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Challenges Ahead in Implementing Central Banks' Sustainable Practices: A Survey from the Banque de France and Asian Central Banks

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Table of Contents

List of Figures and Tables

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Jonathan Thébault[2] and Meltem Chadwick[3]

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Abstract

This paper investigates the growing role of central banks in promoting sustainable policymaking, with a focus on strategies for mitigating climate risk through financial choices. It underscores the urgent economic threat posed by climate change, detailing both physical and transition risks that jeopardise global financial stability and economic growth.

Based on extensive experiences from the Banque de France and various South East Asian central banks, the study examines how these institutions can incorporate climate-related risks into their current mandates, aligning investment strategies with climate objectives without sacrificing their primary goals of price and financial stability.

Key findings from the Banque de France reveal that investments in line with the Paris Agreement can produce similar financial returns while keeping portfolio risks manageable. In Asia, despite facing diverse challenges, such as inconsistent standards, limited market liquidity, and governance issues, central banks have established essential frameworks, green bond markets, and taxonomy guidelines that promote the development of sustainable finance.

The paper concludes by identifying four structural challenges: gaps in data and disclosures, conflicting national policies, geopolitical complexities, and the unique roles of central bank portfolios. It suggests that improved governance, international collaboration, and standardised frameworks are vital for effectively integrating green strategies into central banking operations.

JEL codes: E58, Q54, Q58

Keywords: Central banking and climate risk; Sustainable finance; Paris-aligned portfolios; Green bond markets

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1. Introduction

There is a broad consensus that climate change will intensify, leading to a significant negative impact on global economic output. Kotz et al. (2024) estimate that, even with immediate reductions in CO_2 emissions, the world economy is already committed to a 19 per cent income reduction by 2050 due to climate change. The risks associated with climate change and the policy measures taken to address them have significant implications for both price and financial stability, two of a central bank's primary missions, by shaping the valuation and risk profiles of financial assets. As a result, central banks have begun to integrate climate-related risks into their various actions, whether in terms of the supervisory framework, financial stability control, investment policy or even monetary policy. The Network for Greening the Financial System (NGFS) – comprising more than 140 central banks and supervisors – was co-founded in 2017 by the Banque de France (BdF) (which also serves as its Secretariat) alongside other partner institutions. The NGFS strives to enhance the integration of environmental and climate risk management within central bank and supervisory functions, including conducting research, sharing best practices, and performing analytical work to support the transition to a sustainable economy.

It is noteworthy that the concept of climate change frequently invokes the 'tragedy of the commons', whereby individual actions collectively exhaust shared resources. The primary responsibility for mitigating these large-scale challenges typically rests with the elected representatives in liberal democracies, who have the authority to enact policies and regulations and agree on fiscal measures to protect the environment and foster sustainable practices. Enforcing those legislative acts rests with relevant authorities, including central banks. In this context, it is important to have a clear understanding of both the capabilities and limitations of central banks when given the mandate to address climate change.

Climate change has been characterised as a novel form of systemic risk. It is often referred to as a 'Green Swan, ' which denotes a climate-related event that is highly disruptive and capable of triggering systemic financial crises. Central banks must, therefore, remain particularly vigilant regarding the potential disruptions posed by climate-related events, which are capable of bringing about significant losses to assets held by banks and, in turn, triggering a financial crisis. Unlike traditional risks, these events are categorised by deep uncertainty and complex interdependencies, making them challenging to predict, measure and manage. While many central banks are primarily mandated to safeguard monetary and financial stability, their responsibilities increasingly intersect with climate-related risks. Against this backdrop, even if central banks do not explicitly have a mandate to address climate-related risks, considering this risk within their existing mandate becomes imperative.

The revised Core Principles of the Basel Committee, published in April 2024, consider these interlinkages and the accountability for recognising and managing these risks as assigned to both banks and banking supervisors. Specifically, the revised principles state that banks should understand how climate-related risk drivers may manifest through financial risks, recognise that these risks could materialise over varying time horizons, and implement appropriate measures to mitigate these risks. Additionally, supervisors are expected to consider climate-related financial risks in their supervision of banks, assess banks' risk management processes and require banks to submit information that makes it possible to determine the materiality of climate-related financial risks.

Some central banks are going beyond this by trying to play the role of catalysts to promote markets for sustainable finance by being investors in these markets themselves. In particular, the European Central Bank's (ECB) mandate integrates an objective of improving the quality of the environment, without prejudice to the objective of price stability. As a result, following the ECB's roadmap on climate, the ECB is aligning its financial strategy with the EU's climate objectives. This is being done by integrating climate risk into its Corporate Sector Purchase Programme, collateral framework and stress tests. For its part, the BdF has pursued a responsible investment (RI) approach since 2018, followed by a three-pronged strategy explained in its 2023 Sustainability Report, covering (i) climate issues, (ii) environmental, social and governance (ESG) questions more generally, and (iii) engagement with companies in which it is a shareholder.

Several SEACEN member economies have emerged as prominent exemplars of catalysts to promote markets for sustainable finance, notwithstanding the constraints imposed by their mandates. For example, the People's Bank of China (PBoC) has developed guidelines to promote sustainable finance, including re-lending facilities at preferential rates for banks providing green loans. Bank Negara Malaysia (BNM) has been instrumental in promoting sustainable finance within the country. In collaboration with the World Bank, Malaysia developed the Green Sukuk, an Islamic bond aimed at financing environmentally friendly projects.

The Reserve Bank of India (RBI) has implemented several initiatives to promote green finance and support environmentally sustainable projects. In 2015, the RBI included the renewable energy sector under its Priority Sector Lending guidelines, encouraging banks to provide credit to small renewable energy projects. Effective 1 June 2023, the RBI introduced a framework allowing banks and select non-banking financial companies to offer green deposits. These interest-bearing deposits are earmarked for financing environmentally sustainable projects, such as renewable energy, clean transportation, and sustainable water management. Recently, the RBI has facilitated the issuance of Sovereign Green Bonds to fund public sector projects aimed at reducing carbon emissions. In April 2024, the RBI allowed foreign investors operating within the International Financial Services Centre (IFSC) to invest in these bonds, broadening the investor base and enhancing capital flow towards green initiatives.

The Hong Kong Monetary Authority (HKMA) has implemented several initiatives to promote green finance and support sustainable development. Initially introduced in May 2021 and updated in May 2024, the Green and Sustainable Finance Grant Scheme provides subsidies to eligible bond issuers and loan borrowers for issuing green and sustainable debt instruments in Hong Kong. As of May 2024, the scheme has supported the issuance of over 340 green and sustainable debt instruments, totalling approximately USD100 billion. These are only a few of the initiatives that have been accomplished within SEACEN member economies.

Drawing on these examples, this paper takes the view that central banks may consider playing a catalytic role in supporting the growth of markets for sustainable finance without compromising their core mandate of price and financial stability. In general, central banks will have multiple roles to play in climate risk mitigation strategies. They include (i) offering expert guidance about the impacts of climate risks, (ii) strengthening financial regulation to mitigate climate risks, (iii) raising awareness of financial stability and greening policy, and (iv) supporting the growth of markets for sustainable finance. This paper will focus primarily on the last one, namely, how central banks can play a role in supporting the growth of markets for sustainable

finance. In so doing, the paper will examine the challenges central banks may face, drawing on key insights from the BdF's experience and defining parallels relevant to Asia.

The rest of the paper is organised as follows. Section 2 discusses the political economy considerations when a central bank takes on a more proactive role for sustainable investments/transition. Section 3 provides a case study from the BdF to showcase how its balance sheet is being employed to support access to funding for companies that pursue ambitious carbon reduction targets and provide better climate-related disclosures, resulting in four key insights covered by the following sections. Section 4 shows that Paris Agreement-aligned investments offer similar returns to usual investments, in particular for equities and corporate bonds. Section 5 provides an Asian perspective on green standards and assesses the inventory of the central banks' mandates, green taxonomies and labels in the region. Finally, Section 6 concludes with a brief discussion on the need for governance and cooperation as the main challenge that can be addressed when implementing green strategies within central banks.

2. The Case for a Proactive Central Bank Role

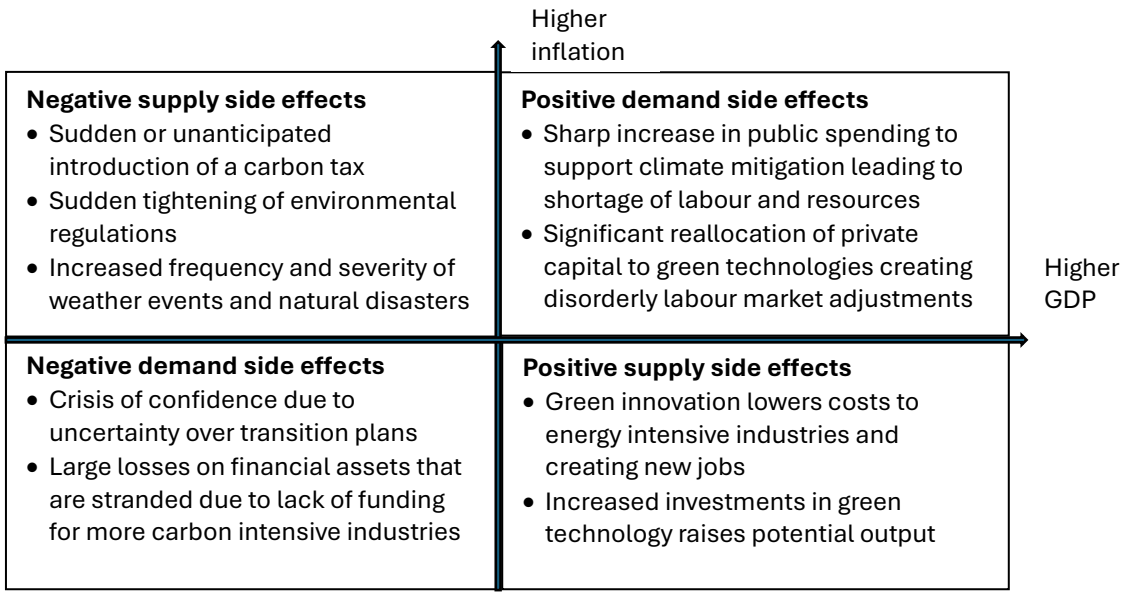
2.1 Climate change, a significant disruptor to the global economy

The increasing frequency and severity of weather-related events over the past decade are well documented, with projections indicating a continuation of this trend. The Sixth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) shows that each incremental rise (+0.5°C) in global temperature intensifies the occurrence of extreme weather events, including heatwaves, heavy rainfall and droughts. These events tend to have more adverse effects on growth and inflation in low- and middle-income countries, given their greater reliance on the agricultural sector, which gets disrupted. Asia's climate is warming nearly twice as fast as the global average, according to the State of the Climate in Asia 2023 Report, which finds that sea-surface temperatures in the northwest Pacific reached record highs in 2023. As a result, extreme events struck vulnerable countries, illustrating the devastating toll of floods, storms, droughts and heatwaves across the region. In 2023 alone, 79 hydro-meteorological disasters were recorded, with over 2,000 fatalities and nine million people directly affected. The Asian Development Bank (ADB) estimates that Southeast Asia could suffer more significant losses than most regions in the world. The ADB also projected in a 2015 report that, unchecked, climate change could trim 11 per cent off the region's GDP by the end of the century as it takes a toll on key sectors such as agriculture, tourism and fishing, along with human health and labour productivity. In Europe, the European Energy Agency Climate published its first European Climate Risk Assessment (EUCRA), which identifies climate risks as a threat to Europe's energy and food security, ecosystems, infrastructure, water resources and people's health and, more importantly, to financial stability. It shows that many of these risks have already reached critical levels and can become dramatic. According to the EUCRA, if decisive action is not taken now, most climate risks identified could reach critical or catastrophic levels by the end of this century. Hundreds of thousands of people would die from heatwaves, and economic losses from coastal floods alone could exceed EUR1 trillion per year. The European Commission shares this diagnosis, particularly in the Mediterranean region.

2.2 Climate change affects financial stability through physical and transition risks

Climate-related natural disasters can create and intensify risks to the stability of the financial system through banks' exposures to assets vulnerable to climate risks. Consequently, there is now a broad consensus among central banks that climate change will have substantial repercussions on the functioning of economies and, hence, on financial systems (Bank of England, 2015). The ECB has also examined the implications of climate change for financial stability. In its May 2019 Financial Stability Review, the ECB discussed how climate change could affect financial stability and analysed the exposure of euro-area financial institutions to climate-related risks. Furthermore, the ASEAN central banks have collectively recognised the importance of managing climate and environment-related risks. A report assessing the implications of these risks on financial and monetary stability was published in 2020, providing a set of non-binding recommendations tailored to the ASEAN context to enhance resilience against climate-induced financial disruptions. These initiatives reflect a broader commitment among Asian central banks to integrate climate-related risks into their regulatory frameworks, ensuring the stability and resilience of their financial systems in the face of escalating environmental challenges.

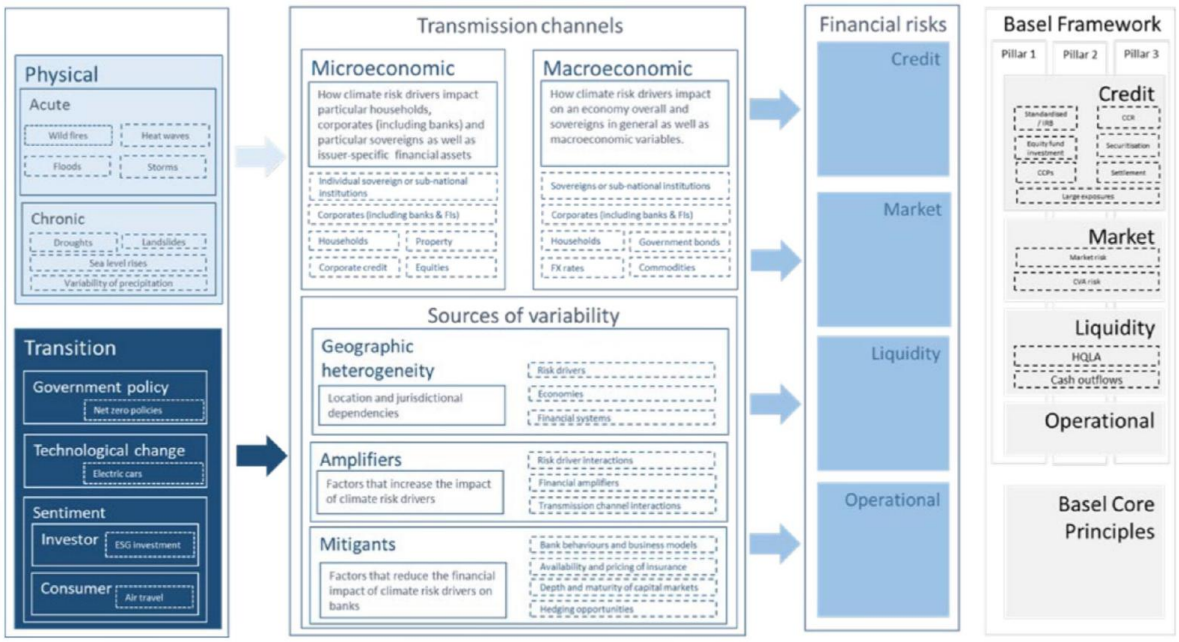
Figure 1 – Visualising how responses to climate risk could affect growth and inflation



Turning specifically to climate-related risks, it has become customary to categorise them under two headings: (a) physical risk, which refers to the impact today on financial sector liabilities that arise from climate- and weather-related events; and (b) transition risk, which refers to the financial risks that can arise from the process of adjustment towards a lower-carbon economy. As explained by the NGFS (2024), both risk categories have direct consequences for central bank mandates, namely, pursuing price stability and safeguarding financial stability. Focusing on the price stability mandate, central banks will have to take into consideration how severe weather events and actions taken by the private sector and the government to mitigate climate risk will affect outcomes for output and inflation. A visual representation of how this might impact these variables is shown in **Figure 1**. Monetary policy frameworks will have to adapt to take these climate-related risks into account, as the transmission channels, as indicated by **Figure 2**, will affect the effectiveness of monetary policy. The impact of climate change on

financial stability hinges on both the distribution of financial exposures and the evolution of prospective financial system losses. In the near term, the impact of climate change on financial stability will materialise through physical risks that banks and other credit intermediaries are exposed to on their balance sheets. Transition risks, on the other hand, will typically materialise over longer horizons. Therefore, they are less detrimental to financial stability unless these risks are suddenly brought forward due to disorderly government regulation. The focus of this paper is not to provide an assessment of these risks but to recognise them and to examine what role central banks can play in controlling them, as they can impact financial stability or even lead to a financial crisis.

Figure 2 – Transmission channels of climate change



Source: BCBS, Climate-related risk drivers and their transmission channels, April 2021

ECB/ESRB, Chartbook for monitoring financial stability impacts of climate, December 2023

2.3 Central bank's role in facilitating sustainable finance

Within the framework of the two points explained above, central banks can support the development of sustainable finance markets by clarifying market standards, ensuring robust definitions of sustainable assets and encouraging financial innovation through their investment policies. Their signals and guidance can significantly influence investment behaviour. A key challenge for central banks will be to justify that such investments can be motivated within the scope of their existing mandates, which focus on price stability and financial stability. In terms of investment, central banks can select sustainable finance practices, both using their funds and foreign exchange (FX) reserves. For instance, in a different context, central banks have stepped outside their mandate to act as catalysts to support the development of capital markets in their jurisdictions by channelling some of their reserve assets to buy bonds issued in their domestic markets (BIS, 2012). To illustrate this point, BdF achieves its climate goals through its equity investments, which are managed, among others, under a strict exclusion policy. BdF Gestion, the bank's asset management arm, is tasked with aligning its corporate equity investments with the targets outlined in Article 2 of the 2015 Paris Agreement. To this end, BdF

Gestion not only implements a thorough exclusion policy but also actively monitors and reports on the carbon footprint of its investment portfolio. Another example is the Bank of Korea (BoK), which gradually increased its investments in ESG-related assets. As of 2023, the BoK more than doubled its foreign exchange ESG assets to USD 19.6 billion, up from USD 9 billion in 2021. The BoK also applies a negative screening strategy to exclude high-carbon emitters from its foreign currency assets. It is considering adopting an ESG integration strategy for the entire asset management process. In January 2024, the BoK established the Office of Sustainable Growth to centralise and enhance its climate-related efforts.

3. Key Takeaways from the Banque de France's Experience as a Responsible Investor

The BdF employs a comprehensive and diversified approach to foster sustainable investing covering corporates, sovereigns and unlisted funds universes, which utilises mainly three asset classes (equities, green bonds and unlisted funds) independently of the currencies in which it invests.[4] The scope of this sustainable approach remains in the non-monetary policy portfolio, including the FX reserves for indicators tracked. More precisely, this section analyses BdF's positions within the pension liabilities, own funds' portfolios, and other portfolios held against the monetary base. It examines how BdF has met its ambitious carbon reduction goals using these three asset classes, leading to the conclusion of four takeaways learned from this experience.

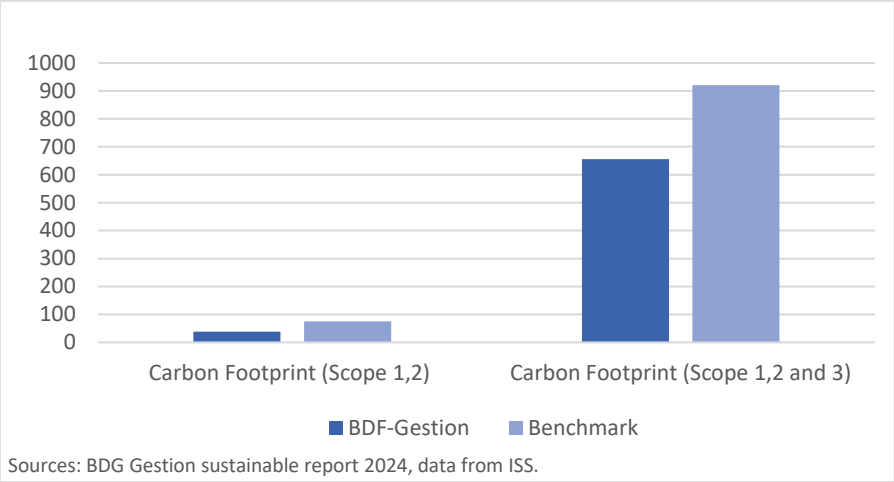
- **Greening equity and corporate investments: a commitment to carbon reduction through strict exclusions**

Since 2021, corporate issuers generating more than 2 per cent of their revenue from thermal coal or 10 per cent from unconventional hydrocarbons have been excluded from BdF's own portfolios. This exclusion threshold has become even stricter by the end of 2024, with the elimination of all companies deriving revenue from coal and unconventional hydrocarbons. Additionally, companies generating over 10 per cent of their revenue from oil or over 50 per cent from gas, as well as those involved in new extraction projects, are also excluded from investment.

This exclusion strategy has yielded substantial results, as demonstrated in **Figure 3**. The carbon footprint of BdF's corporate equity and fixed-income investments managed by BdF's internal asset manager, BdF Gestion, has decreased by 49 per cent in relation to its benchmark, a direct result of the exclusion policy. Lately, even when considering Scope 3 emissions (those linked to the broader supply chain), the reduction remains significant at -27 per cent.

[4] The Banque de France first adopted a Responsible Investment Charter, followed by a three-pronged strategy explained in the 2023 Sustainability report, covering (i) climate issues, (ii) environmental, social and governance (ESG) questions more generally, and (iii)engagement with companies in which it is a shareholder. The Banque de France and the ACPR apply their sustainability strategy to all their missions, namely monetary strategy, financial stability, provision of services to the economy and society, and sustainable performance.

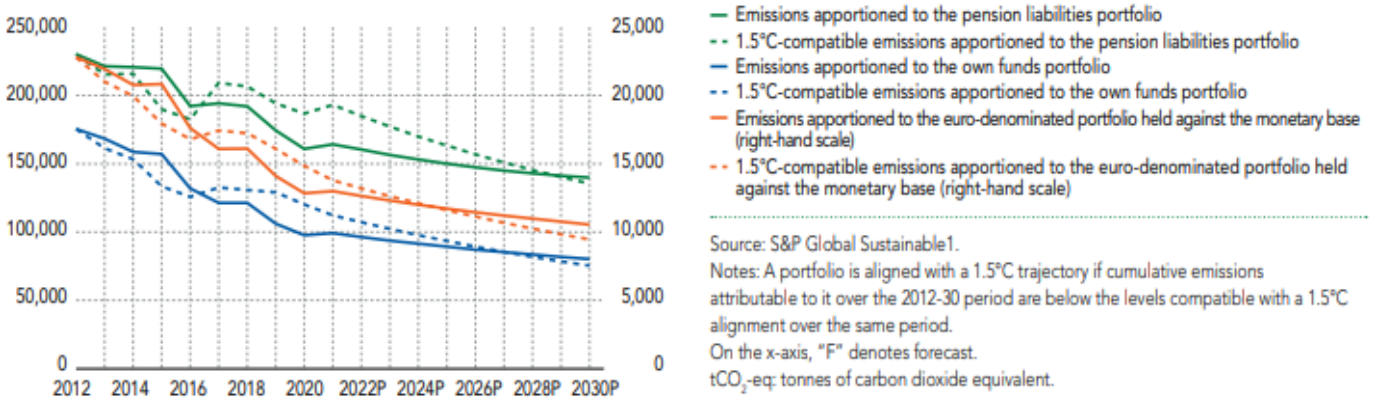
Figure 3 – The carbon footprint of BdF Gestion corporate investments, equities and fixed income (in tCO2/EUR million)



Sources: BDG Gestion sustainable report 2024, data from ISS.

Further enhancing the greening of its equity and corporate bonds portfolios, the BdF eventually invests in external funds that mainly follow the Paris-Aligned Benchmark (PAB) criteria. **Overall, the BdF has set an ambitious goal of aligning all equities and corporate bonds held for its own account with a global warming trajectory of no more than 1.5°C above pre-industrial levels**. Remarkably, by the end of 2023, this target was reached for equities, two years ahead of the original 2025 deadline, demonstrating BdF's swift and decisive action in achieving its climate goals (**Figure 4**).

Figure 4 – 1.5 °C alignment of portfolio equity components (in tC02-eq)



Source: S&P Global Sustainable1.
Notes: A portfolio is aligned with a 1.5°C trajectory if cumulative emissions attributable to it over the 2012-30 period are below the levels compatible with a 1.5°C alignment over the same period.
On the x-axis, "F" denotes forecast.
tCO_2-eq: tonnes of carbon dioxide equivalent.

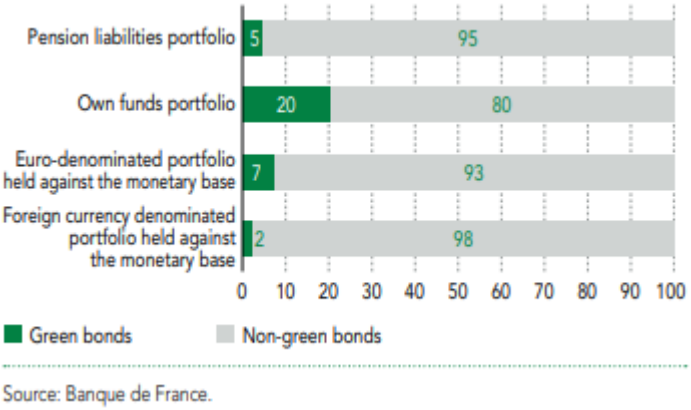
- **Green Bonds: fostering the financing of the Energy and Ecological Transition (EET)**

In addition to its equity investments, the BdF has been an active participant in financing the EET through its green bond purchases. As of December 2023, BdF had acquired a total of EUR 6.0 billion in green bonds since its initial purchase in 2019. Of this amount, EUR 2.9 billion was invested in 2023 alone, with the majority of these purchases denominated in euros. Notably, the Eurozone remains the largest issuer of green bonds, accounting for approximately 40 per cent of global issuance. The size and the liquidity associated with this market have been important elements of these investments, particularly for euro-denominated investments.

The green bonds purchased by BdF, primarily fund projects related to renewable energy generation, building energy retrofits and the development of small- and medium-sized

enterprises (SMEs), focused on energy storage and waste management innovations. The green bond strategy initially focused on assets in the bank's funds and pension liability portfolios, which BdF fully manages. Subsequently, the strategy was extended to include euro-denominated portfolios held against the monetary base, as well as foreign exchange reserves. As of 31 December 2023, these portfolios collectively amounted to EUR 105 billion.

Figure 5 – Share of green bonds in the portfolio (in per cent)



Source: Banque de France.

- **Thematic investment through unlisted funds: direct support to green innovation**

The BdF also contributes to the greening of the economy by investing in thematic unlisted funds focused on EET. These investments are subject to validation by BdF's risk committee and are required to hold recognised green labels when available. As of 2023, BdF's investments in EET thematic funds totalled EUR614 million, marking an increase of EUR160 million from the previous year.

Reliable standards were important in setting up a strategy regarding the unlisted funds. In France, there are four main responsible investment labels supported by public authorities: the Socially Responsible Investment (SRI) label (which underwent a major reform in 2023), Greenfin, and Finansol. As part of its SRI strategy, the BdF prioritises investments in funds awarded to these labels, with a particular emphasis on Greenfin, the SRI label and Finansol. Several of the funds BdF invests in also carry European sustainability labels, such as LuxFLAG and Towards Sustainability.[5] These labels provide certifications to indicate adherence to various sustainability criteria, with enhanced transparency and independent committees to safeguard against greenwashing and to ensure best practices.

Overall, the BdF's experience offers four key insights, which the following sections will cover:

- **Green investments offer similar returns without any significant increase in risk:** in fact, the BdF's experience shows that green investments can offer stable financial performance, as demonstrated in Section 3.

[5] Details for the labels are available as follows: SRI label, Greenfin, Finansol and LuxFLAG.

- **The role of reliable standards is key:** adherence to recognised standards, such as those set by some labels, climate-oriented benchmarks or the EU Green Taxonomy,[6] is essential to ensuring best practices in green investing. These standards help mitigate the risks of greenwashing and avoid conflicts of interest. Section 4 provides an overview of these standards in Asia.

- **Liquidity and market size matter for green bonds, in particular for local currency investments:** for central banks, including the BdF, investing in green bonds and other sustainable assets is feasible, provided that market liquidity and size are sufficient. Sections 4 and 5 assess whether this could be feasible in Asia.

- **Governance and cooperation are the main challenges when implementing green strategies within central banks.** Section 6 discusses these challenges and how they apply to central banks.

4. Paris-Aligned Benchmark Investments Offer Stability and Similar Returns

To enhance the understanding of green investments, this section focuses on Paris-Aligned Benchmarks (PAB) investments, recognising that these investments have been very little studied in the literature. PAB Investments refers to investment strategies that align with the goals of the Paris Agreement, which aims to limit global warming to well below 2°C, ideally 1.5°C, compared to pre-industrial levels. Specifically, Bloomberg's equity and fixed-income PABs allow investors to pursue a net-zero emissions strategy. The design of these indices is based on exclusions and best-in-class effort. The PAB indices developed by Bloomberg are sub-indices of a broader index.[7] Consequently, PAB investments underweight fossil fuels and high-emission industries while overweighting green sectors. This sectoral concentration may result in increased risks and volatility.

For the selected zones, we have calculated returns and volatilities of five indices that have a PAB.[8] We started the analysis on 6 April 2020 to exclude the effect of the COVID-19 crisis. This starting point allows us to obtain the data for all the indices in the study.

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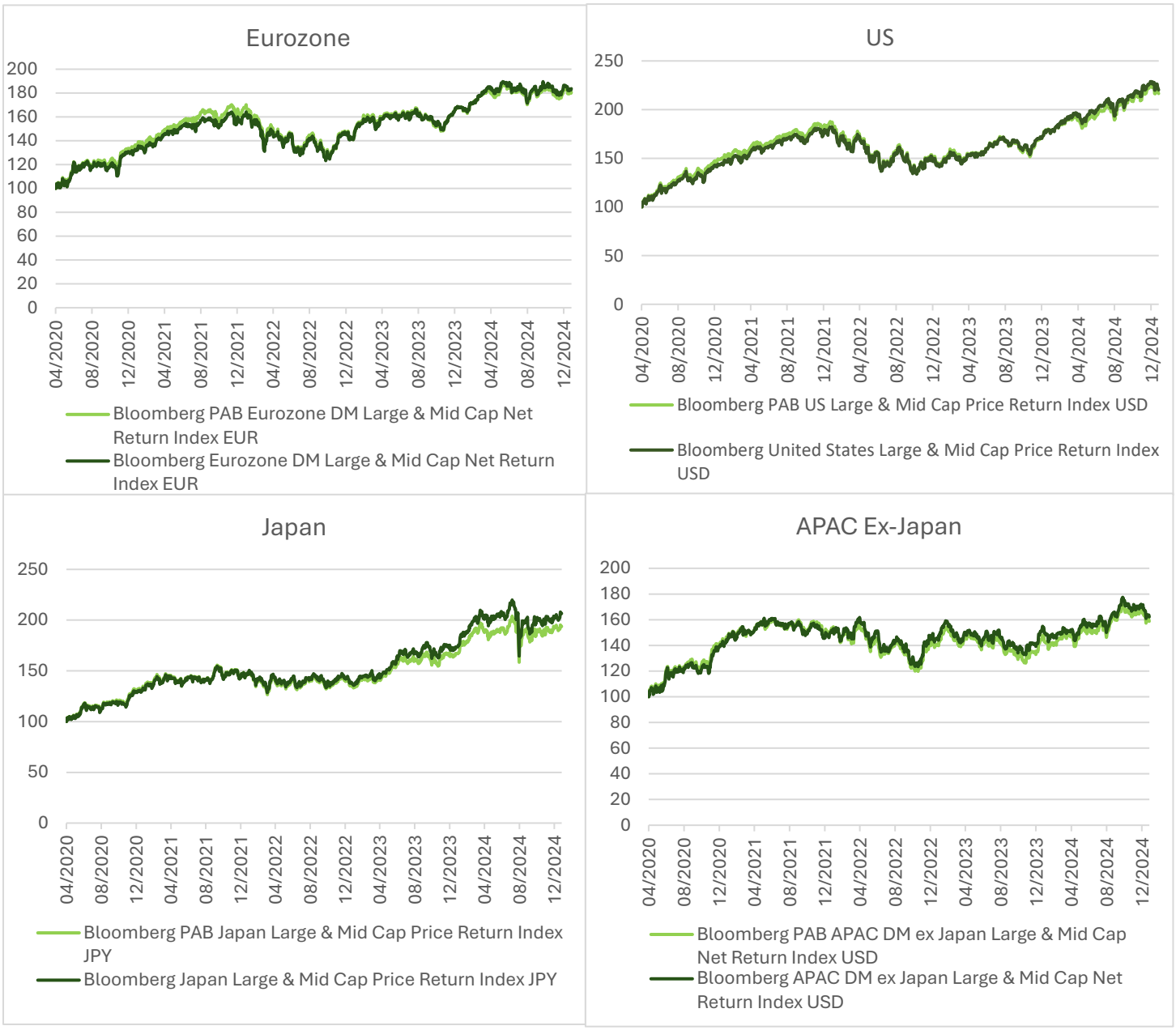
[6] Since 2022, the BdF has calculated the share of activities in the equity and corporate bonds held for its own account that is eligible for alignment with the EU taxonomy. In 2023, on average, 28 per cent of the revenue of the companies in the equity component of the own funds portfolio was eligible for inclusion in sustainable sectors. This proportion was stable compared with the 2022 level and thus remains at its highest level since 2020. It was an average of 38 per cent for companies in the equity component of the pension liabilities portfolio, up two percentage points in 2022, reaching the highest level since calculations of this indicator began. In the case of the corporate bond component of the own funds and pension liabilities portfolio, the average proportion was 29 per cent, on a par with that of the equity component.

[7] The following Bloomberg tickers were used: APXPABN Index, APACXJN Index, EURPABNL Index, EURODN Index, USPABP Index, US Index, JPPABPL Index, JPL Index.

[8] The equity volatilities and fixed income volatilities are all calculated by EGARCH(1,1) models of returns, which are calculated as the log difference of index levels multiplied by 100. Relative to a standard GARCH model with Gaussian errors, an EGARCH specification combined with a Student-t error distribution offers two key advantages in capturing the empirical features of financial time series. First, the EGARCH ("exponential GARCH") formulation directly models logarithmic variance, which both guarantees positive volatility forecasts without imposing inequality constraints on coefficients and, critically, allows for asymmetric or "leverage" effects. In practice, bad news (negative shocks) often engenders larger volatility responses than equally large good news—an asymmetry that the symmetric GARCH model cannot accommodate. The EGARCH model captures this skewed impact, enabling the volatility process to react more strongly to downside moves. Second, replacing Gaussian innovations with a Student-t distribution addresses the well-documented fat tails and excess kurtosis of asset returns. Under the normality assumption, a GARCH model systematically underestimates the probability of extreme price moves and thus underprices tail risk. A Student-t error term, by contrast, allocates substantially more mass to tail events, improving both in-sample fit and out-of-sample risk forecasts.

Overall, for the equity component, this study shows that the return and volatility of the PAB indices are similar to those of the usual indices over the period considered. For Japan and APAC ex-Japan, the returns are slightly lower over the period considered, as illustrated by **Figure 6**. While the returns of the PAB indices are similar or slightly lower, the volatilities are also very similar (**Figure 7**).

Figure 6 – Equities performance for PAB and usual indices

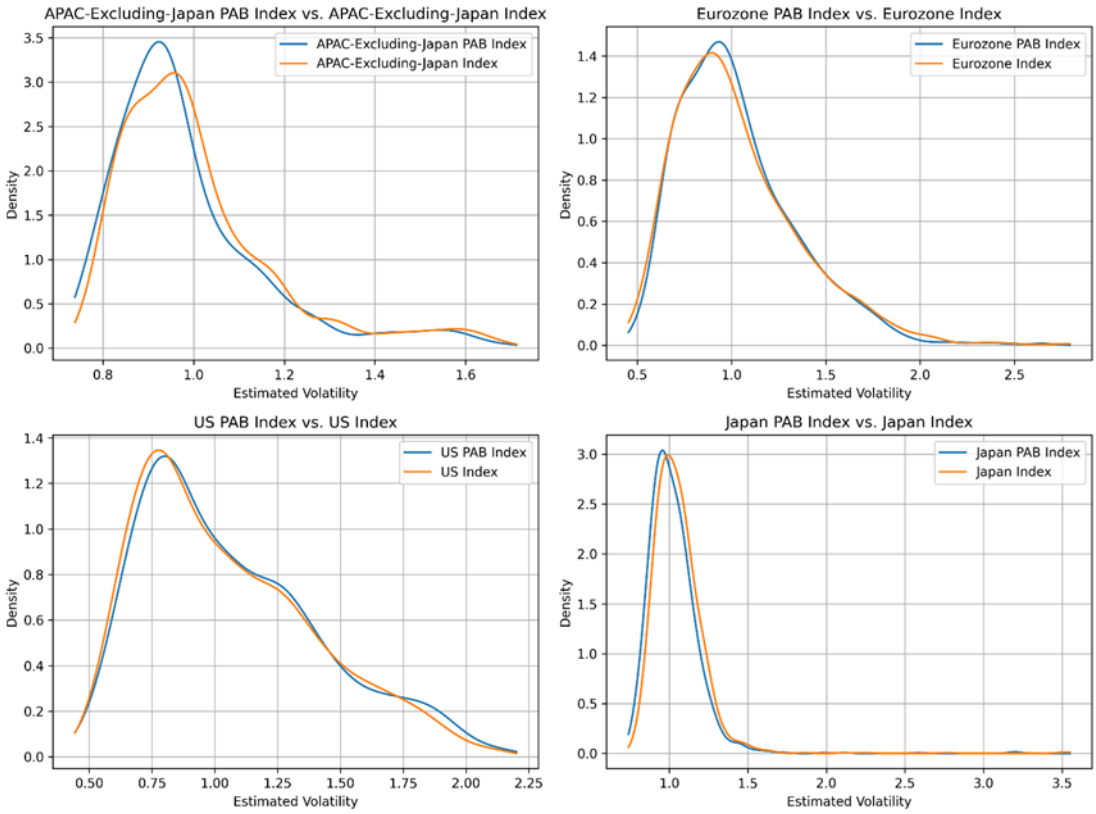


Source: All the data in this section comes from Bloomberg, the authors' calculations, from 06/04/2020 to 31/12/2024. Base 100 as of 06/04/2020.

The pair of kernel-density plots, as illustrated by **Figure 7**, compares the risk characteristics of four "Paris Aligned Benchmark" equity indices against their broad-market counterparts across APAC (ex-Japan), Eurozone, United States, and Japan. **Figure 7**, derived from conditional volatilities estimated by an EGARCH(1,1) model with Student-t error distribution, shows how the day-to-day variability of PAB portfolios compares with that of the parent indices. In all four markets, the PAB densities almost perfectly overlie those of the broad indices. This indicates

that excluding “brown” firms under the PAB methodology has not induced a systematic change in realised volatility. The APAC-ex-Japan PAB index exhibits a very slight shift toward lower volatilities—its average density peak is marginally left of the benchmark, suggesting a modest drag on high-frequency variability, but this effect is subtle. In both the Eurozone and the U.S., the two curves coincide almost exactly, with neither appreciable compression of variability nor fatter tails. The Japan panel likewise reveals near-identity, save for a barely perceptible steeper rise at very low volatilities for the PAB series.

Figure 7 – Kernel density estimates of distributions of return volatilities (PAB and usual indices)



Note: Kernel density estimation is a non-parametric model used to estimate probability distributions. We use kernel density estimation for the volatilities of the logarithmic difference of indices (returns). These volatilities are estimated using an Exponential Generalised Autoregressive Conditional Heteroscedasticity (EGARCH) (1,1) model with Student-t error distribution.

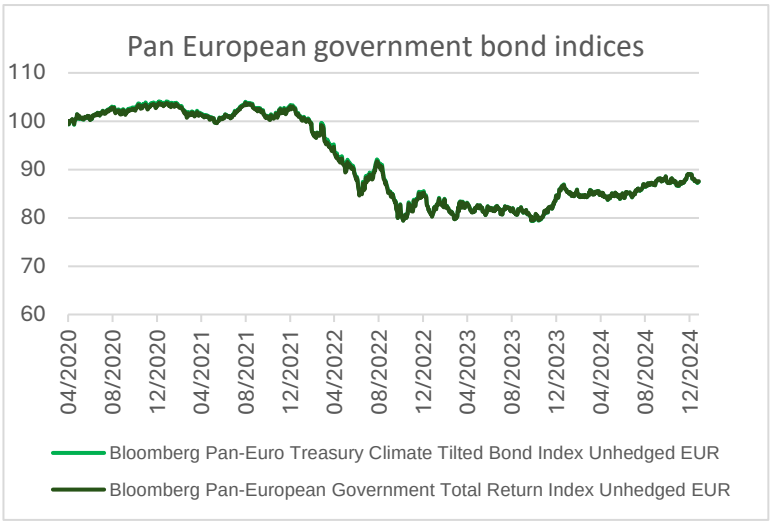
Two key factors may initially explain this performance, although further analysis is needed to strengthen these conclusions. First, the PAB indices overweight the technology and financial sectors, which have outperformed over the past five years. Second, sectors with high carbon exposure, particularly utilities, have generally underperformed – except in 2022. If we look at the APAC ex-Japan index, one of the reasons for the divergence in performance and volatility between the PAB index and its parent index could stem not only from differences in sectoral composition but also from differences in currency composition, adding a component of foreign exchange risk.

When comparing bond indices, the only bond with a comparable duration (±1 per cent) between PAB and non-PAB indices is the Euro government bond index.[9] This index shows less

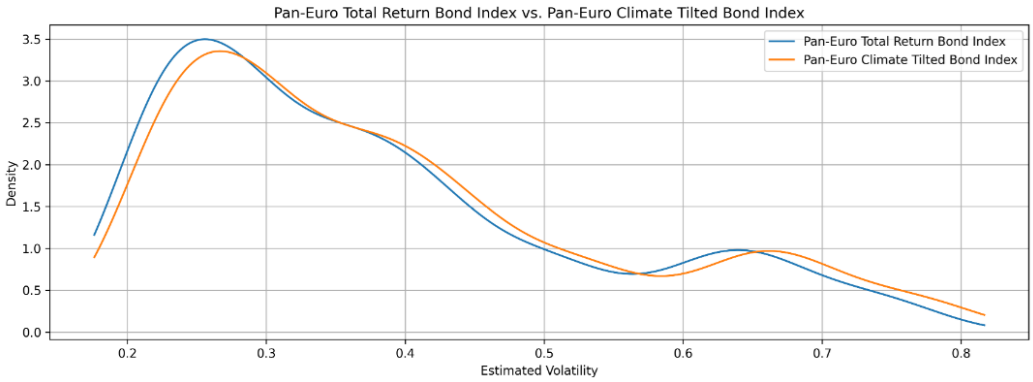
[9] The Bloomberg climate tilted government bond methodology is available here: Gvmt-Climate-Bond-Indices-Methodology.pdf

clear but still interesting results. In other regions, such as the U.S. and APAC, the modified duration of the indices varies by more than 10 per cent, making the overall analysis inconclusive. For Eurozone government bonds, the results are similar to those of equities, showing slightly higher returns with comparable volatility (**Figure 8**).

Figure 8 – Pan-European government bonds performance



KDE of EGARCH(1,1) Estimated Volatilities for Selected Indices



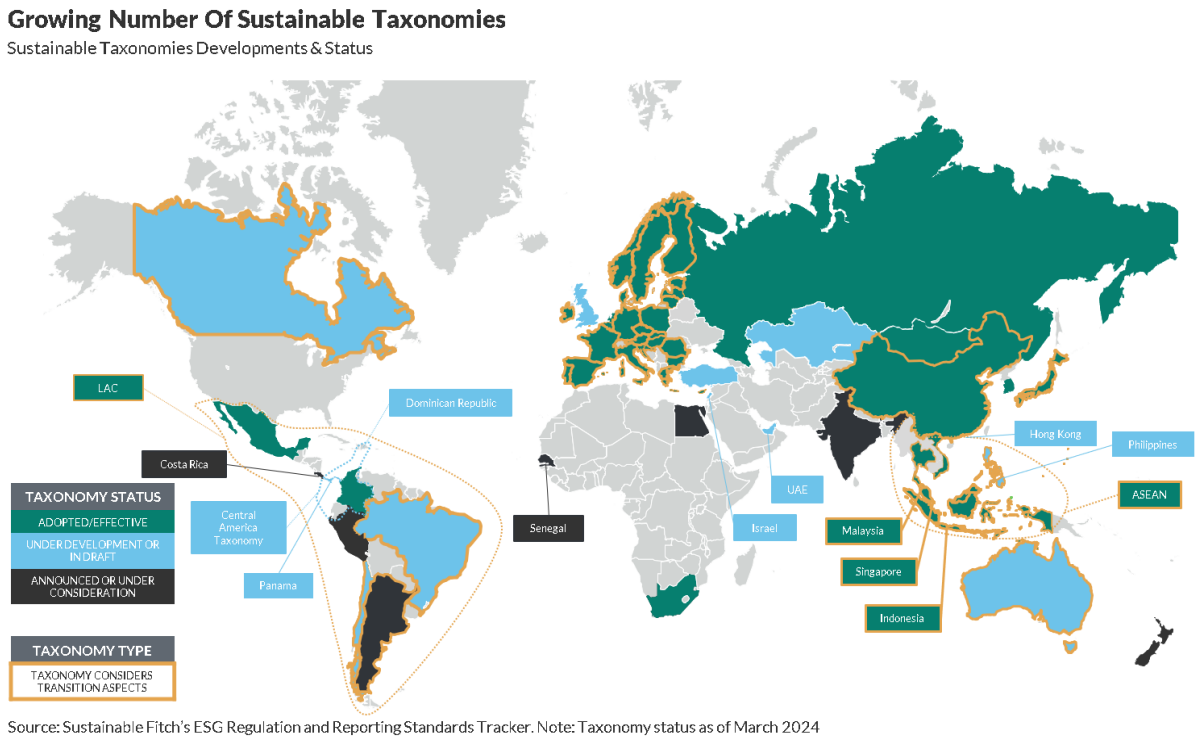
Note: Kernel density estimation is a non-parametric model used to estimate probability distributions. We use kernel density estimation for the volatilities of the logarithmic difference of indices (returns). These volatilities are estimated using an Exponential Generalised Autoregressive Conditional Heteroscedasticity (EGARCH) (1,1) model with Student-t error distribution.

This analysis highlights two important takeaways for central banks as investors. First, if we look at different indices since the COVID-19 crisis, we can conclude that in terms of financial stability from an investor perspective, the past five years have shown that **green ETFs or equity investments, despite their reduced diversification, do not necessarily add volatility and thus do not pose – at first sight – an additional threat to the financial system**. Second, the similar returns of PAB equities, and to some extent fixed income, could present an opportunity for central banks to diversify their investments, particularly as these assets are generally denominated in local currency, taking into account other parameters that could intervene, such as liquidity or size of the market. It is important to note that these results are available for the past five years and are not necessarily indicative of future results.

5. Key Takeaways from the Asian Experience: Taxonomies and Financial Instruments are Effective: The Region is Affected by a Multiplicity of Initiatives

Southeast Asia is one of the most climate-vulnerable regions in the world, facing physical risks like extreme weather events, rising sea levels and loss of biodiversity. At the same time, the region's rapid economic growth demands significant investments in infrastructure and energy—investments that, if not approached through a sustainability lens—could lock in carbon-intensive pathways for decades. Recognising these high stakes, Southeast Asian central banks are increasingly taking proactive steps to align monetary and financial policies with the Paris Agreement and national sustainability objectives, although their mandates do not fully mention green finance or green investment.[10] As mentioned above, the PBoC has been at the forefront of green finance initiatives. In 2021, it introduced a low-carbon lending tool that provides financial institutions with low-cost funds to support carbon emission reduction projects. This programme was extended to the end of 2027, underscoring China's commitment to a green transformation of its economy.

Figure 9 – Mapping of global green taxonomies



Source: Sustainable Fitch's ESG Regulation and Reporting Standards Tracker. Note: Taxonomy status as of March 2024

Asian central banks, such as the PBoC and Bank of Japan (BoJ), have introduced innovative financial tools and programmes to support green projects, focusing on incentivising sustainable investments. However, the central banks of the region have not combined policy adjustments with stringent supervisory measures, including the ECB's fines for non-compliance, to enforce climate-related financial disclosures and risk management. Indeed, the development of clear and harmonised taxonomies for sustainable finance has gained momentum in Asian economies within the last couple of years, enabling governments, financial institutions and investors to channel capital into green and sustainable projects more effectively (**Figure 9**). Taxonomies define what qualifies as a "green" or "sustainable" economic activity. Having a clear taxonomy ensures credibility, reduces confusion in the market, and encourages

[10] The **Appendix** presents a detailed examination of SEACEN member central banks' mandates.

investment flows into genuinely sustainable activities. While several Southeast Asian countries have developed or are developing their national frameworks, efforts are underway to harmonise taxonomies at the ASEAN level. As explained in Section 3, reliable standards ensure transparency and credibility in order to prevent greenwashing and mitigate financial risks. As many central banks also endorse the role of the financial regulator, reliable standards such as green taxonomies offer the possibility to reinforce some green disclosure requirements.

Green equity investments: A first start

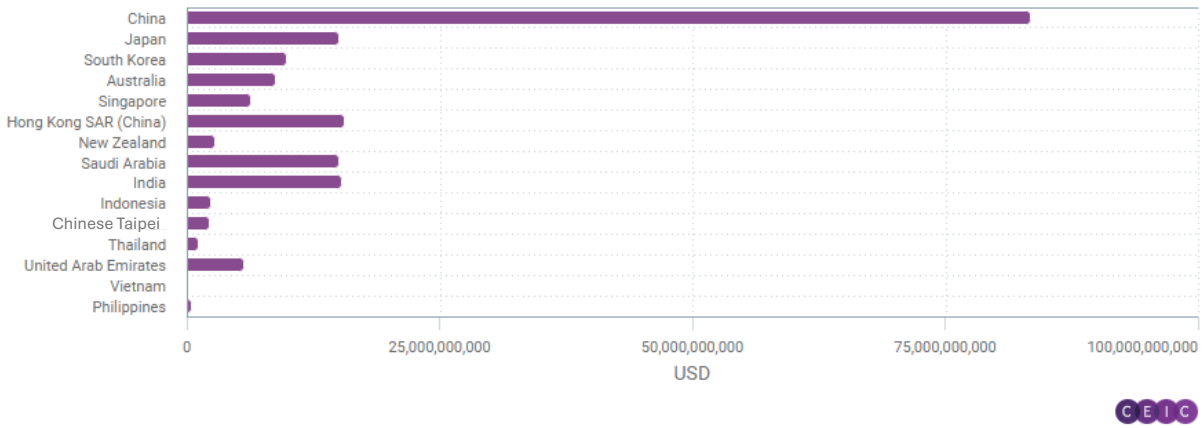
Southeast Asian central banks are increasingly recognising the importance of sustainable finance in achieving climate goals. For instance, the Monetary Authority of Singapore (MAS) has committed up to $500 million in concessional funding to support climate projects across Asia, aiming to mobilise private capital for decarbonisation efforts. While specific exclusion thresholds (e.g., excluding companies deriving over 5 per cent of their revenues from thermal coal) are not detailed in the available sources, the general trend of financial institutions in Southeast Asia adopting stricter exclusion policies aligns with global movements towards decarbonisation. The Climate Bonds Initiative discusses the importance of developing taxonomies and guidelines to manage climate transition risks, which can influence exclusion criteria.

While specific figures for carbon footprint reductions by Southeast Asian public funds are not directly available, Hoon Lim et al. (2024) highlight the increasing role of central banks in the Asia-Pacific region in promoting climate financing and setting decarbonisation targets. This includes efforts to reduce carbon footprints through various strategies, including exclusions and investments in climate-aligned funds.

Green bonds: The Asia-Pacific green bond market is becoming one of the largest markets globally

The Asian Development Bank's 2024 report on Accelerating Green Bonds for Municipalities in Southeast Asia underscores the pivotal role of green, social and sustainable bonds (GSS+) in financing climate-resilient infrastructure within the region. In 2023, GSS+ issuance in Southeast Asia reached USD 21.4 billion, reflecting a growing commitment to sustainable development. Accordingly, municipalities are increasingly leveraging these bonds to fund projects in renewable energy, energy-efficient building retrofits and sustainable public transportation systems. However, challenges such as the need for standardised frameworks, enhanced investor confidence and capacity building persist. To address these, the report recommends expanding project pipelines, standardising blended finance solutions and developing local debt markets to mobilise the necessary capital for sustainable urban development.

Figure 10 – Green bonds amount issued by economy in 2023 (Asia-Pacific)



Figures 10, 11 and **12** illustrate the issuance of Green and ESG bonds in the Asia-Pacific region and key economies. In the Asia-Pacific region, in 2023, China issued most of the Green Bonds, and 49 per cent of the bonds issued are in Chinese renminbi yuan (CNY). The Asia-Pacific green bond market is becoming one of the largest such markets globally. In 2023, the total amount of ESG bonds issued by China and South Korea was more significant than the total amount of ESG bonds issued by Germany and France. In these cases, the bonds are generally denominated in local currency, which can facilitate investment for investors who want to foster local currency investment.

Figure 11 – Green bonds share issued by currency issued in 2023 (Asia-Pacific)

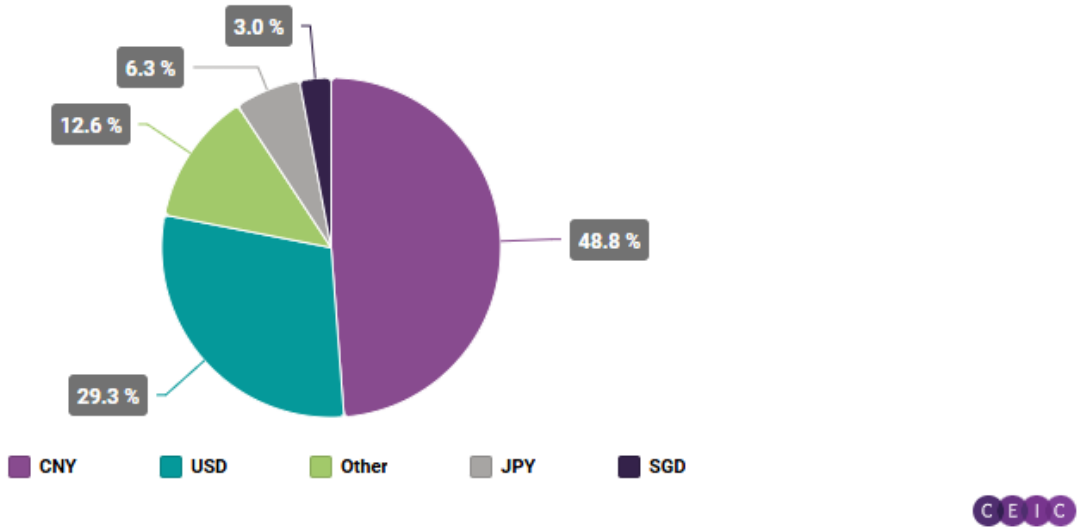
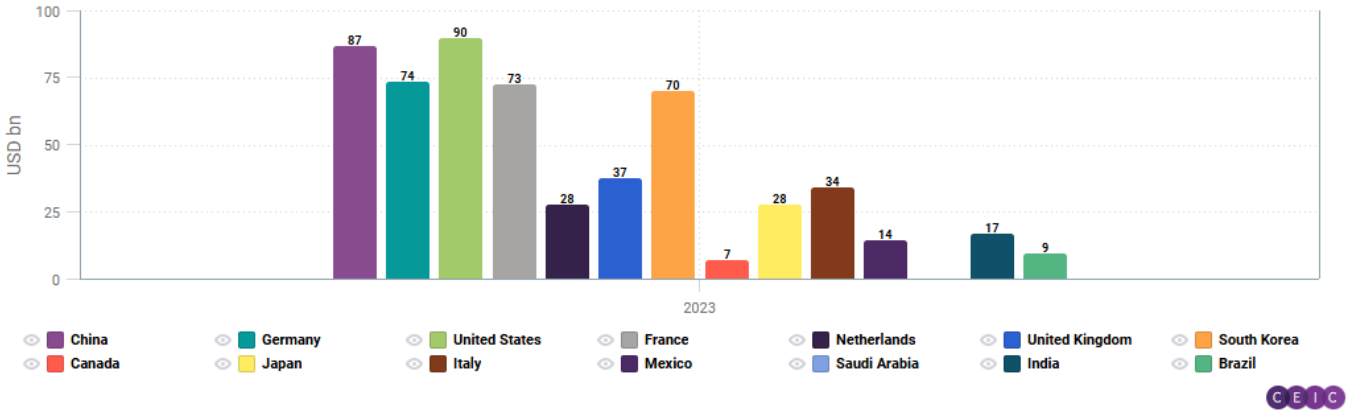


Figure 12 – ESG bonds issuance in USD (2023)



Overall, Asia's experience offers a couple of key insights

Asia's approach to green finance, particularly in the issuance of ESG bonds and the development of sustainable financial frameworks, provides valuable lessons for both regional and global stakeholders. Despite significant progress, there are key challenges and opportunities that Asian central banks and financial institutions must navigate to enhance their contributions to global climate goals.

- **Only a couple of countries dominate Green bond issuance in Asia**: One of the most striking observations in Asia's green finance landscape is that only a handful of countries dominate the issuance of green bonds. China and Japan are the leading players, with China alone accounting for nearly 50 per cent of Asia's total green bond issuance. Other major contributors include South Korea, India and Singapore. However, the rest of the region remains underrepresented in green finance. Given the climate vulnerability of many Asian economies, especially island nations and low-lying coastal countries, there is an urgent need for more nations to participate in green financing. Countries like Indonesia, the Philippines, Thailand and Vietnam, which are particularly exposed to climate risks, can play a more active role in issuing green bonds to finance their climate adaptation and mitigation projects. However, the biggest challenge in these countries is the non-existence of an investor base for capital markets.

- **Diversification of currencies**: Currently, the majority of green bonds in Asia are denominated in CNY, reflecting China's dominance in the green finance market. However, political and economic uncertainties in the region make it essential for green bond issuance to diversify across different currencies, such as the Japanese yen (JPY), Singapore dollar (SGD), Indian rupee (INR) and even the US dollar (USD), to attract a broader investor base.

- **Most Asian countries are developing their green taxonomies:** Most Asian countries are currently in the process of developing their green taxonomies—classification systems that define what qualifies as sustainable economic activity. While these efforts are commendable, they remain fragmented, with substantial variation in definitions and standards across the region. Unlike the EU's well-established green taxonomy, which

sets clear criteria for sustainable investments, Asian taxonomies vary significantly by country. China, for instance, has green bond guidelines that differ from those of Singapore or Japan. This lack of standardisation can lead to confusion among investors and hinder cross-border financing. Many emerging economies in Asia lack the technical expertise and institutional capacity needed to implement complex green taxonomies effectively. More investment in training programmes, knowledge-sharing initiatives and partnerships with international financial institutions will be crucial.

- **Governance and cooperation are the main challenges when implementing green strategies within central banks.** One of the biggest obstacles to the effective implementation of green financial strategy in Asia is governance. Unlike in the EU, where central banks and financial regulators have a more explicit mandate to incorporate climate considerations into their monetary and regulatory policies, most Asian central banks operate within traditional mandates that prioritise price stability and financial stability over environmental sustainability.

- **Balancing economic growth with the green transition:** Many developing economies in Asia face a problematic trade-off between maintaining economic growth and transitioning to a greener economy. Governments often prioritise short-term economic expansion, particularly in sectors like manufacturing and fossil-fuel-based energy, over long-term sustainability.

6. Structural Challenges for Central Banks Could Be Addressed through Four Main Channels

Countries throughout the Asia-Pacific region are increasingly focused on securing the climate finance necessary to advance their sustainable development goals. However, unlocking the required funds for climate financing is no simple task. To fully understand the challenges that Asian countries face, it is essential to consider the specific barriers that continue to limit climate-related investments. Four key issues stand out as particularly significant.

First, there are persistent and substantial gaps in data, disclosures and taxonomies. Reliable, standardised information is vital for accurately assessing climate risks, evaluating project viability and measuring progress toward emissions-reduction targets. When such data are lacking—or when disclosures are inconsistent—investors find it difficult to conduct thorough due diligence or compare opportunities across countries and sectors. Consequently, confidence wanes, and private capital that could otherwise be channelled into green initiatives remains on the sidelines. Improving data collection, standardising reporting frameworks and establishing clear, widely accepted taxonomies are all crucial steps in building trust and attracting much-needed private investment.

Second, conflicting national policy approaches create uncertainty and stall climate action. Although some countries in the region have begun introducing carbon taxes or other market-based mechanisms intended to price emissions accurately, many of these same nations still subsidise fossil fuels. Such contradictory signals can confuse investors, who may question the long-term viability of projects designed to reduce emissions when supportive policies are effectively undermined elsewhere. Harmonising policies, strengthening collaboration among government bodies, and consistently enforcing regulations are therefore essential if the region is to create a predictable environment that encourages innovation and sustainable investment.

Third, the global landscape itself is becoming more complex and fractured, and the actions of central banks call for proactive cooperation. Rising geoeconomic tensions and geopolitical rivalries threaten to overshadow the cooperative spirit required to combat climate change on a global scale. When countries adopt more inward-focused or protectionist postures, large-scale collaborative initiatives—including climate finance partnerships—risk being sidelined. Such geoeconomic fragmentation can slow the flow of technology transfer and impede cross-border investments in renewable energy or climate adaptation projects. Safeguarding collective action will require not only diplomatic finesse but also an unrelenting commitment to keeping climate issues at the centre of international policy agendas.

Fourth, there are main differences between the roles of the central bank's own investments in the function of the region. While the BdF is recognised as a leader in sustainable strategy according to an NGO scorecard, this strategy primarily focuses on Non-monetary Policy Portfolios (NMPPs), particularly for its own funds and pension funds sector, where the disclosure of the data is easier, as the BdF is solely responsible for these funds. In contrast, Asian central banks generally do not have their own funds, nor the authority to invest using their own funds. They are, in general, mandated to manage their FX reserves to ensure monetary or financial stability. Lessons from the Asian financial crisis show that central banks in the region play a key role in risk mitigation and a possible recovery. Indeed, foreign exchange reserves have grown dramatically in emerging Asia since 1997 (BIS, 2012) and have been used as a precaution against the possibility of sudden stops of international capital flows or counter-cyclical policies. Foreign exchange reserves or central banks' own funds in Asia do not function as a typical investment portfolio, making their integration into a green strategy or role complex.

Southeast Asian central banks are increasingly attuned to climate change as a critical driver of financial risk, even in jurisdictions where environmental sustainability is not explicitly named in their legal mandates. Most of these institutions derive their authority to act on climate-related issues from broader objectives of financial stability and economic support, recognising that unchecked climate threats could undermine monetary stability and the smooth functioning of banking systems. Illustrative examples of this proactive stance can be found in Malaysia, where BNM issued a detailed climate taxonomy to guide financial institutions in classifying activities according to environmental impact, and in the Philippines, where the Bangko Sentral ng Pilipinas (BSP) introduced climate stress-testing measures and relaxed certain regulatory constraints to encourage green lending. In some countries, such as Cambodia and Brunei Darussalam, the legislated directives for central banks do not yet reflect sustainability concerns in explicit terms. Still, institutional frameworks aimed at preserving the health of the financial system offer ample scope to address the implications of climate change through enhanced oversight and prudential regulations. Elsewhere in the region, emerging partnerships point to growing momentum; in Laos, for instance, the Bank of the Lao PDR partnered with the International Finance Corporation to develop climate-friendly financing facilities, while the Bank of Papua New Guinea collaborated with the Global Green Growth Institute to launch a Green Finance Centre that will drive environmentally responsible investment at a national level.

Compared to Europe, Southeast Asia's regulatory and policy environment for green finance remains at a more formative stage, reflecting both the diversity of economic development across the region and the absence of a binding supranational authority akin to the European Union. In Europe, the legal underpinnings for climate action and sustainable finance are more firmly entrenched, with measures such as the EU Taxonomy and the Sustainable Finance Disclosure Regulation setting stringent criteria for green economic activities and mandating standardised disclosures across member states. These actions,

which foster the local bond market and green equities, enable the central banks to foster their green strategies. By contrast, ASEAN's approach to taxonomy and disclosure is oriented toward balancing common principles with the realities of member states' differing financial architectures, resource endowments and climate vulnerabilities. Nevertheless, the vast majority of Asian economies have established a taxonomy and a local currency green bond market. The question remains whether central banks will take a more proactive role. As global awareness of climate-related risks continues to expand, Southeast Asia's central banks are poised to strengthen disclosure frameworks and accelerate the transition toward sustainable economic models, drawing on best practices from Europe yet adapting them to local contexts.

Addressing these four challenges – data and disclosure gaps, conflicting national policies, a fractious global environment and the role of central banks' investments – will be essential for Asia-Pacific nations as they strive to enhance access to climate finance. By prioritising transparent and reliable reporting, aligning domestic policies and strengthening international cooperation, countries in the region can foster a more stable investment landscape.

Appendix

A.1- Mandates

Brunei Darussalam Central Bank: The Brunei Darussalam Central Bank (BDCB), formerly known as Autoriti Monetari Brunei Darussalam (AMBD), operates under the Autoriti Monetari Brunei Darussalam Order, 2010. Section 31(1) of this Order outlines the principal objectives of the BDCB, which include achieving and maintaining domestic price stability, ensuring the stability of the financial system, encompassing the promotion and maintenance of its safety, soundness and integrity and aiding in the establishment and oversight of efficient payment systems, both domestic and international.

Notably, the mandate does not explicitly reference climate change or environmental sustainability. However, the inclusion of objectives related to financial system stability and support for the government's economic policies provides a framework within which the BDCB can address climate-related financial risks.

National Bank of Cambodia: The National Bank of Cambodia (NBC) operates under the "Law on the Organisation and Conduct of the National Bank of Cambodia," enacted in 1996. This law defines NBC's primary mission as determining and directing monetary policy to maintain price stability within the framework of the nation's economic and financial policy. In addition, the NBC serves as the monetary and supervisory authority, acting as the sole issuer of the national currency, the Khmer riel, and holds the authority to license, regulate and supervise banks and financial institutions in Cambodia.

Notably, NBC's mandate does not explicitly reference climate change or environmental sustainability. However, the Bank's role in fostering economic development and maintaining financial stability provides a framework within which it can address climate-related financial risks. By integrating environmental considerations into its monetary policy and supervisory functions, the NBC can proactively contribute to mitigating the financial impacts of climate change.

People's Bank of China: The People's Bank of China (PBoC) operates under the 'Law of the People's Republic of China on the People's Bank of China', which outlines its primary objectives as formulating and implementing monetary policy to maintain currency stability and support economic growth and overseeing the financial industry to ensure its stability.

While the mandate does not explicitly reference climate change or environmental sustainability, the PBoC has proactively integrated green finance initiatives within its existing framework. This approach aligns with its broader objectives of economic growth and financial stability. For example, the PBoC has introduced the Carbon Emission Reduction Facility (CERF), a structural monetary policy tool designed to provide low-cost funds to financial institutions. This initiative encourages lending to sectors such as clean energy and carbon reduction technologies, thereby mobilising social capital to address climate change.

Hong Kong Monetary Authority: The Hong Kong Monetary Authority (HKMA), established in 1993, serves as Hong Kong's central banking institution. Its primary functions include: (i) maintaining currency stability within the framework of the Linked Exchange Rate System, (ii) promoting the stability and integrity of the financial system, including the banking system, (iii) helping to maintain Hong Kong's status as an international financial centre, including the maintenance and development of Hong Kong's financial infrastructure, and (iv) managing the Exchange Fund. While the HKMA's mandate does not explicitly reference climate change or

environmental sustainability, its role in promoting financial stability and maintaining Hong Kong's status as an international financial centre provides a framework within which it can address climate-related financial risks.

Reserve Bank of India: The Reserve Bank of India (RBI) operates under the Reserve Bank of India Act of 1934. The preamble of this Act outlines the RBI's primary functions as follows: regulating the issuance of banknotes, maintaining reserves to ensure monetary stability in India, and operating the currency and credit system of the country to its advantage.

While the Act does not explicitly mention climate change or environmental sustainability, the RBI's mandate to maintain monetary stability and manage the country's credit system provides a framework within which it can address climate-related financial risks.

Bank Indonesia: Bank Indonesia's mandate is primarily defined by Act No. 23 of 1999 concerning Bank Indonesia, which has been amended by subsequent legislation, including Act No. 3 of 2004 and Act No. 6 of 2009. The most recent amendment is encapsulated in Law No. 4 of 2023 on Financial Sector Development and Strengthening (P2SK Law).

The original Act and its amendments outline Bank Indonesia's objectives, tasks and authorities, which focus on maintaining monetary stability, regulating the payment system and supervising banks. The P2SK Law introduces further provisions to enhance the financial sector's resilience and development.

Indonesia's parliament widened the central bank's mandate in December 2022 to include supporting sustainable economic growth and formalising its direct purchases of government bonds. The new bill, called 'Development and Strengthening of Financial Sector', specifies that Bank Indonesia is an independent agency and widens its mandate to include maintaining financial system stability to support sustainable economic growth.

Bank of Korea: The Bank of Korea (BoK) operates under the Bank of Korea Act, which primarily mandates the institution to maintain price stability and ensure financial system stability. Traditionally, this mandate does not explicitly reference climate change or environmental sustainability. Yet, recognising the profound economic and financial implications of climate change, the BoK has proactively expanded its focus to include climate-related considerations within its existing mandate. Notable initiatives include the establishment of the Office of Sustainable Growth.

Bank of the Lao PDR: The Bank of the Lao PDR (BoL) operates under the Law on the Bank of the Lao PDR, which outlines its primary objectives as formulating and implementing monetary policy to maintain the stability of the national currency, supervising financial institutions to ensure a sound and efficient financial system and managing the country's foreign exchange and gold reserves. While the BoL's mandate does not explicitly reference climate change or environmental sustainability, the institution has taken proactive steps to integrate climate considerations into its operations. Notably, in September 2022, the BoL signed a memorandum of understanding with the International Finance Corporation (IFC) to boost financing for climate-friendly projects. This partnership aims to create a green finance market, unlock funding for climate-smart business activities and support the Lao PDR's goal of achieving net-zero emissions by 2050.

Bank Negara Malaysia: Bank Negara Malaysia (BNM), as Malaysia's central bank, operates under the Central Bank of Malaysia Act 2009. The Act outlines BNM's primary mandates, which include promoting monetary stability and financial stability conducive to the sustainable growth of the Malaysian economy, issuing currency in Malaysia, safeguarding the value of the Malaysian currency, acting as a banker and financial adviser to the Government and overseeing the nation's payment systems. While the Act does not explicitly reference climate change or environmental sustainability, BNM has proactively interpreted its mandate to encompass these areas, recognising that climate-related risks can significantly impact financial stability and economic growth. In April 2021, BNM issued the climate change-based principal taxonomy (CCPT) to provide financial institutions with a framework for classifying economic activities based on their environmental impact. The CCPT aims to facilitate the flow of capital towards sustainable activities and manage climate-related risks within the financial sector.

BNM has also mandated that insurers conduct industry-wide climate stress testing to assess the resilience of financial institutions against climate-related risks. This initiative underscores BNM's commitment to preparing the financial sector for potential climate-related disruptions. BNM established the Joint Committee on Climate Change (JC3) to pursue collaborative actions for building climate resilience within Malaysia's financial sector. The committee brings together various stakeholders to develop strategies and frameworks addressing climate-related challenges.

Bank of Mongolia: The Bank of Mongolia (BoM) operates under the Law on the Central Bank (Bank of Mongolia), which primarily mandates the institution to ensure the stability of the national currency, implement monetary policy and oversee the financial system. While the foundational mandate does not explicitly reference climate change or environmental sustainability, the BoM has proactively integrated these considerations into its strategic objectives. The BoM submitted the Monetary Policy Guidelines for 2022, which the Parliament of Mongolia approved on 18 November 2021. The monetary policy introduced addressed climate change and sustainable finance as one of seven priority areas. In cooperation with international, public and private institutions, the BoM will support the implementation of activities in the several strategic areas.

In collaboration with the Financial Stability Council, the BoM developed and approved the 'National Sustainable Finance Roadmap' in 2022. This roadmap outlines strategies to integrate sustainable finance principles into the banking sector, aiming to increase the green loan portfolio to 10 per cent of total banking sector lending by 2030.

Central Bank of Myanmar: The Central Bank of Myanmar (CBM) operates under the Central Bank of Myanmar Law, which primarily mandates the institution to formulate and implement monetary policy aimed at maintaining domestic price stability, supervise financial institutions to ensure a stable and efficient financial system and manage the issuance and circulation of the national currency, the kyat. This foundational mandate does not explicitly reference climate change or environmental sustainability and there is no evidence to suggest that the CBM has formally integrated climate-related considerations into its mandate or operations. The CBM's activities remain focused on traditional central banking functions, such as monetary policy and financial supervision.

Nepal Rastra Bank: Nepal Rastra Bank (NRB) which functions under the Nepal Rastra Bank Act, 2002, serves as the central bank of Nepal. Its primary objectives include formulating monetary and foreign exchange policies to maintain price stability, managing foreign exchange reserves and regulating and supervising banks and financial institutions to ensure financial

stability. While the Act does not explicitly mention climate change or environmental sustainability, the NRB has proactively integrated these considerations into its regulatory framework. In 2024, NRB introduced the Nepal Green Finance Taxonomy, a comprehensive framework designed to guide banks and financial institutions in identifying and investing in environmentally sustainable projects. This taxonomy aims to standardise the classification of green economic activities, thereby facilitating the mobilisation of investments toward climate-friendly initiatives and focusing on four main environmental objectives: climate change adaptation, climate change mitigation, natural resource conservation and pollution prevention and control. The taxonomy also emphasises the 'Do No Significant Harm' (DNSH) principle, ensuring that investments contributing to one environmental goal do not adversely affect others.

In addition, NBR issued Environmental and Social Risk Management (ESRM) Guidelines mandating that banks and financial institutions incorporate environmental and social risk assessments into their lending processes. This directive requires financial institutions to evaluate potential environmental impacts, such as risks from floods, droughts and other climate-related events, before approving loans for infrastructure and other projects. The aim is to promote sustainable lending practices and mitigate environmental risks within the financial sector.

NRB has also prioritised the promotion of clean energy investments by allowing banking and financial institutions (BFIs) to provide direct lending to renewable energy projects. Specifically, BFIs can extend loans up to 50 per cent of their core capital to such projects, encouraging investment in sustainable energy solutions and supporting Nepal's transition to a low-carbon economy.

Bangko Sentral ng Pilipinas: The BSP operates under the New Central Bank Act (Republic Act No. 7653), which was later amended by Republic Act No. 11211. The BSP's primary mandates include maintaining price stability, promoting balanced and sustainable economic growth and ensuring a stable financial system. While the foundational legislation does not explicitly reference climate change or environmental sustainability, the BSP has proactively integrated these considerations into its strategic framework, recognising their critical impact on economic and financial stability. The BSP has developed a Sustainable Central Banking (SCB) Program, which outlines its commitment to environmental sustainability. The BSP is committed to championing the sustainability agenda in the financial system, providing an enabling regulatory environment for managing climate-related risks, facilitating climate stress-testing exercises, promoting collaborative approaches in the financial sector and building partnerships to enhance awareness and capacity-building activities. To promote green lending, the BSP has relaxed certain lending rules. Specifically, it is gradually reducing the reserve requirement rate for green, social, sustainability, or sustainable bonds issued by banks from 3 per cent to 0 per cent, thereby encouraging financial institutions to increase their green financing activities.

Monetary Authority of Singapore: The Monetary Authority of Singapore (MAS) operates under the MAS Act, which mandates the institution to promote monetary stability and foster a sound financial centre. While the Act does not explicitly reference climate change or environmental sustainability, MAS has proactively integrated these considerations into its regulatory and supervisory frameworks, recognising their critical impact on financial stability and economic resilience. MAS has mandated that financial institutions incorporate climate-related disclosures into their reporting frameworks. This requirement aims to enhance transparency and enable stakeholders to assess environmental risks and opportunities effectively. MAS is actively integrating climate change considerations into its investment

framework to enhance portfolio resilience and support the transition to a low-carbon economy. MAS has expanded its Finance for Net Zero action plan to include transition finance, outlining strategies to safeguard against greenwashing risks and promote consistent and reliable climate data. This includes requiring ESG ratings and data product providers to disclose transition risks and how they are factored into their products. In collaboration with the BIS Innovation Hub, MAS developed Project Viridis, which explores how regulatory and climate data could be integrated to provide insights into climate-related financial risks.

Central Bank of Sri Lanka: The Central Bank of Sri Lanka (CBSL) operates under the Monetary Law Act (MLA) of 1949, which primarily mandates the institution to maintain economic and price stability and financial system stability with a view to encouraging and promoting the development of Sri Lanka's productive resources. While the MLA does not explicitly reference climate change or environmental sustainability, the CBSL has proactively integrated these considerations into its strategic framework, recognising their critical impact on financial stability and economic resilience. In 2019, the CBSL launched the Sustainable Finance Roadmap for Sri Lanka with technical assistance from the International Finance Corporation (IFC) and financial support from the United Nations Development Programme (UNDP). This roadmap provides strategic directions to integrate sustainability into the financial system, aiming to enhance the management of ESG risks and to mobilise capital towards sustainable economic activities. In 2022, the CBSL introduced the Sri Lanka Green Finance Taxonomy, a classification system designed to identify and define environmentally sustainable economic activities. Developed with support from the IFC and input from various stakeholders, this taxonomy aims to guide financial institutions in directing investments toward activities that contribute to climate change mitigation and adaptation.

Bank of Papua New Guinea: The Bank of Papua New Guinea (BPNG) operates under the Central Banking Act 2000, which primarily mandates the institution to formulate and implement monetary policy with the aim of achieving and maintaining price stability, promote a sound financial structure and foster financial conditions conducive to economic growth in Papua New Guinea. While the Act does not explicitly reference climate change or environmental sustainability, BPNG has proactively integrated these considerations into its strategic framework, recognising their critical impact on financial stability and economic resilience.

In March 2024, BPNG, in collaboration with the Global Green Growth Institute (GGGI) and other key partners, launched Papua New Guinea's Green Finance Centre (GFC). The GFC aims to address environmental and climate challenges by promoting sustainable economic growth through innovative and inclusive climate financing and green investment mechanisms. It serves as the entity responsible for overseeing the implementation of the Inclusive Green Finance Policy (IGFP) and future green finance initiatives in the country.

European Central Bank: Article 127 of the Treaty on the Functioning of the European Union states that “the primary objective of the European System of Central Banks (…) shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union [TEU]. (…)”.

Much work has been done during the ECB’s 2020-21 strategy review to study the role of other considerations related to the secondary objective for the conduct of monetary policy, such as employment, financial stability and climate change. On the legal side, the review has led to a

broad overview of the ECB's mandate, available here, while the specific issue of the links between **climate change** and the mandate had been explored in previous works (see here, chapter 7).

The new ECB strategy policy decisions for other considerations relevant to the pursuit of price stability" and specifies that "taking such considerations into account will often be necessary to maintain price stability over the medium term".

In particular, **it has become increasingly clear over recent years that climate change has consequences for the price stability objective through its impact on macroeconomic indicators such as inflation, output, employment or productivity.** Besides, climate change has and will increasingly have severe consequences on many objectives of the EU, such as the well-being of its peoples, balanced economic growth and the environment. Climate change is therefore also linked to the ECB's secondary objective.

Consequently, as a part of the new strategy, the ECB has formulated an action plan **regarding climate change,** which includes possible refinements of monetary policy tools, such as asset purchases. The ECB's preventive role, i.e., an action against climate change itself, is, however, bound by the above-mentioned legal conditions. It must hence only be understood as being a complementary role alongside the leading public players in the fight against climate change, who belong to the legislative and executive spheres.