



# The greenness of central banking

Rethinking the macroprudential framework







## Authors and contributors

### Main authors

Dr. Antonios Koumbarakis	PwC Switzerland
Moritz Obst	PwC Switzerland
Stephan Hirschi	PwC Switzerland

### Contributors

Dr. Günther Dobrauz	PwC Switzerland
Christophe Bourgoïn	PwC Switzerland
Dr. Marcel Tschanz	PwC Switzerland
Erik Steiger	PwC Switzerland
Joukje Janssen	PwC Netherlands
Ullrich Hartmann	PwC Germany
Dr. Nicole Röttmer	PwC Germany
Rami Feghali	PwC France
Tobias Söttrup	PwC Denmark
Loric Szalai	PwC Switzerland
Sofia Tsankova	PwC Switzerland
Martje Timmermann	PwC Switzerland



# Table of contents

<b>1</b>	<b>Background and introduction</b>	<b>4</b>
<b>2</b>	<b>Sustainable Finance and its impact on central banking</b>	<b>6</b>
<b>3</b>	<b>Responding to the sustainability imperative – initiatives at central bank level</b>	<b>9</b>
<b>4</b>	<b>Proposed changes to central banking</b>	<b>13</b>
	a. Sustainability, monetary policy, portfolio management and reporting	14
	b. Sustainability and risk management	15
	c. Additional supporting measures	16
<b>5</b>	<b>Central bank impact matrix</b>	<b>17</b>
<b>6</b>	<b>Conclusion and recommendations</b>	<b>18</b>
<b>7</b>	<b>References</b>	<b>22</b>



**“A transition to a green and low-carbon economy is not a niche nor is it a ‘nice to have’ for the happy few. It is crucial for our own survival. There is no alternative.”**

**Frank Elderson**, Executive Board Member of the European Central Bank



# 1 Background and introduction

With the world in COVID-19-induced paralysis, climate change and sustainability efforts have been pushed into the background. Governments and regulators around the world are trying to limit the (economic) impact of COVID-19 and there currently seems to be little space for other urgent problems. Yet, if countries allow efforts to slip, the financial and economic damage that may arise from climate change will by far exceed that from COVID-19. Christine Lagarde, the European Central Bank’s President, recognised the urgent and potentially irreversible threat to humanity posed by climate change and soon acted upon this by including sustainability risk (thus climate and social-related risks)<sup>1</sup> into ECB policies and committing to support Ursula von der Leyen’s European Green Deal.

With evidence of rising global temperatures, awareness of climate change risks has been growing, leading to enhanced international action at all societal levels. To achieve the 2030 Agenda for Sustainable Development and the Paris Climate Agreement, investment will have to be directed away from carbon- and resource-intensive investments, and towards sustainable investment. Given the enormous investments needed to bring about a green transformation, the financial sector will have to play a central role in allocating resources towards a sustainable and green economy.

Only recently, there has been intensifying discussion on the dedicated role of central banks in addressing risks associated with climate change and in supporting

the development of green finance. Traditionally, central banks have not explicitly factored environmental or social objectives into their decisions or evaluated their impacts beyond the narrow monetary domain. However, environmentally unsustainable economic activity has become a concern for central bankers and financial regulators, due to the dangers that climate change poses for the real economy and its inherent systemic risk to financial stability. The debate over whether central banks have a role to play in tackling climate change can largely be traced back to the ‘tragedy of the horizon’ speech by former Bank of England Governor Mark Carney. Here, Carney outlined what he called the tragedy of the horizon: the (economic) impact of climate change imposes a cost on future generations that the current generation has no direct incentive to fix and which goes beyond business, political and technocratic authorities’ cycles.

However, where the economy as a whole is endangered, financial stability is affected, relating directly to the role of central banks as guardians of financial, monetary and macroeconomic stability. Therefore, it can be argued that including climate-related risks into central banking is a prerequisite for financial stability, which, in return, is key for a functioning and effective monetary policy. Overall, the importance and urgency of the interaction of monetary policy and climate change has been widely recognised by public sector bodies, including governments, central banks and regulatory activity to promote sustainable finance increasing significantly (McDaniels and Robins, 2018).

<sup>1</sup> Sustainability risks are environmental, social and governance (ESG) events or conditions that could potentially have a negative impact on the value of investment. In the following paper, we focus on environmental ‘climate-related risk’.



Central banks, in particular, are actively engaged in various initiatives such as the Sustainable Banking Network (SBN) and the Central Banks and Supervisors Network for Greening the Financial System (NGFS).

Apart from central banks, serving as a key example for increased global efforts on sustainability, the importance of climate change for the financial industry acquired significant impetus from global sustainable finance initiatives such as the EU Action Plan Sustainable Finance. Prominently, the European Union (EU) responded to the challenge of climate change by aiming to limit the global average temperature increase to 2°C compared to pre-industrial levels. In this context, it contemplates an important role for the financial sector in reaching those goals.

Against the aforementioned background, this paper is intended to be thought-provoking and seeks to contribute to the broader discussion surrounding the implications of climate change on the operations, governance and role of central banks. It is not the aim of this paper to set out a one-size-fits-all approach regarding how central banks can become 'greener', but to contribute to the fundamental understanding of how climate change may affect their key objectives. Overall, it is an attempt at analysing to what extent climate-related risks (through the transition channel physical risk, transitional risk and litigation risk) fit into the current set of central bank mandates and objectives. In this regard, the paper does not refer to central banks as an impulse generator to market participants in its role

as policy-maker and supervisor, but explicitly focuses on their own portfolio management processes and the role of climate-related risks for monetary policy, financial stability and their internal processes. Only by focusing on these aspects will central banking become 'green central banking'.<sup>2</sup>

The paper is organised as follows. Chapter two investigates the possible (political) impact of global sustainable finance initiatives on central banks. In this context, central banks' sphere of competence and their mandate to support government's national policy priorities is discussed in the context of promoting sustainability. Subsequently, chapter three discusses to what extent central banks are already involved in sustainability-focused initiatives and what kind of measures they are taking for their internal operations. Chapter four broadly deals with possible reactions that central banks could show towards the growing sustainability imperative. In this context, light is shed on the correlation between climate-related risks, the stability of the financial system and functioning monetary policy. Due to this correlation, certain adaptations in central banks' risk management process are advisable. In a last step, additional measures that central banks could take to support the greening of the financial system are presented.

<sup>2</sup> Green central banking can be defined as central banking that takes into account climate-related risks which may affect financial stability. In this context, on the one hand, green central banking describes how climate-related risks are considered for the design of 'traditional' goals of monetary policy and financial and price stability. On the other hand, green central banking may imply promoting green investment in its role as supervisor and actively campaigning for green finance, (Volz and Dikau, 2018).

## 2 Sustainable Finance and its impact on central banking

Following the Paris Agreement and the 2030 Agenda for Sustainable Development, the EU recognised in 2015 the importance and core role of the financial system in sustainability as a means to redirect investment towards more sustainable technologies and enterprises, to finance long-term growth in a sustainable way and to contribute to the creation of a low-carbon economy. The European Commission announced that, in order to achieve the EU's 2030 targets agreed in Paris, including a 40% cut in greenhouse gas emissions, it has to fill an investment gap estimated at EUR 180 billion per year.

The financial sector has a key role to play in reaching those goals by:

- re-orienting investments towards more sustainable technologies and businesses
- financing growth in a sustainable manner over the long term
- contributing to the creation of a low-carbon, climate resilient and circular economy.

In 2016, the European Commission established a High-Level Expert Group (HLEG) on Sustainable Finance. The aim of this group was to develop strategies for the integration of sustainability concepts into EU financial services legislation. The HLEG published its final report in January 2018.

As a response to the recommendations from the HLEG, the EC published its Action Plan on Sustainable Finance in March 2018. This action plan contains a comprehensive strategy for linking sustainability and finance by amending financial regulations and policies and explicitly introducing sustainability aspects. In summary, the Action Plan introduces additional sustainability and environment, social and governance (ESG) requirements. As part of the Action Plan, the EU Taxonomy<sup>3</sup> is one of the most significant developments in sustainable finance with extraterritorial reach. In essence, the Taxonomy is a classification system of economic activities and provides an answer to the question of whether a business activity is environmentally sustainable. Hereby, it does not only prevent greenwashing and set clear standards for the market, but it also diverts financial streams away from high-carbon towards low-carbon sectors.

In terms of impact, central banks are not affected by the Action Plan from a strictly legal perspective. This is because the European financial market rules are typically aimed at financial institutions (e.g. banks, asset managers and insurance companies). In addition, central banks are independent, are typically created under a specific body of law (Meade, 2009) and are generally on the policy-making rather than policy-receiving side. Even if some central banks are established under private law, they can rely on far-reaching immunities and privileges (Meade, 2009). However, in most cases, the special regulatory framework governing central bank action makes them autarkic from financial market legislation.

**“An active role in climate policy [...] could undermine our independence and, ultimately, jeopardise our ability to maintain price stability. Central bank independence is an obligation to stay focused on our primary objective.”**

Dr Jens Weidmann, President of the Deutsche Bundesbank

Therefore, it can be argued that the impact of the EU Action Plan on central banks is predominantly of a political nature. Put differently, it (and other initiatives) add(s) political pressure on central banks to become more active in the sustainability sphere in order not to forfeit some of their influence or seem 'outdated'. However, the question arises as to whether they actually have the mandate to do so.

Central banks' role in fighting climate change remains ambiguous and very much a contentious topic. This was highlighted in November 2019 in a speech by Jens Weidmann, President of the German Bundesbank, stating that he would view 'very critically' any attempt to redirect a central bank's actions towards climate change, such as favouring the purchase of green bonds as part of a quantitative easing programme (Arnold and Storbeck, 2019). According to a BIS study, this view is supported insofar as 62.7% of central banks in scope do not include sustainability factors (e.g. carbon footprint) in the pursuit of their policy objectives (BIS, 2019).

<sup>3</sup> Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088.





**“If we don’t do anything about climate change now, in 50 years’ time we will be toasted, roasted and grilled.”**

**Christine Lagarde**, President of the European Central Bank

Equally, there are voices warning that central banks might lose their market neutrality and independence, if they became active outside of their core objectives and possibly even following political postulations or trends (Die Zeit, 2019). Others argue that overstressing central banks’ mandates might result in (i) too many objectives, (ii) too much power being vested in unaccountable institutions, and (iii) there might be resistance to change from within the central banking community (UN Environment Inquiry, 2017). However, there is a wide spectrum of arguments justifying why central banks should respond to environmental and sustainability challenges: (i) the financial and macroeconomic risk argument (climate change touches upon the core responsibilities of central banks), (ii) the market failure argument (the provision of credit by banks to carbon-intensive businesses can be characterised as a credit market failure, therefore, central banks may have a case to use powers to affect credit creation and allocation) and (iii) an argument relating to the role of central banks as credible and powerful actors, especially in developing countries (UN Environment Inquiry, 2017).

**“Climate change is a source of financial risk impacting the entire financial sector and is highly relevant to our mandate.”**

**Eddie Yue**, Co-Chair of the Steering Group, Chief Executive, HKMA



In contrast to the stated opposing views, in a recent study of 133 central banks' mandates it was found that 12% have an explicit sustainability-related mandate and 29% are equipped with a mandate to either directly or indirectly, through the government's policy priorities, enhance the sustainability of economic growth or enhance resilience in general (Volz and Dikau, 2019). Hence, there is already a considerable number of central banks that have a mandate to (in)directly act upon climate change issues. The view that it falls within central banks' mandates is also supported by the Bank of England which strongly considers it a central part of its responsibility to identify, warn against and mitigate any kind of threats to financial stability, including those from climate change-related risks (Volz and Dikau, 2019). Also, the NGFS acknowledges that "... climate-related risks are a source of financial risk. It is therefore within the mandates of central banks and supervisors to ensure the financial system is resilient to these risks ...." (NGFS, 2018).

What becomes clear from the aforesaid is that there is a certain amount of ambiguity surrounding central banks' mandates in the sustainability field. Yet, a certain trend is apparent that consensus on their mandate is emerging. It could be argued that this would be in line with the adapting role of central banks, which is constantly evolving in response to crises or perpetual policy problems. E.g. whereas their original mandate was to secure low and stable inflation rates, their mandate was – implicitly or explicitly – broadened during the financial crisis to include financial stability (Fisher and Kern, 2019).

Overall, this corresponds to their role in society to carry out their mandate in the overall interest of their country and to keep up with the problems of their time. Given the connection between the potential environmental and economic damage that climate change could inflict and the risks to overall economic well-being – and consequently financial stability – central banks' core mandate might well be affected. In this regard, a potential role for central banks in mitigating the risks from environmentally unsustainable economic activity cannot be denied.



This means that overall, the impact of the EU Action Plan and other globally relevant initiatives (such as Climate-related Financial Disclosure, TCFD) in the sustainable finance area on central banks creates additional pressure to consider the role they want to play in climate change policy. In this regard, they have two choices:

- Central banks could choose to retract based on their explicit mandate and disregarding possible consequences of climate change for financial stability.
- Alternatively, they can choose to proactively promote a transition to a sustainable and hence lower-carbon economy. How far central banks can go in playing a role as an overall catalyst for mainstreaming green finance on the one hand, and incorporating climate risks in their core policy frameworks on the other hand, depends significantly on their mandates (Volz and Dikau, 2019).

At the same time, it needs to be acknowledged that it is not only in the hands of the central banks to choose which path they will take. The mandates of many central banks only allow for very limited efforts when it comes to climate change issues. Furthermore, the topics of market neutrality and legitimacy of central banks' action cannot be disregarded. If central banks were to unilaterally expand the scope of their mandate, this would lead to a loss of trust and credibility and, ultimately, political headwind. Therefore, it is also up to politicians to decide which role they want central banks to play in fighting climate change.





### 3 Responding to the sustainability imperative – initiatives at central bank level

**“...as financial policymakers and prudential supervisors, we cannot ignore the obvious risks of climate risk before our eyes.”**

Open letter by the governors of the Bank of England (BoE) and Banque de France, Mark Carney (who is now the former Governor of the BoE) and François Villeroy de Galhau, and co-signed by Frank Elderson, of the NGFS.

For central banks, it is desirable but not always easy to participate in international initiatives and fora. On the one hand, they can show their good will and effort, interact with others in a comparatively informal setting and advance their agenda informally outside of constraining legal frameworks. On the other hand, initiative and effort – as in the case of climate change – can quickly be construed as negligence of their core mandate, or, even worse, overstepping their mandate. Others argue that their independence might be at risk or that central banks may provoke political backlash and parliaments might want more political control over central banks (Eichengreen, 2019).

Nonetheless, central banks are increasingly becoming active in climate change-related policy fields, despite the said criticism. Acting upon their statements, at the beginning of November 2019, the Riksbank announced that it had sold its sub-sovereign debt from the coal-producing provinces of Queensland and Western Australia as well as the Canadian province of Alberta, which invests in oil sands extraction (Sveriges Riksbank, 2019). This is just one example of how central banks are still struggling with finding the right approach to the challenge of climate change. Currently, their strategies are still largely driven by public appeals and symbolic measures. To this point, their efforts mostly find expression in soft law initiatives and voluntary commitment.

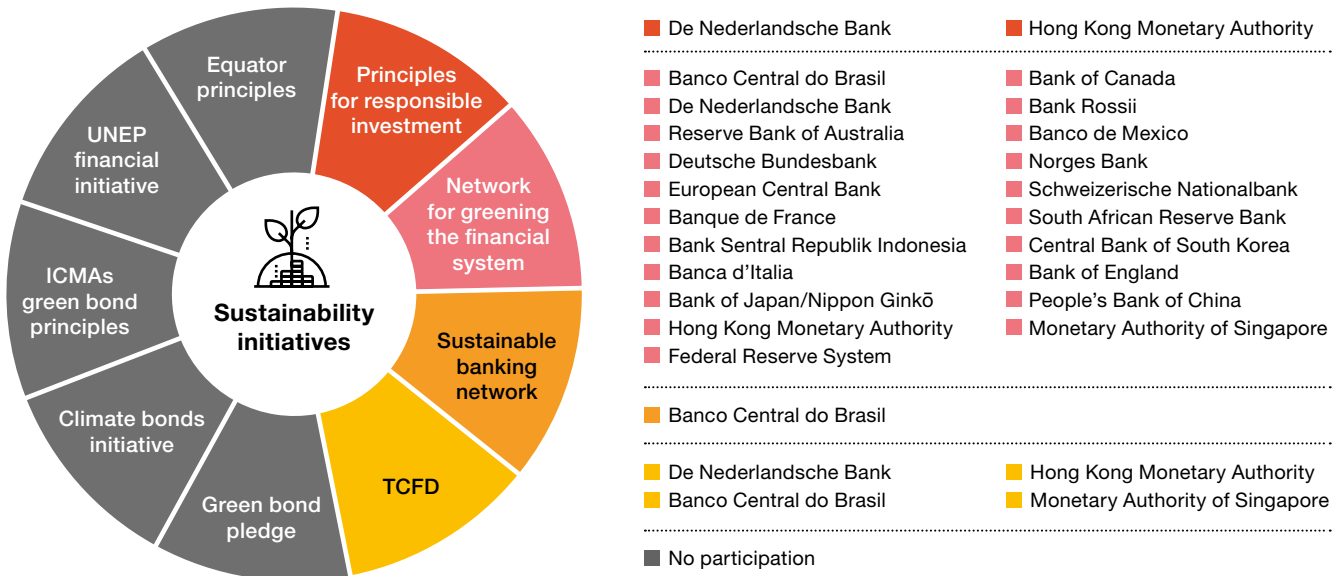
In terms of concrete actions, an efficient way for central banks to foster sustainability factors is to participate in initiatives, which broadly aim to promote sustainable finance in line with international best practices and to raise awareness. Two examples of these sustainability initiatives are the SBN and the NGFS. Initiated at the One Planet



Summit 2017 by eight central banks and supervisors, the NGFS has since grown to 83 members and 13 observers, representing six continents (updated December 2020). The network defines and promotes best practices and publishes various research pieces on green finance, with the goal of helping the financial sector meet the Paris Agreement’s ambitions and manage risks through sustainable investments.

As can be seen in the table on the following page, a large number of central banks are already members of various initiatives. However, the analysis of central bank participation in other sustainability initiatives, such as the UN Principles of Responsible Investing (PRI) or the Task Force on TCFD, show that there is still reluctance or legal hindrance, i.e. their mandate to participate in sustainability initiatives.

Table showing the participation of central banks in international sustainability initiatives



**“Central banks do have to deal with the risks of climate change, but they cannot substitute for climate policy [from politicians].”**

Sabine Mauderer, Board member of the Deutsche Bundesbank

In terms of specific efforts by individual central banks to address climate risks, central banks take different approaches and have diverging views.

**The Dutch Central Bank** is among the leaders in Europe. It was the first central bank in the world to sign both the PRI and the TCFD. It has also adopted a new Charter for Responsible Investment and is committed to integrating six Environmental, Social and Corporate Governance (ESG) principles into its investment practices. The Dutch Central Bank said it wanted to increase the sustainability of the Dutch economy by managing the ESG risks of its own reserves, which amounted to EUR 19 billion invested in the financial markets. It also claimed that this approach would inspire other central banks and the financial sector.

**The Swiss National Bank (SNB)** is also actively engaged in efforts to fight climate change. As a front-runner in this field, the SNB takes ESG considerations into account in the management of its foreign exchange reserves (SNB, 2019), it is actively engaged in managing its operational

activities in a sustainable way (SNB Sustainability Report, 2019) and it is heavily invested in green bonds. Moreover, the SNB takes ESG criteria into account in its portfolio by not holding shares in specific companies whose products or production methods violate existing basic Swiss standards (e.g. human rights) or values (active engagement). This policy is based on values enshrined in Swiss law as well as internationally applicable conventions and contracts adopted by Switzerland. Companies that ‘systematically cause severe environmental damage’ are also excluded (SNB Investment Policy Guidelines, 2015). Although the SNB is still investing in the oil and gas sector in line with its market-neutral approach to stocks investments, in December 2020 it decided to exclude from its portfolio companies whose business primarily consists of operating coal mines (SNB, 2020).

In this context, the Swiss legislator is also becoming increasingly active, including by placing certain obligations on the SNB. In September 2020, the Swiss parliament reached an agreement on the revised CO2 law, which includes various incentives to reduce greenhouse gas emissions in line with the Paris Agreement. It also contains provisions to align financial flows with climate targets and requires the SNB to regularly review the macroprudential financial risks of climate change. Moreover, in March 2020, Switzerland joined the International Platform on Sustainable Finance (IPSF), a platform launched by the European Commission.





**“Our goal is to build a UK financial system resilient to the risks from climate change and supportive of the transition to a net-zero economy.”**

**Andrew Bailey**, Governor of the Bank of England



In terms of efforts by individual central banks, the **Bank of England** is among the global leaders in addressing climate risks. The bank announced its decision to disclose the assessment of how it manages climate-related financial risk, which is contained in its 2020 report. It had also initially expected to start including the impact of climate change in its stress tests of UK banks from next year onwards – a move that has yet to be undertaken by any of the world’s major central banks (Manning, 2019). However, due to the consequences of the Coronavirus pandemic on the UK, the Bank of England announced that it would postpone its climate stress tests until further notice.

**China’s central bank**, meanwhile, has created incentives for banks to support green projects, as well as discouraging those that finance carbon-intensive activities. It also accepts green loans from banks as collateral for refinancing (Manning, 2019). By fixing mandatory disclosure requirements for banks, the PRC is ensuring that ‘green’ lending, ‘brown’ lending and ‘neutral’ lending are properly categorised in their portfolios. Furthermore, the PRC issued different guidelines addressing both green bond verifiers to ensure that the products are actually green and even firms that have been registered as major polluters, to disclose information related to environmental standards (Durrani et al., 2020). Another notable move from the People’s Bank of China, the National Development and Reform Commission and the China Securities Regulatory Commission is the recently (May 2020) announced plan to cut

clean coal from the list of projects eligible for green bond financing. Since the inclusion of highly disputable clean coal projects was the main reason why most international green investors held back from investing in China’s green bonds, this significant step could allow China to emerge as a leading figure in green finance, attracting more global funds (Reuters, 2020).

Other banks, such as **Banca D’Italia**, contribute to raising awareness. It provides technical assistance to the Italian Ministry of Economy and Finance for the negotiations on the legislative proposals resulting from the European Commission’s action plan on sustainable finance. Additionally, the bank adopted a new investment strategy that integrates ESG factors into the management of its equity portfolio. Thereby, it does not consider sectors excluded by the United Nations Global Compact and it gives preference to companies with the best ESG scores (Visco, 2019).

**The Reserve Bank of India** has taken small steps towards greening the financial system by, e.g. setting a mandatory norm requiring banks to provide a portion of the bank lending to a few specific, neglected sectors such as agriculture and renewable energy (Priority Sector Lending – PSL). It has also introduced a National Action Plan on Climate Change 2008 (Jain, 2020).



Being one of the founding members of the NGFS, the **Monetary Authority of Singapore (MAS)** is widely recognised for taking key measures to promote green finance. Along with forming the network, MAS created the Asia Sustainable Finance Initiative, which aims to help shift Asia’s financial flows towards sustainable economic, social and environmental outcomes by working across six focus areas to support financial institutions.

MAS also established a Green Bond Grant scheme to encourage the issuance of green bonds in Singapore. Since its launch in 2017, MAS has expanded the scope of this scheme to further include social and sustainability bonds and renamed it the Sustainable Bond Grant Scheme.

It also issued Guidelines on Responsible Financing addressing its member firms to strictly comply with environmental, social and governance (ESG) disclosures, and integrate other responsible financing practices. In 2018, the MAS and the IFC, a member of the World Bank Group, signed a Memorandum of Understanding (MOU), agreeing to work together to accelerate the growth of green bond markets in Asia. These active and dedicated steps resulted in Singapore becoming a leading centre for green finance in Asia and globally (Durrani et al., 2020; MAS, 2020).

**The European Central Bank (ECB)** is a key actor and driver in the fight against climate change. Along with that, the European Parliament adopted a report which recalls that the ECB is bound by the Paris Agreement as well and therefore has to take further action to advance the management and transparency of climate-related and environmental risks in the banking sector of the EU (EU Parliament, 2018). Signalling its efforts to green the financial system, in May 2020, the ECB issued a guide for consultation on climate-related and environmental risks. It was jointly developed by the ECB and the national competent authorities (NCA) and aims to assess banks’ approaches to these specific risks and to develop supervisory expectations of them.<sup>4</sup>

In 2019, the ECB formally identified climate change as a key threat to the banking sector. As a response, Christine Lagarde, the ECB’s President, suggested changing its mandate to meet new challenges, including climate change.

In July 2020, acting upon her promise to make climate change a top priority for the ECB, Christine Lagarde also announced that the bank had launched the strategic review of all its business lines with a view to examining potential changes to its operations in the fight against climate change (Khalaf and Arnold, 2020). In this context, some expect the ECB to stop or significantly reduce the purchases of bonds issued by fossil fuel companies and other heavy carbon emitters entirely, thereby doing away with the principle of market neutrality (Arnold and Vladkov, 2021). Furthermore, the ECB announced that as of 1 January 2021, EU green bonds that follow the EU Taxonomy will become eligible as collateral.

As regards the developments in the US, the **US Federal Reserve** also joined the NGFS in December 2020, stressing the rapid development, high public expectations and increasing awareness in this context. Already in March 2019, the Federal Reserve of San Francisco cited climate change among the three key forces currently transforming the economy (FRBSF, 2019). In addition, the New York State Department of Financial Services (NYDFS) had already become the first US state financial regulator to join the NGFS. Clearly, strong climate-relevant impetus, policy guidance and regulation can be expected from the Biden Administration.

Overall, what becomes apparent is that currently a single central bank approach to sustainable finance does not exist. Although there are still central banks that do not participate in international sustainability initiatives, many are actively engaged to one extent or another. A trend towards more hard law and institutionalised frameworks can be witnessed. In this regard, it does not come as a surprise that the heads of the International Monetary Fund and European Central Bank made climate change a priority (Bleiker, 2019).

<sup>4</sup> Similar documents in this context: ‘Guidance Notice on Dealing with Sustainability Risks’, BaFin, 2019, ‘Integration of climate-related risk considerations into banks’ risk management’, good practice document, DNB, 2019, and ‘Guide for Handling Sustainability Risks’, consultation document, FMA, 2020.



## 4 Proposed changes to central banking



**“The central bank time horizon is relatively short – but the real challenges to prosperity and economic resilience from climate change will manifest well beyond this. We face a tragedy of horizons.”**

**Mark Carney**, former Governor, Bank of England

The previous paragraphs highlight two key subjects: (i) how central banks and their key mandates are affected by climate change and (ii) the role central banks can play and are already actively playing in the move towards a sustainable financial system. At the end of the day, given the soft power and influence of central banks, they can provide significant impetus for promoting sustainable financial market practices. By leading by good example in integrating sustainability into their policies and frameworks, central banks could be sending a strong signal to all market participants about the topic's urgency.

The following sections describe potential chances to enhance the greenness of central banking. In particular, the focus is first on enhancing portfolio management through sustainability factors. Second, light is shed on the correlation between climate-related risks and the stability of the financial system. Due to this correlation, certain adaptations in central banks' risk management processes are advisable. In a last step, additional measures that central banks could take to support the greening of the financial system are presented.

## a. Sustainability, monetary policy, portfolio management and reporting

In the context of managing their own portfolio, central banks could focus on the following topics, among others:

### **Integrate sustainability factors into portfolio management:**

Central banks would send a strong signal if they included sustainable investment criteria (not only exclusion criteria but rather best-in-class approach and ESG integration) into their portfolio management. As already pointed out in previous publications (NGFS (2019)), integrating sustainability factors and 'ESG criteria' (e.g. carbon footprint) into the management of their own accounts, for example, would have several benefits for central banks, such as reducing reputational risks or generating positive impact for society, financial return being a subordinate goal in this context. In this regard, central banks could set specific carbon targets for portfolio companies (Scope 1, 2 and 3). This would imply reducing (or entirely removing) the share of heavy carbon emitters in their portfolio. At the same time, this could open new doors for incentivising said carbon emitters to reduce their emissions.<sup>5</sup>

### **Incorporate sustainability factors into reserve management:**

Sustainability factors have not traditionally been one of the reserve management objectives, however, they are increasingly playing a role in this regard.<sup>6</sup> Integrating sustainability-related aspects into the reserve management process can either be explicit or implicit (Fender et al., 2020). On the one hand, explicit integration refers to central banks being explicitly mandated to include sustainability as one of the policy purposes for holding reserves. Implicit integration, on the other hand, refers to sustainability being indirectly included in the traditional economic uses of reserves. The preferred option of central banks to integrate sustainability into their reserve management process is the purchase of green bonds (Fender et al., 2020).

### **'Green' repo operations:**

As an established tool in the central banks' toolbox of open market operations, repo operations are a proven method to channel liquidity into the market with central banks receiving collateral in return. If central banks decided to change the criteria for securities eligible as collateral for a repo agreement, with a view to linking it in whole or in part to sustainability factors, this would be a strong signal to the market, considering the size of central banks' repo operations. As a variation of this approach, central banks could offer favourable repo rates in return for 'green collateral'. In this context, it could be suggested to – at a certain point in the future – accept or prioritise green or 'circular bonds'<sup>7</sup> as collateral which are compliant with the EU Taxonomy.

### **Reporting:**

In line with what is increasingly expected from their commercial counterparts (e.g. ECB, 2020), central banks could focus more on the overall transparency in their portfolio management. In this context, some voices even point out that central banks could use an adapted version of the TCFD recommendations (Fisher and Kern, 2019). Increasing the amount of reliable information on central banks' exposure to climate-related risks will not only contribute to greater understanding of their risk-taking but will also enhance the legitimacy with market participants and the general public. Implicitly, it would also raise central banks' awareness of the risk-taking and might accelerate an internal rethinking of their risk management procedures and investment decisions. Ultimately, the menace looming in the background is that central banks with a large quantity of climate-related risks in their portfolio might be stigmatised as 'brown'. As a side effect of more transparency, additional emphasis would have to be put on developing climate-related risk analysis frameworks to measure climate-related risks. In addition, central banks would build additional in-house capacity and knowledge which they could, in return, also use for educational purposes of market participants and their overall supervisory function.

<sup>5</sup> Frontrunners in this context are the Banque de France and the Dutch Central Bank. Both have adopted Responsible Investment Charters for managing own funds as well as pension portfolios or foreign reserves portfolios. Based on this, responsible investment reports are released which describe the sustainability-related performance of the portfolios. What's more, the Dutch Central Bank was also the first central bank to sign the Principles for Responsible Investment.

<sup>6</sup> E.g. in its Responsible Investment Charter, the Dutch Central Bank stipulates that it takes ESG considerations into account for its foreign reserve management.

<sup>7</sup> Circular bonds understood as sustainable bonds dedicated to creating a more circular economy with the proceeds being allocated to circular economy companies and projects.





**“Here is the challenge: climate change and its associated risks provide a direct challenge to financial stability, however the risks are material but extremely difficult to identify, price, allocate and manage with accuracy.”**

**Adrian Orr**, Governor of the Reserve Bank of New Zealand

## b. Sustainability and risk management

### Correlation between climate-related risks and financial system stability

This section describes the correlation between climate-related risks and stability of the financial system, providing the conceptual background for the next section.

Without going into further detail, it is broad academic consensus that climate-related risks<sup>8</sup> can impact financial stability through three types of risks: physical, transition and liability risks (e.g. BoE, 2016). In return, the climate-related risks cause certain financial risks, thereby affecting financial systems’ stability and impeding the achievement of central banks’ objectives (NGFS, 2020). In particular, e.g. BIS and Banque de France identified five key areas in which climate-related risks can give rise to financial risks (Bolton et al., 2020):

- **Credit risk:** Climate-related risks can lead to a decline in the ability of borrowers to repay their debts through direct or indirect exposure. This leads to higher probabilities of default (PD) and a higher loss given default (LGD).
- **Market risk:** In an abrupt transition scenario, the financial assets could be subject to a change in investors’ perception of profitability. This loss in market value can potentially lead to fire sales, which could trigger a financial crisis.
- **Liquidity risk:** Liquidity risk could affect banks and non-bank financial institutions, as banks whose balance sheets would be affected by credit and market risks may not be able to obtain short-term funding, which could potentially lead to operational risk.

- **Operational risk:** Financial institutions may be affected by their direct exposure to climate-related risks. A bank whose offices or data centres are affected by physical risks could see its operations impaired and affect other institutions throughout its value chain.
- **Systemic risk:** Systemic risk includes the exogenous risk to the smooth functioning of the financial system as well the risk created endogenously by the financial system. In this context, climate-related risk should be integrated in the systemic risk definition because climate risk can exogenously and endogenously affect the financial system and thus the financial stability (e.g. failure in bank functions due to not properly incorporating climate-related risk in the risk management process, enhanced risk feedback loops and contagion, which can spiral out of control and impede the smooth functioning of the banking system (see Koumbarakis 2018)).

In view of the aforesaid, central banks’ core objectives of monetary policy and financial stability are heavily impaired by climate-related risk and it is in their own interest to give this new risk type a prominent role in their overall risk management process. How this could be done is highlighted in the next section.

<sup>8</sup> According to (NGFS, 2020), climate-related risks refer to financial risks posed by the exposure of financial institutions to physical or transition risks caused by or related to climate change.

## Corresponding changes in risk management processes

As outlined in the previous section, it is key to not only understand climate-related risks appropriately but to also amend existing risk management processes accordingly. In this context, the following two areas are vital:

**Measuring methodology:** Measuring risks has always been a challenge, however, assessing climate-related risks is a challenge that is yet to be overcome. This is because “...climate-related physical and transition risks involve interacting, nonlinear and fundamentally unpredictable environmental, social, economic and geopolitical dynamics that interact with each other in complex ways and are subject to deep uncertainty.” (Bolton et al., 2020). Existing models are mostly based on backward-looking probabilistic approaches which cannot account for the inherent uncertainty of climate change events. What is therefore needed is forward-looking new methodologies, improving the quantitative and qualitative data situation, assessing the appropriateness of their stress testing procedures, determining key climate risk indicators and developing a scenario analysis framework for central banks that can capture the inherent uncertainty of climate-related risks (NGFS, 2019).



### c. Additional supporting measures

There are additional ways how central banks can support the transformation towards a green financial system, both internally and externally. Serving only as a selection from a multitude of possible considerations, the following points can briefly be touched upon:

**Adapting the Financial Stability and Sustainability Report:** Given the systemic risk to the financial system presented by climate change, particularly central banks' key publications, such as the Financial Stability and Sustainability Report, should be amended to analyse, discuss and disclose climate-related risks. In the context of disclosure, it would be highly beneficial if climate-related risks were disclosed on central banks' websites in order to allow for precise, timely and continuously updated information.

**Inducing a value-based change of mindset into the financial industry:** By focusing on sustainability factors, central banks can clearly communicate a change in values within the financial industry, departing from alleged short-termism and helping to resolve the tragedy of the horizon (Bolton et al., 2020). Given their importance, central banks have the potential to take on a beacon function.

#### **Leading the way to a more coordinated approach:**

Considering their importance for international financial markets and the global economy, the potential of central banks and other standard-setting bodies to cooperate in order to achieve international sustainability objectives is not even close to being fully exhausted.

Central banks would provide an excellent forum for discussions as they are some of the key players in financial market regulation, they are close to political decision-makers and are globally interconnected. At the same time, there currently still is room for improvement concerning a coordinated approach to promoting sustainable finance and mutual recognition of standards (Fisher and Kern, 2019). In order to create an environment paving the way towards thriving cooperation, it is key that central banks devote sufficient resources, build internal structures and have in place a clear strategy on how to address the impact of climate-related risks (NGFS, 2020).

#### **Increasing capacity-building activities:**

Various central banks e.g. are already involved in capacity building concerning monetary policy or financial stability. However, in view of their perception as trustworthy, knowledge-based, independent institutions, they have the potential to become 'knowledge-hubs' on green finance and corresponding research. In return, they could use this know-how for prudential supervision, in their internal approach to green finance as well as to educate market participants.

# 5 Central bank impact matrix

In the context of the proposed measures to enhance the greenness of central banking, an impact rating has been drawn up to highlight the extent of affectedness. As this is a quantitative rather than a qualitative assessment, the impact is shown as being between low (1) and high (5) and reflects the impact on selected central bank divisions.

A comparatively low impact would be proposed for divisions such as HR or statistics. Other areas, e.g. Asset Management or Risk Management, would be highly affected by the proposed measures.

Affected areas	Affected services	Degree of impact from low (1) to high (5)
Economic affairs	Monetary policy analysis	3
	Forecast and analysis	4
	Economic data science	4
International monetary cooperation	International policy analysis	3
Statistics	Banking statistics and data banks	4
Legal and compliance	Legal and compliance	3
Financial stability	Banking system	4
	Systemically important banks	4
	Oversight	2
Risk management	Risk management	5
Asset management	Portfolio management	4
	Portfolio trading	4
Banking operations	Middle to back office	3
Information technology	Banking applications	4
	Infrastructure and IT services	4





# 6 Conclusion and recommendations

All in all, the preceding sections outline how the authors could envisage a world of ‘green central banking.’ Even though the discussion is only at the beginning, the preceding analysis has revealed large differences regarding to what extent central banks have started to address climate-related concerns in practice and to which degree their mandates differ. However, the overall tendency is that central banking is increasingly playing an active greening role and central banks’ international cooperation and alignment is invaluable to streamline efforts and contribute to a consistent approach. This increased involvement is very welcome from an economic and society perspective, but it is also in the central banks’ own interest to play an active role, considering the interconnectedness of financial and climate stability. Importantly, financial stability, and with it a functioning monetary policy, can only be ensured if central banks take into account climate-related risks.

Despite the progress that has been made, there is still a lot to be done. Central banks must contemplate for themselves the role they want to play, independent of public opinion or expectation. However, depending on the outcome of the thought process, a coordinated, interdisciplinary approach that goes beyond roadmaps and initiatives would be advisable. In this context, this paper outlines possible solutions to enhance the greenness of central banking.

Ultimately, nothing is set in stone and the role of central-banking in the context of fighting global warming should be further assessed. A variety of different scenarios is imaginable: (i) central banks might be found limited by their legal mandates and focus on their ‘traditional’ objectives, (ii) mandates might be expanded (to a certain degree), (iii) other institutions might arise, diminishing the need for central bank action, or (iv) central banks could eventually take a trailblazer position. If this was the case, in one’s boldest dreams one could even imagine ESG-certified central banks one day or a sustainable monetary policy in which the goal of macroeconomic well-being can only be pursued in accordance with environmental well-being. In other words, the classical goals of monetary policy – promoting maximum employment and ensuring stable prices and moderate long-term interest rates – would have to be implemented without harming the environment.

The current point of departure for contemplating and examining their position could not be any better for central banks. They are now at a crossroads: they can invest their resources to revitalise the pre-COVID economy, or they can seize the opportunity and further strengthen their efforts towards a green and sustainable transition. In the case of the latter, the world has never been more open to do things differently, to new ideas, ideals and values as at this current point in time.



**“As we look to building a more resilient world emerging from COVID-19, we have an opportunity to also make it more sustainable.”**

**Ravi Menon**, Managing Director, MAS



Therefore, our recommendations to central banks can be summarised as follows:

**Portfolio management and monetary policy**

- Integrate sustainability factors into portfolio management (incl. ESG investment strategies)
- Incorporate sustainability considerations into reserve management
- Calibration of the open market operations ‘green’ repos
- Increased disclosure requirements for the portfolio management process
- Consider green bonds with respect to the EU Taxonomy as collaterals

**Risk management and financial stability**


- Define sustainability risk
- Sustainability risk is a prerequisite of financial stability
- Link sustainability risk with systemic risk
- Incorporate sustainability risk in the current risk management framework
- Establish new sustainability risk methodology (i.e. scenario analysis and carbon value at risk)

**Additional supporting measures**

- Adapt financial stability and sustainability report
- Value-based change of mindset
- Decarbonisation of the balance sheet
- Increase capacity-building activities







**“What concerns  
everybody can only be  
solved by everybody.”**

**Friedrich Dürrenmatt,**  
Swiss author and dramatist

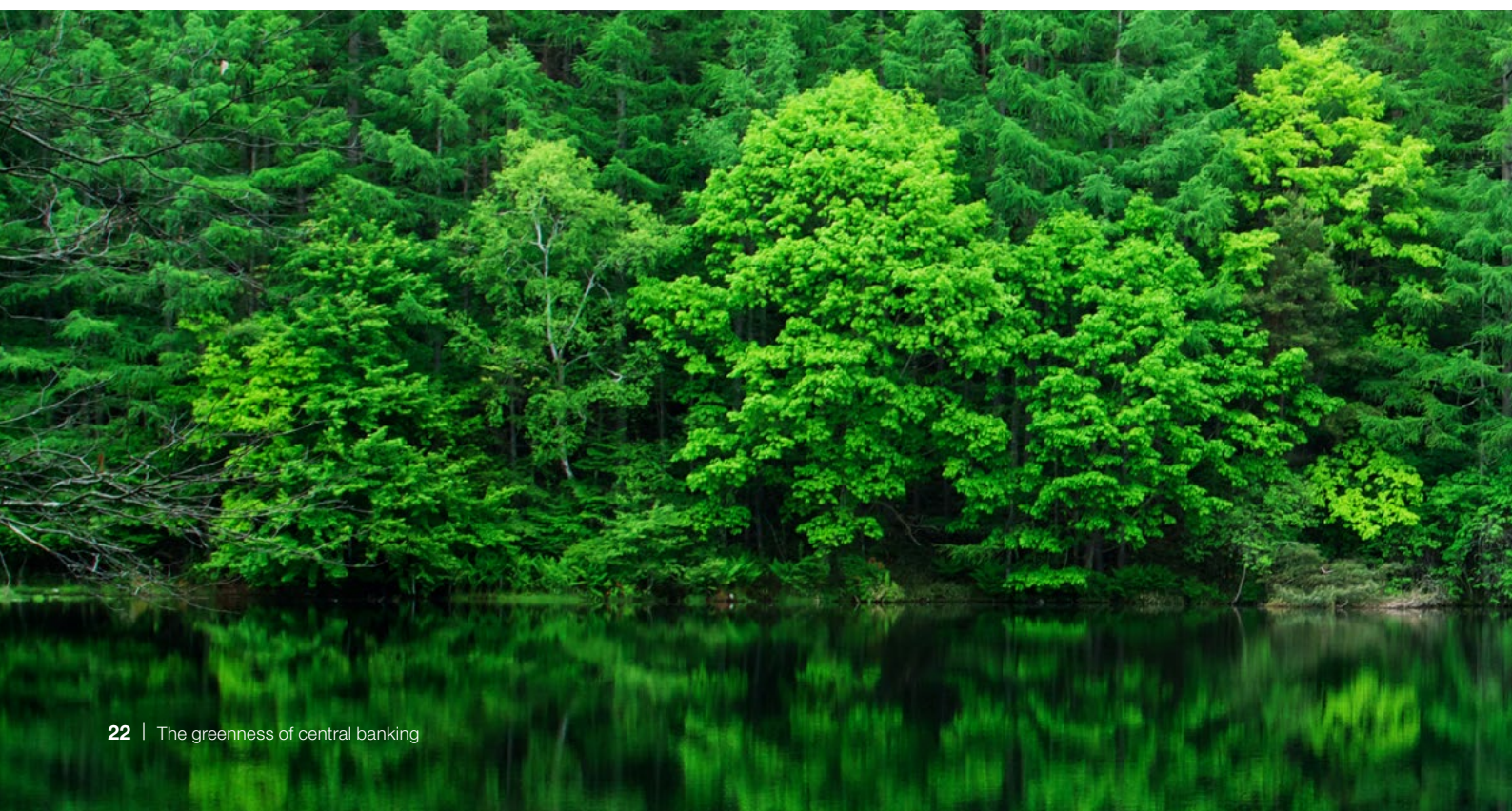






# 7 References

- Arnold, M. and A. Vladkov 2021. “Christine Lagarde expected to make ECB a climate change pioneer”, Article 03.01.2021 in Financial Times.
- Arnold, M. and O. Storbeck, 2019. “Weidmann opposes using monetary policy to fight climate change”, Article 29.10.2019 in Financial Times.
- Bank for International Settlement (BIS), 2019. “Green bonds: the reserve management perspective”, BIS Quarterly Review September 2019.
- Bank of Japan, 2020. “Principle Terms and Conditions for the Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth Conducted through the Loan Support Program”, Terms and Conditions, [https://www.boj.or.jp/en/mopo/measures/term\\_cond/yoryo49.htm/](https://www.boj.or.jp/en/mopo/measures/term_cond/yoryo49.htm/).
- Bleiker, Clara, 2019. “Can central banks fight climate change?”, Article 17.10.2019 in DW.
- BoE, 2016. “Let’s talk about the weather: the impact of climate change on central banks”, Working Paper 603.
- Bolton, P. et al., 2020. “The green swan – Central banking and financial stability in the age of climate change”, Book published by BIS and Banque de France.
- Campiglio et al., 2017. “The climate impact of quantitative easing”, in Nature Climate Change 8(6).
- Die Zeit, 2019. “Eine grüne Geldpolitik ist möglich”, 13 December 2019, Newspaper ‘Die Zeit’.
- Durrani, A. et al., 2020. “The role of central banks in scaling up sustainable finance: what do monetary authorities in Asia and the Pacific think?”, ADBI Working Paper Series No. 1099.
- Eichengreen, B., 2019. “Central Banks Go Green”, Article 07.06.2019 in Finanz und Wirtschaft.
- EU Parliament, 2018. “Annual report: Economic and Monetary Affairs”, Annual Report 2018/2101.
- European Central Bank (ECB), 2020. “Guide on climate-related and environmental risks”, Guide May 2020.
- European Investment Bank (EIB), 2019. “Climate and environmental ambitions of the European Investment Bank Group”, Report 29.01.2020.
- Fender et al., 2020. “Reserve management and sustainability: the case for green bonds?”, BIS Working Paper No. 849.
- Fisher, P. and A. Kern, 2019. “Climate change: the role for central banks”, Paper.
- FRBSF, 2019. “Climate change in the federal reserve”, Economic Letter 2019-09.
- Jacquemart, Charlotte, 2019. “SNB-Direktorin: Nicht unsere Aufgabe, Klimapolitik zu machen”, Article 15.11.2019 in SRF.
- Jain, S., 2020. “Financing India’s Green Transition”, Working Paper No. 338.
- Khalaf, R. and M. Arnold, 2020. “Lagarde puts green policy top of agenda in ECB bond buying”, Article 08.07.2020 in Financial Times





Koumbarakis, A., 2018. *The Economic Theory of Bank Regulation and the Redesign of Switzerland's Lender of Last Resort Regime for the Twenty-First Century*, Schulthess Verlag.

Manning, J., 2019. "Central Banks stepping up the fight against climate change", Article 22.07.2019 in *International Banker*.

Mc Daniels, J. and N. Robins, 2018. "Greening the rules of the game – How Sustainability Factors Are Being Incorporated Into Financial Policy and Regulation", UN Environment Working Paper 18/01.

Meade, E., 2009. "Chapter 3: Political Framework and legal status in 'Issues in the Governance of Central Banks'", Report from the Bank for International Settlements Central Bank Governance Group.

Monetary Authority of Singapore MAS, 2020: <https://www.mas.gov.sg/development/sustainable-finance>, 5 June 2020.

Network of Greening the Financial System (NGFS), 2018. "First Progress Report", Progress Report.

Network of Greening the Financial System (NGFS), 2019. "A call for action – Climate change as a source of financial risk", Working Paper.

Network of Greening the Financial System (NGFS), 2020. "Guide for Supervisors Integrating climate-related and environmental risks into prudential supervision", Working Paper.

Reuters, 2020. "China excludes clean coal projects from list eligible for green bonds", Article, 29 May 2020.

Swiss National Bank (SNB), 2015. "Investment Policy Guidelines of the Swiss National Bank", available at [https://www.snb.ch/en/mmr/reference/snb\\_legal\\_richtlinien/source/snb\\_legal\\_richtlinien.en.pdf](https://www.snb.ch/en/mmr/reference/snb_legal_richtlinien/source/snb_legal_richtlinien.en.pdf).

Swiss National Bank (SNB), 2019. "Climate risks and central banks: an SNB perspective", Money Market Event, Geneva, 14 November 2019.

Swiss National Bank (SNB), 2019. "Sustainability Report 2019", available at [https://www.snb.ch/en/mmr/reference/sustrep\\_2019/source/sustrep\\_2019.en.pdf](https://www.snb.ch/en/mmr/reference/sustrep_2019/source/sustrep_2019.en.pdf).

Swiss National Bank (SNB), 2020. "Introductory remarks by Thomas Jordan", Swiss National Bank news conference from 17 December 2020, available at [https://www.snb.ch/en/mmr/speeches/id/ref\\_20201217\\_tjn/source/ref\\_20201217\\_tjn.en.pdf](https://www.snb.ch/en/mmr/speeches/id/ref_20201217_tjn/source/ref_20201217_tjn.en.pdf).

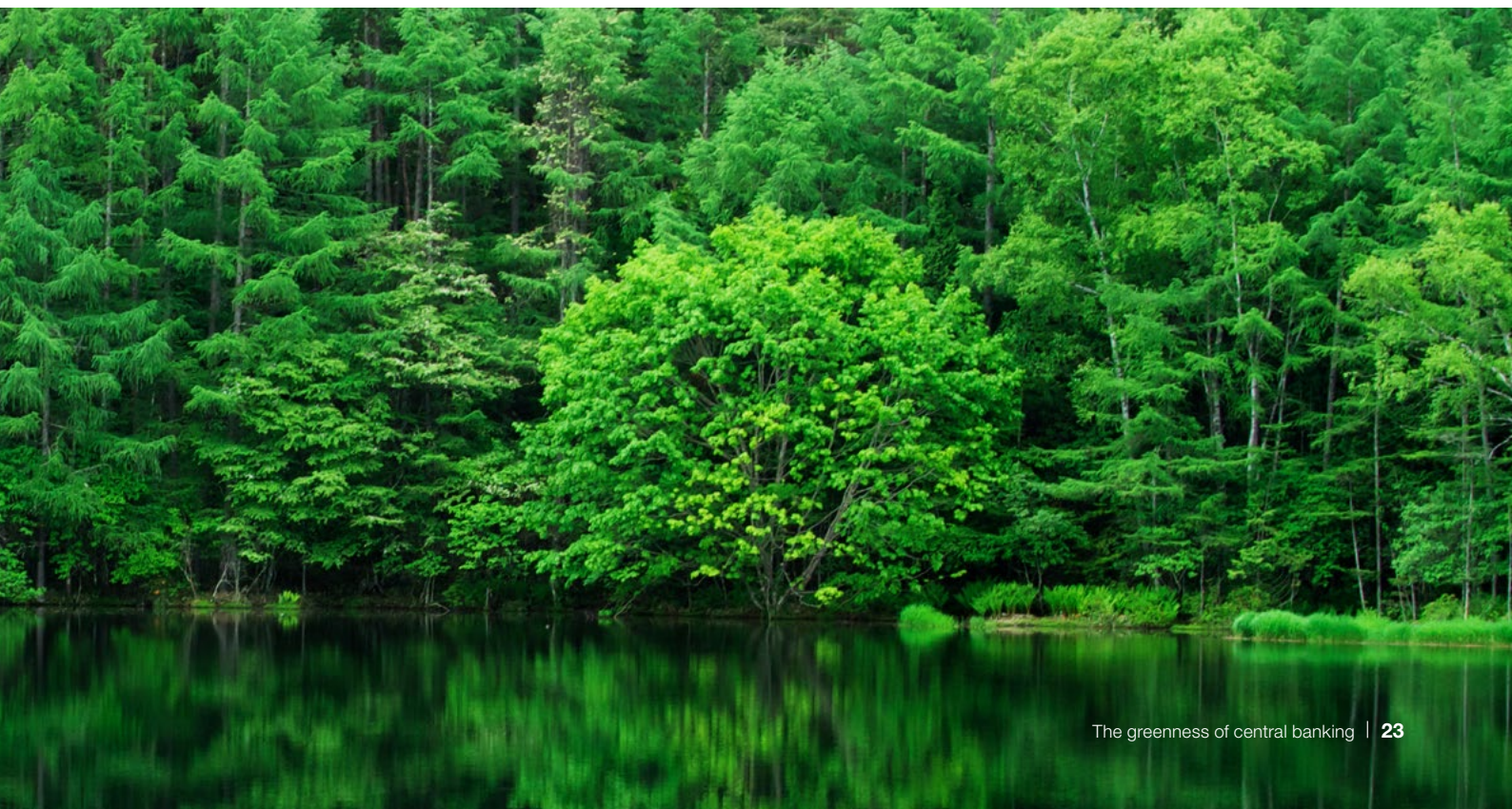
Sveriges Riksbank, 2019. "Flodén: Riksbank selling bonds for climate reasons", Interview, Örebro University and Kommuninvest, Örebro.

UN Environment Inquiry, 2017. "On the role of Central Banks in enhancing green finance", Inquiry Working Paper 17/01.

Visco, I., 2019. "Sustainable development and climate risks: the role of central banks", Speech, at the conference "Make Europe the world champion of sustainable development", Sustainable Development Festival 2019.

Volz, U. and S. Dikau, 2018. "Central banking, climate change and green finance", ADBI Working Paper Series No. 867.

Volz, U. and S. Dikau, 2019. "Central Bank Mandates, Sustainability Objectives and the Promotion of Green Finance", SOAS Department of Economics Working Paper No. 222.





## For more information please contact our experts



**Dr. Antonios Koumbarakis**

Director  
Head Strategic Regulatory and Sustainability  
PwC Switzerland

+41 58 792 45 23  
+41 79 267 84 89  
antonios.koumbarakis@pwc.ch



**Moritz Obst**

Subject-matter expert  
Strategic Regulatory and Sustainability  
PwC Switzerland

+41 58 792 47 19  
+41 79 369 84 29  
moritz.obst@pwc.ch



**Stephan Hirschi**

Director  
Head Sustainability and Climate Change  
PwC Switzerland

+41 58 792 27 89  
+41 79 687 17 78  
stephan.hirschi@pwc.ch