Network for Greening the Financial System

Cover report

Sustainable and responsible investment in central banks' portfolio management

Practices and recommendations

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Foreword

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The increasing severity and frequency of adverse climate events, building on long-term effects of climate change, as well as the growing calls for more stringent climate policies pose material economic and financial risks that investors need to consider. At the same time, rising geopolitical tensions in several parts of the world are jeopardising multilateral cooperation, which is key to collectively tackle climate change. Furthermore, concerns are growing about natural ecosystems degradation, that also stand to have important negative impacts not only on the livelihood of the world population, but also on economic growth and the financial system (NGFS, 2023). The interconnection between the adverse effects of climate change and nature degradation are becoming more apparent. On the one hand, the risk of biodiversity loss is heightened by acute damage to biotopes and gradual warming. On the other hand, the potential of nature to absorb and sink greenhouse gas emissions is weakening with dire consequences for the rate at which our planet is warming.

Many central banks have a role to play as investors. The Network for Greening the Financial System (NGFS) recognizes that the adoption of sustainable and responsible investment (SRI) practices by central banks is important for better managing sustainability-related risks and, without prejudice to members' individual mandates, for fostering the transition to a climate neutral economy. A major reallocation of resources is needed to speed up the transition and transform our economies, that still heavily rely on emission-intensive production. While this reallocation requires adequate climate policy initiatives from governments, the financial sector, including central banks, also has a role to play. This Report presents 10 non-binding recommendations to encourage central banks to further advance their adoption of SRI practices. In doing so, central banks can lead by example, foster the development of sustainability risk management in the financial sector, and mobilise mainstream finance to support the transition towards a sustainable economy (NGFS, 2020a).

Some central banks are already implementing formal policies, setting targets and building up knowledge and expertise on SRI. Others have just started measuring their exposure to sustainability risks, are getting familiar with ESG data, and are taking first steps to integrate this information into their risk assessments. Progress is still needed on several conceptual issues that pose challenges to central banks and private investors alike. Central Banks as investors should stand ready to pragmatically adapt their approach to SRI as new evidence becomes available.

The efforts of NGFS to green the financial system have been strengthened by the growing membership of the SRI group, which has increased diversity and balanced representation among regions globally. This growth testifies to how climate change is recognised by central banks as a global threat, a risk to be managed, and an opportunity to be grasped in their role as investors.

We are grateful to all NGFS members and observers for their commitment to progress NGFS's work from principles to actionable solutions for central banks and, more broadly, for the financial system. With this spirit, we hope that continuous discussions and analysis within the network will provide opportunities to build skills, address challenges, and share views and experiences.

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Executive summary

This Report presents 10 non-binding recommendations for central banks that wish to further advance their Sustainable and Responsible Investment (SRI) practices. In its first comprehensive report (NGFS, 2019a), the NGFS recommended that central banks integrate sustainability factors into the management of their investment portfolios. As part of the Workstream Net Zero for Central Banks, the subgroup on *Sustainable and Responsible Investing* (SRI-subgroup) started to take stock of the way central banks address sustainability considerations in their portfolio management, before presenting results in the SRI Guide (NGFS, 2019) and the Progress Report (NGFS, 2020). This Report aims to further steer action by presenting 10 non-binding recommendations that central banks can use to advance their understanding and adoption of SRI practices. It is based on insights from earlier NGFS publications, as well as case studies, market intelligence, the academic literature and a new survey amongst NGFS members performed in 2023 (the NGFS SRI survey).

The Report focuses on investment portfolios and does not consider portfolios held for monetary policy purposes (policy portfolios). Central banks typically hold different portfolios with various goals, depending on their respective mandates. The recommendations of this Report are relevant to investment portfolios, including FX investments, own funds and pension fund portfolios (these investments were also the focus of the previous SRI publications). The recommendations may also be applicable to portfolios managed on behalf of third parties, such as local governments or other central banks, with the consent of the portfolio owner. Policy portfolios held as a result of asset purchase programs or purely for FX intervention fall outside the scope of this Report. The NGFS Workstream on Monetary Policy explicitly looks into the incorporation of climate-related risks in the monetary policy framework (see NGFS, 2023b) and 2024.

Sustainable and Responsible Investing (SRI) is used as an umbrella term comprising various objectives, strategies and investment approaches. The high-level objectives of SRI range from addressing sustainability risks to which investors are exposed, to generating a positive real-world impact (e.g. contributing to climate change mitigation). More specific sustainability goals can relate to enhancing the portfolio's ESG-score, or reducing its carbon footprint.

This Report focuses mostly on the implications of climate change and draws on two complementary Technical Documents that focus explicitly on corporate and sovereign holdings (NGFS 2024a and 2024b, respectively). The former discusses how central banks can integrate net zero considerations in their investments in equity and corporate bonds, illustrating data sources, metrics and investment approaches (NGFS, 2024a). The latter helps central bank investment managers of sovereign holdings to better understand metrics to capture climate-related risks, opportunities and impacts as well as implementation considerations (NGFS, 2024b). These Technical Documents critically assess existing initiatives, data and tools, and identify various challenges that central banks should account for when further advancing their SRI approach going forward.

While gaining importance, nature-related risks and opportunities beyond climate change are not discussed at length in this Report because guidance on how to embed such considerations in investment portfolios is still in its early stage (NGFS, 2023). However, all the high-level principles and recommendations illustrated in the Report for climate also apply to broader environmental issues.

The NGFS SRI survey has gathered responses from 55 central banks and three observers from five continents, and suggests that members are progressively adopting SRI practices. Compared to the 2020 NGFS SRI survey, the number of respondents grew by 45%. The results show that the adoption of SRI practices amongst central banks is motivated mainly by the commitment to set a good example and to incorporate sustainability considerations in their risk-management practices. Over the past three years, a growing number of central banks has taken steps to formalise their SRI policies, to further embed sustainability considerations in their governance structures and to report more consistently on climate-related risks and opportunities. Respondents also mentioned the ambition to align central banks' portfolios with the climate goals set out in the Paris Agreement. While disclosure standards are increasingly being harmonised, there is no consensus yet on setting, monitoring and reporting sustainability targets (such as carbon reduction targets), mainly due to the lack of complete and accurate forward-looking metrics.

Sustained efforts are needed to achieve a more mature approach to the adoption of SRI in investment portfolios. The field of SRI is still in its infancy. Currently, there is no clear-cut approach that investors can follow to reduce sustainability-related risks in their portfolios and successfully contribute to the transition to a climate neutral world. However, there is growing awareness that sustainability risks may affect central banks' investment portfolios; this warrants further work to incorporate them in the standard risk management framework. Many concerns remain, including on the effectiveness of exclusion strategies. Should investors hold polluting companies in their portfolios and exert their influence to make these companies more sustainable? Or, should they exclude such companies to reduce the risk of stranded assets in their portfolios? Central banks need to look beyond their investment portfolios, lead the research efforts to gain a better understanding of the still unresolved empirical and conceptual issues underlying SRI, and take due consideration of their mandate to safeguard stability in the financial system.

The 10 non-binding recommendations outline various key steps that central banks can take to further integrate sustainability considerations in their investment practices, while remaining vigilant on the effectiveness of their approach. Recommendations 1-4 aim to help central banks to include sustainability considerations in their governance (Governance). Recommendations 5-6 shed light on the way the exposure to sustainability factors can be assessed (Measure). Recommendations 7-8 aim to assist central banks in the implementation of their SRI policy (Act). Finally, recommendations 9-10 help to integrate sustainability considerations in reporting practices as well as in the evaluation process (Evaluate). NGFS members can gradually implement these recommendations. As a first step, central banks should strive to enhance their understanding of sustainability risks, design a formal SRI policy and set up a supporting governance framework. A recursive monitoring, reporting and evaluation process can subsequently help to further refine the SRI policy as time progresses and knowledge of sustainability goals, supporting data and metrics as well as investment tools advances.

Governance

Recommendation 1: Integrate sustainability factors into investment portfolios, without prejudice to legal mandates. The management of sustainability risks is relevant to all central banks, as this helps to prevent financial losses. Whether central bank investment portfolios can also be used to foster the transition depends instead on their respective legal mandate. Central bank mandates are commonly enshrined in law, providing a legal framework for pursuing their primary objectives, such as price, monetary and financial stability, and/or maximum employment. Some NGFS SRI survey respondents have an explicit reference to sustainability in their mandate, or a secondary objective to support government policies, such as national climate policies, which may motivate using investment portfolios to foster the transition.

Recommendation 2: Set a formal and public SRI policy based on clear high-level objectives, to enhance transparency and signal commitment to pursue SRI. A formal policy can be endorsed by the board and at a minimum defines the in-scope portfolios, the high-level objectives (e.g. addressing sustainability risks and/or contributing to real-world impact), the scope of the approach (e.g. a specific climate focus or a broader ESG perspective) and the strategies used to pursue the objectives (such as negative screening, best-in-class, etc.). Ideally, the policy is based on public principles (e.g. UN Global Compact or SDGs) and offers enough flexibility to include new developments. The NGFS SRI survey indicates that the number of central banks with formal SRI policies has more than doubled since 2020 (to 31 central banks).

Recommendation 3: Set up a governance framework to effectively steer the integration of sustainability factors into investment practices. The implementation of a clear framework for decision-making signals the commitment of the central bank to SRI policies and their effectiveness. The NGFS SRI survey indicates that progress is being made at several central banks in embedding sustainability in governance structures, by setting up a dedicated SRI committee, a specialised coordination unit (like climate centers), or by integrating sustainability considerations in existing committees.

Recommendation 4: Enhance sustainability expertise, by building up knowledge and investing in staff capacity. Common actions to improve SRI skills include training, hiring employees with SRI-expertise and/or external consultants, and participating in industry forums and working groups, including collaboration within the NGFS. The NGFS SRI survey indicates that almost half of the central banks have staff dedicated to SRI.

Measure

Recommendation 5: Assess what standards (e.g. TCFD, ISSB, etc.) and frameworks (e.g. UN PRI, UN GC, etc.) can help to better understand the implications of sustainability risks and impacts. Central banks that aim to manage sustainability risks can screen for controversies assess ESG-scores and/or quantify their exposure to climate-related risks (transition and physical). Central banks that wish to capture sustainability opportunities may also want to assess exposure to climate solutions, labelled bonds and options to increase funding to investees with credible and ambitious transition plans. The NGFS SRI survey highlights that out of those central banks that adopt SRI practices, 16% are signatories or willing to sign the UN PRI and 74% adopt TCFD recommendations, while 13% embrace the Paris Agreement goals.

Recommendation 6: Assess what data, metrics and tools are most suitable to measure the exposure to sustainability factors. Since various methodologies can be used to capture sustainability risks and opportunities, and data are still far from perfect, there is added value in comparing data sources, metrics and tools. The NGFS SRI survey suggests that central banks often use multiple data providers to improve data coverage and assess data consistency: 60% of the survey respondents are using ESG data from specialised providers, as well as public data sources on sovereigns such as the IMF Climate Dashboard and the World Bank ESG data portal. Also, the use of various alternative or complementary indicators is widespread.

Act

Recommendation 7: Translate high-level objectives into specific sustainability goals, and assess potential implications for traditional objectives. When setting sustainability goals, other dimensions of the investment process could be impacted such as the financial or reputational dimensions. Specific sustainability goals range from reducing the portfolio's carbon footprint, aligning the investments to net zero, improving the portfolio's ESG score to investing in climate solutions. The NGFS SRI survey indicates that most central banks anticipate trade-offs between these goals and traditional investment objectives (risk-return, liquidity) in case of a delayed transition scenario; a majority of survey respondents is prepared to sacrifice some return and a minority some liquidity in favor of the sustainability goals.

Recommendation 8: Integrate sustainability factors throughout the investment process and decide on a combination of SRI approaches. Ideally, sustainability considerations are included in the strategic asset allocation, the portfolio construction process as well as in the risk management function. The NGFS SRI survey suggests that central banks mostly implement SRI during the portfolio construction process. Almost half of the survey respondents also apply climate stress testing to their own balance sheets. Finally, some also include sustainability factors in their strategic asset allocation alongside liquidity, safety and risk-return. The most common SRI approaches among central banks are green bond investing, negative screening and ESG integration. Only a few respondents apply (proxy) voting and engagement.

Evaluate

Recommendation 9: Adopt disclosure practices in line with global standards, to foster globally comparable information. External reporting on sustainability enhances transparency and aligns with current market practice. The NGFS SRI survey suggests that a large majority of central banks disclose carbon metrics (footprint, WACI or total carbon emissions), mostly based on Scope 1 and 2 carbon emissions. Some respondents also monitor or report ESG scores (34%), forward-looking metrics such as the *Implied Temperature Rise* (21%), and the presence of transition plans or their validation by the *Science-Based Targets Initiative* (13%). The recommendations of the *Taskforce on Climate-Related Financial Disclosures* (TCFD) are embraced by 74% of the respondents (also see NGFS, 2021).

Recommendation 10: Regularly evaluate the SRI policy and update it in light of new knowledge and experience. A monitoring process to assess the implementation status and results of the SRI policy is

crucial, as this ensures progress on sustainability goals and helps identify any need to adapt the approach. It is important for central banks to actively keep track of new insights, critically assess to what extent the chosen approach contributes to the sustainability goals, and stand ready to adapt it as new empirical evidence and theoretical results become available. Such an evaluation process may also include assessing potential trade-offs between sustainability and (other) traditional central bank objectives.

The Report concludes with a number of case studies describing first-hand experiences of NGFS members in their adoption of SRI. While further work is still needed on data issues and disclosures most central banks have taken first steps towards adopting SRI practices in one or more of their investment portfolios. Some central banks further advanced their SRI approach. The case studies put the 10 non-binding recommendations in context and show how objectives, scope and strategies are being adjusted and refined over time. By outlining the possibilities and showcasing practical examples, the case studies contribute to building critical momentum among NGFS members.

1. Introduction

Concerns on climate change are growing as the window to limit global warming to 1.5 degrees Celsius above pre-industrial levels is closing rapidly (IPCC (2023)). Despite the progress of policies and laws addressing climate change mitigation, the IPCC warns that implied greenhouse gas emissions (GHG) make it likely that global warming will exceed 1.5 °C during the 21st century, potentially as early as 2030. According to the UN Paris Agreement's Global Stocktake, the current climate commitments would likely lead to a minimum global warming of 2.4 °C per the end of the century (UNFCC, 2023). Several recent acute climate events and developments (record-high land and marine temperatures, forest fires, droughts, extreme weather events) suggest that non-linearities might be at work that make these forecasts optimistic. Furthermore, there is evidence of an increase in investments in fossil fuels, coupled with insufficient investment in renewable sources of energy (IRENA, 2023). Against this backdrop, the odds for a disorderly or failed transition appear to have become higher than previously considered, raising the need to take action now. While the key levers rest in the hands of governments, the NGFS aims to incentivise the central banking community to do what lies within their power.

This Report presents 10 non-binding recommendations to further advance central banks' adoption of *Sustainable and Responsible Investment* (SRI) practices. SRI is used as an umbrella term comprising multiple objectives, strategies and investment practices. These objectives range from addressing sustainability risks to generating a positive real-word impact, whereby most attention goes to strategies grounded on climate-specific considerations. The scope of the Report is limited to central bank investment portfolios, including their non-monetary policy FX reserves, own funds, third party and pension fund portfolios (e.g. those mentioned on behalf of local governments). Policy portfolios held as a result of asset purchase programmes or purely for FX interventions are not discussed. As official mandates, legal frameworks and the composition of investment portfolios vary per jurisdiction, it is up to each central bank to assess where there is room to adopt SRI practices.

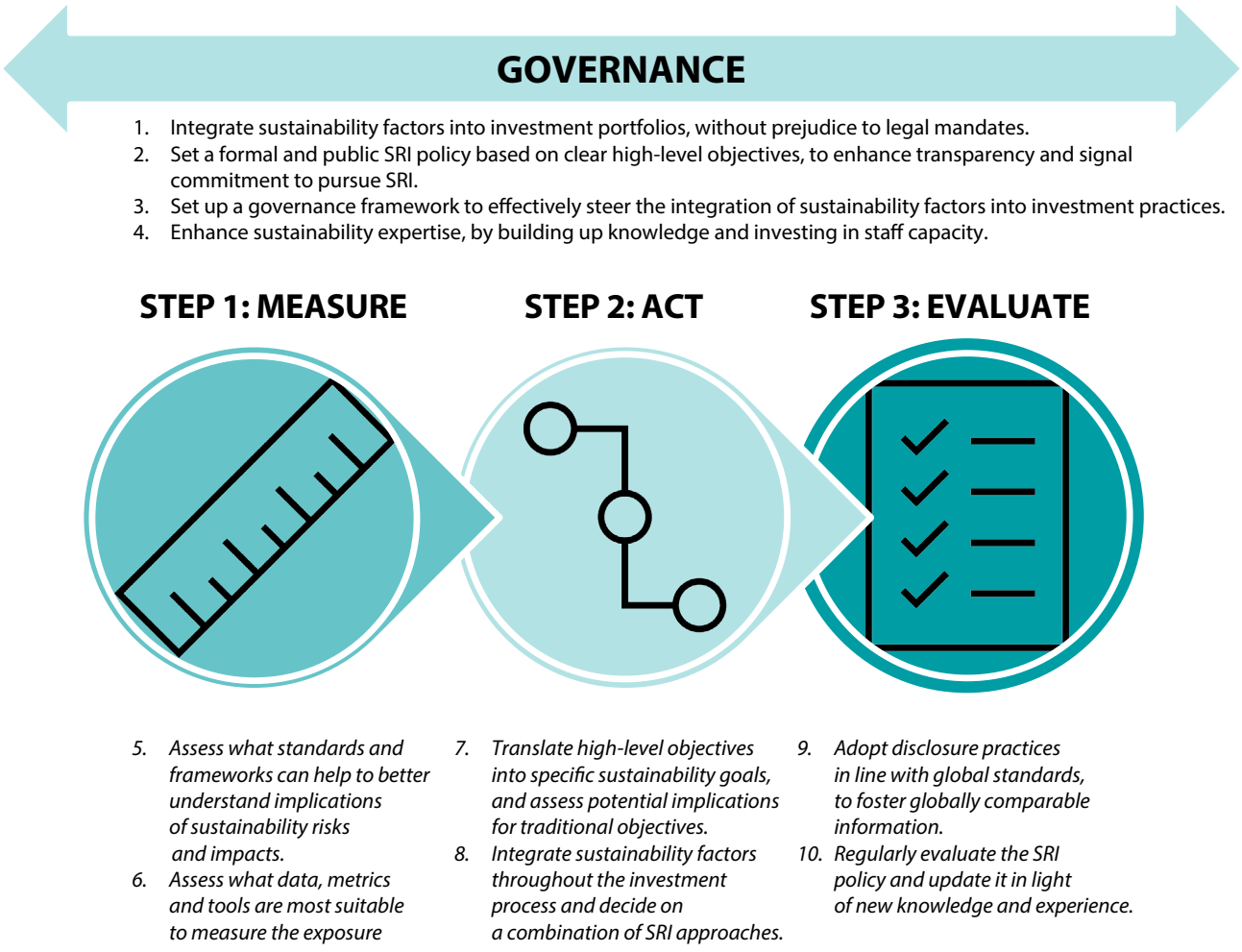
The recommendations are grounded on insights from central bank case studies, market guidance, academic literature, as well as earlier NGFS-publications (NGFS, 2019a, 2019b and 2020). Dedicated working groups have looked into four themes including central bank mandates, integration of SRI in the investment process, and addressing climate risks and opportunities in corporate as well as in sovereign holdings. The documents drafted by these groups helped to gain a better understanding of central bank-specific considerations associated with the adoption of SRI principles in their investment portfolios. Two complementary Technical Documents published alongside this Report provide further insight, specifically into the incorporation of climate-related risks, opportunities and impact in central banks' corporate and sovereign holdings, respectively (NGFS, 2024a/b).

The NGFS SRI survey on current investment practices, covering a total of 55 central banks from five continents and three other observers of the NGFS, suggests SRI considerations are progressively being adopted. Compared to a similar survey performed in 2020 the sample size grew by 45%. The survey indicates that most central banks are still exploring how to pursue sustainability goals within the remit of their mandate. However, amongst central banks that adopt SRI, approaches are becoming more advanced and focus is increasingly on realisation of specific sustainability goals, most likely as a result of more specific climate legislation, advancing disclosure requirements and net zero investment frameworks.

A step-by-step approach is used throughout this Report to present the recommendations. The approach is inspired by the *climate framework of the United Nations Principles for Responsible Investment (UN PRI)* and follows three steps: Measure, Act and Evaluate (PRI, 2015). A well-designed governance process should be built around these steps to ensure that the adoption of an SRI policy follows a formal process with feedback loops in each of the steps, starting with the design (measure), followed by the implementation (act) and finally the assessment (evaluate) (see figure 1).

This Report largely builds upon the structure of the SRI guide (NGFS, 2019). Chapter 1 analyses the current status of SRI practices across the NGFS membership. Chapter 2 addresses the governance and organisational aspects associated with the adoption of SRI. Chapter 3 presents relevant frameworks, data and metrics for measuring sustainability considerations. Chapter 4 discusses how central banks can implement SRI strategies. Chapter 5 elaborates on the design of a sound monitoring, reporting and evaluation process. The document concludes with first-hand experiences of NGFS members in the form of ten case studies on various SRI themes.

Figure 1 **A three step approach to the adoption of SRI by central banks**



Box 1

Methodology of NGFS SRI portfolio management survey

The NGFS survey on Sustainable and Responsible Investment practices (NGFS SRI survey) was conducted among its members in the third quarter of 2023. The survey aimed to catalogue the extent to which SRI criteria are incorporated (currently or envisaged) in central banks' portfolios. Its outline was similar to the 2019 and 2020 surveys, which were used as an input for the SRI guide and progress report (NGFS 2019, 2020). The survey included 11 questions on SRI strategy, 5 questions on SRI challenges and 32 questions on SRI implementation. This similar set-up allowed to track progress compared to last survey's responses.

A total of 58 responses were received and analysed (there were 27 responses in 2019 and 40 in 2020). All but three respondents are central banks (two respondents are EU agencies and one is a regional financial organisation). Compared to the 2020 survey, the sample size grew by 45%. The composition of the respondents however changed somewhat over the time period. In total, 33 central banks provided answers to both the 2020 and 2023 survey.

The respondents collectively cover NGFS-members from 56 jurisdictions, including various supranational institutions (European Union – EU, and Eurozone). Responses came from all continents, with as many respondents from European jurisdictions as from non-European jurisdictions. In total, there were five respondents for Africa, twelve for America, twelve for Asia and Pacific, and twenty-nine for Europe[1].

1 The total number of central banks members of the NGFS in each region are: 17 for Africa, 15 for America, 19 for Asia Pacific, 38 for Europe.

2. Setting the scene: central bank investment portfolios

This chapter sets out the characteristics of central bank investment portfolios, and assesses the extent to which they allow for the adoption of SRI. The NGFS SRI survey results show where central banks currently stand in their adoption of SRI, and provides the background against which the 10 non-binding recommendations are formulated.

Recommendation 1: Integrate sustainability factors into investment portfolios, without prejudice to legal mandates.

2.1 Motivations for the adoption of SRI

The adoption of sustainability considerations in investment practices can broadly be motivated by either a risk or an impact perspective, or both. The NGFS SRI Guide (2019b) presents two high-level objectives for adopting SRI in central bank portfolios: (i) addressing sustainability-related risks with the aim to enhance the financial characteristics of the portfolio, (ii) generating real-world impact by allocating more capital to investees that positively contribute to the environment and society. The extent to which a combination of SRI objectives may be pursued by central banks depends on their respective mandates and legal frameworks.

Central banks can explore the room within their mandate and legal framework to integrate sustainability factors into the management of their investment portfolios. Addressing sustainability risk (objective i) is relevant to all central banks, as incorporation of such risks should help to enhance risk-adjusted returns over the longer term[1]. Sustainability risks refer to an environmental, social or governance event or condition that, if it materializes, could cause a material negative impact on the value of the investment. Integration of such risks can also be relevant for various other areas of central banking (like operational risk management). Generating real-world impact (objective ii), for instance by using central bank investments to foster the climate transition, is less straightforward and depends on the central bank's legal mandate. Central bank mandates are commonly enshrined in law, providing a legal framework for pursuing their primary objectives, such as price, monetary and financial stability, and sometimes maximum employment. These mandates vary across jurisdictions, and only some central banks have explicit sustainability mandates (Dikau and Volz, 2021).

The adoption of SRI in investment portfolios helps to build up relevant expertise which could feed into positive spillovers to other central bank tasks. Sustainability risks have the potential to affect economic growth, inflation dynamics and the stability in the financial system. The adoption of SRI in the investment portfolios requires critical thinking on the broader economic implications of climate change, and can provide valuable insights into the complex dynamics associated with the climate transition that are also relevant for meeting central bank core responsibilities. As an example, to reduce the climate risk embedded in the portfolio, central banks can decide to exclude or to engage companies with high GHG emissions. While the prior would help reduce the portfolio's overall climate risk, the latter has the potential to help central banks gain insights into economic processes that are increasingly relevant for their institutional mandates (e.g. about the interaction between the energy transition and inflation) as well as to have a positive real-world impact.

1 The first NGFS call for action report (2019) encourages central banks to lead by example in their own operations and integrate sustainability factors into the management of investment portfolios. The report argues that this could have several benefits, including: i) better understanding of long-term risks and opportunities which could enhance the risk-return profile of long-term investments, ii) reduction of reputational risks as central banks would be less likely to invest in companies exposed to climate risks without a clear motivation and iii) contribute to positive (societal) impact.

Figure 2 **High-level objectives for central banks' portfolio management**

Source: NGFS SRI Guide (2019).

2.2 Central bank investment portfolios

Central banks traditionally hold different portfolios to achieve various goals, depending on their respective mandates, preferences and conditions. The SRI guide identifies five different portfolio types. The scope of this Report is limited to the investment portfolios, including the FX investments, own funds, pension funds and third party portfolios. As the bulk of central bank's assets is held for policy purposes, this portfolio type is briefly discussed to clarify the difference between central bank holdings.

- **Policy portfolios (not in scope)** are at the heart of central banks' mandates, and are held for FX intervention, the execution of asset purchase programs or other monetary policy goals. These portfolios constitute the largest share of central bank investments, and mostly consist of high-grade government and supranational debt. These investments generally have strict requirements in terms of credit quality and liquidity, depending on the specific policy objective for which they are held.
- **FX investment portfolios** represent the share of FX reserves not held for monetary policy goals, but earmarked for financial return generation. Various central banks do not distinguish between FX investments and own funds, but as both portfolios have the same objective, their characteristics are similar. The discussion on FX reserves in this Report relates to FX investments.
- **Own fund portfolios** typically aim to generate returns within a certain risk tolerance level and are not related to policy objectives. The asset mix of these portfolios often includes equities, corporate bonds and sometimes private debt, in addition to government and supranational debt.
- **Third-party portfolios** are subject to client demands. Examples are the foreign reserves managed on behalf of a local government or of the European Central Bank (ECB). The objectives and asset allocation of these portfolios vary, as these attributes are determined by the third party.
- **Pension portfolios** serve as a long-term savings account for retirement and tend to have a longer investment horizon[2]. These funds are generally invested in more diverse asset classes and geographic locations compared with those of own and policy portfolios.

The specific characteristics of a portfolio determine the extent to which SRI objectives can be adopted. FX investments and own funds give more leeway to adopt SRI practices, as these are held to generate a return and are generally less bound by the central bank's policy objective. As holdings in pension portfolios are more diverse and tend to have a longer-term focus, these are also suited to the adoption of SRI practices (provided that this aligns with the beneficiaries' demands). Third-party portfolios are more heterogeneous and are subject to varying client demands. The NGFS SRI guide (2019) discusses the applicability of the two high level objectives (risk/return and impact) per portfolio.

2 Note that the NGFS survey, and therefore this progress Report, only considers pension portfolios that are part of central banks' balance sheets. This means that pension schemes for central bank employees managed by a separate foundation or other off-balance-sheet vehicle are not taken into account.

Box 2

Central banks' motivations for engaging in SRI practices

Central banks' main motivations for adopting sustainability considerations in their investment practices align with the risk perspective (objective i). The NGFS SRI survey suggests that protecting against sustainability risk (rank 1), mitigating reputational risk (rank 2) and setting a good example (rank 3) are the most important reasons for central banks to adopt SRI (Table1). This ranking of motivations is similar to previous years and aligns mostly with the desire to protect or improve the risk-return profile of the portfolio. The good-example motivation is especially relevant if a central bank calls upon the financial sector to address sustainability-related risks.

The impact perspective has gained importance amongst central banks compared to previous surveys (objective ii). The NGFS SRI survey shows that this motivation has gained importance (it now ranks 4). Interestingly, the survey suggests that 13% of respondent central banks have an explicit reference to sustainability in their mandate. Furthermore, some respondents have secondary objectives in their mandate to support government policies, such as national climate policies. This may create leeway to use part of the investment portfolios to foster the transition[1].

Complying with international standards is also important; demand from stakeholders, fiduciary duty and legal requirement are considered less important. Regarding compliance with international standards or frameworks (rank 5, unchanged from the previous survey), central banks tend to follow widely accepted principles related to human rights, environmental protection and controversial weapons[2]. Demands from stakeholders and fiduciary duty are less prominent (rank 6 and 7, in the order), as central banks operate independently and often do not explicitly manage funds on behalf of beneficiaries (such as beneficiaries of pension schemes). Finally, abiding by legal requirements is deemed least important, which suggests that central banks' adoption of SRI practices is not a result of climate change mitigation policies.

Table 1 **Motivations for adopting SRI**

Ranked motivations	2023	2020	2019
Protecting against sustainability risk	1	3	2
Reputational risk	2	1	1
To set a good example	3	2	3
Achieving positive impact	4	5	N/A
International standards/frameworks	5	4	5
Demand from stakeholders	6	6	4
Fiduciary duty	7	7	6
Legal requirements	8	9	N/A
Other	9	8	7

Note: 45 respondents ranked their motivations (1-9, where 1 was considered most important) for adopting SRI in their investment practices.
Source: NGFS SRI portfolio management survey 2023, 2020, 2019.

1 Dikau and Volz (2021) find that among 135 central banks, 40% are mandated to support the government's policy priorities and 12% have explicit sustainability mandates.

2 Specific frameworks that were mentioned in the NGFS SRI survey include the UN Global Compact (UNGC), recommendations of the Taskforce for Climate Related Financial Disclosures (TCFD) as well as the Paris Agreement.

This year's NGFS SRI survey highlights that central banks mostly adopt SRI in their own funds and their FX investment portfolios, similar to previous years. Out of all responding central banks, almost 69% currently adopt some form of SRI in one or more portfolios. However, not all efforts to integrate sustainability considerations in investment practices are the result of an official SRI policy.

A breakdown per portfolio type indicates that the level of policy formalisation is highest for the own funds, followed by the FX investments, pension funds and lastly by the third party portfolios (table 3). While further progress can be made, the number of central banks with formal SRI policies in place has increased strongly compared to the previous NGFS SRI survey performed in 2020.

Table 3 **Breakdown of portfolio composition and SRI adoption**

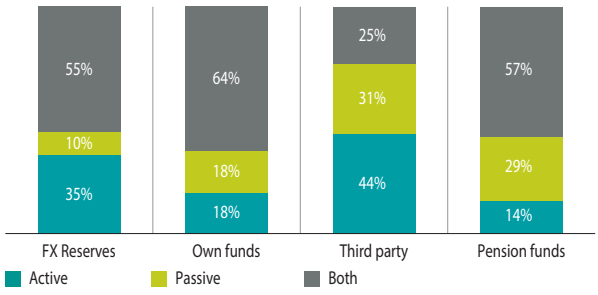
	2023			2020
Portfolio	**Central banks managing this portfolio [% (no.)]**	**Of which adopting SRI per portfolio [% (no.)]**	**Of which adopting SRI with a formal policy per portfolio [% (no.)]**	**Central banks with a formal SRI policy per portfolio [% (no.)]**
FX investment	87% (48)	69% (33)	46% (22)	25% (12)
Own funds	40% (22)	86% (19)	77% (17)	33% (7)
Third party	35% (19)	80% (15)	21% (4)	33% (4)
Pension funds	15% (8)	86% (7)	50% (4)	57% (4)

Note: As the composition of survey respondents changes over the years, the numbers are not fully comparable. In 2023, 55 central banks answered the survey versus 40 in 2020. 33 central banks were respondents to both the 2020 survey as the 2023 survey.

Source: NGFS SRI portfolio management survey 2023, 2020.

Central bank portfolios vary in terms of asset class composition, investment style and management (figure 3). The FX reserves are mostly invested in traditional central bank assets like high quality bonds issued by (sub) sovereigns, supranationals and agencies. These funds are managed in-house by internal staff, and mostly held for policy purposes. However, some of the FX reserves are also held to generate financial returns, and are often invested via mutual funds, exchange traded funds (ETFs) or discretionary mandates. In the pension and own fund portfolios, the asset class mix is more diverse and also consists of equity and corporate credits. For the own funds, a pure passive approach is slightly more common than for FX investments and the portfolios are mostly invested via mutual funds, ETFs and/or discretionary mandates. As regards pension. funds, these portfolios often combine passive and active approaches implemented via direct holdings, mutual funds or ETFs. Third party portfolios are more mixed in terms of asset classes, and sometimes also invest in risky asset classes. These portfolios are mostly managed in-house and invested via direct holdings and derivatives.

Figure 3 **Management style per central bank portfolio**



Source: NGFS SRI portfolio management survey 2023.

2.3 SRI strategies

Central banks can apply various strategies, depending on their respective SRI objectives and portfolio constraints. The NGFS SRI guide identified five non-mutually exclusive strategies that central banks can combine to achieve their high-level SRI objectives (risk protection or positive impact): negative screening, best-in-class, ESG integration, impact investing, voting and engagement (Table 4, NGFS, 2019)[3].

In general, a more diversified asset class composition allows for the application of a greater variety of SRI strategies. Central banks traditionally invest in safe and liquid assets, like bonds issued by (sub-)sovereigns, supranationals or agencies. As most sovereign issuers also issue green bonds, it is feasible for central banks to apply a labelled bond investing strategy, as reflected in the survey results. It is however not straightforward to apply negative screening, best in class, ESG integration or voting and engagement for these holdings. Diversification issues may arise due to the relatively small number of issuers. Furthermore, specifically for sub-sovereigns, supranationals and agencies, it is complex to assess and compare their sustainability performance, owing to limited ESG-data coverage for these issuers as well as to conceptual problems. While ESG-data is more readily available for sovereigns, conceptual problems remain. Finally, engaging with (sub-) sovereigns may be controversial as it could raise questions about consistency with the central bank mandate, or raise risks for independence. Most central banks also invest in other asset classes like equity and corporate credits with the aim to generate risk-adjusted returns. This corporate investment universe is very broad, highly diversified in terms of issuers and generally well covered by ESG-data, making it easier to apply a broader range of SRI strategies.

Table 4 **Mapping of SRI strategies to high-level objectives**

SRI strategy	Risk	Impact	Features
Negative screening	x	x	Exclusion may be based on poor ESG-performance, in absolute terms or relative to industry peers, or misalignment with international norms (such as UNGC violations or producers of controversial weapons). Negative screening restricts the investment universe, and aims to filter out controversial names to reduce reputational risk and, for instance, the risk of stranded assets.
Best-in-class (or positive screening)	x	x	Weighing based on positive performance, relative to sector/industry peers on specific ESG-criteria. Allows for a mitigation of risks without hampering sectoral diversification, thereby benefiting diversification. Lagging companies are motivated to improve their conduct, which may also add to impact.
ESG integration	x		A systematic and explicit inclusion of material ESG criteria into investment analysis. Often used in combination with screening and thematic investing. ESG integration enhances traditional financial (risk) returns and aims to improve the riskreturn profile of the portfolio.
Voting and engagement	x	x	Exerting influence to maximize overall long-term value, including the value of common economic, social and environmental assets, on which returns and client and beneficiary interests depend. Voting and engagement is often used to improve companies' business conduct, and focuses mostly on good governance with the aim to reduce financial risks and/ or to generate positive impact.
Impact investing		x	To generate an intentional positive and measurable impact on the environment and/or society, alongside financial returns. Such strategies target financial returns that range from below market to risk-adjusted market rate.
Labelled bond investing		x	Investing in labelled bonds is a form of thematic investing. It focuses on ESG trends rather than specific companies or sectors, enabling investors to finance structural shifts that can change an industry. It requires identification and allocation of capital to themes or assets related to certain environmental or social factors, such as clean energy, energy efficiency, or sustainable agriculture.
Carbon reduction	x	x	Carbon reduction measures aim to reduce the portfolio carbon footprint or intensity, and allow for comparing and benchmarking portfolios and strategies. The decarbonisation targets are generally part of a broader climate strategy, and help to identify priority areas and actions for reducing real-world emissions. Decarbonisation can aim to reduce transition risk, or to help speed up the climate transition.

3 This classification is broadly in line with market terminology on SRI. PRI (2023) distinguishes five main SRI strategies, including screening (positive and negative), ESG integration, thematic investing, stewardship and impact investing. The additional strategies in this Report – carbon reduction measures as well as labelled bond investing – can be placed under the thematic investing strategy.

Labelled bond investing is applied in all central bank portfolios. The largest portfolio share is allocated to green bonds, followed by social, sustainable and sustainability-linked bonds, in line with the composition of the labelled bond market. Only a few central banks have set explicit target allocations for labelled bonds. Furthermore, only 10 % of central banks measure the associated positive impact of the sustainable projects financed by the bonds' use of proceeds, which may be a result of limited transparency and standardisation of reported impact metrics or resources constraints at central banks. Several frameworks and standards are used by central banks to assess and select labelled bonds, including those issued by the International Capital Market Association, Climate Bond Initiative and the EU (see the case study of the National Bank of Belgium – NBB in the Appendix).

Negative screening and ESG integration rank prominently within the FX reserves, the own funds as well as the pension funds. Exclusion filters are set primarily on the basis of (inter)national laws, conventions, principles and standards, such as the international treaties on controversial weapons, labour as well as on human rights. Some respondents also screen for involvement in the production of tobacco, thermal coal and other fossil fuels. As regards ESG integration, a first step is to determine which criteria are financially material. Central banks indicate that this materiality assessment is often done by a specialised ESG data provider as reflected in the ESG scores, or, in some cases, by an external manager. Only a few central banks do their own materiality assessment.

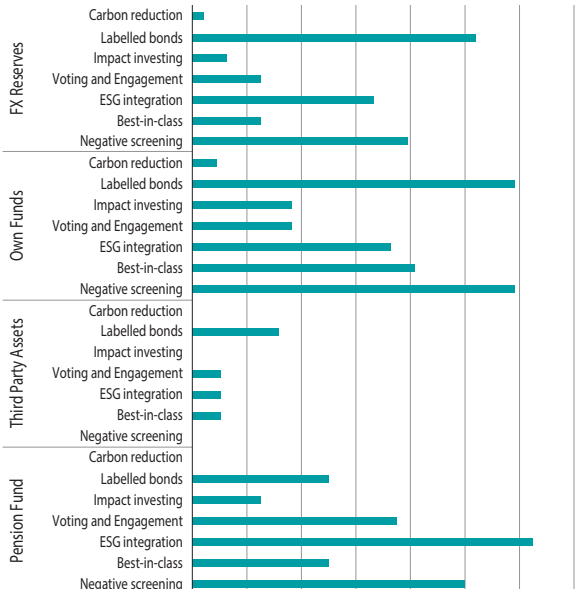
Best-in-class strategies are mostly applied in own funds portfolios, and scoring methodologies often explicitly include carbon metrics. The scoring methodology is generally founded on a combination of ESG scores and carbon metrics, and implemented via an external manager. Some central banks apply a best-in-class strategy themselves and also include more forward looking aspects in their scoring, such as projected GHG emissions, implied temperature rise as well as quality of climate transition plans.

Voting and engagement strategies are sometimes applied in the pension or own fund portfolios. A few central banks follow a voting and engagement approach, mostly within their own or pension fund portfolios. Such strategies are generally based on the stewardship approach of the external asset managers the central bank works with. Only a few central banks have set and execute themselves their own voting and engagement policy.

Carbon reduction strategies are applied by a few central banks, within their FX reserves or own funds. A number of central banks has made a net zero commitment and set corresponding GHG emissions reduction targets, either at the asset class or at the portfolio level. These targets are generally pursued via a combination of strategies, including reducing exposure to fossil fuel investments (negative screening), tilting the portfolio towards companies that are favourably positioned to the climate transition (best-in-class) and engaging with companies that need to further align their business with the goals set out in the Paris Agreement (voting and engagement).

Impact investing beyond labelled bonds is not very common. A few central banks invest explicitly in impact funds that contribute to social impact or to the climate transition, for instance by investing in renewable energy companies.

Figure 4 **Most applied SRI strategies per central bank portfolio**



Note: Percentages of central banks responding to the SRI survey that apply SRI strategies per portfolio type. How to read this chart: "52% of central banks with FX reserves invest in labelled bonds." Percentages were calculated using the number of central banks managing the portfolio type: 48 central banks manage FX reserves, 22 own funds, 19 third-party assets, and 8 pension funds.

Source: NGFS SRI survey 2023.

There is no consensus on how central banks may best integrate sustainability considerations in the management of their investment portfolios. Seven strategies are identified that may help central banks to achieve their specific SRI objectives (summarised in Table 4). The applicability of these strategies depends on the motivation for adopting SRI, as well as the features of the portfolio under consideration. Labelled bond investing and negative screening are currently the most prominent strategies across central bank portfolios. Some central banks go a step further and implement a best-in-class approach or integrate ESG criteria in their investment processes. Only a few central bank apply impact investment (beyond green bonds).

3. Governance

A formal and transparent SRI policy with explicit consideration of sustainability in the decision making process strengthens central banks' commitment to lead by example, and ensures that sustainability is properly embedded in the investment process.

Recommendation 2: Set a formal and public SRI policy based on clear high-level objectives, to enhance transparency and signal commitment to pursue SRI.

Recommendation 3: Set up a governance framework to effectively steer the integration of sustainability factors into investment practices.

Recommendation 4: Enhance sustainability expertise, by building up knowledge and investing in staff capacity.

3.1 Formalisation of SRI policies

A formal and public policy enhances transparency and signals that the central bank is committed to SRI policies and ensures a continuous attention to their effectiveness. If leading by example is among the central bank's objectives, as was suggested by the NGFS SRI survey (see table 1), a formal and public policy is a requirement.

A good SRI policy should ideally be approved by the board, and meet a number of criteria:

i. clearly define the high-level SRI objectives and scope of the approach (e.g. a specific climate focus, or a broader ESG perspective), taking into consideration the relationship between sustainability objectives and traditional central bank objectives,
ii. explain the investment approach utilised to pursue the high-level SRI objective(s) (such as portfolio construction via a combination of negative screening, carbon reduction measures and best-in-class),
iii. explain the framework for decision-making, to enhance consistency in the design of the investment process,
iv. offer enough flexibility, so as to facilitate inclusion of new asset classes and criteria. Also, as the field of SRI is rapidly evolving, the policy should be updated at least every three years, and allow for policy changes, should they become necessary.

Moreover, it is considered good practice to identify who is responsible for the policy implementation and its assurance, how often it will be reviewed and any guidelines on how potential policy breaches are addressed. (PRI, 2023 b).

The NGFS SRI survey shows that climate-specific considerations are prioritised within central banks SRI policies. Since 2020 the number of central banks with a formal SRI policy covering the FX reserves or the own funds has more than doubled (see table 1). In these policies, priority is given to climate followed by broad ESG considerations. A few respondents also include considerations related to nature or the sustainable development goals (figure 5).

The thinking about SRI is evolving, as the majority of central banks consider further expanding their approach. In the future, 78% of respondents consider adopting (more) SRI principles in their portfolio management practices. Among them, the main focus is on broad ESG (84%), followed by net zero (67%) and nature-related issues (47%) (figure 6). While data and methods to analyse nature-related risks are still in development, the risks stemming from nature loss are highly material, as acknowledged by the NGFS (NGFS 2022, 2023). As sustainability risks and opportunities are often interlinked, there are merits in an integrated approach that addresses multiple SRI themes at the same time (e.g. climate/nature nexus).

Figure 5 **Current scope of central bank SRI policies**

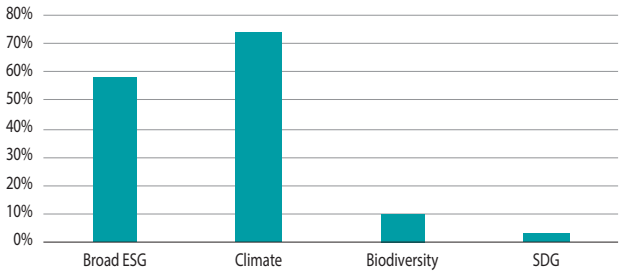
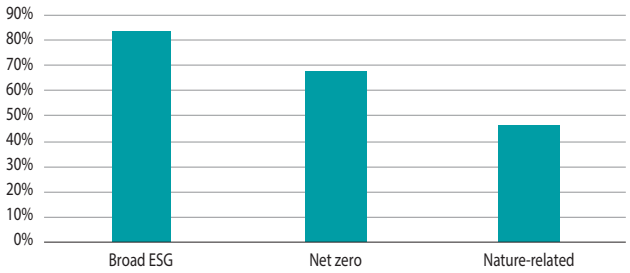


Figure 6 **Future scope of central bank SRI policies**



Note: Percentages LH figure are based on the 31 central bank respondents that have adopted formal SRI policies. Percentages RH figure are based on the 43 central bank respondents that consider adopting (more) SRI principles in their investment portfolio management practices
Sources: NGFS SRI Survey 2023.

3.2 Decision making process

An adequate and transparent governance framework signals central bank's commitment to SRI, and ensures a continuous attention to the effectiveness of its approach. Central banks are encouraged to establish a governance framework to effectively steer the integration of sustainability factors. The revised NGFS guide on climate-related disclosures presents recommendations to enhance central bank's disclosure on governance (NGFS, 2024), noting that transparency is instrumental to the framework's effectiveness. A similar conclusion can be drawn for other sustainability themes (beyond climate).

Central banks should adopt high-level SRI objectives and clarify how these align with their legal mandates. The role of the board and management in the design, implementation and oversight of the SRI objectives should be decided. Ideally, the board and management should have – and signal – an active role in approving and promoting SRI policies. Furthermore, specific structures should be in place to oversee and recommend updates to the SRI strategy. It should be clear which bodies are involved in this process, and how responsibilities are allocated (NGFS, 2024).

Central banks are encouraged to disclose their governance related to SRI. Climate-related disclosure can play an important role at various stages of the investment process. The disclosure should specify whether a formalised SRI policy exists and how it is approved, how the SRI principles are defined, and which bodies are responsible for SRI decision-making (e.g., developing, implementing and monitoring compliance with investment guidelines). Central banks are also encouraged to cover investment portfolios that are externally managed. Furthermore, central banks could describe whether there are provisions in the mandate, constraints, or any other specific risk that influences the decision to adopt SRI in the investment portfolios (NGFS, 2024).

The NGFS SRI survey highlights that central banks take steps to further embed SRI in their organisational structures. Currently, 22% of central banks (39% of those with formal SRI policies) have a dedicated committee in place to establish SRI policies and to monitor and evaluate results. Other central banks have chosen to integrate sustainability in existing committees or to set up lower-level coordination units (working groups and climate centers). The decision-making bodies intervene at several stages of the investment process in order to design, steer, control and redefine the SRI policies. Usually, board members are involved in the design of the SRI strategy, either directly or via the participation in one or more committees. Some central banks also involve external stakeholders, for example, by establishing ethics committees. At most central banks, the executive board is responsible for approving the SRI policy; in some cases this responsibility lies with the head of reserve management or chief investment officer.

3.3 Capacity building

Central banks could enhance their sustainability expertise, by building up knowledge and investing in staff capacity. The most common actions for central banks to gather more knowledge on SRI include investing in training of staff, hiring dedicated employees and/or external consultants, and participating in industry forums and working groups to engage with market participants.

The NGFS SRI survey indicates that central banks are investing in research, capacity building and collaboration within the NGFS and other international organisations. The number of central banks with staff dedicated to sustainability issues has remained constant over the last few years (35% of the sample). Specifically the majority of such central banks have dedicated, staff within the portfolio management team (25%). The number of full time employees dedicated to SRI ranges from 0.5 to 44, with an overall increase in the last years. Various roles are required for a thorough implementation of SRI, ranging from portfolio management, risk management, market analysis to reporting.

4. Measure

Various frameworks and standards offer guidance on how to apply sustainability information within the investment process. A good understanding of existing ESG data and metrics, feeds into better measurement of the exposure to sustainability factors.

Recommendation 5: Assess what standards (e.g. TCFD, ISSB, etc.) and frameworks (e.g. UN PRI, UN GC, etc.) can help to better understand the implications of sustainability risks and impacts.

Recommendation 6: Assess what data, metrics and tools are most suitable to measure the exposure to sustainability factors.

4.1 Sustainability standards and frameworks

In their assessment of the exposure to sustainability factors, central banks refer to a wide set of initiatives (see Table 5). A set of international principles from the UN and the OECD generally provide the basis for their interaction with companies and other stakeholders[4]. Investors that aim to assess climate-related risks and opportunities mostly build their approach on guidance issued by the TCFD, Glasgow Financial Alliance for Net Zero (GFANZ) and the Partnership for Carbon Accounting Financials (PCAF)[5]. Investors that aim to contribute to the climate transition often base their approach on guidance issued by industry bodies like the Net Zero Asset Owners Alliance (NZAOA) or the Paris Aligned Investment Initiative (PAII). These initiatives build on guidance related to climate targets, pathways and scenarios as presented by Science Based Targets Initiative (SBTI), the Transition Pathway Initiative (TPI) and the NGFS. Table 5 gives an overview of various recent initiatives that aim to support the implementation of SRI. These initiatives are characterised by diverse levels of ambition, multiple (and potentially non-complementary) objectives, and different scopes and characteristics (binding or not, public or private, methodology- or reporting-oriented, etc.). Central banks should decide for themselves which initiatives best align with their SRI policy, and help to enhance their understanding of sustainability factors.

4 Companies that do not meet UNGC or OECD guidelines are considered controversial, and investing in such names can feed into reputational risk. Furthermore, UN PRI presents six principles that offer a menu of possible actions for incorporating ESG issues into investment practice (PRI, 2024).

5 The International Sustainability Standards Board (ISSB) in mid-2023 incorporated the TCFD-recommendations to set a global baseline for sustainability disclosures, firstly focusing on climate information.

Table 5 **Initiatives to support implementation of sustainable and responsible investing**[1]

The dots highlight the focus area of the initiative, while the shaded cells indicate all areas addressed

Initiative	Scope	Link	High level commitment	Exposure and metric methods	Scenario analysis	Target setting	Enabling action	Reporting
OECD guidelines for multinational enterprises on responsible business conduct	ESG	OECD MNE	•					
UN global compact (UNGC)	ESG	UNGC	•					
UN sustainable development goals (SDGs)	ESG	17 SDGs	•					
UN environnent programme finance initiative (UNEP FIs)	ESG	UNEP FI	•					
UN principles for responsible investing (PRI)	ESG	UN PRI	•					
UN net zero asset owners alliance (NZAOA)	Climate	NZAOA - Target setting protocol	•					
Global reporting initiative (GRI)	ESG	GRI standards						•
International sustainability standards board (ISSB)	Climate/ Broad ESG	ISSB - Sustainability-related Disclosures						•
Taskforce for climate related disclosures (TCFD)	Climate	TCFD recommendations						•
Glasgow financial alliance on net zero (GFANZ)	Climate	GFANZ transition planning						•
Partnership for carbon accounting financials (PCAF)	Climate	PCAF standard		•				
Science based targets initiative (SBTI)	Climate	SBT guidance FI				•		
Climate Action 100+	Climate	Climate Action 100+					•	
IIGCC Paris aligned investor initiative (PAII)	Climate	IIGCC NZIF				•		
Paris agreement capital transition assessment (PACTA)	Climate	Climate scenario analysis			•			
Transition pathway initiative	Climate	Tool – Transition Pathway Initiative		•				
Taskforce on nature related financial disclosures (TNFD)	Nature	TNFD						•
Natural Capital Protocol	Nature	Natural Capital Protocol		•				
Nature Action 100	Nature	NA 100+					•	
Investor Policy Dialogue on Deforestation (IPDD)	Nature	IPDD					•	
Spring stewardship initiative for Nature	Nature	Spring					•	

1 Also see: PRI (2023) The investor guide to climate collaboration (unpri.org).

Sources: SBTI (2023), Financial science-based targets guidance. Additions made by authors, based on insights obtained in NGFS technical working group on sustainable and responsible investing.

The NGFS SRI survey indicates that central banks mostly apply a broad ESG scope, and start by assessing issuers ESG-scores and screening for controversial activities or conduct (e.g. production of tobacco or violation of norms such as the UN Global Compact principles or the OECD guideline for multinationals). In addition, some apply a climate-specific scope, and focus explicitly on measuring and reducing the carbon footprint of their portfolios. A limited number of central banks align part of their portfolios with net zero goals and look at guidance offered by frameworks like the NZAOA or the PAII. Only a few central banks have expanded their assessment to include nature-related risks. Currently, six central banks and one observer are signatories to the PRI while another five consider becoming a signatory. So far, in setting net zero goals, central banks have mostly embraced the EU Benchmark Delegated Regulation (6 central banks), followed by PAII (3), and the NZAOA (3). Various central banks also refer to the requirements of the Paris Agreement itself (5).

4.2 Data, metrics and tools

As various metrics can be used to capture sustainability factors, there is added value in comparing guidance set out in investor initiatives, frameworks and tools. This helps to determine what combination of data points and metrics best captures the exposure to sustainability factors. As ESG data is far from perfect yet with respect to comparability, coverage, reliability, costs and transparency on estimation methodologies, central banks can use multiple data providers to check for data consistency. Some central banks engage with data providers to enhance data quality and coverage.

The NGFS SRI survey shows that 60% of the respondents are using ESG data from specialised providers (mostly Bloomberg, ISS, Carbon 4 Finance and MSCI). They are also using public data sources on sovereigns such as the IMF Climate Dashboard and the World Bank ESG data portal. The number of data sources used ranges between 1 and 8.

4.2.1 Broad ESG scope

ESG scores are often considered by central banks to get a better understanding of an issuer's sustainability profile and manage underlying risks. However, these scores present several challenges. ESG scores combine a multitude of indicators (e.g., carbon metrics, water and energy use for environmental assessment, diversity and labour incidents for social, etc.), which are selected, assessed and combined differently by data providers. Corporate ESG scores from the same issuer produced by alternative rating agencies typically display very low correlation[6]. ESG scores for sovereigns are relatively new and while the methodologies are still being refined, the sovereign issuer scores tend to have higher correlation (see the Technical Document on sovereigns for a further discussion). Central banks thus need to carefully consider the information value of ESG scores, and assess whether utilisation of these scores indeed feeds into better assessment of sustainability risk.

Environmental scores are sometimes also used as a tool to better align portfolios with the low-carbon transition. In this respect, "E" pillar scores are being considered to assess and rebalance investor portfolios with the aim to contribute to real-world carbon reduction. However, there is evidence that in spite of their narrower focus, these scores suffer from problems similar to those of the broader ESG scores. This hinders their use to align portfolios with the low-carbon transition (OECD, 2021).

4.2.2 Climate-specific scope

Transition and physical risks tend to materialise over different time horizons, even if both risk channels affect firms' asset valuation today and their effects can compound over time. The implications of long-term climate change depend on many factors and are very complex to predict, which makes it difficult for investors to assess and quantify these risks. Climate risk assessment is mostly based on climate scenarios, in which there is an intertemporal relationship between physical and transition risks. Most scenarios assume that an early transition would be more orderly and less costly for the economy than

6 Investigation into the methodologies of six large data providers suggests that divergence in corporate ESG-scores is mostly a result of measurement choices (56%), scope (38%) and weight (6%) (Berg, Kolbel, Rigobon, 2022). Similar divergences are found for the environmental scores, also due to the differences in the qualitative component of the assessment (Bernardini et al., 2024).

a late transition, simply because it is more likely that temperature rise is contained and physical climate risks do not fully materialise.

4.2.1.1 Physical risk

The assessment of physical risks is often based on climate scenarios and projections of associated economic impact. To measure physical risks, ideally an assessment of the exposure, likelihood, vulnerability and resilience or adaptation capacity of a company, country or region should be undertaken, both for acute physical risks (i.e. natural hazards such as floods, wildfires, droughts, etc.) as well as chronic physical risks (i.e. increase in sea level or ocean temperatures). The translation of acute physical risks into projected economic impact seems to be more developed than the translation of chronic physical risks (NGFS, 2024). A benchmark methodology has not yet emerged, and required data are scattered. However, various case studies can offer interesting insights (see ECB, 2023).

The NGFS SRI survey indicates that various central banks employ climate scenario analysis to estimate the impact of climate risks. Currently, 20% of central banks use climate scenarios in their risk analysis, and another 16% considers doing so. The majority of central banks make use of NGFS scenarios, and only five respondents also use other scenarios (e.g. IEA or PACTA). The outcome of the climate scenario analysis is mostly used for knowledge building and gauging the long-term impact on portfolio returns, but not yet as a fully-fledged risk management tool. A number of central banks in addition make use of the Climate Value-at-Risk metric, which is also based on scenario analyses and can be used to gauge physical risks for corporates or sovereigns[1]. The metric is based on complex modelling and sensitive to the underlying scenario assumptions.

1 The metric estimates the percentage change in an issuer's market value by the end of the century resulting from the potential effects of physical risks (e.g. flooding and heatwaves), in terms of present value of costs associated with the disruption of production due to either acute or chronic events or the opportunities from lower exposure to these risks.

4.2.1.2 Transition risk

The assessment of transition risks is generally based on a combination of backward- and forward-looking emission metrics. Backward-looking metrics, such as historical carbon footprints, are relatively easy to calculate but fail to consider the future effects of transition plans. Forward-looking measures estimate projected GHG emissions under different scenarios but suffer from greater levels of uncertainty, and are less available. Data and assumptions used for constructing these metrics may diverge across data providers, as methodologies for estimating historical and projected GHG emissions are not harmonised. Low transparency on estimation methods could hamper the ability of investors to grasp limitations and differences across metrics provided.

The GHG Protocol Corporate Standard classifies a company's carbon emissions into three scopes (GHG protocol, 2023). While scope 1 and 2 GHG emissions are more widely reported and are measured with relatively good consistency, scope 3 emissions are scarcely reported and often estimated via complex assumptions[7]. As a result, different data providers estimates suffer from low consistency and usability, besides methodological opacity (Ducoulombier, 2021). These limitations should be heeded (see the Technical Document on corporates for further discussion).

PCAF (2023) sets out two main categories to determine sovereign GHG emissions[8]. The direct (scope 1) GHG emissions of a sovereign are primarily considered as those generated within national boundaries and categorised as production emissions (according to the standard of United Nations Framework Convention on Climate Change, UNFCCC)[9]. The second category, consumption emissions, addresses the issue of "carbon leakage" by adding emissions embedded in imports and deducting emissions related to exports. Consumption emissions therefore reflect the demand side and account for consumption patterns and trade effects. Using production-based versus

7 Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions that occur in the value chain of the reporting company, including both upstream and downstream. The latter generally make up the largest share of emissions for most firms, suggesting that their consideration appears logical for both impact- and risk-motivated investors.

8 Scope 1 emissions are generated within its boundaries. Scope 2 are emissions attributable to the purchase, in this case import, of electricity, steam, heat and cooling from outside the country territory. Finally, scope 3 emissions relate to all other (non-energy) imports from goods or services from outside the country territory as a result of activities taken place in the country territory.

9 PCAF recommends reporting on two kinds of production emissions: including and excluding emissions through land use, land-use change, and forestry (LULUCF). Generally, these emissions account for a small part of countries' emissions but can be important for some countries.

consumption-based emissions can affect the geographical distribution of GHG-related metrics. In contrast to scope 1, 2 and 3 emissions for corporate entities, the sovereign emission allocations cannot be summed with other asset classes and should be seen as providing complementary information. Furthermore, there are very few data providers for sovereign GHG emissions (e.g., IMF Climate change dashboard, Carbon Action Tracker) but the transparency of modelling is high (see the Technical Document on Sovereigns for further discussion)[10].

At the investee level various metrics can be used to capture climate transition risk. Table 6 sums up the four metric categories. As regards backward-looking metrics, the investee's GHG emissions as well as the composition of its energy mix can be used to assess how carbon-intensive the investee is in comparison to its peers. Jointly assessing these metrics over time can provide information on whether GHG emissions are being reduced as a result of e.g. changing the composition of energy consumption. As regards forward-looking metrics, the investee's performance vis-à-vis its sectoral pathway, or its peers, as well as the quality of its transition plan can be used to get a better understanding of the way the investee is expected to reduce GHG emissions going forward[11, 12]. The estimated gap to the sectoral transition pathway is a measure of whether the investee is taking sufficient steps to bring down its GHG emissions[13].

At the portfolio level, ideally a combination of complementary indicators is used. The methodology for calculating quantitative metrics at the portfolio level is complex, and influenced by many decisions, such as the way underlying indicators are weighed and aggregated[14]. Furthermore, as regards scope 3 GHG emissions, major challenges are the lack of consensus on how to incorporate them in the calculation of portfolio-level carbon footprints, and how their consideration feeds into double-counting. It is therefore recommended to supplement quantitative metrics which qualitative indicators, and combine backward- with forward-looking metrics (see the two Technical Documents).

Guidelines for the calculation of historical portfolio GHG emissions metrics are well-established and widely used for corporate issuers, and still being refined for sovereign issuers. As regards corporate issuers, standards follow the recommendations of the TCFD or PCAF, and advice calculating a number of complementary metrics based on scope 1-3 GHG emissions, to get a full view

Table 6 **Metrics to gauge climate transition risk**

Type of metric	Corporates	Sovereigns
Backward-looking	GHG emissions scope 1, 2 and 3	GHG emissions from production and consumption
Backward-looking	Fossil fuel mix in energy company revenues	Fossil fuel mix in country's energy consumption and production
Forward-looking	Gap or comparison with sectoral transition pathways	Gap or comparison of country transition pathways
	Climate Value-at-risk	Climate Value-at-risk
	Implied temperature rise	Implied temperature rise
Forward-looking	Gap or comparison of company transition plan vs peers; Quality of TPs	Quality of country's transition policy to meet Nationally Determined Contribution (NDC) and Paris Agreement targets

10 Note that PCAF (2022) distinguishes between scope 1-3 sovereign emissions analogous to the scopes for corporates. These scopes, however, do not correspond to the commonly used distinction between production, consumption and government emissions.

11 The IIGCC provides a high-level framework based on 10 qualitative criteria for the assessment of companies, and their net zero transition plans. These qualitative criteria include, among others, target setting, disclosure, decarbonisation strategy, as well as climate governance and climate policy engagement. The framework distinguishes between companies that are "Not aligned", "Committed to aligning", "Aligning", "Aligned" and "Achieving net zero". E.g. companies that are "Aligning" have set a short- or medium-term target, formulated a plan on how to meet these targets, and disclosed scope 1 and 2 as well as material scope 3 emissions.

12 For sovereigns, assessments of the climate strategy are more complex, as multiple dimensions come into play including the country's level of development and fairness considerations. There are various initiatives that assess and score the quality of country's climate strategy based on a combination of qualitative as well as quantitative metrics. Examples include the Germanwatch climate change performance index (CCPI) and the Climate Action Tracker (CAT). Please see technical document on sovereigns for a further discussion.

13 The sectoral transition pathways provide a science-based roadmap to net zero, that represents a benchmark of pace and timing for a specific sector to decarbonize, under determined assumptions of climate policies and technological innovation. They are especially relevant for the carbon-intensive sectors.

14 For example, when calculating the implied temperature rise at the portfolio level, there are seven options for weighing and aggregating the individual companies in the portfolio (CDP, 2020).

of the portfolio's absolute and relative GHG emissions. These metrics include total carbon emission (TCE), the carbon footprint (CF) as well as the weighted average carbon intensity (WACI). TCE measures the total emissions that can be attributed to a portfolio and provides insights on the climate impact. CF and the WACI are relative metrics and can be used for comparison across portfolios. Please see the PCAF Standard for a precise definition of these metrics (PCAF, 2022). For sovereign securities, there are currently no clear cut guidelines on how to calculate portfolio-level measures. PCAF does however propose metrics for single sovereign issuers which can be aggregated to the portfolio level, in order to calculate the financed emissions. Please see the ECB's climate-related financial disclosures as an example of how the sovereign portfolio metric can be calculated (ECB, 2023).

Guidelines for the calculation of forward-looking portfolio GHG emissions metrics are less advanced and still developing. Portfolio-level metrics and aggregation approaches need to be developed further, and require careful consideration and methodological transparency as not to obscure asset-level performance. Two metrics are often used to assess the portfolio's transition risks in a forward-looking manner.

- *The Implied Temperature Rise (ITR) indicates to what extent an investee or portfolio aligns with global climate targets.* The ITR expresses the increase in global temperature in degrees Celsius (°C) that would occur at the beginning of the next century if the whole economy performed in a similar way to the firms in the portfolio, in terms of overshooting or undershooting the carbon budget necessary to keep the global temperature below 2 °C. The measure can be used for different asset classes, and can be aggregated to the portfolio level. An ITR below 1.5 °C tells investors that the portfolio is expected to be on track to meet Paris Agreement goals. There is no agreed approach to aggregate and allocate temperature alignment results for a given financial asset class, and even less so across different asset classes as these need to follow different alignment methodologies (Noels, Jachnik, 2022).
- *The Climate Value at Risk (CvaR) estimates the percentage change in an issuer's market value resulting from the climate transition.* The model simulates the potential impact of future decarbonisation costs and opportunities, stemming from either changes to climate policies or technological opportunities related to the climate transition, quantified on the basis of green revenue share and green patents. Scenario analysis is often used to calculate climate VaR metrics. Conducting scenario analysis is a process that involves identifying and assessing the potential implications of a range of plausible future scenarios (e.g., a 2 °C, or greater than 2 °C, rise in average global temperatures). As such, the metric is highly sensitive to modelling assumptions (PRI, 2021).

Central banks agree that a combination of backward- and forward-looking metrics is necessary to properly assess climate-related risks. In corporate holdings, the main focus is on transition risks metrics and less on physical risks metrics. In sovereign holdings, most of the metrics focus on thematic bond labels. Among those central banks that have formulated a decarbonisation pathway for (some of) their portfolios (15 in total), portfolio alignment is generally assessed by means of backward-looking GHG emissions metrics. Approximately half of these central banks also use forward-looking metrics such as the implied temperature rise or the implementation of science-based net zero targets to assess portfolios' alignment.

5. Act

Sustainability factors are ideally embedded in different stages of the investment process. High-level objectives, such as managing sustainability risks or contributing to positive impact, could be broken down into specific sustainability goals that can be pursued by using a combination of investment approaches.

Recommendation 7: Translate high-level objectives into specific sustainability goals, and assess potential implications for traditional objectives.

Recommendation 8: Integrate sustainability factors throughout the investment process and decide on a combination of SRI approaches.

5.1 Sustainability goals

Once central banks set specific sustainability goals, they can consider what investment options and tools they have to steer these goals. The two high-level SRI objectives (risk management and real-world impact), can be broken down into specific goals that central banks may pursue alongside their traditional investment objectives.

Explicit sustainability goals, possibly articulated via either quantitative or qualitative targets, can help to give direction and to actively steer measurable outcomes. Such targets can be set at the level of one specific portfolio or more broadly at the asset class level. Some central banks have set a positive impact target, which they meet via a dedicated allocation to climate solutions (e.g. a small fund or portfolio that invests in renewables). Other central banks have set sustainability goals that cover the full span of their investment portfolios, such as exclusion of issuers that violate the UNGC. Table 7 gives an example of how high-level objectives can be broken down into sustainability goals, and what implementation options and tools central banks could consider per objective.

Central banks can track progress on their sustainability goals by consistently monitoring a set of metrics. As described in chapter three, ESG-scores are often used to gauge broad sustainability risks. Climate-related metrics give information about the issuer's GHG emissions, its energy mix as well as its investment in climate solutions and the quality of the issuer's transition plan. Nature related metrics are still at their infancy and so far they refer to water, waste and pollution risk and impact management of issuers.

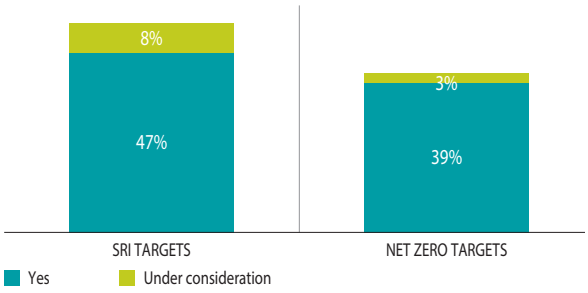
Table 7 **Sustainability objectives, investment options and tools**

High-level objective	Sustainability goals	SRI approach	Examples of tools and metrics
Extra financial (= making a real-world impact)	Investing in (real-world) decarbonisation	Tilting to low carbon or net zero committed investees	Transition pathways SBTi approved targets Climate action 100+
	Investing in climate solutions	Dedicated allocation to investees that contribute to green projects	EU green taxonomy green bonds
	Investing in (some of) the sustainable development goals	Dedicated allocation to investees that contribute to certain SDGs	SDG mapping
Financial (= addressing sustainability risk)	Enhancing the ESG-score of the portfolio	Excluding investees with a low ESG-score, or tilting to investees with higher ESG-scores	ESG-scores
	Reducing portoflio exposure to risk of stranded assets	Excluding investees with high exposures to thermal coal, oil and gas	Fossil fuel revenue thresholds Carbon footprinting
	Reducing reputational risk exposure	Excluding controversial investees, for instance those involved in tobacco, human rights controversies or arms	UN Global Compact OECD guidelines for multinational enterprises World benchmarking alliance

The NGFS SRI survey shows that 47% of the central banks that adopt SRI in their investment portfolios have set a sustainability goal of some form. Moreover, 39% of them have set a net zero target, and another 3% considers doing so (see figure 7). So far, only a few central banks have also broken down their net zero target into interim targets for one or more of their portfolios. Out of those central banks that have not set explicit targets, some argue that their ability to reduce their GHG emissions largely depends on the market average decarbonisation trajectory, as they do not have the possibility to actively adjust the portfolio weights much. Moreover, the direction of the market is influenced by external factors (e.g., consumers' attitude, technological innovation and supply chain/ availability of transition critical materials) that affect corporate decisions and limit investment options in sustainability.

The net zero targets are mostly expressed in carbon metrics (carbon footprint or carbon intensity). Out of the 15 central banks with a net zero target, the majority refers to a perimeter that considers only Scope 1 and 2 emissions, due to significant issues regarding data on Scope 3 emissions. Some of these central banks also use forward-looking measures (such as decarbonisation trajectories and implied end-of-period temperatures) to track their progress.

Figure 7 **Central banks with targets**



Note : percentages are calculated based on the 38 central banks that have adopted SRI practices in their investment portfolios.

Source: NGFS SRI Survey 2023

5.2 Implementation approaches

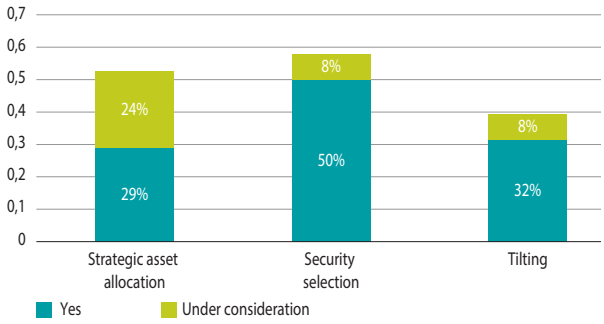
Central banks need to determine what steps of the investment process should be adjusted to effectively steer towards the chosen sustainability goals. In general, the investment process is divided into two parts: strategic asset allocation (e.g. to determine the ideal asset class mix of the entire portfolio) and portfolio construction (e.g. selection and weighing of individual securities within one portfolio). At the strategic level, various central banks have made attempts to include sustainability considerations as a fourth pillar in their asset allocation modelling, alongside liquidity, safety and risk-return. At the level of portfolio construction, central banks use sustainability considerations to identify securities that help meet their goals, and to decide on relevant portfolio weights (tilting). The two steps are handled within the risk management function, to ensure an ongoing monitoring and management of financial (risk and return) and sustainability dimensions.

The NGFS SRI survey indicates that most central banks apply sustainability considerations in their security selection (Figure 8). Within the portfolio construction process, several central banks use sustainability considerations to define their investment universe and to decide on portfolio weights (tilting). Some central banks weight their portfolios by optimising SRI metrics, subject to tracking-error and other constraints. Portfolio tilting requires sophisticated techniques to: 1) strike a balance between different types of SRI metrics (backward- and forward-looking data); 2) avoid limiting diversification too much; 3) mitigate the risk of unduly penalising specific sectors (for instance sectors that need financial resources to make the transition).

With regards to the strategic asset allocation, several central banks attempt to combine risk-return with sustainability considerations within the optimisation process across a variety of asset classes. Central banks for instance used: 1) ESG scores, carbon intensities/ footprints and climate-exposures-at-risk are used to place constraints on the strategic portfolio optimisation (e.g., mean-variance optimisation or minimisation of expected shortfall); 2) Climate scenarios to assess the risks of proposed allocations; 3) Paris-aligned or climate-aware benchmarks to perform robustness checks on the optimal asset allocations; 4) Implied temperature rise metrics to assess the long-term carbon emission trajectories of the asset allocations. However, attempts to integrate sustainability factors in the strategic asset allocation are often hindered by lacking data and methodologies. See the case studies of DNB and BCRA on the integration of sustainability factors in the strategic asset allocation.

The NGFS SRI survey further suggests that over half of the central banks that adopt SRI, also incorporate sustainability considerations in their risk management framework. In several cases, traditional measures of risk and return, such as tracking errors and relative-return vis-à-vis market benchmarks, are viewed as complementary to sustainability metrics. Some central banks have set up performance-attribution systems that allows them to separately measure the impact of each block of their SRI strategy on returns and tracking errors (e.g., to measure the different impacts of norm-based exclusions vs. ESG tilts).

Figure 8 **SRI in the investment process**



Note: Percentage shares are calculated using the 38 central banks that already adopt SRI principles in their portfolio management. Percentages reflect central banks that already implement or consider implementing SRI criteria in their security selection, strategic asset allocation, or portfolio tilting process.

Source: NGFS SRI Survey 2023.

5.2.1 Net zero goals

While most central banks focus their SRI practices on the sustainability risk perspective, an increasing number is exploring the adoption of net zero goals, as they want to hedge transition risk and contribute to the climate transition. The paragraphs below discuss the building blocks of a net zero strategy, and briefly elaborate on the two underlying sustainability goals.

Net zero strategies aim to realise real-world GHG emissions reduction as well as transition risk mitigation, via a combination of decarbonisation targets and targets for investing in climate solutions. The goal of a net zero strategy is to align the portfolios with a net zero pathway in order to reach carbon neutrality within a certain timeframe (by 2050 at global level)[15]. A net zero strategy for sovereign portfolios is currently difficult to implement, as central banks tend to consider a narrow basket of sovereign issuers owing to liquidity and security constraints. The scope of net zero strategies thus focuses on corporates, and the targets are mostly realised by using a combination of negative screening, best-in-class and stewardship. Carbon reduction pathways help to reduce the portfolio's overall carbon footprint over time, whereby the required pace of decarbonisation should be based on sector-specific decarbonisation pathways. Climate solutions refer to products and services that enable GHG emissions reduction in the real economy via innovative technical solutions for energy efficiency and low-carbon production.

15 Guidance issued by the IIGCC and the UN-endorsed Net Zero Asset Owner Alliance (NZAO) requires investors to set clear interim targets, to gradually reduce their carbon footprint over time. To ensure real-world impact, NZAOA suggests investors to engage with asset manages and investees as well as to design credible transition plans. Based on the latest IPCC report, the NZAOA for instance has set expectations of interim targets at portfolio-level for carbon emission reductions. These are a reduction of between 22% and 32% by 2025 and between 40% to 60% by 2030, measured against a specific base year (UNEP FI, 2023).

Targets for investing in climate solutions are generally formulated as a dedicated allocation to companies or projects with a high share of so-called green revenues or capex, or allocation to green bonds.

5.2.1.1 Investing in companies that act towards the transition

When constructing portfolios, central banks can favour companies with low GHG emissions today or companies with relatively high GHG emissions today but good transition plans. Only favouring companies with low GHG emissions can help to achieve a portfolio decarbonisation target in the short term, but may not lead to real-world decarbonisation in the long term and, if applied on a vast scale, would suffer from a fallacy of composition. It would be feasible to reach net zero targets for the individual investor, but not at the aggregate level, for at least two reasons. First, it is mainly the high emitters that need to invest in green technologies if GHG emissions are to come down, and investment in these technologies is very capital intensive. Central banks can consider whether such companies have set transparent and realistic reduction targets that are validated by the SBTI. Second, some high-emission products are an indispensable ingredient of the world economy (e.g. steel, cement, energy), and simply excluding these sectors would lead to "paper decarbonisation". GFANZ encourages its affiliates to help high GHG emitters to decarbonise their production (Angelini, 2024). Central banks can use transition pathways to benchmark individual firms' carbon emissions against sector peers, and thereby account for heterogeneity across and within sectors. The Transition Pathway Initiative, for instance, carries out transition plan assessments and publishes sectoral decarbonisation targets, including listed equity companies, corporate bond issuers and banks (TPI, 2024).

Voting and engagement can be used to influence company behaviour with the aim to maximise overall long-term value, for instance by reducing GHG emissions. A sound stewardship approach consists of three steps: 1) establishing high-level objectives which stem from the investment beliefs; 2) formulating expectations and deliverables/milestones; 3) measuring and monitoring results to take action in time and adjust the strategy where needed (PRI, 2023a)[16].

Engagement with companies can raise awareness and help to better understand companies' strategies, and hence to avoid greenwashing and climate transition risk. Voting against management or in favour of shareholders' climate resolutions can be used to put pressure on the company, and is especially relevant when engagement is not progressing. Engagement efforts are often directed at companies that have a large weight in the portfolio, or explicitly to highly polluting companies, such as in the Climate action 100+ initiative which targets 170 of the largest GHG emitters worldwide (CA, 2023). *See the case studies of Norges Bank and Banca d'Italia on climate-related engagement with investee companies*.

Central banks may also engage with external asset managers on the integration of net zero considerations in voting and engagement practices. Many central banks outsource their investments in equity and corporate bonds. Asset managers generally have their own voting and engagement policies, and after selection, central banks have little influence on the design of such policies. They can, however, actively engage with the asset managers to signal what principles/practices they deem important in their pursuit of net zero goals. External asset managers could be assessed on the quality of disclosure, voting policies and results of their engagement efforts. When asset managers fail to meet expectations on engagement and voting, reducing or terminating the investment relationship may be considered as an escalation measure, amongst others. Market guidance provided by the Net Zero Asset Owners Alliance can be used to assess, score and benchmark asset managers' practices and application of climate diligence, for instance in their proxy voting approaches or climate policy engagements (NZAOA, 2023).

Stewardship presents a host of challenges for investors, and for central banks in particular. Stewardship is resource intensive as it requires frequent interaction with investee companies, thus most investors rely on external parties for the implementation of their proxy voting and engagement. Furthermore, stewardship can presents various challenges, such as legal and reputational risks, and knowledge gaps that central banks need to carefully consider and mitigate (see the Technical Document on corporates, 2024).

16 Stewardship for central banks can entail a wide range of initiatives that span from voting and engagement with investees, to starting a dialogue with stakeholders, including data providers, credit rating agencies and asset managers. See TD corporates for more discussion on stewardship.

The NGFS SRI survey suggests that central banks are cautious with the implementation of voting and engagement strategies, because of operational and reputational considerations. Application of this strategy is operationally complex, as it requires understanding of good corporate governance codes which can vary across jurisdictions, as well as knowledge on very specific company matters, such as election of directors and approval of fundamental corporate changes. Taking a stance on such matters could raise reputational issues for central banks, especially for those companies where governments have a stake. Clear (transparent) and rule-based policy guidelines, as well as outsourcing the implementation of voting and engagement to specialised providers or external asset managers, may help to address these concerns.

Currently, out of those central banks that adopt SRI, 34% apply some form of engagement. Only 11% vote directly themselves and the other 16% vote indirectly via an asset manager. Going forward, central banks could increase knowledge sharing on this topic: 40% of central banks indicate that in the future they would consider some form of dialogue or collaboration on stewardship within the NGFS.

5.2.1.2 Investing in climate solutions

Central banks can invest a dedicated part of their portfolios in sustainable projects, like those contributing to the climate transition. Investing in high quality green bonds, of which the proceeds are used to finance environmental projects, green technological innovation and/or renewable energy companies, can be considered investments in climate solutions (IIGCC, 2021). This is especially true if the proceeds can be mapped to sustainable activities, as defined by the EU Taxonomy. More broadly, central banks can invest in bonds (social or sustainability labelled bonds) or investment funds aiming to finance projects with a positive impact on specific themes, e.g. water, forestry, education, hospitals. These themes are generally mapped to the 17 SDGs[17].

Impact solutions can take the form of infrastructure funds, investment funds specializing in renewable energy or even private equity. Examples of impact investing strategies include focusing on pure-play companies like wind power or solar firms, but also on enabling companies that provide solutions to reduce energy usage. Beyond energy-related topics, impact solutions can be found across the economy, from regenerative agriculture, carbon capture and storage to reforestation.

Labelled bonds are the most commonly used financial instruments by central banks to realise positive impact and allocate funds to specific themes. Issuers can use various frameworks to issue labelled bonds. Some frameworks, including the CBI's Climate Bonds Standard, only allow for green bond proceeds to finance projects that align GHG emissions with the 1.5 °C scenario, while other standards, such as the ICMA Green Bond Principles, allow for financing green projects that do not necessarily have a direct emissions impact, e.g., by focusing on biodiversity. Concerns remain whether issuing green bonds leads to a reduction of GHG emissions more broadly at the issuer level. The 2020 NGFS Progress Report notes that corporate green bond issuance does not necessarily translate into a significant reduction in firm-level carbon intensity, especially considering that most of the green bonds are issued by carbon-intensive firms (NGFS, 2020a). Investors may thus need to undertake extra analysis, such as assessing impact reports or transition plans published by issuers to assess the quality of green bonds. Auditing of green impact data at both bond- and issuer-level remains key for improving credibility. *See the case study of NBB on labelled bond selection*.

Investing in sovereign green bonds also presents specific challenges for central banks. First, green sovereign bonds do not always offer the same level of liquidity as traditional reserve assets. Second, sustainable sovereign debt instruments tend to have long maturities which do not align with the short duration of traditional central bank benchmarks, and therefore may require additional financial engineering (e.g., through interest rate derivatives) to hedge duration risks. Third, not all countries have issued green bonds, so tilting towards green bond issuers may impact the portfolio's currency composition as well as portfolio diversification. Such adjustments may become challenging due to the need to hold sufficiently large

17 The SDGs state that ending poverty and other deprivations, goes alongside strategies that improve health and education, reduce inequality, and increase economic growth – while tackling climate change and working to preserve oceans and forests. The SDGs emphasize the interconnected environmental, social and economic aspects of sustainable development. See THE 17 GOALS | Sustainable Development (un.org).

amounts of sovereign securities denominated in major currencies – in particular in the case of FX reserve portfolios (Fender, McMorrow & Zulaica, 2022). General challenges to the lacking development of sovereign green bond markets might derive from the lack of comparability, transparency and availability of impact measures to compare green bond issued by different governments (NGFS, 2022).

The NGFS SRI survey asked what investment solution central banks would deem most appropriate when pursuing SRI. Beyond green bonds, various central banks have set up dedicated thematic or green impact portfolios to explicitly allocate capital to renewables companies, and help fund the energy transition. For the corporate holdings (bonds as well as equity) the majority of central banks indicate that they deem third-party specialist products with a focus on ESG/climate (e.g. via fund/ETF/mandate) most suitable. For the sovereign holdings, however, a self-directed approach through a bespoke combination of climate-related metrics (mainly green labels) is considered more suitable.

5.3 Trade-offs and challenges

In spite of important progress in recent years, the adoption of SRI policies is still in its infancy, and presents various challenges for investors, including central banks. In what follows we review a few.

Investors may have to give up some financial returns owing to their SRI policy. There is no clarity in the literature on the expected returns of sustainable investments. Investors who take sustainability risks into account can achieve better risk-adjusted results than the unaware investors (Pedersen, 2023), although those with a preference for sustainability could reach a lower risk-return efficient position than sustainability-agnostic investors (Angelini, 2024). The stable performance of sustainable investments over the last decade is often explained by the growing demand for such instruments which may have (temporarily) boosted their relative returns (Cheng et al. 2023). In a new long-term equilibrium, however, the relative returns on sustainable investments are expected to largely depend on the size of the pool of sustainable investors and the materialisation of climate shocks (Pastor et al., 2022; Cheng et al, 2023). Low carbon investments could outperform conventional investments, for instance when there is a durable shift in investors' demand for net zero products or when carbon risk materializes (e.g. in the form of carbon pricing) and investors start pricing the externalities[18].

Investors may struggle to pursue SRI strategies while keeping a market-neutral approach. Many central banks invest their portfolios passively to avoid interfering with the allocation of capital across sectors and with the market pricing mechanism. SRI, however, entails by definition abandoning the market-neutral approach. Tilting the portfolio within sectors (i.e. without abandoning high emitting sectors altogether, or reducing their weight in the portfolio) can help to largely replicate market composition, while still affecting the relative funding costs of high and low GHG emitting firms within the same sector. Excluding entire sectors or over-allocating towards specific sectors could lead to accusations of interfering with government policy that could in the worst case impact central bank's reputation. It could also lead to unintended consequences (Angelini, 2024).

Investors may face trade-offs when combining sustainability goals. For instance, as firms with high ESG-scores often tend to have higher GHG emissions, it may not be feasible to aim for a lower carbon footprint and a higher ESG-score (Amenc, 2023). At the same time, companies that have a relatively low carbon footprint may still have a negative effect on nature (e.g. photovoltaic plants can have negative impacts on land depletion, deforestation and pollution). Central banks should be mindful of the interlinkages between different sustainability goals and may want to identify key parameters/metrics for each goal (ranging from net zero to ESG-score targets). This can help steer capital to corporates/sovereigns that contribute to one sustainability target, while not harming other targets.

Investors need to be wary of carbon leakage phenomena. Corporates may reduce GHG emissions by just transferring them outside their perimeter (e.g. via demergers). There is evidence of firms selling polluting plants to buyers facing

18 Prosperi and Zanin (2023) propose a modelling framework for medium-term projections of stock returns under different carbon price scenarios. Their findings suggest that the impacts of a carbon price policy are not confined to the most polluting firms (mining and quarrying, transportation and storage firms) for the effect of systematic risk, and that investors should prepare portfolios for climate transition risk under uncertainty about the timing of carbon policy introduction.

weaker environmental pressures, in order to benefit from higher ESG ratings and lower compliance costs, without any real improvements on pollution levels[19]. Responsible investors need to be aware that ESG ratings cannot help them capture these phenomena.

To prepare for trade-offs, central banks may want to include a preference for sustainability within their utility function, at par with the return and risk preferences. Trade-offs can become prominent when investors commit to explicit sustainability goals, and are at some point confronted with relative underperformance of their portfolios. In this case, they would have to choose whether to prioritize the risk/return or the impact objective. In addition, the adoption of specific sustainability goals could at some point interact with traditional central bank constraints related to security, liquidity, currency composition and risk-return considerations. Especially for sovereign holdings such considerations are important, as these investments often have to meet certain liquidity requirements which limit the consideration of sustainability factors.

The NGFS SRI survey indicates that the large majority of central banks (60%) expect trade-offs to emerge between sustainability and other goals: aiming for sustainability goals is expected to mostly interfere with liquidity, then return and lastly with the safety objective. In case trade-offs materialize, 67% of central banks indicate that they would be inclined to sacrifice return (to a certain extent), and to a lesser extent sacrifice liquidity (36%) and last safety (15%).

19 See Duchin, Gao and Xu (2023), Gozlugol and Ringe (2023), Fraser and Fiedler (2023).

6. Evaluate

Regular evaluation of the SRI policy allows central banks to take stock of the developments in methodologies (e.g. climate scenario analysis), market practices (e.g. new investment solutions), data (e.g. more focus on forward- looking metrics), broader patterns in society (e.g. technological innovation) and, more generally, to benefit from new knowledge (e.g. new theoretical and empirical evidence). The evaluation process helps central banks to redefine their overall portfolio management framework and objectives. Monitoring and evaluation should be a recursive process in which the effectiveness of the chosen SRI approach is critically assessed, alongside the possibility of setting more ambitious sustainability goals.

Recommendation 9: Adopt disclosure practices in line with global standards, to foster globally comparable information.

Recommendation 10: Regularly evaluate the SRI policy and update it in light of new knowledge and experience.

Despite its fast growth, SRI is still developing in terms of information, methodologies and practices. Central banks need to take a dynamic and proactive stance in the design and implementation of their SRI approach, and regularly evaluate and update their approach to ensure alignment with market practices. The evaluation should check whether the implemented SRI strategies help to achieve the objectives and goals, and whether the approach needs to be updated to reflect the latest thinking on the climate transition (e.g., technological innovation, climate policies, etc.) and sustainable finance instruments and tools. The outcome of the evaluation process may result into revising the SRI policy consistently to embed new themes (e.g. nature-related issues and biodiversity loss, such as deforestation), expand to new asset classes or include more ambitious targets, or change approach, if necessary.

6.1 Monitoring and reporting

Monitoring the implementation of the SRI policy is crucial to ensure progress on goals and to identify any need to adapt the approach. Once SRI policies are enacted, central banks may decide on a combination of metrics to monitor progress over time. Annually assessing the realised contribution to chosen sustainability goals, as well as evaluating updates to chosen metrics and methodologies, ensures that the chosen targets align with long-term objectives. As part of the monitoring process, central banks could assess trends in market practices, benchmark progress versus peer central banks, stay abreast of industry developments, and adapt strategies accordingly.

Since many central banks implement their SRI policy (at least partly) via external managers, there is also a need to consistently monitor the way these parties integrate sustainability factors. Monitoring of external managers entails an iterative process between the asset owner and investment manager to promote disclosure, discussion and improvement of ESG incorporation, stewardship and real-world outcomes. The PRI provides guidance on how to select and monitor investment managers, and has developed a disclosure tool to use as a basis for the monitoring process (PRI, 2020). The PRI suggests monitoring disclosure, grouped at the firm, fund, asset class, stewardship and real-world outcomes level. Using a set of consistent and standardised disclosures can help comparability across investment managers, asset classes and themes or practices. Furthermore, the PRI recently launched a framework to assess, monitor and evaluate how external managers use stewardship to address sustainability issues, as well as a due diligence questionnaire, which can be used to discuss the outcomes of the stewardship approach with the external managers (PRI, 2023a).

External reporting on sustainability enhances central banks' transparency and aligns with current market practice. A regular and transparent reporting process allows for continuous improvement of the SRI policy, as it forces a periodic review of sustainability goals and practices. Central banks are improving their corporate sustainability disclosures, as pointed out by growing adoption of TCFD recommendations. Central banks are recommended to disclose their sustainability exposure in line with global standards as much as possible, to contribute to globally comparable information.

The NGFS SRI survey indicates that out of the central banks that have adopted SRI practices, 26% are monitoring and measuring the impact of SRI strategies on risk-return profile and further 26% are considering doing so. Among central banks that already adopt SRI, 66% use SRI metrics for monitoring purposes. The large majority focuses on carbon metrics (footprint, WACI or total carbon emissions), mostly based on Scope 1 and 2 carbon emissions (18% include also Scope 3). Some central banks also monitor ESG scores (34%), forward looking metrics e.g. ITR (21%), and the presence of transition plans or their SBTi validation (13%). Currently, 45% of the central bank respondents follow the recommendations of the TCFD and disclose a number of carbon metrics. This is a large increase compared to 2020, where only 15% of respondents disclosed carbon metrics.

6.2 Evaluating the effectiveness of the SRI policy

Central banks are recommended to evaluate the effectiveness of their SRI policy regularly (e.g. at least annually), as well as to reassess their goals (e.g. at least every three years). The periodic evaluation process helps investors, including central banks, to run a systematic, holistic, objective assessment of their SRI policy, in order to evaluate success and identify underperforming areas (2023). Central banks can consider various variables in the design of a good evaluation process, and for instance look at (i) a combination or financial and sustainability risk metrics (risk assessment), (ii) real-world impact (impact assessment), (iii) broader market developments (informed evaluation), (iv) performance versus climate benchmarks or peers (benchmarking). These will be further elaborated on below.

Risk assessment allows for the evaluation of financial risks associated with SRI and to measure potential misalignment with pre-set bandwidths. The risk assessment covers both traditional financial risks and sustainability risks, allowing central banks to make decisions on the preferred balance of risk types.

Impact assessment aims to evaluate if the SRI portfolio targets contribute to tangible real-world effects. Some studies (De Angelis et al., 2021 and Rohleder et al., 2022) provide evidence that investors' decarbonisation strategies via green investment or divestment exert price pressure on high-carbon firms that leads them to reduce carbon intensity or emissions. Other researchers, however, argue that the opposite effect can also materialise, when companies reduce GHG emissions by transferring them outside their perimeter, feeding into carbon leakage (Duchin, Gao and Xu (2023), Gozlugol and Ringe (2023), Fraser and Fiedler (2023)). Central banks with an impact objective may want to analyse if and how the investee companies lowered their GHG emissions, for instance by looking at the company's allocation of capital expenditures.

Assessing trends in sustainable finance ensures that the SRI policy remains up-to-date, and that new insights are properly incorporated in the investment process. Analysis of evolving sustainability regulations and industry standards can help to regularly evaluate the design of the SRI policy. Central banks can use such insights to assess the SRI results in a forward-looking fashion.

Benchmarking entails comparing the SRI performance against relevant sustainability and climate standards or peers. Evaluation of the adequacy of standard climate benchmarks (e.g., Paris Agreement Benchmark) is needed to check whether they are updated regularly to reflect best practices and to include relevant developments (e.g., technological innovation and climate policies). Benchmarking against peers can also be a good way to evaluate the SRI policy, and engaging with financial and sustainability experts can help to make informed decisions and further optimize SRI strategies. Becoming a signatory to the UN-endorsed PRI facilitates benchmarking against market participants.

The evaluation of results helps to identify possible trade-offs in the pursuit of sustainability goals and could help adjust the SRI policy in a timely manner. In this regard, it is desirable to estimate the economic impact of SRI strategies, both ex-ante by projecting the risk-return characteristics of their portfolio tilts, as well as ex-post, by comparing the performance of the tilted portfolios to that of market benchmarks. In this vein, central banks that manage internally their portfolios can control the potential trade-offs with financial objectives by managing the relative risk/return between a pure market-based benchmark and the SRI portfolio, through a regular monitoring of its tracking error and setting relevant bandwidths.

7. Next steps

The Report takes stock of the continuous progress of central banks in integrating sustainability criteria in their portfolio management. Many advancements have been recorded in the use and disclosure of relevant sustainability-related metrics. However, the integration of forward-looking and alignment techniques is still complicated by a relatively low quality, transparency and actionability of such metrics. Overall, central banks' efforts aim to reduce climate-related risks and contribute to a smooth transition. This Report records a growing awareness of central banks that real-word improvements cannot be achieved without concrete steps to integrate climate considerations in investment processes. While this is true for the whole financial system, central banks can lead by example.

The SRI workstream will continue to invest in capacity building with the aim to further advance the SRI practices of NGFS members. Going forward, the workstream will investigate how various sustainability metrics interact with one another and discuss what combination of SRI strategies would be most suitable to realise real-world impact. The NGFS intends to assess common practices and principles of stewardship for central banks. For example, the central banks' stewardship experiences can be reviewed and a forum can be set up to discuss challenges and solutions, hereby helping to implement stewardship as a tool to steer investments to make real-world impact. In addition, the NGFS could explore good practices for analysing investees' transition plans and draw up first guidance for central banks' transition plans. In this, the NGFS aims to bring the expertise and knowledge to set common criteria to assess and draw credible, transparent and decision-useful transition plans. Finally, the SRI workstream will expand the scope of its work beyond climate, and take steps to further explore the financial risks and impacts related to nature and biodiversity loss, as their importance is increasingly recognised by investors.

8. Case studies

1 De Nederlandsche Bank (DNB) – The integration of SRI in the strategic asset allocation

De Nederlandsche Bank (DNB) sets its strategic asset allocation (SAA) every three years. During the SAA process, it is determined how much to invest per asset class. Currently, DNB invests in a wide range of asset classes including developed and emerging market equity, as well as investment grade and high yield corporate bonds. The choices made during the SAA-process determine to an important extent the risk-return profile of the entire own-account portfolio. SRI considerations are increasingly being incorporated into the SAA analysis, as DNB holds a dual investment objective. Next to solid risk adjusted returns, DNB strives towards long-term broad value creation with its investments. This aligns with DNB's mission as a central bank to contribute to sustainable prosperity. Moreover, part of DNB's investment beliefs is that taking into account ESG criteria when making investment decisions, in particular climate risk, will decrease risks and will provide investment opportunities.

In the design of the SAA, SRI and climate risk considerations were taken into account at three levels:

1) Qualitative assessment: Not all investment categories offer the same possibilities to apply an SRI policy. In the selection of asset classes, a qualitative assessment considers to what extent DNB SRI policy goals and beliefs could be integrated. Elements that were taken into account include amongst others the availability of frameworks for Paris alignment, engagement opportunities, carbon footprint and broader ESG indicators.
2) Climate scenarios: The SAA is based on long-term scenario analysis. In addition to traditional economic scenarios, three specific climate scenarios were used in the SAA study to assess risk and returns per asset class. These scenarios were based on the work of the United Nations' Intergovernmental Panel on Climate Change (IPCC). The response of the investment portfolio was assessed over a 40-year horizon under an orderly, disorderly and failed transition scenario. Using a series of 'climate aware' optimisations, it was assessed how different climate transition scenarios could influence the optimal asset allocation.
3) Paris aligned benchmarks: In addition to traditional market benchmarks, DNB applies Paris aligned benchmarks from MSCI in the SAA study to see to what extent this influences the performance of the optimal asset allocation.

The integration of SRI in the SAA process is affected by several limitations and challenges, for example:

- Model limitations: Because of uncertainty regarding the assumptions about climate pathways and the role of technological innovation in speeding up the transition. Not all possible effects of climate change, such as tipping points, are incorporated in the models. Being a top-down approach, interdependencies between different climate-related impacts are also not included.
- Use of estimates: Carbon data can be based on estimates of data providers instead of reported emissions by companies. Results differ based on the metrics that were used (e.g. including scope 3 emissions or not, use of carbon footprint versus WACI). Also, there may be double counting of emissions between asset classes.
- Mixed signals: Asset classes that perform relatively well in climate transition do not necessarily offer the best SRI investment opportunities. Scores on general ESG criteria not always correlate well with climate risk metrics.
- Marginal assessment: The scenario analysis ignores the impact dimension of responsable investment. The quantitative optimisations take into account the financial risks of climate change but ignore broader opportunities that asset classes offer to implement SRI strategies. Generating positive real-world impact often depends on a bottom-up approach within an asset class, which is not fully considered when taking a top-down view at asset class level.

Despite these challenges, the outcome of the climate analyses provided meaningful insights in the potential consequences of climate change on the SAA portfolio. However, the outcomes must be regarded with care due to the mentioned limitations. Due to such limitations and uncertainties, the results of the climate analysis were used as supportive – not leading – in determining the investment mix. DNB aims to further refine its SAA approach as better data and models become available.

As regards governance, the Asset Management department leads the process and the Board is responsible for approving the SAA. An external advisor was hired for the modelling of economic scenarios, optimising the portfolio and running the climate analysis. The Board is accountable and takes the key decisions, including approval of the investment objectives, the risk budget and the SAA. The Board receives first line advice on the SAA from DNB's Investment Committee. DNB's Risk Management Committee advises on the risk budget and provides the Board with a second line risk opinion on the SAA proposal.

2 Bank Negara Malaysia – ESG Integration

Bank Negara Malaysia (BNM) ESG investment framework is anchored in three fundamental pillars. Firstly, maintaining reserve management objectives of capital preservation, liquidity, and optimal risk-adjusted returns. Secondly, BNM would benchmark itself with other central banks on the best ESG investment approach. Thirdly, BNM utilises data that is tangible and relevant in its investment process. BNM also adopts a pragmatic approach to ESG integration in its reserve management due to the continuously changing nature of the ESG investment landscape.

Since 2022, BNM has integrated ESG considerations into its strategic asset allocation (SAA) exercise, guided by the framework described above. The integration consists of a 3-step process:

1. A socially responsible investment (SRI)-based negative screening at portfolio levels. This process, which had been adopted since 2012, excludes exposures in entities that are involved in non-SRI activities such as defense, alcohol, tobacco and gambling.
2. A top-down asset allocation framework driven by long-term macro-economic and financial markets outlook. These outlooks are based on both fundamental and valuation assessments, which then drive each asset classes (cash, bond and equity) expected returns.
3. A mean-variance optimisation exercise, which overlays ESG ratings onto the expected return and credit rating of each asset class, to generate the optimum portfolio. To standardise the ESG metrics across all asset classes, BNM subscribes to a single ESG data provider. The SAA is then selected based on the optimal combination of the risk-adjusted return profile of the overall portfolio, BNM's liquidity requirements, and ESG ratings.

The integration of ESG considerations in SAA allows BNM to achieve outcomes consistent with the three fundamental pillars:

1. Reserve management objectives are maintained. This is in comparison to target-based approaches (e.g. reduction of carbon intensity in the portfolio), which according to BNM's assessment, would have a higher risk of feeding into lower diversification benefits, possibly affecting returns and liquidity.
2. Key ESG metrics for monitoring ESG aspects of the portfolio are measurable and tangible. These metrics are overall ESG score and rating, environmental score and sovereign exposures that are consistent with Paris-aware carbon emissions path.
3. Increased allocation in ESG-labelled bonds. BNM's exposure to ESG-labelled bonds have been increasing in tandem with the global ESG bond issuances.

BNM continues to monitor developments in the ESG markets. An important element to this is a continuous capacity building, such as promoting sustainability through internal training, leveraging on fund managers' expertise and participation in international or domestic sustainable forums. Through the framework, approach, and cumulative experiences, BNM looks to continue making progress in ESG investments.

3 Banco Central de la República Argentina – A sequential screening strategy of financial counterparts based on environmental scores and their introduction in the strategic asset allocation

Banco Central de la República Argentina (BCRA) began in 2021 to assess how ESG-investing could impact its reserves management. A comprehensive study took stock of the state of art of the green bond market and ESG metrics. This study concluded that BCRA should first focus on reputational risks and how to create incentives in its reserves management without compromising the traditional objectives of safety, liquidity and return. Two recommendations were issued to BCRA: i) to include "sustainability", or more precisely "environmental protection" into the investment objectives and ii) to closely monitor international developments and participate in the NGFS. Accordingly, in the next annual review of the BCRA Investment Guidelines, the Board of Directors approved the updated investment criteria. Thereafter, these new

criteria established that, after complying with traditional security, liquidity and profitability objectives, portfolio managers must be proactive in implementing investment strategies that promote environmental protection and support environmentally responsible projects.

BCRA drafted a two-stage plan to create incentives in its reserve management processes to help achieve the long-term objectives of the Paris Agreement. The first stage aimed to create incentives for BCRA counterparties by classifying them based on environmental scores. The second stage aimed to integrate environmental scores into the BCRA's strategic asset allocation.

First Stage of SRI implementation: classifying counterparties based on E-scores. The first stage was developed in 2022 and formally adopted in January 2023. Extensive research was carried out on both the available ESG metrics and more specific environmental metrics. Once the availability and correlation of such metrics was delimited (considering a list of eligible banks and financial institutions[20]), a screening strategy was developed and submitted for Board approval.

The strategy design posed several challenges given the vast universe of environmental measures. Generally, the measures are based on different assessment approaches (and for instance focus on performance, risk and/or disclosure metrics). When selecting indicators, a wide range of issues emerged, including comparability (categorical vs numerical data), availability (data gaps), timeliness (indicators with lagged inputs), low correlation, ambiguity/understandability (scope and vague definition), continuity (methodological changes over time), and costs involved.

The strategy sought to capture both tails of the distribution (leaders/laggards) to create appropriate incentives for BCRA´s counterparties (positive/negative) without strongly affecting the investment universe. Focus was on environmental metrics, since BCRA's investment objective is strictly environmental, but also other metrics were included to enhance consistency and reduce risk (as mentioned, due to the vast universe of available metrics and the very low correlation between them). Among the wide variety of metrics, BCRA focused on those available in Bloomberg, to facilitate transparency in the classification criteria used, but also to have updated, easily comparable, and understandable information (compared to non-cardinal/ordinal figures).

Among the vast universe of metrics, BCRA selected the MSCI Implied Temperature Rise (ITR) as its primary metric. The most attractive characteristics of this indicator were that it is forward-looking, which computes both the current carbon footprint and the projected trajectory, as well as it allows a straightforward and intuitive interpretation, since it is measured in terms of temperature goals embedded in the Paris Agreement. In order to reduce model risk, the ITR was complemented with three other metrics, also considering their scope and availability (ISS Quality Score, Sustainalytics ESG Risk Score and CDP Climate Score). The idea of a sequential strategy was to minimise exposure to the selection of a single indicator. The adoption of complementary indicators also sought to guarantee full coverage of eligible counterparties.

The strategy is based on the categorisation of the eligible counterparties in three different groups (Chart 1): (i) the "green" group has an ITR < 1.5 or "good scores"[21] for at least two of the other three complementary indicators, and are thus considered "leaders" in the alignment with the Paris Agreement objectives; (ii) the "brown" group has an ITR > 3.2 or bad scores"[22] for at least two of the other three complementary indicators, and are thus considered "laggards" in the alignment with the Paris Agreement objectives; (iii) the "yellow" group has an ITR between 1.5-3.2 and neither "good" nor "bad" scores. The positive screening ("green category") rewards counterparties with a 10% increase in credit limits, but only for counterparties with the highest credit profile (counterparties classified in Level 1 or Level 2 of internal credit risk assessment)[23], in order not to expose BCRA to higher credit risks.

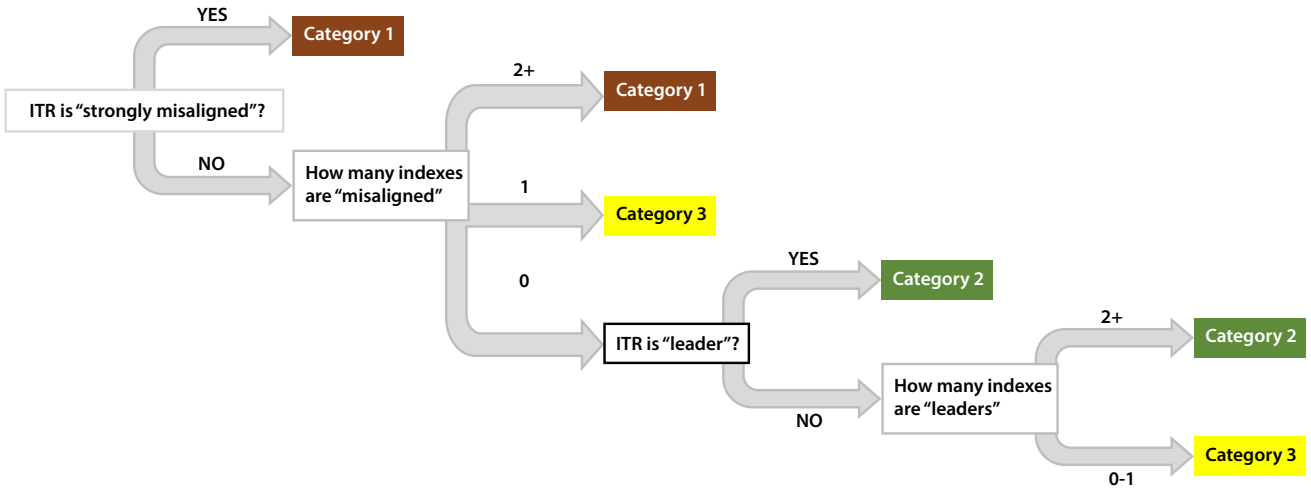
20 BCRA's Investment Guidelines currently lists 49 banks and financial institutions from 14 different countries as its eligible banking risk to invest its foreign exchange reserves.

21 Sustainalytics Risk Score < 20 and/or ISS Quality Score <= 2, and/or CDP Climate Score => 7.

22 Sustainalytics Risk Score > 30 and/or ISS Quality Score => 9, and/or CDP Climate Score <= 2.

23 BCRA investment guidelines distinguishes five different categories for setting up credit risk limits, based on three independent and public indicators: credit ratings, market prices (credit default swaps – CDS), and structural models *à la* KMV-Merton (e.g. DRSK Bloomberg model). Counterparties classified from Level 1 (highest) to Level 4 (lowest) are eligible, with different credit limits.

Chart 1 **Counterparties' classification according to ESG metrics**

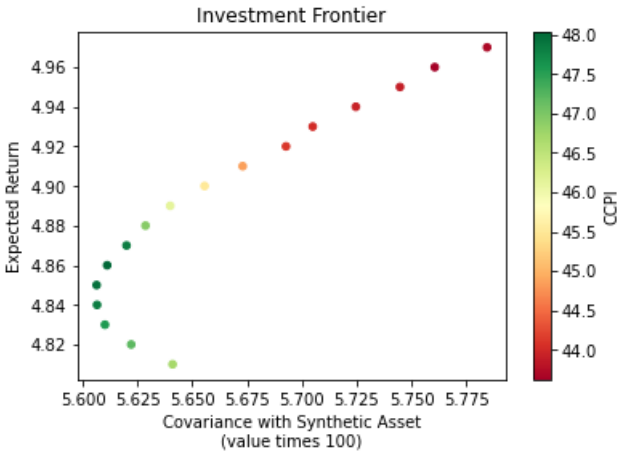


The negative screening ("brown category") penalises counterparties by limiting them to have the upper bound of a Level 3 entity (BCRA internal credit risk assessment) as the maximum credit limit exposure. Those entities in the residual "yellow" group, are neither penalised nor rewarded.

The second stage of SRI implementation: including E-scores in the strategic asset allocation. The second stage has been developed throughout 2023 and will be submitted for Board approval in the first quarter of 2024. BCRA aims, in this second stage, to improve its strategic asset allocation (SAA) model by including environmental scores in the selection of the reference portfolio. The current SAA framework determines the optimal asset allocation based on the maximisation of risk-adjusted returns, but also on the hedging provided by the reserves portfolio against the most common external shocks[24].

BCRA has planned to introduce environmental considerations into its SAA decision, by using the Climate Change Performance Index (CCPI)[25]. This allows BCRA to estimate the environmental score of each of the investment portfolios that comprises the efficient frontier already determined in the current framework (an example is shown in Chart 2). Once the efficient portfolios are determined through the projection of risk-adjusted returns and hedging against external shocks (i.e., by minimising the covariance with a synthetic asset index which represents Argentina's external shocks), the optimal portfolio is selected as the one with the highest environmental score, obtained as a weighted value by applying each CCPI score to its corresponding country index.

Chart 2 **Efficient frontier based on risk-adjusted returns, external shocks hedging and CCPI**



24 For more information please see Mario L. Torriani & Pablo Orazi & Matias Vicens, 2022. "Strategic Asset Allocation of a Reserves' Portfolio: Hedging Against Shocks," Open Economies Review, Springer, vol. 33(5), pages 973-995, November.

25 For more detail on its rankings and methodology, access https://ccpi.org/.

4 *Latvijas Banka – Sustainability transition of the developed market equity portfolio*

In November 2021, Latvijas Banka (LB), the central bank of Latvia, announced its ambition to integrate sustainability objectives into the management of investment portfolios as set out in its Sustainability Strategy. LB manages gold and financial investments with the objective to ensure capital preservation, liquidity, and income generation over the medium term. Now an additional principle – the principle of sustainability – has been added to the investment guidelines.

LB has an investment composition with 82% invested in fixed income, 11% in equities and 7% in gold. The fixed income portfolio has a large exposure to mortgage-backed securities (MBS), asset-backed securities (ABS), as well as developed market (semi-) sovereign issuers – asset classes which are all characterised by limited availability of sustainability data. As the incorporation of sustainability targets into investment portfolios primarily depends on advancements in data disclosures and metrics, equities are currently considered by LB the best asset class for implementing a meaningful SRI strategy. LB's largest equity exposure is towards developed markets (~90%), which is passively managed by an external asset manager against the MSCI World index. Emerging Market equity investments are done via ETFs.

For the developed market equity portfolio, LB implemented its dedicated sustainability strategy in 2022. This strategy is based on the following sustainability principles:

- Climate-related risk mitigation is achieved by optimising the portfolio to realise carbon neutrality by 2050 at the latest. The portfolio is in compliance with the European Union Paris Agreement's provisions and aims at an initial target of 50% reduction in carbon intensity against the benchmark, followed by self-decarbonisation of 7% per annum (2019 base year), and subsequently applies whichever of the two feeds into the highest decarbonisation rate at any given rebalancing period (e.g. versus the benchmark or versus the previous portfolio level). Thematic investment opportunities are captured by applying green opportunities and glide path transition factors.
- Stewardship is being outsourced to the external asset manager that manages LB's equity portfolio. The manager has a comprehensive stewardship policy and experience in engagement and voting according to a client's guidelines. The engagement policy allows LB to leverage its position as a shareholder in public companies to influence corporate decision-making in relation to climate-related risk and other ESG-related factors.
- Exclusions are applied based on the respective issuer's conduct, product, engagement, and PAB-aligned activity. In general, engagement is favoured over exclusion.
- Portfolio tilting is applied with a preference for companies with better biodiversity and waste management practices (+10% relative to the benchmark (the MSCI World)). ESG factor tilting is also applied with the aim to improve the ESG score of the portfolio (+10% relative to the MSCI World).

The concept of sustainability does not have a universal definition and is interpreted differently among individuals, organisations and countries. The interpretation of sustainability can vary due to a combination of factors, reflecting diverse perspectives, values, time horizons, priorities, etc. A major challenge was to precisely define the SRI objective and the applicable sustainability criteria for the equity portfolio. In the formulation of its objective, LB has taken inspiration from its own country's goals, European Union policies and also from the Eurosystem targets. The primary focus of the approach is on climate neutrality. Some of the most important considerations and associated challenges include:

1. A choice for tilting over exclusion. In defining the SRI strategy, it has been extensively debated whether to apply exclusions or tilting. Excluding issuers with the lowest ESG scores is a clear-cut way to improve a portfolio's sustainability metrics and avoid investing in disreputable companies. Tilting, on the contrary, does not quickly feed into improved ESG scores and is more demanding from an investor perspective; it favours those with better scores but via engagement leaves room for influencing the behaviour of poor performers. If successful, it positions the portfolio for transition gains. ESG data differs across data providers, thus creating room for policy errors if an exclusion methodology were to be applied based solely on this data. Considering these factors, it was decided to apply ESG tilting to the portfolio.
2. A thematic focus on climate change, pollution and biodiversity. The sustainability strategy explicitly recognises climate neutrality, adaptation to the consequences of climate change, reduction of inequalities, as well as prevention of environmental pollution and

conservation of biodiversity as the most prominent challenges for Latvia's long-term development. The design of the thematic investment approach was tackled in close collaboration with the external manager, as it needed to combine climate, pollution and biodiversity. The manager had already developed strategies to combine climate-related risk mitigation, thematic investing and ESG-tilting. The strategy to address biodiversity conservation and waste reduction, however, had to be developed from scratch. LB chose natural capital and pollution and waste as the best metrics to address these themes, but choosing a specific tilting number was more challenging. It was agreed to start gradually and review the decision annually.

3. A choice for a broad market over a Paris aligned benchmark. An additional issue was to decide whether to switch to a Paris Aligned benchmark or keep the existing one. Upon reviewing the methodologies of the Paris Aligned indices in comparison with similar strategies by the external manager, several reasons were identified for maintaining the current broad market benchmark, including (i) a lower portfolio turnover, (ii) a lower tracking error (compared to MCSI World index) and (iii) lower index license fees, as well as (iv) the possibility to separate the decision on strategic asset allocation from the sustainability aspect of the portfolio, (v) greater flexibility in the future as data improves, and finally (vi) immediate feedback on the gains or costs of the sustainability strategy.

Collaborating with an external manager has multiple benefits. For one, it gives the possibility to outsource the management, including analytical and operational capabilities for portfolio rebalancing on a daily basis. Furthermore, in the design of the SRI approach, LB benefited from specific resources and knowledge that were not available in-house, and was able to learn from the manager's expertise. In this set up LB relies on sustainability data from the external manager whose proprietary model is based on a combination of data points from different data providers. LB deems this to be an efficient and reliable arrangement as this is something that would be more difficult to achieve when using the limited data LB has access to.

The Council of Latvijas Banka is responsible for approving the principles and targets related to investment activities, including climate-related investment targets. LB's Investment Committee and the Market Operations Department implement these principles in practice and report to the Council at least once a year. The Bank is also working on incorporating sustainability objectives into other portfolios. The current climate-related risk management framework is not considered set in stone. It is expected that over time, sustainability-related data disclosures will be enhanced and further improvements will be possible, especially in the field of metrics, data standards, and quality.

5 National Bank of Belgium – Labelled bond strategy

The National Bank of Belgium (NBB) increasingly uses sustainable and responsible investment (SRI) principles to shape its activities. For its non-monetary policy portfolios, the NBB recognises sustainability as a fourth objective of its strategic asset allocation policy, alongside liquidity, safety and return. In this context, the NBB's SRI Charter plays a key role in informing and guiding the Bank's management of its reserves. The SRI Charter consists of five pillars:

- *Screening:* Excluding certain assets, issuers and counterparties based on sustainability and responsibility criteria.
- *Embedding:* Using climate and other environmental, social and governance criteria in investment decision-making.
- *Financing:* Supporting the transition to a sustainable and inclusive net zero economy by investing in thematic assets such as green, social and sustainability bonds.
- *Disclosing:* Fostering transparency on implementation of the SRI Charter, including through the publication of annual climate-related disclosures.
- *Engaging:* Encouraging internal and external stakeholder engagement in SRI activities.

NBB has formulated a dedicated strategy for investing in labelled bonds. By investing in so-called labelled or thematic assets, such as green, social or sustainability bonds, the NBB helps to finance the transition to a sustainable and inclusive net zero economy. Around 10% of the NBB's total bond portfolio was invested in thematic assets at the end of 2022 (representing a value of around EUR 2 billion). The Bank aims to continue growing this share, which is reflected in its labelled bond target mentioned in both NBB's SRI Charter and NBB's climate-related financial disclosures. This target spells out the aim of trend wise increasing the

relative share of labelled bonds within the total bond portfolio. A milestone in the implementation of the SRI principles, particularly regarding the SRI Charter's financing pillar, was the creation in 2021 of a USD-denominated sub-portfolio consisting entirely of investments in thematic bonds. As a result of continuous investment, the nominal value of this portfolio reached USD 1 billion in 2022**.**

The security selection process aims to ensure that proceeds from labelled bond issuances are effectively allocated to projects that meet green, social or sustainability objectives. The NBB takes care to invest in securities aligned with international standards. More precisely, the thematic bonds in which NBB invests must comply with the Green Bond Principles, Social Bond Principles or Sustainability Bond Guidelines issued by the International Capital Market Association (ICMA). NBB requires confirmation to this effect provided by a second-party opinion, or external verification as complying with the Climate Bonds Initiative's standard. Once introduced, the EU Green Bond Standard could replace or complement these two frameworks. Purchasing these types of securities also supports the UN Sustainable Development Goals. Information on aspects such as the use of proceeds, impact reporting and ICMA alignment is obtained in several ways, including through analysis of the green/social/sustainability bond framework and from sources such as Bloomberg.

Financing the transition to a sustainable and inclusive net zero economy must form part of an overarching investment strategy. To this end, a separate portfolio consisting solely of thematic bonds is a useful tool to align strategic objectives and operational incentives. The labelled bonds in this portfolio are held to maturity; in this way it differs from an actively managed portfolio focused mainly on return.

There are various challenges in setting a labelled bond target. The first challenge is associated with fluctuations in portfolio size. This hurdle can be overcome in part by analysing the expected evolution of portfolios over time and the capacity to invest in labelled bonds. In addition, the use of a relative target, i.e. a labelled bond share as part of the aggregate bond portfolio, can help to set a credible, realistic objective. The second challenge relates to the relatively high GHG emissions of green bond issuers. All things being equal, increasing the share of green bonds in a portfolio can cause financed emissions to surge. This because issuer-emissions are used to calculate the carbon metrics, without accounting for the potential emission reduction financed by the green projects. Of the corporate sectors, utilities and power generation are among those with the highest green bond issuance rate, which should help these companies decarbonise their often carbon-intensive activities. Hence, buying green bonds from such issuers contributes to financing their transition, but can initially result in a sharp rise in financed emissions. As explained in the NBB's climate-related financial disclosures, such an increase should be viewed in conjunction with the growth in a portfolio's green bond share. In addition, transparency on other metrics can help further clarify climate-related performance. For example, the NBB also discloses the carbon impact ratio, which is the ratio of the sum of avoided and reduced emissions (or emissions savings) to induced emissions. More precisely, the portfolio carbon impact ratio is derived as the exposure weighted average of the carbon impact ratios for the various green bonds it contains. With this in mind, it is important to clearly explain the context, while tracking decarbonisation progress over time.

As regards the governance process, the pillars and targets embedded in the SRI Charter were developed by the NBB's Financial Markets Department and approved by the Board of Directors. These include the labelled bond target. The SRI charter was formulated with input from staff and senior management, and subsequently endorsed by the Investment Committee and approved by the Board of Directors. The Investment Committee is responsible for overseeing implementation of the SRI Charter and deciding on tactical aspects, while the Board of Directors is responsible for taking decisions on the Charter's strategic direction, pillars and targets. Financial Markets Department staff are responsible for effective implementation of the Charter and the frequent monitoring of key indicators. They report to the Investment Committee and the Board of Directors on the progress made and challenges faced, so as to strengthen decision-making at the appropriate levels. In addition, the involvement of the NBB's Corporate Social Responsibility Board, Climate Hub and TCFD team is intended to ensure a consistent internal approach to SRI.

6 *Bank of Finland – Selecting and Monitoring External Fund Managers*

The Bank of Finland (BoF) has four investment objectives: liquidity, safety, return and responsibility, which cover both direct and indirect investments. BoF also uses three main responsible investment (RI) approaches: ESG integration, thematic investments, and norm-based screening. Exclusions to investment universe are done based on ESG considerations including climate-related exclusions.

BoF uses external fund managers especially in equity and real estate asset classes. The four investment objectives are integrated in the selection and monitoring of external managers of SRI portfolios. Also, BoF needs to monitor the progress of its fund managers on climate targets to ensure to reach BoF's publicly stated asset class-specific intermediate and portfolio-wide long-term climate targets.

Before a new external fund manager can be appointed, BoF conducts a thorough due diligence process by means of an extensive questionnaire. This due diligence process includes an analysis of, amongst others, (i) ESG/RI approaches used, (ii) tools applied, ESG/RI capacities within the investment/ research teams, (iii) abilities to identify ESG risks and opportunities, (iv) fines paid and other regulatory activities conducted against them. This questionnaire has been developed in-house, although for example PRI reporting has been used to add new questions. Some questions are asset class-specific such as proxy voting policy and voting statistics, which are only relevant for equity managers.

After the selection, it is also important to continue to monitor the ESG/RI activities of the external fund managers. BoF follows the developments in their policies and any changes in their capacity to manage relevant risks and opportunities. For the monitoring of external managers, in addition to meetings and reports from asset managers during the year, BoF uses its own modified due diligence-questionnaire as an annual check-up and also external reports such as the PRI reports and the GRESB reports (real estate specific framework). Currently all private sector asset managers are PRI signatories, so they are obliged to report on their activities according to the PRI reporting framework. These reports are public thus available also to non-signatories from the PRI website.

The outcomes from BoF's selection and monitoring process are presented to the Responsible Investment Working Group by the portfolio managers. Using BoF's questionnaire and external reports, and meetings before and during the investment period, ensures that BoF investment objectives and targets are being met. As the process is developed in-house in collaboration with the portfolio managers, there has been little, if any, push back from the participants. The process allows for a logical workflow and systematic check-up points. The working group meeting minutes are circulated to the Board. Approving Responsible Investment Principles and target setting are Board-level decisions, the working group and asset management office are responsible for implementing policies, monitoring progress made and reporting to the Board of its findings.

The selection and monitoring process was formulated within the asset management office with support in relevant areas from the risk management function. The portfolio managers are responsible for sending out the annual questionnaire and presenting findings to the internal RI working group. The RI expert helps to develop the annual questionnaire and supports the portfolio managers when needed. Any action related to the questionnaire responses are mainly within the portfolio managers' responsibility as information received is part of the investment decision-making process.

The main challenges encountered relate to information availability and constraints on capacity. Some of the data BoF needs for its own reporting are subject to the PRI reporting framework and its schedule, and are thus not always available in time. Furthermore, there is a need for internal capacity building as portfolio managers are responsible for presenting findings to the RI working group. The RI expert supports the portfolio managers although the work is conducted by the portfolio managers as part of BoF ESG integration approach which is in line with BoF investment objectives. BoF believes that requesting this type of information from current and potential asset managers can support the traditional central bank objectives (and at minimum is not harming them).

7 *Banca d'Italia – Portfolio decarbonisation pathways and corporate transition plans assessment*

Banca d'Italia (BdI) investment policy integrates both financial and sustainability objectives. The financial goals are rooted in traditional principles, seeking to mitigate financial risks and prudently generate returns. Sustainability considerations enter into portfolio optimisation with a dual purpose: firstly, to acknowledge the impact of sustainability risks on the pursuit of traditional objectives, and secondly, to contribute to achieving the goals of the Paris Agreement and the European Union's target of carbon neutrality by 2050. The motivation behind this approach is primarily outlined in BdI's Responsible Investment Charter and the Strategic Plan for 2023-2025. The charter, along with subsequent reports on sustainable investments and climate risks, illustrates the commitment of BdI to invest responsibly and to gradually decarbonise its non-monetary policy portfolios. The Strategic Plan for 2023-2025 articulates BdI's dedication to environmental concerns as one of its priorities, paying particular attention to the issue of fighting climate change. The sustainable investment strategy specifically addresses all non-monetary policy portfolios, such as the financial portfolio, foreign currency reserves, and the supplementary pension fund.

BdI incorporates sustainability criteria at both the strategic asset allocation and security selection levels for the management of its non-monetary policy portfolios. Within the strategic asset allocation framework, BdI establishes sustainability-focused optimisation constraints targeting private sector issuers. The goal is to achieve a portfolio that either maintains or improves both the current ESG score and the Weighted Average Carbon Intensity. For corporate bond and equity security portfolios, BdI ex-ante excludes entities operating in the financial sector. Furthermore, it excludes issuers that violate fundamental conventions on labour and international treaties on controversial weapons, as well as tobacco producers. Deviations from benchmarks are allowed to overweight issuers with ambitious and verified decarbonisation strategies, superior ESG scores, and positive track records on carbon intensity reduction. Throughout the process, BdI primarily relies on data from Bloomberg, MSCI, and SBTi. Concerning bonds issued by supranationals, sub-nationals, and agencies (SSAs), the sustainability strategy deemed most suitable is the gradual expansion of green bonds' holdings. For its green bond purchases, BdI adheres to the definition provided by the ICMA's Green Bond Principles.

BdI also started to directly engage with companies within its equity portfolio to (a) gain a deeper understanding of their initiatives towards decarbonising their activities and to enhance business sustainability and (b) signal its commitment toward greening the financial system. In this context, in 2022, the Bank initiated constructive dialogues with the companies responsible for about 80% of the carbon emissions in its equity portfolio. These discussions have been conducted through a questionnaire covering the following themes: (a) climate governance; (b) climate strategy; (c) climate change risk management; (d) metrics and targets; (e) interactions with shareholders on climate issues; (f) environmental and social issues. BdI engages with companies also to address concerns regarding sustainability metrics used for decarbonisation strategies and pathways, including: (a) delays in the updating of sustainability data by information providers relative to corporate disclosures, (b) discrepancies between projected absolute carbon emissions and decarbonisation trajectories provided by various ESG dataproviders, and (c) the absence of a common framework for evaluating the ambition and robustness of companies' climate-related commitments.

The governance of sustainable investments at the BdI is jointly overseen by the Governing Board, the Strategies and Financial Risks Committee, and the Investments Committee, with support from the Climate Change and Sustainability Committee[26]. Both long-term allocation proposals (strategic allocation) for the financial portfolio, foreign currency reserves, and short-term allocation proposals (tactical allocation) are presented by the risk management department in collaboration with the market operations and economic research departments. The strategic allocation proposal integrates financial considerations, climate, and sustainability risk issues, aiming for a progressive decarbonisation of the portfolios.

26 The primary role of the Climate Change and Sustainability Committee is not directly related to investment tasks, but instead focuses on promoting analyses dedicated to the risks and opportunities relating to ESG profiles. The Committee is supported by the Climate Change and Sustainability Hub, which facilitates coordination among various departments in the BdI on ESG issues.

This proposal, which may encompass topics such as engagement with companies, undergoes a prior review by the Strategies and Financial Risks Committee and is then approved by the Governing Board. The Investments Committee holds the responsibility for regularly verifying the convergence of the financial portfolio toward the strategic allocation objective. The Governing Board oversees both internal and external climate-related reporting. For internal reporting, the governing bodies of the BdI routinely receive information that includes both financial and sustainability profiles of the portfolios, prepared by the risk management department. Annually, BdI publishes a Report on sustainable investments and climate-related risks, fulfilling two key commitments made in 2021 with the publication of the Responsible Investment Charter: (a) to regularly publish information on achieved results and methodologies applied to integrate environmental, social, and governance (ESG) criteria into the allocation of investments and risk management, and (b) to contribute to the dissemination of the culture of sustainable finance in the financial system and among the public. Through the Report, the Bank also fulfills the commitment it has taken on, together with the Eurosystem central banks, to regularly disseminate information on climate-related risks for non-monetary policy portfolios.

8 Hong Kong Monetary Authority – Net zero investment approach on corporate portfolio

The Hong Kong Monetary Authority (HKMA) believes that giving due attention to ESG factors including climate change can unlock sustainable long-term values. This helps to reduce ESG risks of underlying investments, and contributes to achieving the investment objectives of the HKMA Exchange Fund. To reinforce its commitment to the global climate agenda and further bolster the Exchange Fund's resilience, the HKMA has set a target of net-zero GHG emissions by 2050 for the Investment Portfolio to support the government climate strategies and to lead by example.

The HKMA pursues a net-zero target for the Investment Portfolio containing different asset classes. To realise a net-zero portfolio underpinned by the overarching guiding principle to grant priority to ESG investments with comparable long-term risk-adjusted returns, a three-pronged approach is followed:

(i) Investment: For listed equities managed externally, the HKMA has invested in passive mandates adopting ESG indices as benchmarks and implemented decarbonisation overlay strategy in favour of lower emitting companies. As for corporate bonds, the HKMA actively sources green, social and sustainability bonds for its internal holding and invests in externally managed green/transition bond funds. In the private market space, the HKMA invests in renewable energy assets as well as funds supporting climate transition.

(ii) Integration: ESG assessment is conducted in the selection, appointment and monitoring of external managers and general partners. As well, ESG-related metrics are incorporated in credit risk analysis of internally managed bond portfolios.

(iii) Active ownership: The HKMA engages with external managers with a focus on "grey" underlying portfolio companies, while maintaining ongoing dialogue with general partners on ESG reporting for private investments.

The availability and quality of ESG data, in particular those with a forward-looking perspective, remains the biggest challenge for implementing the portfolio net-zero strategy. This is especially challenging for private market investments.

The governance framework entails the Exchange Fund Advisory Committee's (EFAC) endorsement of the framework and guiding principle for responsible investment of the Exchange Fund. The EFAC delegated the oversight of associated ESG risks to its Investment Sub-Committee (ISC). The ISC endorses the risk management strategy including net-zero target setting, and monitors the HKMA's work progress. Sustainable Investing team of the Exchange Fund Investment Office coordinates with portfolio teams to design and implement relevant strategy and reports regular progress to the ISC.

9 Banque de France – Temperature alignment / Net zero strategies for own funds and pension fund portfolios

The Banque de France (BdF) has made a commitment to progressively align its own fund and pension fund portfolios with a global warming trajectory of well below 2 °C. Accordingly, it ensures that its investments comply with the commitment made by France under the 2015 Paris Agreement. BdF initially set and then achieved the

target of aligning the equity component of its own funds investment portfolio with a sub-2 °C target by 2019. Up until now, this equity component remained aligned with the 2 °C target as its implied temperature rise was between 1.75 °C and 2 °C in 2022. The target was subsequently extended to the equity component of the pension liabilities portfolio in 2021 as well. Again, the target has remained intact, with the implied temperature rise for this component also sitting at between 1.75 °C and 2 °C at end-2022. The implied temperature rise of the corporate bond component of the pension liabilities portfolio, which was measured for the first time in 2022, is also aligned with the 2 °C target and was between 1.5 °C and 2 °C at end-2022.

Among the measures to assess the alignment of its portfolios, BdF considers the past and future annual carbon emissions trajectories of companies in its investment universe. By comparing companies against a benchmark trajectory, it is possible to assess each firm's alignment with a target of sub-2 °C warming trajectory. Alignment of the portfolio is then measured by aggregating and comparing past and future emissions, on the one hand, and the benchmark emissions of portfolio companies, on the other hand, which are allocated on a proportional basis reflecting the share of the investment relative to the company's value.

To align its portfolios, BdF takes a two-stage approach: (i) it applies a filter that prevents it from investing in companies whose trajectories are least compatible with the 2 °C target; and (ii) it gives preference to companies that are aligned with the target. By applying a climate filter at the level of the universe (e.g. best-in-universe), BdF excludes approximately 5% of the worst-performing companies from its investment universe. Exceptionally, some of these companies may be retained in the portfolio if (i) they implement a strategy that contributes significantly to the energy transition and (ii) the equity component remains aligned with the 2 °C target overall.

Main challenges relate to high level of complexity, data quality and coverage. Carbon alignment data are provided by S&P Global Sustainable1. These cover Scope 1 and Scope 2 GHG emissions over the 2012-2030 period. For this period, S&P Global Sustainable1 calculates a carbon emissions trajectory for each company, which it compares against a theoretical emission trajectory that would enable compliance with sub-2 °C global warming. Company carbon emissions trajectories are obtained from historical data and the targets set by firms themselves, or, in case of missing values, from estimates and projections. The theoretical trajectory for 2 °C alignment is calculated using the two methodologies recommended by the Science Based Targets Initiative (SBTi)

- In the case of companies that emit the most carbon and whose business activities are homogeneous, S&P Global Sustainable1 refers to the sector carbon budgets established by the International Energy Agency (IEA), and then applies the "sectoral decarbonization approach" (SDA). Per sector, every company is assigned a carbon sub-budget based on its carbon intensity, production and market share. A company whose carbon intensity trajectory is above its theoretical budget is therefore not 2 °C aligned.
- When considering other companies, S&P Global Sustainable1 uses the 2 °C scenario for global GHG emissions of the Intergovernmental Panel on Climate Change (IPCC), then applies the GHG emissions per unit of value added (GEVA) approach. All companies must reduce their carbon intensity at the same pace (5% a year), irrespective of their sector. Companies that do not lower their carbon intensity at this pace are therefore not 2 °C aligned.

This methodology, which was developed by S&P Global Sustainable1, is in line with the recommendations issued by the Task Force on Climate-related Financial Disclosures (TCFD) in 2021 on portfolio alignment.

BdF's governance framework provides that the responsible investment strategy is implemented by its Finance Directorate, which is part of the General Secretariat. The responsible investment strategy is presented at least once a year to the General Council and determined by BdF's decision-making bodies, namely the Assets-Liabilities Committee and the Pension Plan Strategic Committee. Operational execution of the responsible investment strategy is steered by a quarterly investment committee on which the Risk Directorate sits alongside the Finance Directorate, under the chairmanship of the Secretary General. The General Secretariat also participates in BdF's Executive Committee on Climate Change, which brings together all of the General Directorates to coordinate the Bank's sustainable finance strategy. The General Secretariat is additionally part of the BdF's climate expert networks on research and financial supervision.

10 Norges Bank – Climate stewardship with investee companies

Norges Bank, the central bank of Norway, is an institution with two areas of responsibility. First, based on the mandate given by Norway's central bank act, the Bank conducts central banking operations. Second, based on a separate investment mandate, Norges Bank Investment Management (NBIM) manages Norway's sovereign wealth fund – the Government Pension Fund Global. The objective of the fund is to achieve the highest possible return with acceptable risk in line with the investment mandate issued by the Norwegian Ministry of Finance. The fund is invested in listed equities, listed bonds, unlisted real estate and unlisted renewable energy infrastructure. Moreover, Norges Bank's foreign exchange reserves are divided into a fixed-income portfolio and an equity portfolio. The fixed-income portfolio (of the foreign exchange reserves) is managed by the central bank-arm, while the equity portfolio (of the foreign exchange reserves) is managed by NBIM. The equity portfolio of the foreign exchange reserves is managed according to the same principles and responsible investment strategies as the equity investments in the Government Pension Fund Global.

In 2022, NBIM published a climate action plan, describing the fund's approach to managing climate risks and opportunities through specific actions over the period 2022-2025[27]. The plan was based on the understanding that as a long-term, global, and diversified investor, the fund's returns, and ultimately its ability to support the financial welfare of future generations, hinge on sustainable development in economic, environmental, and social terms.

The plan's overarching goal is to drive portfolio companies towards net-zero emissions by 2050. It focuses on improving market standards, increasing portfolio resilience, and effectively engaging with portfolio companies. This means encouraging companies to align their activities with global net-zero emissions in line with the Paris Agreement, which thereby reduces the financial risks associated with climate change and optimises the opportunities presented by a transition to a low-carbon economy.

The main tool NBIM uses to implement its climate action plan is engagement. By means of an expectation document on climate change, NBIM communicates with investee companies. NBIM believes in the power of dialogue and collaborative efforts to foster change and influence corporate behaviour towards more sustainable practices. To support this engagement strategy, NBIM updated its expectation document on climate change in 2023[28], which serves as a reference point for company interactions on climate-related topics. The updated expectation document accentuates the need for companies to integrate climate risks and opportunities into their corporate strategies. It emphasises the role of company boards in ensuring climate risks are considered in corporate strategy and risk management. The document also underscores the importance of transparent climate risk disclosures and reporting of GHG emissions. Importantly, NBIM calls for companies to commit to net-zero emissions by 2050 or sooner and align their activities with the objectives of the Paris Agreement. It also urges companies to set science-based interim emission reduction targets that cover scope 1, scope 2, and material scope 3 emissions.

As part of the climate action plan, NBIM has set a target to engage with companies representing 70% of the financed emissions in the equity portfolio. On this basis a focus list of around 250 companies for engagement has been developed. These companies will be engaged primarily through company dialogue. Company boards will be informed if they fail to meet core expectations, and the fund may decide to vote against directors, climate transition plans and/or executive remuneration plans, and file shareholder proposals. Creating a focus list allows for more detailed and business-relevant engagements with the companies on their climate targets, transition plans and performance. The target of 70% was deemed to be the most ambitious coverage possible while maintaining a detailed dialogue with the relevant companies.

A challenge is to remain principles-based and challenging in the dialogues, while adapting to the individual company context and not becoming prescriptive or adopting a "box-ticking" approach. Data availability also remains an issue. While company reporting on climate change has improved significantly over

27 See 2025 Climate action plan | Norges Bank Investment Management (nbim.no).

28 See NBIM | Climate Change | Expectations of Companies.

the last years, data quality, comparability and frequency of updates from third-party vendors makes benchmarking challenging. To mitigate these challenges the fund engages companies on a sector-by-sector basis, allowing for tailored comparisons between similar companies and the refinement of industry expertise. Covering portfolio managers are also closely involved in the dialogues, which enables a better understanding of the financial implications of company transition plans (or lack thereof). One of our priorities when assessing transition plans is to understand and quantify the levers companies are planning to use to reach their decarbonisation targets, and the associated capital expenditures.

Company-specific objectives are set for all company engagements, which are tracked on an ongoing basis. The expectations set out in the document have been well-received by companies, and the dialogues are generally deemed to be constructive and valuable for both NBIM and the companies. In line with investor interest, we observe that the share of the fund's financed scope 1 & 2 emissions covered by credible net zero targets has increased from 29% in 2020 to almost 65% in 2023. Stewardship work takes time. Relationships and knowledge need to be developed, and escalation actions towards non-responsive companies may stretch over several years.

Bibliography

Amenc N., et al. (2023)
Green Dilution: How ESG Scores Conflict with Climate Investing. *Financial Investigator.*
Retrieved from [*https://www.financialinvestigator.nl/nl/nieuws-detailpagina/2023/10/24/Scientific-Beta-How-ESG-scores-conflict-with-climate-investing*]

Angelini (2022)
Net zero pledges of financial firms: trade-offs and problems. *Round Table on New Frontiers in Banking and Capital Markets,* La Sapienza University

Angelini (2024)
Portfolio decarbonisation strategies: questions and suggestions (Occasional Papers No. 840). Banca d'Italia.
Retrieved from [*https://www.bancaditalia.it/pubblicazioni/qef/2024-0840/index.html?com.dotmarketing.htmlpage.language=1*]

Berg F., Kölbel J. F., Rigobon R. (2022)
Aggregate confusion: The divergence of ESG ratings. Review of Finance, 26(6), 1315-1344.
Retrieved from [*https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3438533*]

Bernardini E., Fanari M., Foscolo E., & Ruggiero F. (Forthcoming)
Environmental Data and Scores: Lost in Translation. *Journal of CSR.*
Retrieved from [*https://ssrn.com/abstract=4554969 or http://dx.doi.org/10.2139/ssrn.4554969*]

Bloomberg (2024)
Global ESG assets predicted to hit $40 trillion by 2030, despite challenging environment, forecasts Bloomberg Intelligence. Bloomberg LP.
Retrieved from [*www.bloomberg.com*]

CDP-WWF (2020)
Temperature rating methodology. A temperature rating method for targets, corporates, and portfolios.
Retrieved from [*CDP-WWF temperature rating methodology - CDP*]

Cheng R., Gupta B., & Rajan R. S. (2023)
Do green financial policies offset the climate transition risk penalty imposed on long-term sovereign bond yields? *Research in International Business and Finance,* 65.

Cifrino D. A. (2023, June 29)
The Rise of International ESG Disclosure Standards. McDermott Will & Emery LLP Blog.
Retrieved from [*The Rise of International ESG Disclosure Standards (harvard.edu)*]

De Angelis T., Tankov P., & Zerbib O. D. (2021)
Climate Impact Investing. SSRN.
Retrieved from [*https://ssrn.com/abstract=3562534*]

Dikau S., & Volz U. (2021)
Central bank mandates, sustainability objectives and the promotion of green finance. Ecological Economics, 184.
https://doi.org/10.1016/j.ecolecon.2021.107022

Duchin R., Gao J. and Xu Q. (2023)
Sustainability or Greenwashing: Evidence from the Asset Market for Industrial Pollution. Mimeo.

Ducoulombier F. (2021)
Understanding the importance of Scope 3 emissions and the implications of data limitations. The Journal of Impact and ESG Investing.
https://doi.org/10.3905/jesg.2021.1.018

European Commission (2019)
Targeted consultation on the update of the non-binding guidelines on non-financial reporting.
Retrieved from [*https://finance.ec.europa.eu/regulation-and-supervision/consultations/2019-non-financial-reporting-guidelines_en*]

ECB (2023) Climate-related indicators
Analytical indicators on physical risks.
Retrieved from [*https://www.ecb.europa.eu/stats/all-key-statistics/horizontal-indicators/sustainability-indicators/data/html/ecb.climate_indicators_physical_risks.en.html*]

Fender I., McMorrow M., & Zulaica O. (2022)
Sustainable management of central banks' foreign exchange (FX) reserves. London School of Economics.

Fraser A. and Fiedler T. (2023)
Net-zero targets for investment portfolios: An analysis of financed emissions metrics. Energy Economics, 2023, vol. 126, issue C.

GHG Protocol (2023)
Frequently asked questions.
Retrieved from [*FAQ.pdf (carbonprotocol.org)*]

Global Impact Investing Network (2023)
2023 GIINsights.
Retrieved from [*2023 GIINsights | The GIIN*]

Global Impact Investing Network (2022)
GIINsight: Sizing the Impact Investing Market 2022. Retrieved from [*GIINsight: Sizing the Impact Investing Market 2022 | The GIIN*]

Gözlügöl A. and Ringe W.G. (2023)
Net-zero transition and divestments of carbon-intensive assets, No 386, SAFE Working Paper Series from Leibniz Institute for Financial Research SAFE.

IIGCC (2021)
Resources: Net zero investment framework implementation guide.
Retrieved from [*Net Zero Investment Framework Implementation Guide (iigcc.org)*]

Haas C., Jahns H., Kempa K., Moslener U. (2023)
Deep uncertainty and the transition to a low-carbon economy. Energy Research & Social Science, Vol. 100. Retrieved from [*https://doi.org/10.1016/j.erss.2023.103060*]

Intergovernmental Panel on Climate Change (2023)
Summary for Policymakers. In:Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

IRENA (2023)
World Energy Transitions Outlook.
Retrieved from [*World Energy Transitions Outlook 2023 (irena.org)*]

Lawton G. (2023)
Timeline and history of ESG investing.
Retrieved from [*Timeline and History of ESG Investing, Rules and Practices (techtarget.com)*]

NZAOA (2023)
Elevating climate diligence on proxy voting approaches. A foundation for asset owner engagement of asset managers. UN Convened Net Zero Asset Owners Alliance.
Retrieved from [*https://www.unepfi.org/wordpress/wp-content/uploads/2021/04/16-Elevating-Climate-Diligence-2.pdf*]

NGFS (2019a)
A call for action: Climate change as a source of financial risk (First comprehensive report). Paris, France: Network for Greening the Financial System.
Retrieved from [*NGFS - First comprehensive report*]

NGFS (2019b)
A sustainable and responsible investment guide for central banks' portfolio management (NGFS Technical Report). Paris, France: Network for Greening the Financial System.
Retrieved from [*https://www.ngfs.net/sites/default/files/medias/documents/ngfs-a-sustainable-and-responsible-investment-guide.pdf*]

NGFS (2020a)
Progress report on the implementation of sustainable and responsible investment practices in central banks' portfolio management (Technical document). Paris, France: Network for Greening the Financial System.
Retrieved from [*sri_progress_report_2020.pdf (ngfs.net)*]

NGFS (2021)
Guide on climate-related disclosures for central banks (Technical document). Paris, France: Network for Greening the Financial System.
Retrieved from [*guide_on_climate-related_disclosure_for_central_banks.pdf (ngfs.net)*]

NGFS (2023a)
Statement of nature-related financial risks. Paris, France: Network for Greening the Financial System.
Retrieved from [*https://www.ngfs.net/sites/default/files/medias/documents/statement_on_nature_related_financial_risks_-_final.pdf*]

NGFS (2023b)
Monetary policy and climate change: Key takeaways from the membership survey and areas for further analysis (Technical document). Paris, France: Network for Greening the Financial System.
Retrieved from [*Monetary policy and climate change (ngfs.net)*]

NGFS (2023)
Nature-related financial risks: A conceptual framework to guide action by central banks and supervisors (NGFS Technical document). Paris, France: Network for Greening the Financial System.
Retrieved from [*ngfs_conceptual-framework-on-nature-related-risks.pdf*]

NGFS (2024a)
Net zero alignment for portfolios of equities and corporate bonds (NGFS Technical document). Forthcoming.

NGFS (2024b)
Climate risk and impact of sovereign debt portfolios – Metrics, data and implementation considerations for central banks (NGFS Technical document). Forthcoming

NGFS (2024c)
Revised guide on climate-related disclosures (NGFS Technical document). Forthcoming.

Noels J., & Jachnik R. (2022)
Assessing the climate consistency of finance: Taking stock of methodologies and their links to climate mitigation policy objectives. OECD Environment Working Papers, 200.

OECD (2021)
ESG investing and climate transition: Market practices, issues and policy considerations. Paris, France: OECD.
Retrieved from [*https://www.oecd.org/finance/ESG-investing-and-climate-* transition-Market-practices-issues-and-policy-considerations.pdf]

Pástor L., Robert F., Stambaugh Lucian A., Taylor (2022)
Dissecting green returns. Journal of Financial Economics, 146(2), 403–424.
https://doi.org/10.1016/j.jfineco.2022.07.007

Pedersen L. H., Fitzgibbons S. & Pomorski L. (2021)
Responsible investing: The ESG-efficient frontier. Journal of Financial Economics, 142(2).

Prosperi L., & Zanin L. (2024)
A modelling framework for equity portfolio projections under different carbon price scenarios. Journal of Climate Finance, 6, 100033.
Retrieved from [*https://ssrn.com/abstract=4062090*]

PRI (2015)
Developing an asset owner climate change strategy. Principles for Responsible Investment.
Retrieved from [*https://www.unpri.org/download?ac=1885*

PRI (2021)
Climate metrics.
Retrieved from [*download (unpri.org)*]

PRI (2023a)
Definitions for responsible investment approaches (Technical guide). Investment Tools. Principles for Responsible Investment.
Retrieved from [*https://www.unpri.org/investment-tools/definitions-for-responsible-investment-approaches/11874.article*]

PRI (2023b)
Developing and updating a responsible investment policy, October 2023.
Retrieved from [*https://www.unpri.org/download?ac=19467*]

PRI (2024)
What are the Principles for Responsible Investment? Retrieved from [*https://www.unpri.org/about-us/what-are-the-principles-for-responsible-investment*]

Rohleder M., Wilkens M., & Zink J. (2022)
The effects of mutual fund decarbonization on stock prices and carbon emissions. Journal of Banking & Finance, 134.

Ruijie Cheng, Bhavya Gupta, Ramkishen S. Rajan (2023)
Do green financial policies offset the climate transition risk penalty imposed on long-term sovereign bond yields? Research in International Business and Finance, 65.

SBTI (2022)
Financial sector science-based targets guidance (version 1).
Retrieved from [*https://sciencebasedtargets.org/resources/files/Financial-Sector-Science-Based-Targets-Guidance.pdf*]

United Nations Framework Convention on Climate Change (2023)
Technical dialogue of the first global stocktake: Synthesis report by the co-facilitators on the technical dialogue.
Retrieved from [*https://unfccc.int/documents/631600*]

Verheyden T., Eccles R. G., & Feiner A. (2016)
ESG for all? The impact of ESG screening on return, risk, and diversification. Journal of Applied Corporate Finance, 28(2), 47-59 (Spring).
Retrieved from [*https://doi.org/10.1111/jacf.12174*]

World Wide Fund for Nature (2023)
Assessing portfolio impacts.
Retrieved from [**wwf_assessing_portfolio_impacts_final.pdf (panda.org)*]

Annex 1: Net zero approaches, considerations and metrics

Approach	Implementation considerations	Possible portfolio metrics
Portfolio construction = combination of negative screening, tilting (best-in-class) and ESG integration	Use a combination of current and projected climate performance Use bottom-up active selection or top-down passive tilting Replicate sectoral composition of traditional market benchmark Measure carbon emissions reduction against climate or market benchmark	GHG emissions (current) GHG emissions (projected) % of revenue European Union tax-aligned Share of fossil fuel revenues Share of investees with good quality transition plan % of investees with good quality of sustainability disclosure Implied temperature rise
Stewardship = Voting and engagement with investee companies, dialogue with asset managers, signaling stance on sustainability issues to policy makers/ regulators	Establish motivations and goals for engagement and select relevant parties to engage with Engage individually, or collectively with other investors and/or central banks Directly engage with corporates, or indirectly engage via an V&E service provider or an asset manager Themes/topics to focus on within stewardship efforts: • For investee companies, this could be quality of disclosures, decarbonisation targets or transition plans. • For asset managers, this could be an assessment of their approach to integrating climate-related considerations in proxy voting or policy engagement. • For policy makers, this could be performed via consultation on sustainability regulation. Define escalation process to follow when there is insufficient progress in the engagement	% of financed emissions under engagement Number of shareholder meetings voted on (number or % of times voted against management) Number of milestones reached Number of engagement actions taken (e.g. letters, consultation responses)
Thematic = investing in climate solutions, for instance via green bonds or renewable energy infrastructure or private equity impact funds	Set a dedicated target allocation for labelled bonds or for specific types of labels (green, social, sustainable) Define sustainable outcomes to achieve with thematic investments (e.g., what SDGs to contribute)	Share of company revenues aligned with sustainable taxonomy Share of green bond proceeds aligned with sustainable taxonomy Share of company revenues/bond proceeds contribute to SDGs Share of renewable energy generation GHG emissions avoided

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Glossary

Best-in-class: An SRI strategy that involves either positive screening or index-adjusted weighting ("ESG tilting") by comparing the ESG characteristics of a firm to its peers.

Carbon footprint: A measure to assess carbon emissions associated with the investments held within a financial institution's portfolio.

Carbon reduction measures: Strategies and actions undertaken by investors to mitigate the carbon emissions associated with their investment portfolios.

Carbon leakage: Situation where, due to stringent climate policies or reputational reasons, businesses were to transfer carbon-intensive production to other firms outside the corporate group perimeter or to countries with laxer emission policies, which may lead to an increase of emissions. The additional emissions resulting from such actions is considered carbon leakage.

Decarbonization and "paper decarbonization": While decarbonization is a deliberate process of reduction of carbon emissions pursued by an organization (e.g. issuer or investor), "paper decarbonization" may entail a pure nominal (and potentially unintentional) reduction of carbon metrics (e.g. carbon intensity or footprint) due to monetary or financial reasons, which do not lead to real-world carbon emissions reduction.

ESG integration: An SRI strategy that aims to enhance traditional financial (risk) analysis by systematically including ESG criteria in the investment analysis to improve risk-adjusted returns.

Extra-financial objective: A set of sustainability goals, which can be determined either in general (e.g., ESG score) or in specific objectives (e.g. climate, environmental, social, governance).

Fiduciary duty: Obligation of an investment manager to act in the fiduciary's best interest, according to a pre-agreed set of investment objectives.

Financial objective: A set of goals set for the investor's portfolio in terms of return, risk, and liquidity, which can be determined either in absolute terms or relative to a benchmark.

GHG emissions: Gases released into the Earth's atmosphere that contribute to the greenhouse effect and global warming. The primary greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases.

Green bonds: Bonds for which the proceeds should be used exclusively for (predefined) green projects.

Impact investing: An SRI strategy that aims to achieve a quantifiable positive impact alongside financial returns.

Investment approach: A set of decision-making criteria, modelling, and investment options to implement investment strategy.

Investment strategy: A set of principles and criteria based on risk tolerance, time horizon, and investment objectives, designed to guide investor's decision to achieve investment goals.

Labelled bonds: Bonds that have specific environmental, social, or governance (ESG) or sustainability purposes. The collected proceeds are used to funding projects or expenditures with ESG benefits or facilitating improvements to an issuer's sustainability targets.

Metrics: Indicators summarizing the evaluation of an issuer's sustainability performance, exposure, and management ability with regard to sustainability risks/opportunities.

Negative screening: A SRI strategy that systematically excludes companies, sectors, or countries from the investment universe.

Net zero strategy: A SRI strategy that aims to align investment portfolios with the goal of achieving net zero greenhouse gas emissions.

Own funds: Any portfolio of a central bank that is not related to a formally mandated (policy) goal, but that is held, for example, to make up for operating expenses or for gathering market intelligence.

Pension funds: Portfolios managed by central banks that serve as long-term savings accounts for retirement and have a longer investment horizon.

Policy portfolios: Any portfolio which has been formally mandated to the central bank, e.g., for monetary policy purposes, foreign exchange interventions, etc.

SRI: Sustainable and Responsible Investment – used as an umbrella term under which multiple strategies and investment practices can be placed that explicitly take climate or broader ESG criteria into account.

Scope 1 greenhouse gas emissions: Direct emissions of greenhouse gases that occur from sources that are owned or controlled by the reporting corporate entity.

Scope 2 greenhouse gas emissions: Indirect emissions of greenhouse gases associated with the consumption of purchased or acquired electricity, steam, heating, and cooling by a firm.

Scope 3 greenhouse gas emissions: Indirect emissions that occur along the value chain of a firm, including both upstream and downstream activities that are outside the corporate direct operational control.

Sustainability risks: Negative financial impacts stemming from a diversity of sustainability factors, e.g. climate-related, environmental, social and governance issues regarding the investee behaviour. These risks can entail different materiality of impacts on asset risk/return profile and can be measured through several data types.

Stewardship: Range of activities undertaken by shareholders to monitor, engage, and intervene on matters that may affect the long-term value of investee companies.

Strategic asset allocation: A portfolio strategy whereby the investor sets target allocations for various asset classes.

Sustainability-linked bonds (SLBs): Bonds where the financial terms, including the coupon rate or principal amount, are linked to the issuer's achievement of predefined sustainability targets or performance metrics.

Sustainable bonds: Bonds with proceeds earmarked for financing projects or activities that have positive environmental or social impacts.

Taxonomy: A set of criteria established as a basis for an evaluation of whether and to what extent a financial asset will support given sustainability goals.

Third-party assets: Assets that a central bank manages on behalf of a third party.

Tilting: A strategy where an investor adjusts the weightings of certain assets within their portfolio relative to a standard benchmark or index, with the aim to enhance returns, manage risk, or realise sustainability objectives.

Total carbon emissions: The sum of greenhouse gas emissions associated with the investments held within a financial institution's portfolio.

Voting and engagement: A SRI strategy that involves exercising ownership rights and "voice" to change a company's behavior with regards to ESG issues, such as the violation of international standards and norms.

Labelled bonds: Bonds with specific characteristics or purposes explicitly "labelled" at the time of issuance. These bonds often finance projects or initiatives that align with certain ESG criteria. Examples of labelled bonds include green bonds, social bonds, sustainability bonds.

Acronyms

BCBS	Basel Committee on Banking Supervision
CDP	Carbon Disclosure Project
CF	Carbon Footprint
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change
CTB	EU Climate Transition Benchmark
ESG	Environmental, social and governance
FSB	Financial Stability Board
GCEL	Global Coal Exit List
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	Greenhouse Gas
IAMs	Integrated Assessment Models
ICMA	International Capital Market Association
IEA	International Energy Agency
IFC	International Finance Corporation
IIGCC	Institutional Investors Group on Climate Change
IRENA	the International Renewable Energy Agency
ISSB	International Sustainability Standards Board
ITR	Implied Temperature Rise
IUCN	International Union for Conservation of Nature
KPI	Key Performance Indicator
MAS	Monetary Authority of Singapore
NGFS	Network for Greening the Financial System
NZAOA	UN-convened Net Zero Asset Owner Alliance
PAB	EU Paris-Aligned Benchmark
PAII	Paris Aligned Investor Initiative
PCAF	Partnership for Carbon Accounting Financials
SBTi	Science Based Targets Initiative
SDGs	Sustainable Development Goals
SEEA EA	System of Environmental Economic Accounting Ecosystem Accounting
SRI	Sustainable and Responsible Investment
SSA	Sub-)sovereigns, Supranationals, and Agencies
TCE	Total Carbon Emissions
TCFD	Task Force on Climate-Related Financial Disclosures
TPI	Transition Pathway Initiative
TPT	UK Transition Plan Taskforce
UNEP FI	United Nations Environment Programme Finance Initiative

UN PRI	United Nations Principles for Responsible Investment
UN GC	United Nations Global Compact
V&E	Voting and Engagement
WACI	Weighted Average Carbon Intensity
WWF	Worldwide Fund for Nature


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