities. This includes information on high-level climate-related objectives and the implications of legal mandates for climate-related actions.</li> <li>• The form and frequency of discussions regarding risks and opportunities by board(s) and management.</li> <li>• How they ensure a holistic integration of climate-related materiality into their processes and decision making.</li> </ul>
Disclosure of governance structures around central bank functions	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• How governance structures for specific areas and functions encompass climate-related risks and opportunities.</li> <li>• Governance structures around any adaptation of monetary policy and asset management to climate-related risks and opportunities.</li> <li>• Governance structures around sustainable and responsible investment. This includes information on principles for sustainability and responsibility and the areas responsible for developing and monitoring compliance with the investment guidelines.</li> <li>• Governance structures around financial stability. This includes information on bodies responsible for managing climate-related risks to financial stability.</li> <li>• Governance structures around internal operations. This includes information on the division of responsibilities for ensuring climate-friendly operations.</li> </ul>

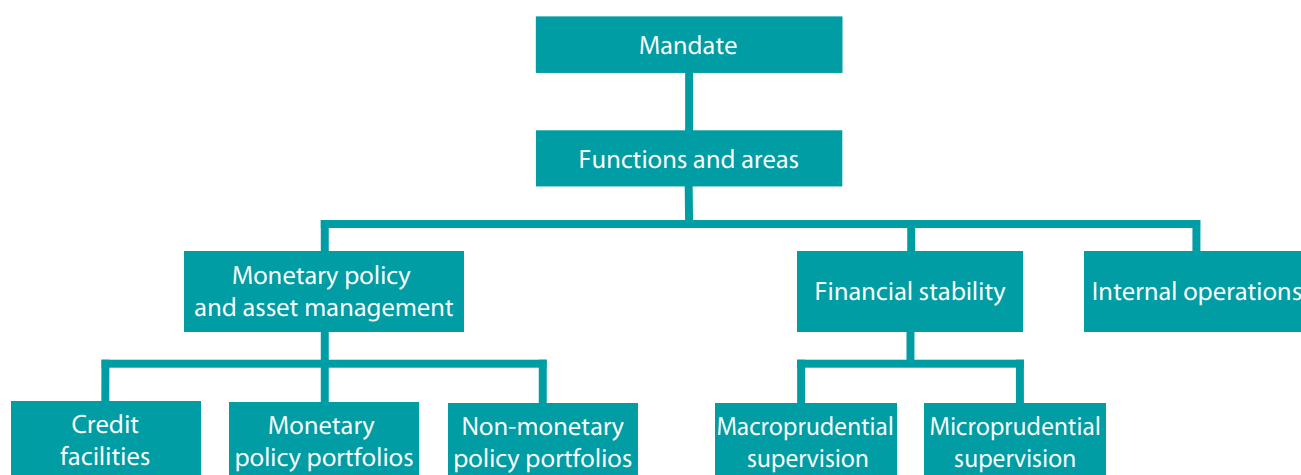
**This chapter outlines the recommendations for governance disclosures.** Stakeholders (e.g. governments, civil society, the financial sector, and the general public) are interested in understanding the role of different board and management levels in overseeing climate-related risks and, where relevant, opportunities. Transparency about governance structures, accountability, and oversight could enhance public confidence that central banks are adequately addressing the economic and financial consequences of climate change and the transition to a net-zero economy. Disclosures should strive to clarify governance regarding the central bank's high-level approach to climate-related risks and opportunities. Disclosures could also describe climate-related governance structures for specific areas and functions in the central bank.<sup>7</sup>

The following questions provide guidance for disclosures on governance structures:

- How is governance around climate-related risks and opportunities integrated into the central bank's governance system?
- What is the role of the board and management in the design, implementation, and oversight of the high-level approach?
- How often are the approaches presented to the board for review and refinement?
- What is the governance structure around climate-related risks and opportunities under each central bank function?
- Has the central bank established specific structures to oversee and recommend updates to the strategy? Which bodies are these, and how are the responsibilities allocated?
- How are approaches formulated in action plans and executed by areas of the central bank?

<sup>7</sup> See BIS (2009) and IMF (2021).

Figure 3. **Disclosure of the overall governance approach (where applicable)**



## 2.1 Disclosure of overall governance

**Central banks are recommended to disclose their high-level approach to climate-related risks and opportunities.** This could constitute the first step towards more comprehensive disclosure of climate-related governance at the central bank. One key piece of information is the institutions' high-level climate-related objectives. Central banks could also disclose the form and frequency of discussions regarding climate-related risks and opportunities by board(s) and management.

**Central banks are generally recommended to ensure a holistic treatment of risks and opportunities,** including those that originate from climate change and the transition to a net-zero economy. To this end, central banks would have to establish a comprehensive framework that spans all functions and integrates climate-related risks and opportunities in the relevant areas. **Central banks could describe the nature of this comprehensive framework** and explain how they integrate climate-related financial materiality into their processes and decision making.

### Central banks' mandates

**If a climate-related disclosure is made, central banks should describe the implications of their legal mandates for their climate-related actions.** Mandates define the

legal parameters within which a central bank can operate, and motivate their decisions. Mandates may constrain certain climate-related actions altogether. Differences in mandates may thus explain why different central banks make different decisions regarding climate-related risks and opportunities. These differences might be significant across supervisory and non-supervisory central banks.

The mandates of most central banks are centred around ensuring price stability as well as, in some cases, full employment and/or financial stability. Mandates might require central banks to actively use policy instruments to support a transition to a net-zero economy. This can be the case if the central bank has an active sustainability mandate.<sup>8</sup> Alternatively, it can be the case that the central bank has a mandate to support its government's economic policies.<sup>9</sup> **How the mandate is interpreted in terms of climate change should be clear from disclosure reports.**

## 2.2 Disclosure of governance structures around central bank functions

**Central banks are recommended to disclose how governance structures for their specific areas and functions encompass climate-related risks and opportunities.** Disclosures could describe the specific involvement and responsibility of the functions

<sup>8</sup> See Dikau and Volz (2021).

<sup>9</sup> NGFS (2020d) found that about one-fifth of the central banks reviewed have been assigned different types of (mainly secondary) sustainability mandates.

covering monetary policy, asset management, financial stability, and internal operations to address climate-related risks and opportunities. As part of this, central banks could describe the latitude given to area managers and the oversight arrangements. To make the disclosure more tangible, specific climate-related metrics and targets for governance could be defined in disclosure reports. For example, these metrics and targets can cover the introduction of responsibilities for climate change among the central bank's senior executives and dedicated committees.

## Monetary policy and asset management

Monetary policy operations usually encompass the provision of credit to counterparties by central banks against adequate collateral. In addition, central banks often hold specific portfolios for monetary policy purposes, including securities portfolios held as part of asset purchase programmes. Asset management of a central bank can also relate to non-monetary policy portfolios, which can include own funds, pension portfolios, third-party portfolios, and sovereign wealth funds.<sup>10</sup> Besides, central banks often hold foreign exchange reserves that serve either or both of these purposes, depending on the context. Earlier reports by the NGFS show that some of these tools used by central banks can be calibrated to mitigate the rise of climate-related risks in their operations.<sup>11</sup>

### **The governance structure around any adaptation of credit facilities and investment portfolios to climate-related risks and opportunities is a key disclosure item.**

The information indicates which bodies or committees are responsible for the conduct of operations and definition of frameworks, as well as for any decisions to adapt operations and frameworks to address climate-related risks. Governance disclosure also includes information on the checks and balances, as well as the trade-offs, around the decisions to integrate climate considerations into operations. When making disclosures, central banks should be clear about the implications of the climate-related objectives for different type of accounts and portfolios.

<sup>10</sup> See NGFS (2019b).

<sup>11</sup> See NGFS (2021a).

<sup>12</sup> See NGFS (2018).

### **In a climate-related disclosure, central banks are recommended to describe the governance around sustainable and responsible investment.**

The disclosure could include principles for sustainability and responsibility. The disclosure might also contain information on the areas responsible for developing and monitoring compliance with investment guidelines. Central banks are encouraged to cover both monetary and non-monetary policy portfolios, including cases where non-monetary policy portfolios are managed externally. Central banks could describe whether there are any specific risk constraints attached to monetary policy portfolios that prevent sustainability and responsibility principles from being applied to these portfolios.

## Financial stability

NGFS members have previously acknowledged that climate-related risks are a source of financial risk, and that it is within the mandates of central banks and supervisors to ensure the resilience of the financial system to these risks.<sup>12</sup> **Central banks are recommended to disclose the governance structure around financial stability in relation to climate-related risks.** With regard to that, central banks could disclose which bodies are responsible for managing climate-related risks to financial stability.

Some central banks have a financial policy committee and/or are members of interagency financial stability councils. Central banks could explain how often climate-related risks are discussed in these fora.

## Internal operations

**Central banks are recommended to disclose the governance structure related to their internal physical operations.** Relevant areas for disclosure include energy and water consumption, procurement, business travel, and cash production. As part of this, central banks might disclose the division of responsibilities in these areas and functions. Central banks might also disclose their guidelines for public tenders, including the weight attached to sustainability considerations.

## The governance aspects of climate-related disclosures by central banks

Several central banks have recently published climate-related disclosures covering governance. Examples of this are listed below:

- The *Central Bank of Brazil* launched its first report on social, environmental and climate-related risks and opportunities in September 2021. In the governance chapter of the report, the central bank describes its purpose, structure, and engagement. The central bank also outlines how social, environmental, and climate-related risks are embedded in its strategic risk evaluation.
- *De Nederlandsche Bank* included a climate-related disclosure in its annual report. The central bank described how climate priorities are integrated into its work and detailed the internal bodies responsible for shaping policies, including the role of the governing board in assigning weights to these priorities.
- *Bank Negara Malaysia* has used its annual report to describe the roles and accountabilities, as part of a whole-of-the-bank approach to managing climate-related risks, as well as its climate collaboration with other national authorities and international institutions and organisations.
- The *Bank of England* has issued a disclosure report, describing the committees and steering groups governing the central bank's work on climate change. The report also describes changes made to the governance structure to ensure effective coordination on climate-related work across the central bank.
- The *Bank of Russia* discloses governance aspects in a section of its website dedicated to sustainable development. This section describes how climate-related risk management is organised at the central bank. Key results of the climate-related and environmental risk analysis are published in financial stability reviews. The *Bank of Russia's* wider work in the area of sustainable finance is disclosed in its annual report.
- The *Monetary Authority of Singapore's* inaugural sustainability report elaborates on the formation of a distinct management forum to coordinate the monetary

authority's green finance and sustainability efforts across its various roles as a central bank, financial supervisor, and manager of foreign exchange reserves. The report also describes efforts to support the development of a green finance hub as part of Singapore's green economic growth strategy. The report illustrates how the management and board are responsible for the overall green finance strategy and the sustainability of the foreign exchange reserves.

Other central banks have disclosed the governance structure around responsible investment and corporate and social responsibility. Examples are again listed below:

- The *Bank of Finland* has used its blog to disclose the central bank's working groups related to responsible investment, including the investment procedures and engagement with external asset managers.
- The *Banque de France's* responsible investment report presents the bodies in charge of implementing the responsible investment strategy. It also describes how the *Banque de France's* general governance fits in with the responsible investment strategy, besides presenting governance related specifically to sustainable finance.
- *Norges Bank* has used its annual report to describe the governance structure pertaining to the identification of, and actions taken on, climate-related risks and opportunities for its central bank functions, the Government Pension Fund Global, and the equity portfolio of the central bank's foreign exchange reserves. *Norges Bank* has also provided information about the governance structure of the Government Pension Fund Global in a report on responsible investment.
- *Sveriges Riksbank* has published a sustainability strategy that describes how the central bank incorporates sustainability into its work. As part of the strategy, the central bank has begun to regularly disclose the carbon footprint of its corporate bond portfolio. *Sveriges Riksbank* also applies a sustainability perspective in the management of foreign exchange reserves, which is described in its financial risk and investment policy.

Sources: Banco Central do Brasil (2021), Bank Negara Malaysia (2021), Bank of England (2021), Bank of Russia (2021), Banque de France (2021), De Nederlandsche Bank (2021), Hyrske (2021), Monetary Authority of Singapore (2021), Norges Bank (2021), Norges Bank Investment Management (2021), and Sveriges Riksbank (2020).

## 3. Strategy

Table 2. Summary of disclosure recommendations on strategy

Topics	Key takeaways
Description of climate-related risks	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• A description of the material physical and transition risks to credit facilities, investment portfolios, and internal operations.</li> <li>• Strategies for identifying and assessing the inward and outward impacts of physical and transition risk on credit facilities, investment portfolios, and internal operations.</li> <li>• The time horizon for climate-related risks, as well as strategies to address differences between the time horizons of climate-related and non-climate-related risks.</li> </ul>
Adaptation of areas and functions	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• Adaptation of areas and functions to climate-related risks and opportunities. Central banks are encouraged to be specific on the adaptation of monetary policy, asset management, financial stability, and internal operations.</li> <li>• Changes to operational frameworks for monetary policy, asset management, and financial stability embedded in climate-related strategies.</li> <li>• The prioritisation of analytical areas and circumstances that led to this prioritisation.</li> <li>• Challenges faced and lessons learned when drafting and implementing a strategy.</li> <li>• Evaluations of their strategies' resilience to climate-related scenarios that differ from the scenarios underlying the central bank's baseline disclosure.</li> <li>• Cooperation with external entities.</li> <li>• Initiatives to ensure sustainable and responsible portfolio management, as well as considerations about these initiatives for risk management.</li> </ul>
Capacity building	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• Strategies for capacity building around climate-related risks and opportunities.</li> <li>• Use of external consultants and the type of information received.</li> </ul>

**This chapter outlines recommendations on disclosures of strategies used to address climate-related risks and opportunities.** Central banks are likely to have formulated a climate-related strategy for how they intend to manage climate-related risks and opportunities. They are recommended to disclose the content of this strategy. One purpose of the disclosure is to ensure that stakeholders understand the central bank's strategic response to these forces, and how this strategic response has affected the central bank's areas and functions.

The following questions provide guidance for disclosures on strategy:

- How does the central bank integrate climate-related risks and opportunities into its general strategy?
- How does the central bank integrate the relevant time horizons for climate-related and non-climate-related risks?
- What are the priorities in the central bank's considerations? How do these priorities interact with the central bank's functions?

- How does the central bank ensure that all relevant functions, areas, and experts are included in the implementation of the climate-related strategy and ongoing management of climate-related risks?
- How is the resilience of the central bank's strategies to alternative scenarios assessed?
- What is the strategy on capacity building and cooperation with external entities?

### 3.1 Description of climate-related risks

**Climate-related disclosures should reflect the fact that central banks are confronted with both inward and outward climate-related financial risks.** On the one hand, central banks' balance sheets can be exposed to inward climate-related risks. On the other hand, central banks finance greenhouse gas emissions, thus contributing to outward climate-related risks, when providing credit to monetary policy counterparties and investing in assets issued by entities that emit greenhouse gases.<sup>13</sup>

<sup>13</sup> See IOSCO (2021).



The adverse consequences of climate change and the transition to a net-zero economy are frequently divided into physical and transition risks. **Central banks are recommended to disclose their strategies for identifying and assessing material physical and transition risks to their credit facilities, investment portfolios, and internal operations.** Physical risks result from climate change. These risks can be driven by an increased severity and frequency of natural disasters (acute risk) and by gradual changes in climate patterns, such as higher temperatures (chronic risk).<sup>14</sup> Transition risks result from the adjustment of economies towards net-zero operation. These risks can arise on account of policy measures (e.g. greenhouse gas taxation), new technology and innovation, litigation risk, and changes in consumer preferences.<sup>15</sup>

In the same way as for financial risks, **climate-related disclosures should reflect that central banks are exposed to inward and outward risks related to their internal physical operations.** Inward risks related to internal operations can be both physical risks and transition risks. For instance, inward risks might be caused by natural disasters compromising central banks' operations or by the transition to a net-zero economy. Outward risks arise as a result of central banks' own greenhouse gas emissions.

**Central banks are recommended to disclose their strategies for identifying and assessing inward and outward impacts connected to their credit facilities, investment portfolios, and internal operations.** In comparison with other financial institutions, the outward perspective may be more important to central banks, given their high exposure to political and reputational risks. As an example, a central bank might be exposed to public criticism if it does not reduce its emissions in line with the climate goals of its government. **A description of material climate-related risks can be an important first step in the disclosure of strategy by a central bank.**

## Time horizons

Climate-related risks can materialise over short-term, medium-term, and long-term horizons. In many cases, climate-related risks are likely to emerge over a longer time horizon than non-climate-related risks, given the long-term nature of climate change and the transition to a net-zero economy. **Central banks are recommended to disclose how their strategies address this difference between non-climate-related and climate-related risk management.** The strategies are likely to build on an assessment of the most relevant timeframe for climate-related risks and opportunities. As part of their disclosure, central banks could communicate this timeframe.

## 3.2 Adaptation of areas and functions

Climate change and the transition to a net-zero economy will increasingly affect macroeconomic variables that are key for the conduct of monetary policy (e.g. inflation and employment). These forces might also influence the monetary policy space and the transmission of monetary policy. This will affect policy rates and the management of monetary and non-monetary policy portfolios. It could additionally, through risk management, impact on planning and decisions related to credit operations and collateral. Turning to the financial system, climate change and the transition will likely propagate to the balance sheets of banks and investors due to changes in the market value of assets and bank credit. This may translate into financial risks.<sup>16</sup>

<sup>14</sup> See EBRD-GCECA (2018) and BCBS (2021b).

<sup>15</sup> See NGFS (2019a).

<sup>16</sup> See NGFS (2019c, 2020a, 2021a).

Figure 4. **From physical risk to financial stability risks**

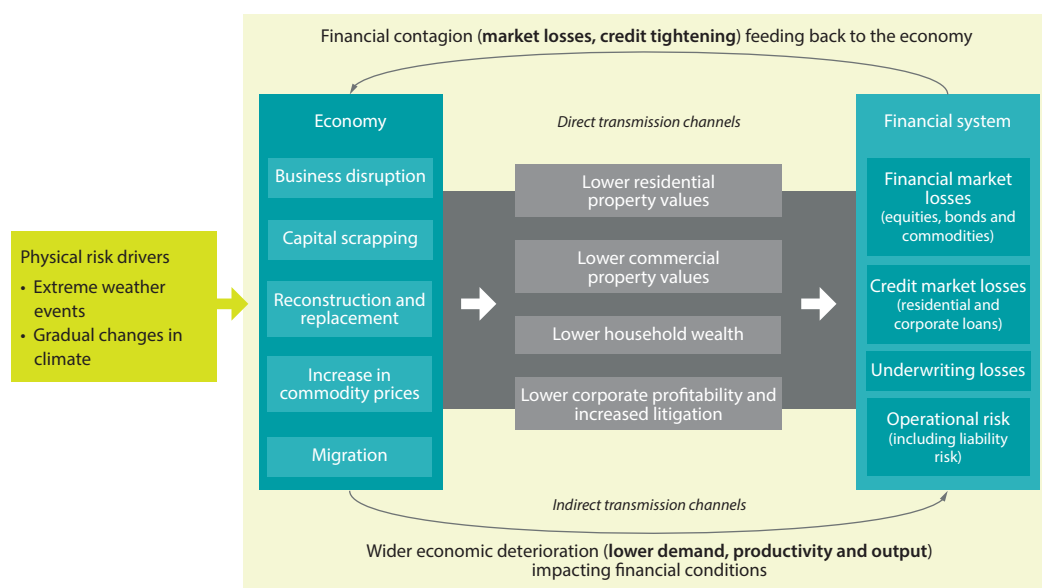
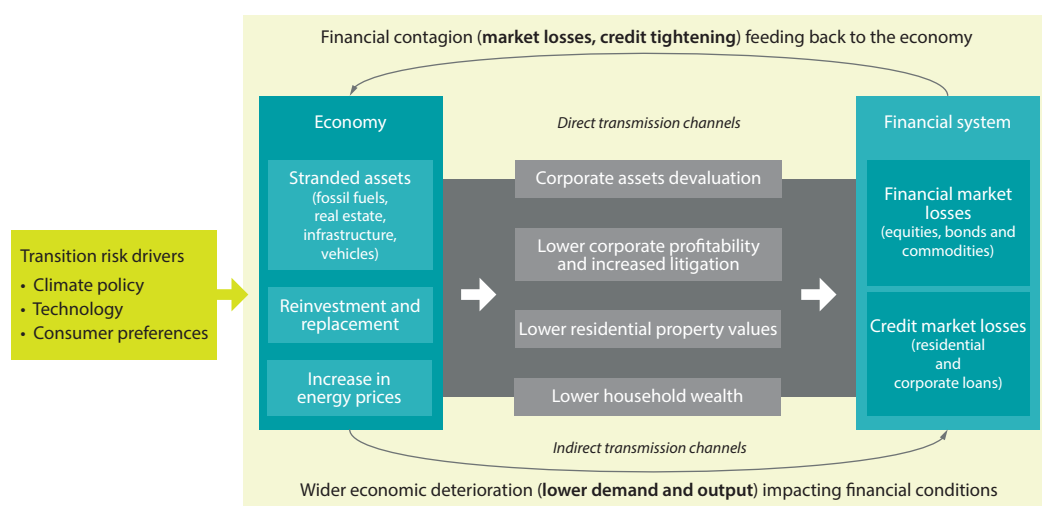


Figure 5. **From transition risk to financial stability risks**



Source: NGFS (2019a).

If appropriate, **central banks are recommended to disclose the adaptation of areas and functions, as well as changes to operational frameworks, embedded in their climate-related strategies.** Relevant areas for financial disclosure include credit operations, collateral frameworks, asset management, and processes around macroprudential and microprudential supervision. In addition to financial disclosures, **it is relevant for central banks to disclose changes to their internal operations.** These changes could be aimed at ensuring the resilience of buildings and infrastructure to climate

change or reducing the central banks' greenhouse gas emissions.

Lastly, **central banks could disclose the processes that led to the adoption of a climate-related strategy.** Central banks might discuss the challenges faced and lessons learned when drafting and implementing the strategy. They could also describe evaluations of their strategies' resilience to alternative climate-related scenarios that differ from the scenarios underpinning their baseline disclosures.



## Prioritisation of efforts

As part of their formulation of strategy, central banks are likely to have prioritised analytical areas in which they seek more knowledge about climate-related risks and opportunities. **Central banks could disclose this prioritisation of analytical areas.** They could also disclose the circumstances that led to certain analytical areas being prioritised.

## Sustainable and responsible investment

**Central banks are recommended to disclose whether they have a sustainable and responsible investment strategy.** If this is the case, they should disclose their initiatives to ensure sustainable and responsible portfolio management.<sup>17</sup> The specific eligibility criteria for different portfolios are a key disclosure item in this regard. It would furthermore be relevant to disclose the frequency at which investment portfolios are screened for compliance with the eligibility criteria. Central banks could also disclose considerations about the implications of sustainable and responsible investment practices for risk management.<sup>18</sup>

**Central banks will need to strike a balance between transparency and confidentiality, subject to the different nature and objectives of the portfolios under consideration.** Disclosures on sustainable and responsible investment are likely to be least sensitive for central banks' own portfolios, since they are not held for monetary policy purposes. For pension portfolios and third-party portfolios, reporting is addressed to beneficiaries

and clients. Public disclosure on third-party portfolios may be more sensitive owing to confidentiality issues or specific fiduciary responsibilities. For policy portfolios, sustainable and responsible investment disclosures could be considered, as long as this does not compromise the formulation and implementation of monetary policy.

## 3.3 Capacity building

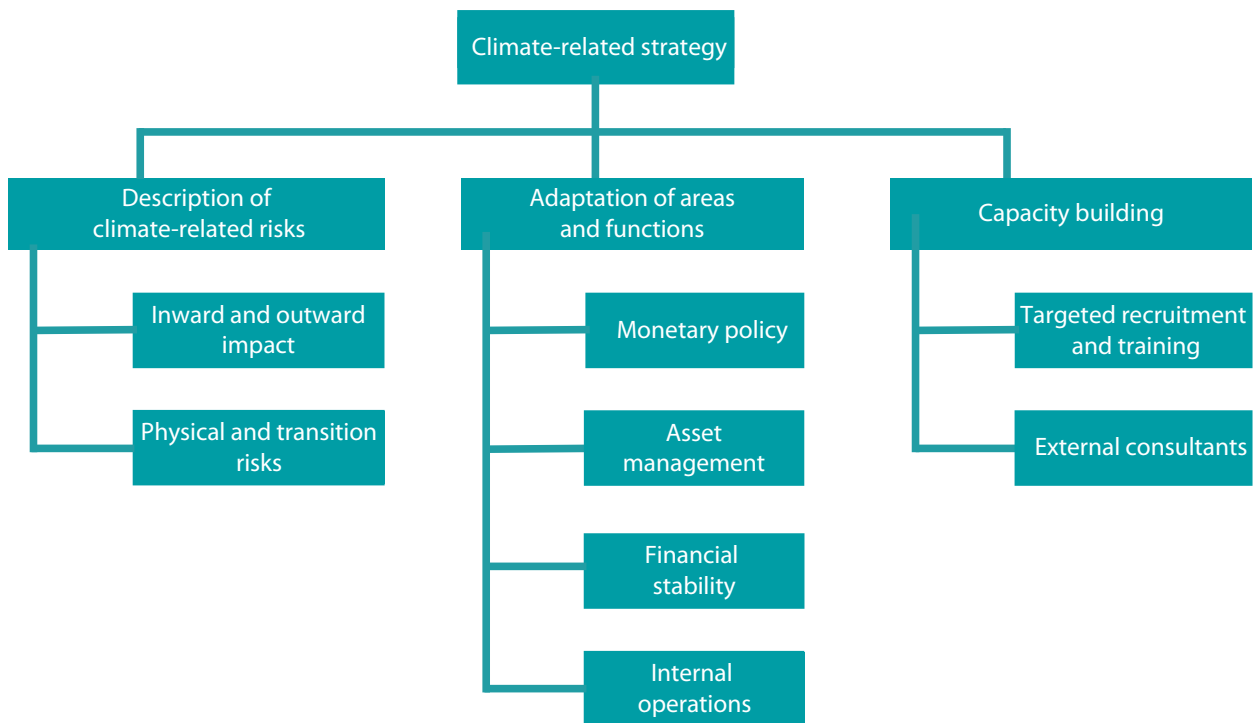
Climate economics and sustainable and responsible investment are, in many cases, new ground for central banks. This creates a need to build capacity. Capacity building will likely be based on a combination of targeted recruitment and the upskilling of existing staff. **Central banks are recommended to disclose their strategies for capacity building around climate-related risks and opportunities.** This could include describing the current skill levels and how these are scheduled to increase in the future. For instance, a central bank could describe the number of full-time equivalents who have been trained in climate economics, risk analysis, or sustainable and responsible investment practices across its functions.

Central banks might seek assistance from external consultants on the tools and methodologies used to identify, assess, and manage climate-related risks and opportunities. **Central banks are encouraged to disclose their use of external consultants who provide guidance on these issues,** subject to contractual restrictions. Central banks might also disclose the nature of the information received.

<sup>17</sup> Commonly used strategies for sustainable and responsible investment include negative screening, best-in-class investing, ESG integration, impact investing, and voting and engagement (NGFS, 2019b).

<sup>18</sup> See NGFS (2020c).

Figure 6. **Disclosure of the climate-related strategy**



## Box 2

### Drafting a climate-related disclosure report

The process of preparing a climate-related disclosure report will depend on the scope and shape of a central bank's intended disclosures. Practical steps will vary, but the following items can help guide central banks through the beginning of the process.

#### Who should be involved in the drafting process?

Central banks are recommended to ensure a holistic treatment of risks and opportunities. To guarantee the full disclosure of climate-related risks and opportunities, central banks are recommended to involve all relevant functions at an early stage. Broad involvement could raise awareness internally about the importance of disclosures. Key in-house functions include the board and areas in charge of monetary policy, asset management, financial stability, and external engagement, as well as corporate services in charge of internal operations.

#### Planning for the review and validation process

Climate-related disclosure should be subject to an appropriate internal governance process. This process is likely to include governance structures, controls, compliance functions, and assurance specialists. Early guidance by, and the regular involvement of, senior management is recommended to bolster ownership of the process and ensure that benefits can trickle down to all areas and functions.

#### Time management

Time management is an important consideration when preparing disclosure reports, especially if the central bank wishes to publish the report together with the institution's annual report. Sufficient time needs to be earmarked for the review and governance process and for the assurance process. For example, the *Bank of England* reports that it took them more than 10 months from the planning of their report to delivery, given the large number of areas involved, internal governance, and their reliance on external data providers.

## 4. Risk management

Table 3. Summary of disclosure recommendations on the risk management process

Topics	Key takeaways
Identification of climate-related risks	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• Whether they use quantitative or qualitative approaches to identify climate-related risks.</li> <li>• The impact of climate-related risks on credit facilities and investment portfolios using backward-looking or forward-looking methodologies, acknowledging the potential limitations of each type of methodology. Disclosures should be made with a focus on financial materiality, and they should evaluate different types of climate-related risk in combination with each other.</li> <li>• Direct and indirect impacts, as well as the assumptions upon which their identification is based. Relevant quantitative methodologies include scenario analysis, stress testing, and reverse stress testing.</li> </ul>
Data	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• Their use of data, the sources of those data, their incorporation into risk analysis, as well as relevant limitations of those data.</li> <li>• The share of issuers in a portfolio that are covered by data in the analysis.</li> <li>• External data providers' methodologies subject to contractual restrictions.</li> </ul>
Integration into the prevailing risk management framework	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• How they integrate climate-related risks into their existing risk management frameworks.</li> <li>• Whether the integration of climate-related risks into risk management follows a top-down approach, where climate-related risks are seen as a stand-alone source of risk, or a bottom-up approach, where climate-related risks are seen as an amplifier of non-climate-related risks.</li> <li>• Whether a given risk metric captures both non-climate-related and climate-related risks, or whether a separate framework exists for climate-related risks.</li> <li>• How discrepancies between climate-related and non-climate-related risk management are handled.</li> </ul>
Assessment of physical and transition risks	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• The impact of physical and transition risks on credit facilities and investment portfolios using backward-looking and, where possible, forward-looking methodologies, acknowledging the potential limitations of each type of methodology.</li> <li>• Processes for developing, validating, and using models to analyse physical and transition risks, as well as all critical assumptions underlying the models. One key backward-looking metric for transition risks is the financed greenhouse gas emissions of a credit facility or investment portfolio. Other relevant methodologies include scenario analysis, stress testing, and reverse stress testing.</li> <li>• Whether, and how, they have assessed the ability of counterparty banks and issuers in their credit facilities and portfolios to prevent, withstand, or recover from impacts of natural disasters and substantially higher average temperatures.</li> <li>• The impact of physical and transition risks on internal operations. One key metric for transition risks is the greenhouse gas emissions from internal operations.</li> </ul>
Climate-related targets	<p>Central banks are encouraged to disclose:</p> <ul style="list-style-type: none"> <li>• Targets for physical and transition risks. Options include limiting the exposure to specific hazards and setting targets for reducing financed greenhouse gas emissions, respectively. Targets should ideally be aligned with the central bank's overall climate strategy, supported by an appropriate set of metrics that allows progress to be tracked over time, and balanced between potentially conflicting objectives.</li> <li>• Targets for the reduction of greenhouse gas emissions from internal operations, aligned to a net-zero pathway.</li> </ul>

**This chapter outlines recommendations for risk management disclosures, as well as metrics and targets to disclose physical and transition risks.** Identifying, assessing, and managing climate-related financial risks should be considered an integral part of central banks' risk management functions. Disclosed information helps stakeholders evaluate a central bank's climate-related risk profile and management of its activities. Central banks are recommended to disclose the current state of their climate-related risk management.

The following questions provide guidance for disclosures on risk management:

- Does the central bank treat climate-related risks as a separate risk category or as an amplifier of conventional risk categories, such as market and credit risk?
- What is the relationship between the central bank's climate-related and non-climate-related risk management? Does the central bank integrate climate-related risk into its existing risk assessment methods and targets?
- What is the planned development and implementation of climate-related risk management?
- Which approaches does the central bank take in identifying its exposure to physical and transition risks? What are the main metrics and targets used?
- What are the critical methodological assumptions and data underlying the assessment methods that the central bank uses to disclose its exposures? Are the methodologies backward-looking or forward-looking?
- How do assessment methods and targets influence risk management practices and investment decision making?
- Does the central bank set targets to reduce its physical and transition risks? If so, how is progress towards achieving those targets evaluated?

## 4.1 Identification of climate-related risks

**Central banks are recommended to disclose how they identify their exposures to climate-related risks.**

**They should aim to describe the exposures they identify with a focus on financial materiality.** Assets with a finite maturity (e.g. bonds) could be evaluated over their lifetime and assets without a specific maturity (e.g. equities) over a sufficiently long period. Information on the direct and indirect impacts, as well as the assumptions underlying the identification of these exposures, could also be provided. **Distinctions should be made between impacts over short-term and long-term horizons. Central banks should strive to evaluate different types of climate-related risk in combination with each other, rather than separately.** For instance, combinations of physical risks can have a greater impact than if each source of risk is evaluated separately, because of climatic interactions between different climate events and feedback mechanisms (e.g. climate tipping points) that amplify climate change.

**Central banks are recommended to disclose whether they use quantitative or qualitative approaches, as well as backward-looking or forward-looking methodologies, to identify climate-related risks** (see Table 4). Qualitative approaches typically rely on expert judgements. These judgements can be added as an overlay to quantitative analysis or used as an alternative in the event of data gaps. Qualitative reporting can also be an option in initial disclosure reports for communicating results from quantitative analyses that rely on assumptions that are so strong that the central bank considers it inappropriate to report the specific figures. **If only a qualitative approach is used, central banks could explain their reasons for doing so.**<sup>19</sup> Three examples of quantitative identification and assessment methods are discussed in the Annex: scenario analysis, stress testing, and reverse stress testing. The methods can be used in combination to obtain a comprehensive picture.

Table 4. Approaches in climate-related risk identification

Approach	Methodology	Examples of data
Qualitative	Backward-looking	Qualitative categorisation
	Forward-looking	Expert judgements, e.g. about future pathways
Quantitative	Backward-looking	Historical data, e.g. on natural disasters or greenhouse gas emissions
	Forward-looking	Scenario projections, e.g. NGFS scenarios

<sup>19</sup> See BCBS (2021a).

Backward-looking methodologies forecast future outcomes on the basis of historical data. **Central banks could start by identifying and disclosing climate-related risks using backward-looking methodologies.** This may provide stakeholders with information on financial materiality across the spectrum of climate-related risks that could materialise in the future. However, historical climate-related losses are likely to underestimate potential future losses, as climate change and the transition to a net-zero economy intensify. An understanding of past climate-related impacts could nevertheless serve as a starting point to disclose future impacts, on the assumption that these will increase in frequency and severity.<sup>20</sup>

Forward-looking methodologies forecast future outcomes on the basis of historical data in combination with projections for future climate and transition pathways. **Central banks are recommended to use forward-looking methodologies, where possible, to identify and disclose climate-related risks.** One key advantage of forward-looking methodologies is that they account for increases in the frequency and severity of climate-related events. As such, they are designed to provide a better insight into the future risks faced by lenders and issuers, and whether lenders and issuers plan to mitigate these risks. Despite these benefits, forward-looking methodologies tend to be more complex and sensitive to the assumptions used in the calculations, in comparison with backward-looking methodologies. In addition, forward-looking methodologies are under development, and data providers are refining their approaches. This makes forward-looking methodologies challenging to use until a more mature state is reached. In some cases, it may therefore not be feasible to disclose climate-related risks using forward-looking methodologies.<sup>21</sup>

## 4.2 Data

Climate-related risk management is at an early stage of evolution. One substantial challenge in measuring climate-related risks is data availability, and, where data are available, a lack of standardised and consistent methodologies. In particular, data are often not comparable across asset classes and data providers, especially in terms of how they evolve over time. Data for smaller unlisted companies and sub-sovereign entities are also often not available. These data gaps lead to a low degree of transparency and comparability about climate-related risks.

**Where appropriate, central banks are recommended to disclose their use of data, the sources of those data, and their incorporation into risk analysis.** Central banks should also disclose limitations in the data used, such as missing or inconsistent variables. Central banks are recommended to disclose the share of issuers in a portfolio that are covered by data in the analysis.

Central banks are likely to rely, partially or fully, on external data providers to assess and disclose exposures to climate-related risks. Where it is not apparent, **central banks are recommended to describe their data providers' methodologies,** subject to contractual restrictions. Disclosure of methodologies provides clarity about the assumptions underlying the identification and assessment of climate-related risks, besides allowing for a more accurate interpretation and comparison of results with peers.

## 4.3 Integration into the prevailing risk management framework

Current financial risk management practices at central banks take a wide range of different types of risk into consideration. This raises the question of whether, and how, existing asset management frameworks best integrate climate-related risks with non-climate-related risks. A risk taxonomy that maps climate-related and non-climate-related risks is shown in Table 5.<sup>22</sup>

20 See EBRD-GCECA (2018).

21 See NGFS (2020a).

22 Broeders and Schlooz (2021) discuss the peculiarities of managing climate-related risks at central banks.

Table 5. **Sample of risk categories, risk types, and climate-related mapping**

Category	Type	Example of climate-related mapping
Financial	Credit risk	Climate-related company-specific costs or losses that lead to a credit downgrade or default on credit obligations
	Market risk	Supply and demand imbalances that increase market volatility and negatively impact asset prices
	Liquidity risk	Lower market liquidity due to changes in investor preferences associated with climate-related risks
	Liability risk	Litigation aimed at central banks for decisions to mitigate climate-related risks or for financing of greenhouse gas emissions
Non-financial	Strategic or policy risk	Diminished ability to stimulate the economy due to weaker monetary policy transmission and a smaller monetary policy space
	Operational risk	Destruction of central banks' buildings and infrastructure due to natural disasters caused by climate change
	Reputational risk	Public awareness of central banks' financing of greenhouse gas emissions

**Integration of climate-related risks into financial risk management can take a top-down or bottom-up approach. Central banks are recommended to disclose which approach they use.** The distinction is important, as the choice of approach could reflect whether the central bank interprets climate-related risks as a stand-alone source of risk or as an amplifier of non-climate-related risks. Moreover, the choice could reflect the granularity of risk categories used within the central bank, as well as the materiality of climate-related financial risks relative to other sources of financial risk.<sup>23</sup> The two approaches are described below:

- **Top-down approach:** The central bank treats climate-related risks as a stand-alone source of risk that is distinct from other sources. Assessment and management consequently take place separately, with bespoke tools being used to assess and manage the climate-related risks.
- **Bottom-up approach:** The central bank treats climate-related risks as amplifiers of non-climate-related risks. Climate-related factors are identified, assessed, and managed as sub-components within a standard management framework for each class of assets, by adapting the existing tools.

As part of disclosing how it integrates climate-related risks, the central bank could clarify whether a given risk metric captures both climate-related and non-climate-related risks, or if separate frameworks exist. Disclosures can also describe how discrepancies between climate-related and non-climate-related risk management are handled by the central bank.

23 See TCFD (2020).

## 4.4 Assessment of physical risks

**Central banks are recommended to assess and disclose the impact of direct and indirect material physical risks on their credit facilities, investment portfolios, and internal operations.** When assessing credit facilities and portfolios, central banks should make sure they consider indirect effects from companies' value chains. For instance, a company might not be exposed to any material damage from climate change itself, but nevertheless be exposed through its suppliers. To the extent possible, **central banks are recommended to use forward-looking methodologies to assess the impact of physical risks.** Central banks can also disclose using backward-looking methodologies, acknowledging that historical data are likely to underestimate future climate-related losses. Central banks should disclose the processes for developing, validating, and using models to analyse physical risks.

**Central banks are recommended to break down physical risks into chronic and acute risks, as well as by sectoral impact.** Prioritising a number of risk factors, moreover, allows for an in-depth assessment of the factors deemed most critical by the central bank. This prioritisation is usually an outcome of the identification of relevant risks. Prioritisation might take place implicitly, for instance, because the assessed risk factors are embedded in the analytical scenarios used by central banks. Nonetheless, **it is important that central banks disclose which physical risks they consider material to their functions.**



## Resilience to climate change

**Central banks are recommended to disclose whether, and how, they have assessed the ability of monetary policy counterparties, as well as issuers in their portfolios, to prevent, withstand, or recover from impacts of natural disasters and substantially higher average temperatures.** Since the impact of physical risk on some asset classes is highly dependent on a country's

resilience strategies against climate change, country-specific indicators (e.g. the quality of infrastructure, the strength of the institutional framework, and adaptation measures against physical risks) could be taken into account. Similarly, with companies, the quality of management and strategies to adapt to a changing climate could be considered. In this regard, it may be relevant to consider the protection of companies' production sites and supply chains.

### Box 3

#### Examples of central banks' exercises on physical risks

Some central banks have developed and disclosed exercises on physical risks. Examples of this are listed below:

- The *Bank of England* uses a scorecard approach to measure current and expected future physical risk exposures of specific assets. The assets are assigned to percentile rankings within the asset class under consideration. The central bank thus obtains a measure of relative physical risk exposures across its sovereign and corporate holdings. For sovereign holdings, a range of indicators (flood risk, heat stress, hurricanes, sea-level rise, water stress, and wildfires) are used to score each country's risk exposure as a proportion of its gross domestic product, population, and agricultural land use. Physical risk scores of corporate holdings are a weighted average of three main channels of risk: geographic location of a firm's direct operations, location of firms' supply chains, and location of their consumer markets. Furthermore, the *Bank of England* uses scorecard indicators to evaluate companies' managerial approach to physical risks. The *Bank of England* has not set targets for these metrics. Lastly, the central bank has conducted a scenario analysis to estimate the probability of default of various sectors within its corporate bond portfolio due to physical risk. Three different scenarios with different levels of emissions and resulting degrees of warming are used, leading to different levels of economic impact.

- The *Autorité de Contrôle Prudentiel et de Résolution* conducted a pilot exercise to assess climate-related risks and their impact on the French banking and insurance sector. The exercise covered 2020 to 2050 and contained a number of metrics. In particular, the assessment included the average temperature in metropolitan France, property-damage activities of insurers, and developments in air pollution, as well as the impact of the metrics on the claims and premium ratio of insurers. For banks, the exercise evaluated the credit risk of corporate and retail portfolios. The pilot exercise took second-round effects of physical risks into account.
- The *Banque de France* uses a forward-looking methodology from an external data provider in the management of its own funds and pension fund portfolios. Results and methodologies are disclosed in the *Banque de France's* annual responsible investment report. The *Banque de France* has not set any specific target for physical risks.
- The *European Central Bank* has published an occasional paper on its economy-wide climate stress test. The calculation of expected losses from physical risk combined the direct impact on firms' exposure to extreme weather events with indirect impacts, such as the expected damage at the regional level, as a share of the gross domestic product.

Sources: *Autorité de Contrôle Prudentiel et de Résolution* (2021), *Bank of England* (2021), *Banque de France* (2021), and *European Central Bank* (2021).

## 4.5 Assessment of transition risks

**Central banks are recommended to assess and disclose the impact of material transition risk on their credit facilities and investment portfolios.** They are also recommended to disclose their approach to modelling this risk, as well as the processes for developing, validating, and using these models. A benchmark for considering countries' and companies' resilience to transition is requirements under the Paris Agreement and national transition goals.

### Backward-looking metric: greenhouse gas footprint

**Measurement of a central bank's financed greenhouse gas emissions represents a starting point for assessing its exposure to transition risk.** Central banks' financed emissions are the emissions associated with their credit facilities and investment portfolios.<sup>24</sup> The thinking behind this metric as a measure of transition risk is that counterparty banks that are particularly exposed to emission-intensive non-financial companies would be more severely affected by future mitigation of climate change than counterparty banks that are less exposed. This would also be the case for issuers with high direct or indirect emissions, resulting in higher potential losses on such investments. Financed emissions are usually considered a backward-looking metric, being that it is based on current emissions.

Financed greenhouse gas emissions account for the bulk of the emissions associated with central banks, since the production and purchase of energy at central banks is generally small in comparison with the size of their economic activity. Accordingly, central banks' financed emissions have a stronger connection with transition risk than the central banks' own emissions.

**Financed greenhouse gas emissions can be computed using weighted average carbon intensity.** For central banks' lending to counterparty banks, weighted average carbon intensity can be computed as

$$\sum_{i=1}^B \left( \frac{\text{lending to counterparty } i}{\text{total lending to counterparties}} \frac{\text{emissions of counterparty } i}{\text{economic activity of counterparty } i} \right),$$

where  $B$  is the number of counterparty banks. For central banks' investment portfolios, weighted average carbon intensity can be computed as

$$\sum_{i=1}^N \left( \frac{\text{market value of investment in issuer } i}{\text{market value of portfolio}} \frac{\text{emissions of issuer } i}{\text{economic activity of issuer } i} \right),$$

where  $N$  is the number of assets in the portfolio. Interpreting weighted average carbon intensity is relatively simple. It is the direct and indirect greenhouse gas emissions of the entities in the credit facility or investment portfolio relative to the size of their economic activity, on average across the facility or portfolio. Weighted average carbon intensity allows financed emission trends to be monitored and compared with differently sized portfolios over time. Box 4 provides options for how to compute the greenhouse gas intensity of sovereigns and companies.

**Other indicators can complement weighted average carbon intensity, to provide a more comprehensive measurement of transition risk.** For example, central banks may wish to disclose their exposure to emission-intensive sectors (e.g. fossil fuels) or the emissions of each sector within a corporate portfolio relative to sector-specific benchmarks.<sup>25</sup>

24 PCAF (2020) contains detailed methodological guidance to help financial institutions measure and disclose financed greenhouse gas.

25 See TCFD (2017a, 2017b, 2021a, 2021b).



## Box 4

### Calculation of greenhouse gas intensity

The greenhouse gas intensity of an entity is the emissions it generates relative to the economic value it creates. This box describes approaches to calculate the greenhouse gas intensity of assets issued by sovereigns and companies.

#### Sovereigns

One widely used method for measuring sovereign emissions is based on production, i.e. the emissions from all goods and services produced within a country's territorial boundary and consumed anywhere in the world. This method assumes that a country's government is responsible for all emissions within its jurisdiction, given its executive power and responsibility for the governance of the state. This notion is consistent with the compilation of national greenhouse gas inventories by the Intergovernmental Panel on Climate Change. An alternative method for calculating sovereign emissions is to consider only the emissions associated with public expenditures. In essence, this treats the government more like a corporation and focuses narrowly on the emissions it is most directly responsible for.

The economic value that a country creates is most commonly measured by its gross domestic product, when computing greenhouse gas intensity. However, alternative methods, such as population size, exist as well.

#### Companies

Central banks are recommended to disclose the emissions of counterparty banks and issuers represented in a central bank's credit facilities and investment portfolios. Company emissions are frequently divided into three scopes:

- Scope 1 emissions are direct emissions from sources controlled or owned by the company.
- Scope 2 emissions are indirect emissions associated with the purchase of electricity, steam, heat, or cooling by the company.
- Scope 3 emissions are indirect emissions outside scope 2 that occur in the supply chain of a company or as a consequence of using that company's products and services.

The economic value that a company creates is most commonly measured by its total revenue, when computing greenhouse gas intensity. Alternative measures exist here as well, such as the company's enterprise value including cash.

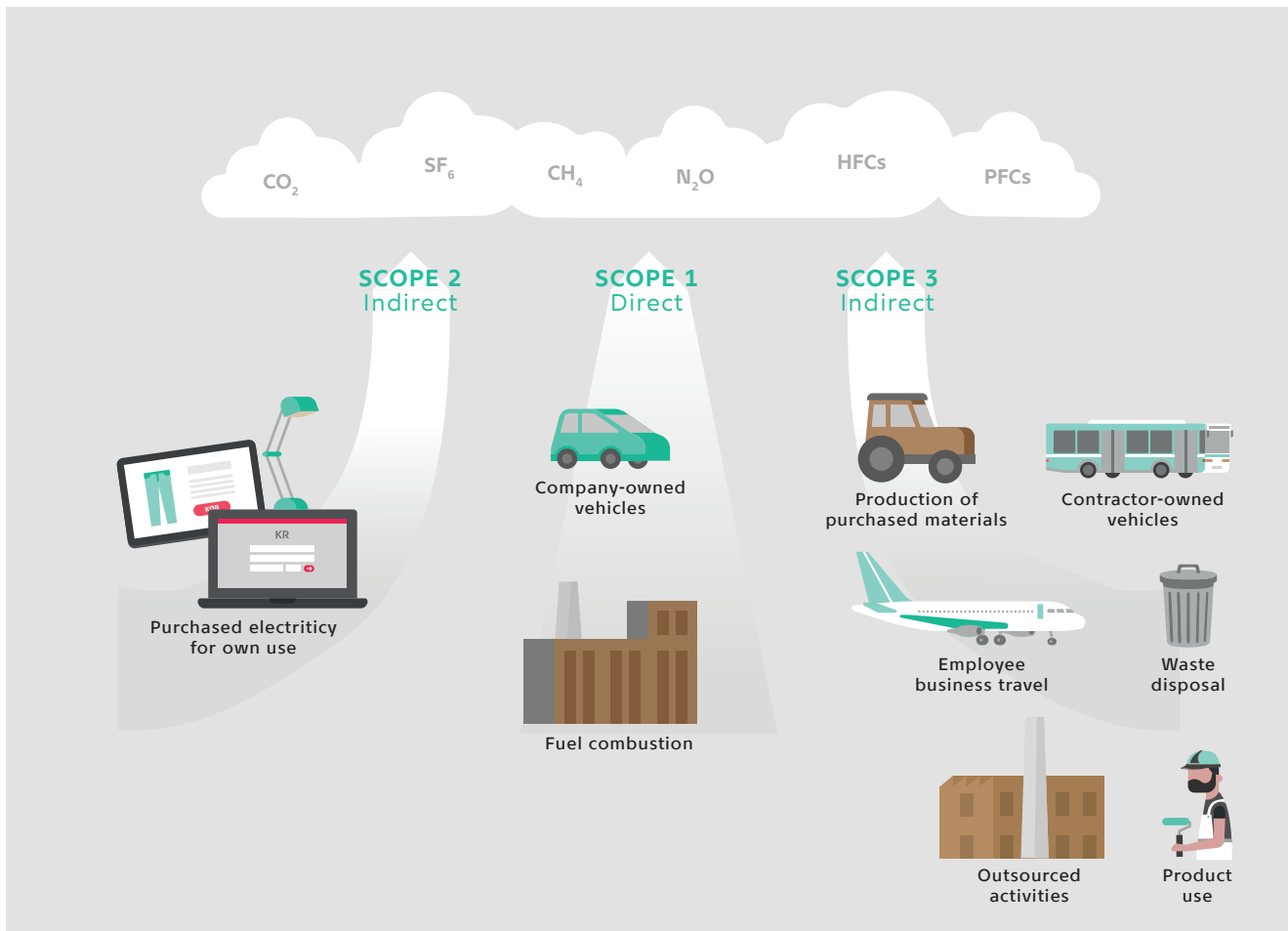
Data availability on companies' scope 3 emissions is still low. As a result, disclosure based on scope 3 emissions may not be possible in many cases. Central banks should nevertheless strive to increasingly disclose scope 3 emissions as the data become more available over time. Scope 3 disclosure is particularly relevant for sectors where these emissions represent a large proportion of the companies' total emissions. This could be the case for portfolios concentrated on energy or internal combustion engine vehicles.

Sources: Greenhouse Gas Protocol (2004), Intergovernmental Panel on Climate Change (2019), and NGFS (2021 d).

Lastly, **central banks are recommended to disclose the greenhouse gas emissions from their internal operations.** Central banks are also invited to disclose on broader environmental targets, such as energy and water use. For some central banks, disclosing their own emissions would be the first step in a stepwise approach to disclosure. Importantly, while internal operations typically constitute a minor contribution to transition risks,

the measurement of a central bank's own emissions sheds light on the extent to which its current internal operations are not aligned with long-term net-zero transition goals. Disclosure of central bank's own emissions would also mean that they gain concrete experience in measuring greenhouse gas emissions. This might enable central banks to better interpret the financed emissions associated with their credit facilities and investment portfolios.

Figure 7. **Overview of scopes and emissions across a value chain**



Source: Inspired by Greenhouse Gas Protocol (2004).

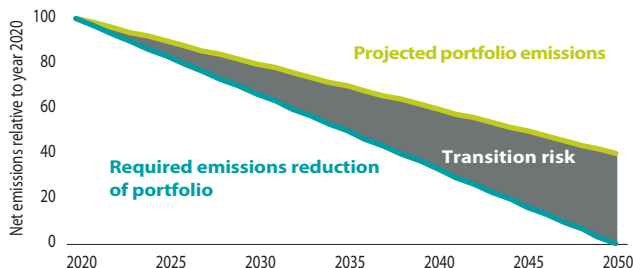
## Forward-looking risk metrics

One major challenge that comes with using current financed greenhouse gas emissions to assess and disclose transition risk is that the metric is based on current emissions. As a consequence, current financed emissions do not account for differences across countries and firms in their ability and plans to reduce emissions in the future. Forward-looking metrics can overcome this challenge, at least conceptually. The forward-looking information can be useful as governments and companies announce policies and strategies that commit to reducing emissions in line with international climate goals.

Where possible, **central banks are recommended to disclose the impact of transition risk on credit facilities and investment portfolios using forward-looking methodologies.** Figure 8 illustrates the difference between

backward-looking and forward-looking metrics in the context of a net-zero transition. A simple backward-looking metric, based on the year 2020, would measure transition risk as a gap between emissions in 2020 and the long-term emission goal. A business model may thus be deemed unsustainable, based on its current direct and indirect emissions. A forward-looking metric would instead factor in future transition pathways for the economy, as well as initiatives taken by individual issuers and counterparties to mitigate transition risk. When the forward-looking metric is used, the scope of transition risk is the difference between current plans to reduce direct and indirect emissions and the required emission reductions, associated with a given climate goal.

Figure 8. **Backward-looking and forward-looking transition metrics**



Source: Own illustration.

Forward-looking metrics are still in their infancy. There is no single forward-looking metric that can fully quantify the future transition risks of a country or company.

Accordingly, **central banks are recommended to use different forward-looking metrics to assess and disclose transition risks.** They should be cautious about placing too much emphasis on a single metric.

Existing forward-looking metrics can broadly be separated into two groups. On the one hand, central banks can use metrics based on scenario analyses, stress testing, and reverse stress testing to disclose the transition risk faced by their credit facilities and investment portfolios. On the other hand, climate data providers are developing approaches to assess forward-looking climate risk. Box 5 gives three examples of forward-looking metrics that can be used to disclose transition risks of a company or country.

### Box 5

## Examples of forward-looking metrics for transition risk

#### Binary measurements of alignment

The metrics measure the alignment of a portfolio based on the share of assets in the portfolio that are issued by companies with declared targets aligned with specific climate goals, such as the goals of the Paris agreement.

#### Benchmark divergence metrics

The metrics measure the alignment with climate goals at an individual company level, by constructing normative benchmarks from forward-looking climate scenarios and comparing a company's forecast performance with them. The models can be adapted from internal analyses based on historical climate performance or third-party analyses of companies' future climate performance.

#### Implied temperature rise metrics

The metrics expand upon benchmark divergence models to translate the assessment of alignment at the issuer level into an implied temperature rise if the activities of the issuer represented the global economy.

### Box 6

## Application of forward-looking metrics for transition risk

Some central banks have published estimates for the implied temperature rise associated with their portfolio. Examples of this are listed below:

- The *Banque de France* set and achieved the goal of aligning the equity component of its own funds investment portfolio with a target of below 2°C by 2019. By the end of 2022, the *Banque de France* will apply the same target to the equity component of the pension liabilities investment portfolio, which in 2020 had an implied temperature rise of 2-3°C.

- The *Bank of England* reported an implied temperature rise of 3.0°C for 2021 for its Corporate Bond Purchase Scheme portfolio. In its report, the *Bank of England* also adopted a binary target measurement approach, in which it compares the decarbonisation plans of corporates in the Corporate Bond Purchase Scheme with an indicative pathway of emissions reductions consistent with the United Kingdom achieving net-zero emissions by 2050.

Sources: Banque de France (2021) and Bank of England (2021).

## 4.6 Climate-related targets

After having identified and assessed physical and transition risks, **central banks may choose to define and disclose climate-related targets, supported by appropriate metrics.** The targets might not always be based on inward financial risk assessments. Instead, they could also be based on outward risks or non-financial risks related to the strategy of the central bank.

As central banks decide on the nature and ambition of their targets, they should be aware of possible inherent conflicts. For example, given potential trade-offs between mitigating physical and transition risks, setting targets for both these categories might cause an innate conflict of objectives. To provide transparency and traceability regarding the choice of targets, **central banks could disclose their processes for setting, implementing, and updating these targets.** This could include stating the facilities and portfolios that the targets apply to.

**Some central banks might decide not to set targets for their credit facilities, investment portfolios, or other functions. If this is the case, central banks are still encouraged to explain their rationale for not doing so.**

For instance, the decision not to set targets could be based on potential conflicts with a mandate and/or the impact on the effectiveness of monetary policy tools.

Central banks need to carefully consider the appropriateness of the time horizon and the indicators they choose when setting targets. **Targets could be quantitative – though they may be qualitative at first – based on recognised metrics that allow progress to be tracked over time.** Tracking progress requires a clearly defined base year for the metrics and period over which a target is supposed to be achieved. It also requires that the metrics and targets be tracked consistently over time, to allow for comparability. Hence, for any target, central banks may disclose the time frame over which the target applies and the base year from which progress will be measured. Ideally, progress against these targets will be tracked and reported annually.

**Central banks are recommended to disclose the concrete steps they take to achieve their targets,** anchoring their actions to quantitative elements. The target time horizon could be framed by setting intermediate targets at regular intervals, to assess whether central banks are on track to meet their long-term targets.

### Box 7

#### Setting targets for emissions from central banks' internal operations

Central banks may want to set and disclose targets to limit emissions from their internal operations. Setting a clear example could encourage private companies to take a more active role in reducing emissions. This would show that central banks are practising what they preach and not asking more of others than they are prepared to do themselves. Central banks could disclose whether they intend to use greenhouse gas offsets in the

computation of emissions and, if so, disclose their targets with and without such offsets. Central banks may also decide to define broader environmental targets, such as for energy or water use. As part of the effort to achieve climate neutrality, targets related to internal operations should be based on transparent criteria, recognised metrics, and a well-defined timeline.

### Targets for physical risks

Targets related to physical risks could be defined with different degrees of complexity and granularity, from sensitivity measures (e.g. exposure to specific hazards) to more comprehensive risk-based measures (e.g. based on

the assessment methods specified in the Annex). As regards the sensitivity measures, targets could range from reducing exposure to asset classes, sectors, or certain issuers with significant physical risks, to setting and implementing limits for the proportion of assets materially exposed to key categories of commonly accepted physical risks.

As for the latter category, a target could be defined focusing on the alignment of a portfolio with lower physical risks or ensuring resilience of the portfolio to climate-related risk. Both aspects (exposure and risk) could be specified in order to ensure adequate diversification in the portfolio. More specifically, central banks could opt to set targets such as:

- Excluding certain sectors or issuers from portfolios based on their exposure to physical risk.
- Reducing the bond duration in a portfolio to a certain threshold, to mitigate medium-term to long-term physical risk.
- Increasing the share of investments in assets whose issuers report on their physical risks.
- Running stress tests to explore physical risks for certain portfolios by a certain deadline.

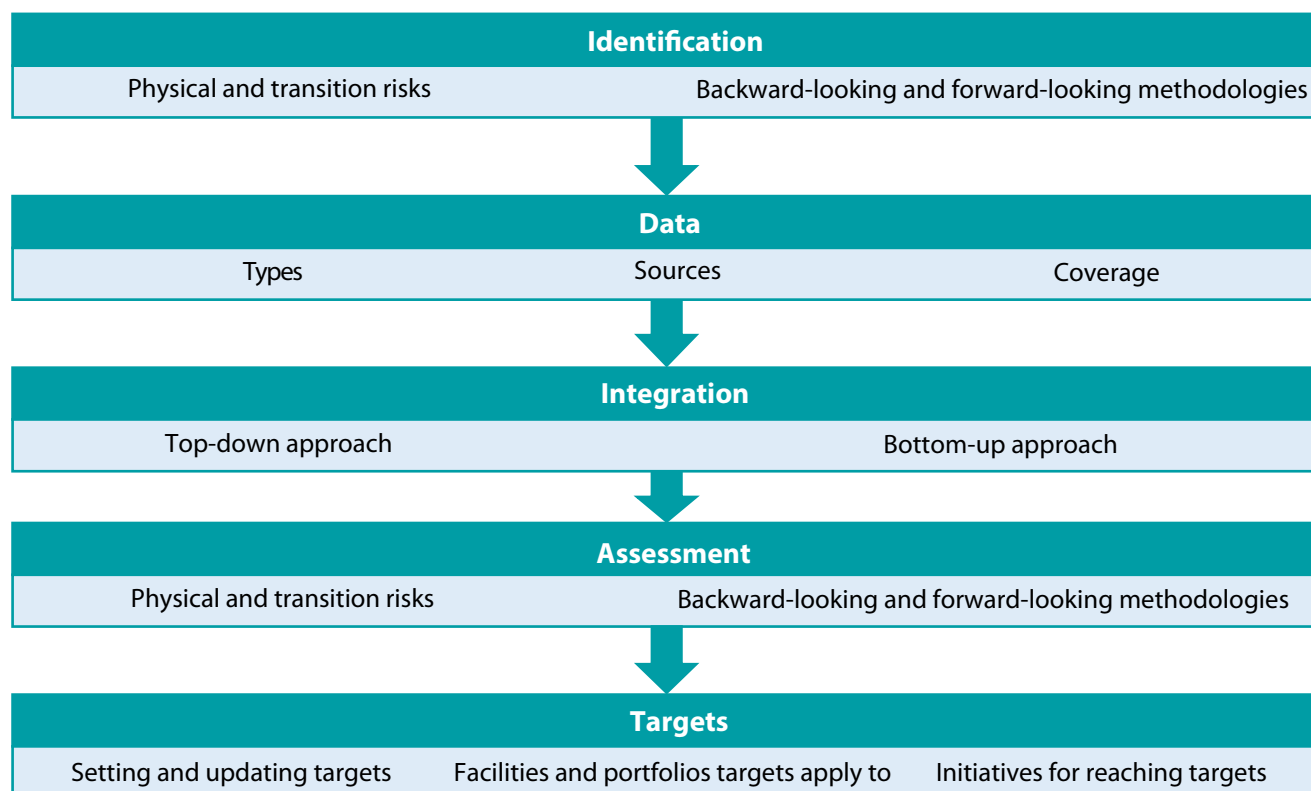
### Targets for transition risks

Transition risks exist across the various portfolios a central bank may have. Targets related to these risks can vary widely, and could aim at the total volume invested in certain assets or sectors, or the relative share of such

investments. Targets can increase transparency by requiring better emissions data coverage, or necessitate action by central banks themselves (e.g. stress testing) or external parties (e.g. selection criteria for external fund managers). Depending on their respective mandate and investment policy, examples of transition risk-related targets that central banks may choose to adopt for one or more of their portfolios include:

- Aligning some or all portfolios with a 1.5°C or 2°C pathway by a given deadline.
- Increasing the scope of the data coverage of portfolio companies' greenhouse gas emissions to a given share by a certain deadline.
- Reducing the greenhouse gas intensity of the assets held in all portfolios, or a certain portfolio, by a given amount per annum by a certain deadline.
- Increasing to a certain share, by a certain deadline, the proportion of the largest emitters in an investment portfolio that have set science-based climate goals.
- Aligning by a certain deadline a given share of assets managed under external mandates with specific requirements specified by an alliance of climate investors.

Figure 9. **Disclosure of climate-related risk management**



## 5. Looking ahead

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The NGFS has issued six recommendations for central banks, supervisors, policymakers, and financial institutions to enhance their role in the greening of the financial system and in managing climate-related and environmental risks. This includes achieving robust and internationally consistent climate-related and environmental disclosures.<sup>26</sup>

This guide elaborates on steps central banks could take to prepare their climate-related disclosures. Other NGFS workstreams have been working on different aspects of disclosure. Publications on gathering timely and consistent data, decision-useful stress tests, and sustainable and responsible investment are instrumental in achieving climate-related disclosures by the central banking community. The NGFS remains committed to expanding and strengthening its collective efforts in these areas.

Climate-related disclosure by central banks is still in its infancy. Looking ahead, the NGFS will continue to serve as a forum for central banks to share their experiences and

discuss challenges and possible ways forward. As part of this work, it would be important to have further guidance on metrics for disclosure on climate-related governance structures and strategy. The same can be said for risks associated with credit operations and counterparty collateral. Furthermore, future work could include additional guidance on the preparation of disclosures on central banks' internal operations.

The NGFS is part of the collective effort to broaden the understanding of environmental risks and opportunities. Its work reflects the increased attention that central banks and financial supervisors are paying to these risks. This could also result in guidance on environmental disclosures.

In the coming years, climate-related disclosure by central banks is expected to go mainstream. The NGFS will continue to contribute to this progress and develop new guidance for the management and disclosure of climate-related and environmental risks and opportunities.

<sup>26</sup> See NGFS (2019a).

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## 8. Annex: Assessment methods

This annex provides examples of quantitative identification and assessment methods that can be used to disclose climate-related risks. The list is non-exhaustive, as other methodologies exist.

Table 6. **Disclosure on forward-looking assessment methods**

Method	What to disclose?
Scenario analysis	<ul style="list-style-type: none"> <li>• Process for developing scenarios.</li> <li>• Different dimensions of scenarios.</li> <li>• Outcome of scenario analysis, e.g. impact on balance sheet for a specified horizon.</li> <li>• Impact of scenario analysis on climate-related strategy.</li> </ul>
Stress testing	<ul style="list-style-type: none"> <li>• Process for design and execution of stress test.</li> <li>• Scenarios used in stress testing.</li> <li>• Outcome of stress test, e.g. impact on balance sheet for a specified horizon.</li> <li>• Evaluation of the plausibility of scenarios.</li> </ul>
Reverse stress testing	<ul style="list-style-type: none"> <li>• Process for design and execution of reverse stress test.</li> <li>• Features of scenarios in reverse stress test, including the risk factors involved and the size and duration of the shock in these risk factors.</li> <li>• Outcome of reverse stress test, e.g. critical loss level and impact on balance sheet for a specified horizon.</li> <li>• Evaluation of the plausibility of the scenarios used to reach the critical loss level.</li> </ul>

### Scenario analysis

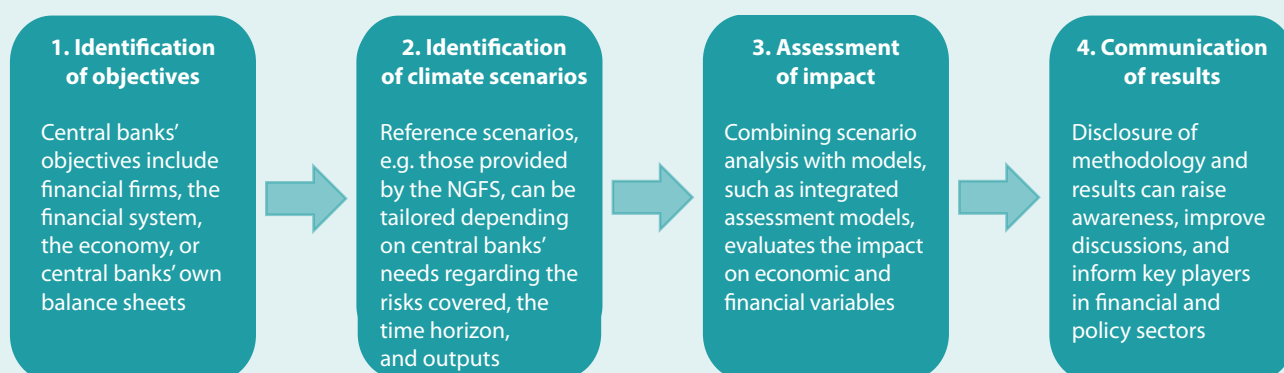
Central banks can use scenario analysis to identify, assess, and disclose financial risks connected with climate change and the transition to a net-zero economy. In developing scenarios, central banks could use multiple sources of data and different narratives, exploring plausible scenarios. A range of spatial, political, social, regulatory, and environmental factors across countries and regions should be reflected. Outputs from these analyses, coupled with results from non-climate-related analyses, could allow for climate-related risk assessments of credit facilities and investment portfolios.

Central banks may choose to disclose the institution’s process for developing scenario analyses. Scenario analysis solutions should clearly define the different dimensions of physical and transition risks, relevant time horizons, and the asset classes considered. Central banks should be transparent about the modelling methodology and granularity of data used. The disclosure should cover the translation of climate scenarios into a series of economic and financial shocks and their effects on cash flow projections and the fair value of assets and liabilities. This would allow central banks to assess and construct portfolios that are resilient to different plausible climate trajectories.

Central banks can use scenario analysis to identify specific sovereigns, sectors, industries, or individual issuers that are highly exposed to climate-related risks and thereby assess potential risks on their balance sheets. They may also perform a detailed scenario analysis on a representative sample of issuers in terms of the types of activities they perform, their location and exposure to climate-related risks, and then extrapolate the results of this analysis to the portfolios as appropriate.

## Box 8

### Scenario analysis model for climate-related risks



Scenario analyses aim to identify and assess potential implications of climate-related risks in terms of a range of plausible future states under such conditions. The comparison of different paths with different probabilities, including a baseline scenario, facilitates better informed decision making. In addition, scenario analyses can provide insights into how the financial system as a whole might cope with climate-related risks.

Climate scenarios are usually used for longer time horizons up to 2100. The main assumptions for climate scenarios can

be defined in line with scientific climate pathways, such as the NGFS Scenarios Portal or those developed by the Intergovernmental Panel on Climate Change. This includes, amongst others, the time horizon, the granularity of data, and the number of different scenarios. The scenarios incorporate different intensities of physical and transition risks. The impacts are combined with transition pathways and economic indicators and define a consistent set of economic, financial, and climate variables needed to evaluate the dynamics of central banks’ assets and liabilities over the investment horizon.

Sources: The illustration is based on NGFS (2020b). See NGFS (2021b) for a description of the NGFS Scenarios Portal.

## Stress testing

The use of stress testing to assess climate-related risks on central banks' balance sheets is a relatively new development. Based on the results, central banks will be able to better understand the vulnerabilities of their balance sheet, cultivate risk awareness, and take mitigation actions. Climate-related stress testing involves collecting and using granular climate-related data. In recent years, progress has been made on climate-related stress testing methodologies. This has been possible due to growing experience and the increased availability of datasets. As databases with exposure information have gradually improved and become available, several institutions have begun, or are planning, stress-testing exercises using firm-level or transaction-level information.

### Box 9

#### Using stress tests to assess financial institutions' ability to cope with shocks

Stress tests are used to assess financial institutions' ability to cope with economic and financial shocks. Instead of providing best estimates of expected losses, stress tests quantify losses given a pre-defined stress event. Most stress tests define severe, but plausible, scenarios to provide information about the tail risks faced by financial institutions. Widely used stress test scenarios

use macroeconomic (e.g. unemployment rate) and financial (e.g. interest rates) variables. The results are often expressed in terms of capital adequacy ratios for banks. Stress test results help financial institutions identify vulnerabilities and address them early, for instance by setting limits for particular risk factors or raising enough capital to cover unexpected losses.

Adapting traditional stress tests to climate-related risks for central banks raises challenges. Climate-related risks are expected to materialise over longer time horizons than those used for traditional banking sector risks. Data covering future climate or transition patterns may be unavailable or unreliable. Moreover, measuring the impact of climate-related risk requires granular exposure data, ideally by sector and region, in order to differentiate and assess risks along these dimensions.

If a central bank decides to measure its climate-related risks by stress testing, it may also choose to disclose relevant information about the stress test itself. Central banks may disclose the institution's process for designing and executing the stress test. They may also consider disclosing the scenarios used in the stress test, to spread best practices in this area and make the disclosed results more comparable.

## Reverse stress testing

Reverse stress testing can be used to complement scenario analysis and stress testing. Central banks that use climate-related reverse stress tests should disclose their process of designing and executing these tests, including the critical loss level, the relevant time horizon, and the key features of the scenarios leading to the estimated loss. The critical loss level for central banks may differ from that of commercial banks. For commercial banks, the critical loss level is defined relative to a default scenario. For central banks, it can be defined as a scenario in which the central bank is no longer capable of implementing monetary policy in an independent and effective manner. Central banks may disclose their evaluation of the plausibility of the scenarios used in reverse stress tests to reach the critical loss level. Lastly, central banks may disclose information on the impact of the scenarios on balance sheets.

## Box 10

### Reverse stress testing and climate-related risks

In a reverse climate stress test, a central bank aims to find combinations of climate-related risk factors or scenarios that cause a pre-defined critical financial loss level over a specific horizon. For instance, a central bank might explore which climate-related event causes a given loss in a particular portfolio over a given time period. A reverse stress test helps the central bank identify its

core climate-related vulnerabilities. The challenge with reverse stress testing is that there are an infinite number of combinations of risk factors that yield the same critical loss level. Therefore, a precondition in reverse stress testing is that the risk managers demonstrate the plausibility of the selected scenarios.



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