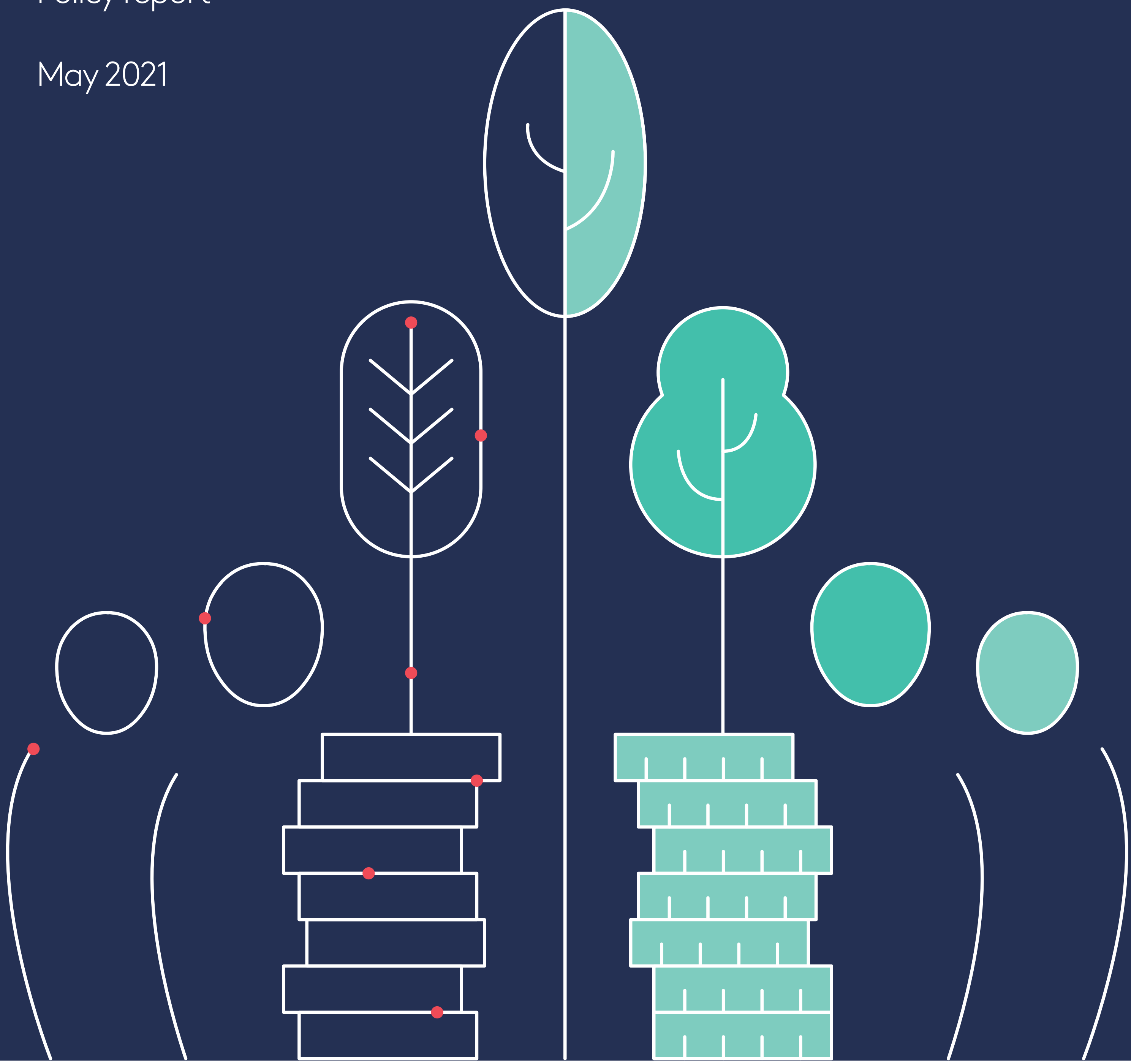
Climate-neutral central banking

How the European System of Central Banks can support the transition to net-zero

Simon Dikau, Nick Robins and Ulrich Volz

Policy report

May 2021



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Contents

List of abbreviations

BdF	Banque de France
BIS	Bank for International Settlements
CSPP	Corporate Sector Purchase Programme
DNB	De Nederlandsche Bank
ECB	European Central Bank
EIOPA	European Insurance and Occupational Pensions Authority
ESCB	European System of Central Banks
ESG	environmental, social and governance
ESMA	European Securities and Markets Authority
GFANZ	Glasgow Financial Alliance for Net Zero
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
JTM	Just Transition Mechanism
NCB	national central bank
NFRD	Non-Binding Guidelines on Non-Financial Reporting Update
NGFS	Network of Central Banks and Supervisors for Greening the Financial System
PEPP	Pandemic Emergency Purchase Programme
PRI	Principles for Responsible Investment
TCFD	Task Force on Climate-related Financial Disclosures
TEG	Technical Expert Group on Sustainable Finance
TFEU	Treaty on the Functioning of the European Union
TLTRO	Targeted Longer-Term Refinancing Operations

Key messages and summary recommendations

The European Union has adopted the goal of becoming climate-neutral by 2050 – in other words, an economy with net-zero greenhouse gas emissions. The primary policy responsibility for delivering this goal rests with the European Commission and the member states' governments. The European Central Bank (ECB) and the EU's national central banks will also need to take action to complement, catalyse and amplify these net-zero policies within the financial system.

The first signs that EU central banks are recognising the imperative of alignment with net-zero are beginning to emerge. A comprehensive approach is now required, not least as part of the ECB's strategy review. To make this happen, the European System of Central Banks (ESCB), with the ECB at its helm, needs to mainstream net-zero across all ESCB operations. Based on the ESCB's mandates, there is a compelling two-fold rationale for doing this: first, net-zero is the best way of minimising the risks of climate change to the stability of the EU economy and financial system; and second, EU central banks and supervisors need to ensure that their activities are coherent with the EU's and member states' climate neutrality policies.

Recommendations for upgrading EU central bank and supervisor approaches in line with climate neutrality

i. Strategy: EU central banks and supervisors need to develop a climate neutrality roadmap, with long-term expectations and near-term actions. This would include the promotion of close liaison between policymakers and central banks. The mission statement of the ECB should be updated to include the EU's climate neutrality objective as part of this.

ii. Prudential regulation: Prudential supervisors in the EU should make climate neutrality a core element of supervisory practice at micro and macro levels, aligning supervisory expectations and prudential instruments with net-zero. This would involve requiring all regulated financial institutions to submit net-zero transition plans. Prudential capital requirements should also reflect financial institutions' exposure to climate risks.

iii. Scenarios: Forward-looking scenarios used by EU central banks and supervisors need to become more consistent with a climate neutrality pathway to limiting warming to 1.5°C and complemented with short-term outlooks.

iv. Monetary policy: The ESCB needs to consistently integrate climate neutrality into monetary frameworks and models to adequately account for the impacts of climate change on macroeconomic outcomes. In addition, central bank instruments and policy portfolios need to become operationally aligned with net-zero.

v. Portfolio management: Sustainable and responsible investment practices in all European central bank portfolios should include a climate neutrality target, and central banks should each publish a transition plan to achieve this.

vi. Just transition: EU central banks should assess the implications of net-zero for jobs and livelihoods and explore policy options to mitigate potential downside sectoral and regional consequences.

vii. International cooperation: Climate neutrality needs to be incorporated into the way that EU central banks operate within key international financial and regulatory frameworks and processes. The EU's central banks have the potential to be global leaders in climate-neutral central banking.

1. Introduction: The need for a climate-neutral European financial system

Achieving climate neutrality by bringing greenhouse gas emissions to net-zero is a core goal of global as well as European climate policy.[1] Together with strengthening resilience to physical shocks and ensuring that the transition process is fair and just, climate neutrality is a key pillar of the European Union's Green Deal programme. In this policy report, we set out why central banks in the EU need to adopt net-zero strategies, and we provide seven concrete recommendations for how they can. The report builds on the global framework set out in our recent publication *Net-zero central banking: A new phase in greening the financial system* (Robins et al., 2021), and applies its approach to the specific priorities and mandates of EU central banks.

The EU is a long-standing climate leader. The European Central Bank (ECB) as well as the wider European System of Central Banks (ESCB) are also scaling up their climate activities. Indeed, developing a strategic response to the risks posed by climate change is a central pillar of the ECB's strategy review, which was launched in early 2020. The review, which is to be concluded by mid-2021, comes at a crucial time as it coincides with the EU's plans to advance the Green Deal as a tool to deliver a sustainable recovery from COVID-19. It will also conclude ahead of the landmark COP26 climate summit in November 2021, where accelerating the mobilisation of net-zero finance will be a top priority.

Given the commitment of the European institutions and governments to net-zero, it is imperative for ESCB central banks and EU supervisors to develop their own net-zero approach aligned with the EU targets. A clear net-zero strategy will be crucial for ESCB central banks to deliver on their mandated goal in the Treaties to maintain price stability, safeguard financial stability and ensure policy coherence by supporting the general economic policies in the EU.

The urgency of the transition and the need to act swiftly

To meet the Paris Agreement target of limiting global warming to well below 2°C and preferably to 1.5°C above the pre-industrial temperature, a comprehensive economic transition to climate neutrality needs to be realised at unprecedented scale and speed.

The Intergovernmental Panel on Climate Change's *Special Report on Global Warming of 1.5 Degrees* (IPCC, 2018) estimated that limiting global temperature increase to 1.5°C requires an annual average investment in the energy system of about US$2.4 trillion (at 2010 values) between 2016 and 2035, corresponding to about 2.5 per cent of world GDP. Importantly, to achieve climate neutrality by 2050, much of this investment will need to be front-loaded: investment precedes emissions reduction.

The European Commission has estimated that an additional €260 billion of investment per year, about 1.5 per cent of 2018 GDP, is needed to achieve the 2030 goals of the European Green Deal (European Commission, 2019b). Others have estimated that investments in renewable energy amounting to around €3 trillion would have to be realised to achieve the EU climate neutrality goal by 2050 (Hainsch et al., 2020). These upfront investments will generate considerable benefits beyond avoiding catastrophic climate change, including helping to reduce dependency on fossil fuel imports, and providing a powerful stimulus for innovation and job creation.

Building a climate-neutral economy not only requires large-scale investment in low-carbon infrastructure and retrofitting existing infrastructure: it also necessitates a swift phasing out of investment in carbon-intensive activities in order to achieve climate neutrality by 2050 (Figure 1 below). Indeed, the transition to a low-carbon economy will entail a large-scale structural change in which industries, especially those directly linked to fossil fuel production and consumption, will have to decline (Semieniuk et al., 2021).

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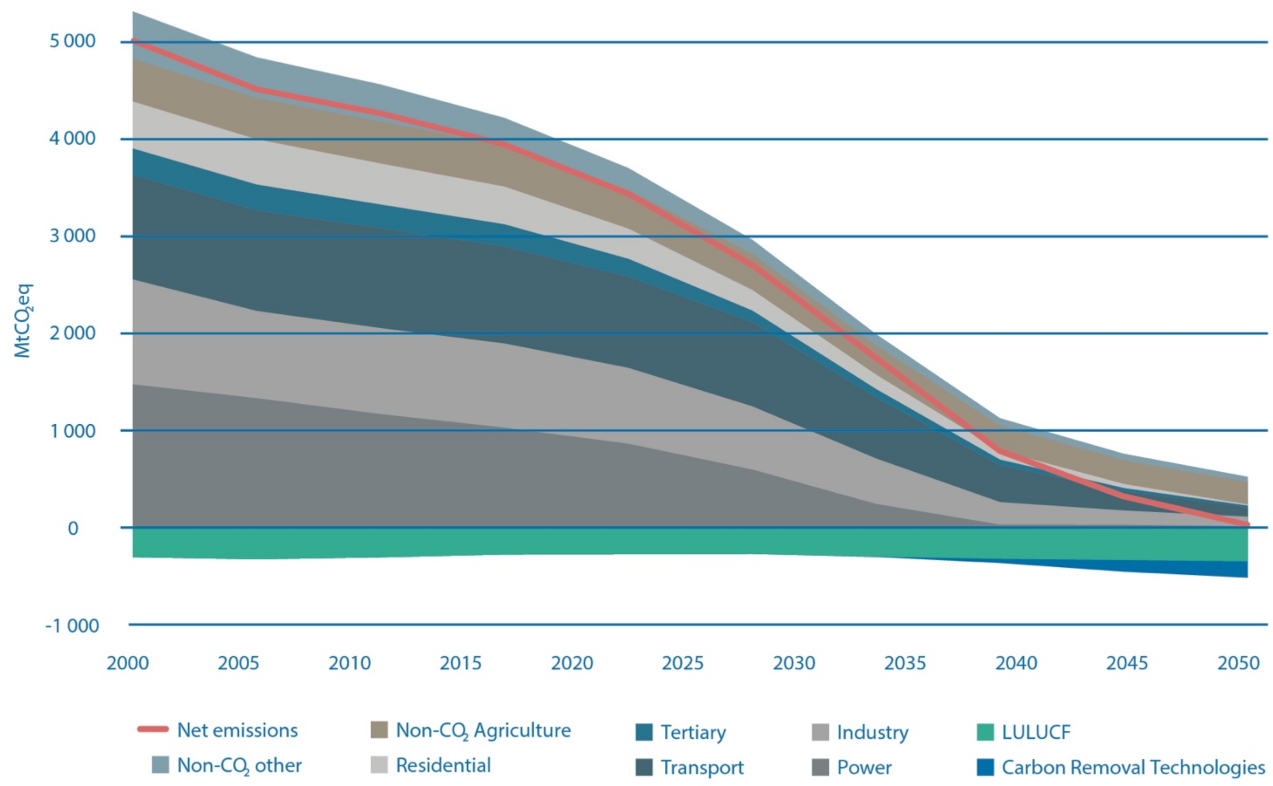
1 The term 'net-zero' refers to the target of reducing the greenhouse gas emissions that cause global warming to zero by balancing the amount released into the atmosphere from various sources with the amount removed and stored by carbon sinks. This is also described as 'carbon neutrality' (while 'carbon neutrality' is the same concept applied to CO_2 emissions only). In this report, net-zero and climate neutrality are used interchangeably. See www.lse.ac.uk/granthaminstitute/explainers/why-is-net-zero-so-important-in-the-fight-against-climate-change/ for a full 'Explainer' about net-zero.

Figure 1. Greenhouse gas emissions trajectory for the EU to achieve climate neutrality by 2050



Notes: $MtCO_2eq$ = million tonnes of carbon dioxide equivalent. LULUCF = land use, land use change and forestry.
Source: Created from European Commission (2019c)

The scale and urgency of the needed changes of economic structures and sectors in the EU, especially in the energy, transport and industrial sectors, which are responsible for almost 90 per cent of CO_2 emissions, is unprecedented. The transition will have to be fast; major changes must be realised in the next five to 10 years to prevent further investments that lock in carbon. It is now widely recognised by central banks that transition risks pose a material threat to financial stability and can also have significant impact on price stability and macroeconomic conditions more broadly (NGFS, 2021). Investors are exposed to carbon-intensive assets that could become stranded, thus bringing new sources of risk for financial stability that could delay the low-carbon transition (Monasterolo, 2020).

The case for aligning the financial system with climate neutrality

According to Mark Carney, the UN Special Envoy on Climate Action and Finance, current calculations suggest that "the financial system as a whole is funding temperature increases of over three degrees centigrade" and there is "a striking gap between what society wants and what the market values" (Carney, 2020).

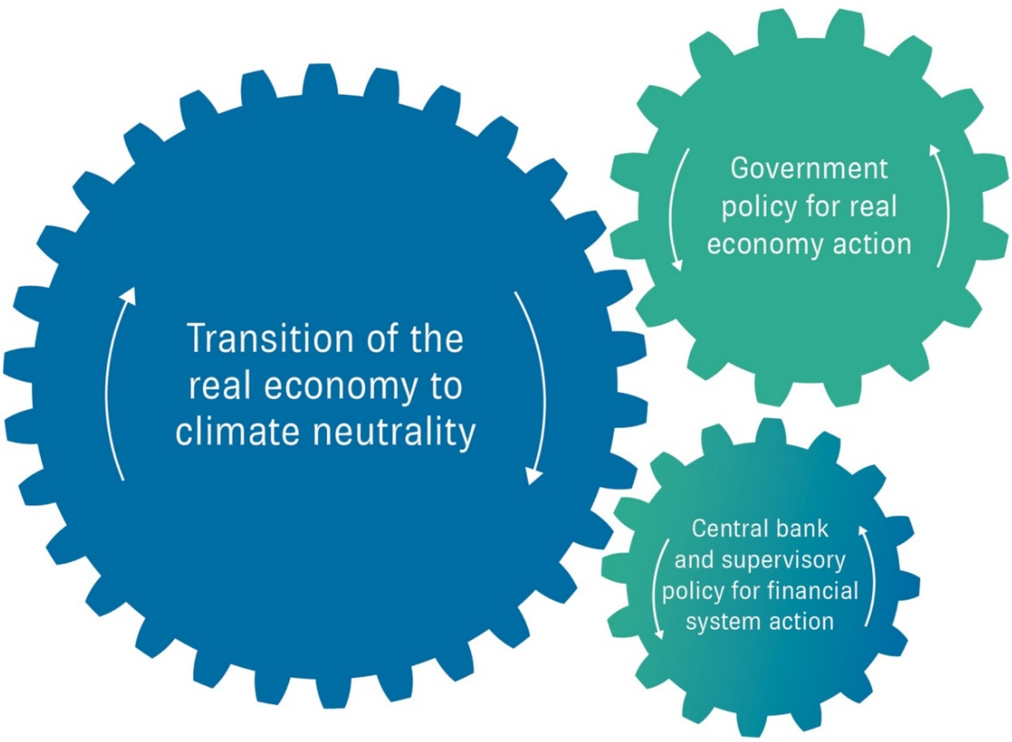
To close this gap, a growing number of investors and banks are making voluntary commitments to align their portfolios with net-zero by 2050. The UN-convened Net-Zero Asset Owners Alliance has led the way, bringing together more than 30 pension funds and insurers with over US$5 trillion in assets (UNEP FI and PRI, 2020). Banks have followed, often prompted by investors to take action, and nearly 40 banks with over $15 trillion in assets have supported a collective commitment to action and started to report on progress (CCCA, 2020). Asset managers with $32 trillion in assets have also established their own net-zero coalition to support the goal of net-zero emissions by 2050 or sooner, in line with global efforts to limit warming to 1.5°C (NZAM, 2020). In April 2021, these initiatives came together in the industry-led and UN-convened Glasgow Financial Alliance for Net Zero (GFANZ), involving more than 160 firms responsible for over $70 trillion of assets, who have committed to apply science-based guidelines to reach net-zero emissions and to cover all emission scopes.

These pledges are important but they will be insufficient to deliver a climate-neutral financial system. One of the GFANZ members is Allianz and its CEO, Oliver Bäte, has stressed the need "to move from something that is voluntary and a coalition of the willing to making it mandatory in the financial sector to drive to net-zero" (Bäte, 2021). The definition of what a credible net-zero transition plan entails is still at an early stage. Without market-wide standards and enforcement, there is a risk of greenwashing. In addition, there is no guarantee that voluntary commitments will be adequate at an aggregate level to deliver the transition. Furthermore, achieving net-zero portfolios may not always be consistent with the underlying goal of establishing a climate-neutral economy.

Given the scale and necessary speed of the needed economic transition to reach the climate neutrality objective by 2050, there is no scenario in which central banks can remain passive, as to do so would potentially slow-down the transition through insufficient financial system action and alignment. As Frank Elderson, executive board member of the European Central Bank, and Sabine Mauderer, member of the executive board of the Deutsche Bundesbank, observed recently: "While we cannot take on the tasks of governments, we also cannot be mere bystanders in the transition to a net-zero economy" (NGFS, 2021).

As guardians of the financial system, the ECB and national central banks (NCBs) need to consider how they can support a speedy reorientation of lending and investment across the EU in line with the EU's climate neutrality goal. To achieve this, it is now vital that the ECB and the NCBs establish a systematic approach that mainstreams net-zero across all ESCB operations in order to support the alignment of the financial sector with the EU's climate neutrality goal and ensure policy coherence. Figure 2 shows how government policy will have to come together with financial policy and system action to effectively drive the transition to a climate-neutral economy.

Figure 2: How government policy and financial system action can deliver climate neutrality



In highlighting the crucial role that central banks ought to play, we do not want to diminish the leading role that governments must take in setting the policy frameworks, as without this a net-zero transition cannot succeed. Indeed, there are many areas where central banks will have to rely on government policies and regulations. It is true that central banks can play an important role by complementing, catalysing and amplifying governments' net-zero policies, but they cannot substitute these. Within their mandates, central banks need to strike the right balance between anticipating and addressing macrofinancial risks to the economy, and supporting governments' economic and climate policies.

Structure of the report

The remainder of this report is structured as follows:

- Section 2 sets out the EU's climate neutrality policy objective.
- Section 3 then explores the implications of this goal for European central banks, considering their mandates and objectives.
- Section 4 outlines concrete recommendations across seven focus areas for the ESCB central banks to align their monetary and prudential policies with climate neutrality and contribute to building a net-zero financial system.
- Section 5 concludes.

2. Climate neutrality as a policy priority for the EU

The recent policy context

The goal of net-zero was embedded in the 2015 Paris Agreement and came to life following the IPCC's 2018 *Special Report on Global Warming of 1.5 Degrees*. Holding global warming to 1.5°C with no or limited overshoot requires global net human-caused emissions of carbon dioxide to fall by about 45 per cent from 2010 levels by 2030, reaching 'net-zero' around 2050; emissions of greenhouse gases other than CO_2 also need to decline substantially (IPCC, 2018).

In line with this assessment, the European Commission presented in 2018 its vision for achieving net-zero greenhouse gas emissions in the EU by 2050, looking at all key sectors of the economy and society (European Commission, 2018). In March 2019, the European Parliament supported the objective of making the EU climate-neutral by 2050. This vision was later reaffirmed in the European Green Deal, the Commission's action plan to make Europe the first climate-neutral continent by 2050, while ensuring a just and inclusive transition (European Commission, 2019c). This goal has been endorsed by both the European Council and the European Parliament in its resolution on the European Green Deal in January 2020.

In March 2020, the European Commission presented a proposal to make this political commitment legally binding (European Commission, 2020b). As part of the Green Deal, the Commission has proposed the first European Climate Law, which, if adopted by the Parliament and the Council, will make the climate neutrality objective legally binding (European Commission, 2020c). The European Parliament and Council reached a provisional agreement on the Climate Law Regulation in April 2021. The proposed law "sets the 2050 target and the direction of travel for all EU policy, and gives predictability for public authorities, businesses and citizens" (European Commission, 2020a). The proposed law defines climate neutrality as meaning achieving net-zero emissions by 2050 at the latest, covering all greenhouse gases, not just carbon dioxide.[2] EU-wide emissions need to be balanced by removing greenhouse gases from the atmosphere, which can be achieved through negative emissions technologies, such as protecting and increasing natural sinks, and investing in carbon capture technologies.

Under the proposed law, the EU institutions and the member states are bound to take necessary measures to meet the objective at the EU and national level, respectively, taking into consideration the importance of promoting fairness and solidarity among member states. The law aims to ensure that all EU policies and all sectors are in line with this objective.

Five EU member states have already incorporated a net-zero emissions target into law. Sweden is bound to reach net-zero emissions by 2045 and Denmark, France, Germany[3] and Hungary by 2050 (European Parliament, 2020).[4] In addition, a growing number of EU companies and financial institutions are setting their own net-zero targets for 2050 and are highlighting how these plans would be achieved.

Scaling up sustainable finance

Mobilising the finance needed to deliver these targets has been a core priority, as set out in the *Action Plan on Financing Sustainable Growth* (European Commission, 2018); this built on the recommendations of the High-Level Expert Group on Sustainable Finance (2018). The *Action Plan* sets out a comprehensive strategy to further connect finance with sustainability in Europe and includes 10 major actions points, focusing on first, reorienting capital flows towards a more sustainable economy; second, mainstreaming sustainability into risk management, and third, fostering transparency and long-termism. Furthermore, the European Green Deal also recognises sustainable finance as key for mobilising the necessary capital:

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2 The IPCC defines climate neutrality as a state in which human activities result in no net effect on the climate system. This would require balancing emissions with removal of CO_2, but also accounting for the biogeophysical effects of human activities which, for instance, affect surface albedo or local climate.

3 A German court ruling in April 2021 stated that the national net-zero law from 2019 did not go far enough to ensure climate protection, and requiring that the Government propose significant economic restructuring and plans to reduce emissions by 65% from 1990 levels by the end of the decade and to achieve climate neutrality by 2045 (BMU, 2021).

4 This is occurring within a global context where 127 countries, responsible for around 63 per cent of emissions, are considering or have adopted net-zero targets already, including Japan, South Korea, the UK, the US (all for 2050) and China (for 2060) (CAT, 2020).

a European Green Deal Investment Plan has been proposed, which outlines how at least €1 trillion of sustainable investments would have to be mobilised over the next decade (European Commission, 2020d). The design of the second phase of the EU's sustainable finance strategy is currently underway (European Commission, 2020e).

Using a common classification system: the Taxonomy

A key element of the *Action Plan on Financing Sustainable Growth* has been the development of a common classification system for sustainable economic activities, the so-called EU Taxonomy. The Taxonomy is designed to provide robust, science-based environmental performance criteria for green economic activities. The Taxonomy Regulation, which is based on the advice of the Technical Expert Group (TEG) on Sustainable Finance, entered into force on 12 July 2020 (European Parliament and European Council, 2020).

The Taxonomy establishes six environmental objectives:

- Climate change mitigation (which is the focus of net-zero)
- Climate change adaptation
- Sustainable use and protection of water and marine resources
- Transition to a circular economy
- Pollution prevention and control
- Protection and restoration of biodiversity and ecosystems.

Based on these objectives, a unified classification system for sustainable activities has been established, which has direct implications for the alignment of central banking operations, as noted by the ECB (2020a). The Taxonomy Regulation also tasks the Commission with establishing technical screening criteria through Delegated Acts. The first of these has been published to define the technical screening criteria for economic activities that can make a substantial contribution to climate change mitigation and adaptation (European Commission, 2021a).

3. Foundations for climate-neutral central banking in the EU

The primary policy responsibility for delivering climate neutrality rests with the EU and its member states. However, the EU's central banks will need to play an essential role to complement, catalyse and amplify these policy signals across the financial system.

The question for the ESCB is no longer *whether* it should respond to climate change, but rather *how* (Schnabel, 2021a). Out of the 28 ESCB central banks (and 20 Eurosystem central banks), 24 (including all 20 Eurosystem central banks) are members of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), which has grown more than tenfold from eight institutions since its launch in December 2017. Most, if not all, ESCB institutions and European supervisors have begun to explore the direct implications of climate change for their operations and are signalling a range of new expectations in terms of micro- and macroprudential management.[5] Moreover, they are considering how to integrate climate-related impacts into their monetary policy framework and manage their own portfolios in line with sustainable investment principles. Overall, EU central banks and supervisors are deliberating increasingly ambitious plans to respond to the macrofinancial stability threat posed by climate change.

At a strategic level, the ECB frames its current response to climate change with a focus on the identification of physical and transition risks. The ECB highlights four priority areas:

(i) Economic analysis, ensuring that climate change is integrated in the ECB's macroeconomic models, forecasting methods, and risk assessments

(ii) Banking supervision, aiming to ensure that banks manage climate-related risks adequately

(iii) Monetary policy and investment portfolios

(iv) Financial stability, by measuring and assessing the systemic financial stability implications of climate change (ECB, 2021a).

The ECB has also established a Climate Change Centre to shape its climate agenda and mainstream climate considerations across all its operations. Climate factors are also an essential part of the ECB's ongoing monetary policy strategy review, which was launched in early 2020. To date, however, the climate response from ESCB institutions has largely been framed without a clear positioning with regard to the EU's climate neutrality target, and without considering the double materiality of their own actions.[6]

The rationale for supporting climate neutrality

The question of why the EU's central banks should care about climate change and how climate neutrality fits into mandates is at the core of the discussion of policy coherence between the operations of the ESCB and the climate neutrality policy targets in the EU. Identifying the relevant policy space within the limits set by the European Treaties is key to finding a systemic perspective, addressing both micro- and macroprudential risks, and, by implication, working to ensure that all financial flows become aligned with net-zero.

[5] Other European central banks are deepening their response to the threat of climate change. The United Kingdom, for example, has also made achieving net-zero by 2050 a legally binding commitment. It has translated this into an updated statement of economic strategy, which it has communicated to the central bank, the Bank of England. Following the explicit inclusion of 'net-zero transition' as a government priority in the Bank of England's March 2021 MPC Remit Letter, the Bank (a former ESCB member) signalled action to evaluate how to address the climate impact of its corporate asset purchase programme (Bank of England, 2021; HM Treasury, 2021).

[6] Double materiality is an extension of the accounting concept of materiality of financial information. Double materiality also assesses the impacts of a company on climate – or any other dimension of sustainability – in addition to the material impact that climate-related factors can have on the company. See Täger (2021).

A compelling dual rationale for climate-neutral action by ESCB institutions exists:

- First, achieving a net-zero economy is the best way of minimising the risks of climate change to price stability and the stability of the financial system.
- Second, central banks and supervisors need to ensure that their activities are coherent with net-zero government policy, in this case those of the EU and its member states, and to support these policies where possible.

Based on these foundations, a clear net-zero strategy is now crucial for central banks to deliver on their mandated goal of the Treaties to maintain price stability, safeguard financial stability and ensure policy coherence by supporting the general economic policies in the EU. In the following, we explore how this dual rationale for net-zero central banking relates to the specific mandates of EU central banks and supervisors, which are being revisited in light of new challenges that were outside of scope when the ECB's mandate was drafted 30 years ago with a narrow focus on preventing inflation (de Boer and van 't Klooster, 2020).

Macroeconomic and financial stability

The ESCB's primary objective is to maintain price stability, as stated in Article 127(1) of the Treaty on the Functioning of the European Union (TFEU). The relevant implications of climate change relate to physical as well as transition risks, where shifting to a climate-neutral EU can have direct and indirect implications for consumer prices. The financial stability implications of the net-zero transition and structural changes can also affect the effectiveness of monetary policy. NGFS-led research by the Bundesbank has highlighted the challenges climate change can present for the conduct of monetary policy (NGFS, 2020a). In particular, the NGFS emphasised that "Climate change and its mitigation will increasingly affect key macroeconomic variables for the conduct of monetary policy across many different time horizons" and that "These effects may be relevant to monetary policy even if they only materialise beyond the conventional three- to five-year policy horizon" (2020a: 3). Furthermore, an early and smooth transition is the scenario that minimises risk of instability for the financial system and limits the long-run disruption for the economy, businesses and livelihoods (e.g. probabilities of default are lower in the case of an early and smooth transition than in the case of a disorderly transition or in a 'hothouse Earth' scenario) (De Guindos, 2021).

Acknowledging and addressing the financial instability implications of climate change (e.g. Bolton et al., 2020) has been the starting point for most central banks and supervisors. All NGFS members have recognised that climate-related risks are a source of financial risk and are therefore within the mandates of central banks and supervisors (NGFS, 2018). Interestingly, Article 127 of the TFEU, which contains the objectives and tasks of the ECB/ESCB, does not explicitly point to any clear, unambiguous role for the ECB regarding financial stability (Mersch, 2018). Nor is financial stability one of the four basic tasks referred to in Article 127(2). However, the Treaty explicitly requires the ESCB to contribute to financial stability and efficiency by "promot[ing] the smooth operation of payment systems" (127(2)) and by "contribut[ing] to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions and the stability of the financial system" (Article 127(5)). Moreover, as pointed out by Papademos (2006), the ECB has a special interest in a stable and efficient financial system "because there are close complementarities between price stability on the one hand, and financial efficiency and financial stability on the other". The importance the ESCB ascribes to financial stability is also reflected in the Eurosystem Mission Statement, which explicitly states that "we aim to safeguard financial stability" (European Central Bank, 2021). Importantly, several NCBs are also directly responsible for prudential supervision (see Table 1).

Table 1: Mandates of the EU's national central banks and policy coherence

Central bank of	Secondary national mandate to support government policies	National banking supervisor	National net-zero law
Eurozone	-	-	Proposed legislation
Austria	No*	Separate	In policy document
Belgium	No	CB	
Cyprus	Yes	CB	
Estonia	No	Separate	
Finland	No	Separate	In policy document
France	Yes	Separate	In law
Germany	No	Separate	In law (2030 target)
Greece	Yes	CB	
Ireland	No	CB	In policy document
Italy	-	CB	
Latvia	No	Separate	
Lithuania	Yes	CB	
Luxembourg	No	Separate	
Malta	No	Separate	
Netherlands	No	CB	
Portugal	No	CB	In policy document
Slovakia	No	CB	
Slovenia	No	CB	In policy document
Spain	No*	CB	Proposed legislation
Non-Eurozone			
Bulgaria	-	CB	
Croatia	No	CB	
Czech Republic	Yes	CB	
Denmark	No	Separate	In law
Hungary	Yes	CB	In law
Poland	Yes	Separate	
Romania	No	CB	
Sweden	No	Separate	In law

*Note: *The secondary objectives of the central banks of Austria and Spain included employment and/or growth references.*

Source: IMF Central Bank Legislation Database, Energy & Climate Intelligence Unit Net Zero Tracker, European Parliament (2020)

In this contributory role, the ESCB is tasked to offer advice to the relevant authorities of the member states concerning prudential supervision (under ESCB/ECB Statute, Article 25; TFEU Article 127(4)), which is a strategic role through which a comprehensive net-zero strategy could be developed and recommended. Furthermore, under Article 127(6) of the TFEU (also reflected in Article 25 of the Statute of the ESCB), the Council is permitted to confer specific tasks upon the ECB concerning prudential supervision. This provision was activated through the establishment of the Single Supervisory Mechanism (SSM), which also outlines specific macroprudential tasks and tools (conferred on national authorities), of which a high-level alignment with the net-zero transition should be explored.

Policy coherence

Operationalising climate neutrality in the context of policy coherence is critically important to ensure that the actions of central banks are not perpetuating a high-carbon status quo in financial markets that delays a transition in the real economy. The question of policy coherence is particularly relevant for monetary policy because of the significant size of central banks' balance sheets and the increased impact on the economy and financial markets. Here it will be vital to ensure that a climate-neutral calibration of instruments does not impair central banks' ability to exercise their primary functions and to avoid potential conflicts associated with a 'supportive role' of central banks. In this context, the NGFS has highlighted in a recent publication how this is possible as well as the associated technical hurdles (NGFS, 2021).

The TFEU sets out that "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" (TFEU, Article 127 (1)). The referenced TEU Article 3 outlines what the ESCB is tasked to contribute to, namely to "the sustainable development of Europe based on [...] a high level of protection and improvement of the quality of the environment". This clearly means that the ESCB's mandate does indeed include, *inter alia* and without prejudice to the objective of price stability, supporting the EU's environmental objectives (Volz, 2017). As pointed out by ECB Board Member Frank Elderson (Elderson, 2021): "This mandate, which is sometimes referred to as the ECB's 'secondary objective', stipulates a duty, not an option, for the ECB to provide its support." In addition, ECB Board Member Isabel Schnabel has argued that, "if faced with a choice between two monetary policy measures that have the same impact on price stability, the ECB would have to choose the one that is more in line with EU policies" (Schnabel 2020).

Furthermore, there are two additional provisions that can be seen to establish the legal basis for the policy coherence argument, which are separate from the ECB's mandate but still impose obligations on the ECB (ClientEarth 2021). Unlike the secondary mandate, they are not expressed to be 'without prejudice' to the primary mandate. First, TFEU Article 7 establishes the principle of consistency/coherence and demands that the EU ensures policy consistency, and second, TFEU Article 11 introduces the principle of environmental integration, which requires the EU to integrate environmental protection requirements into the definition and implementation of its policies. Elderson (2021) also refers to these provisions and argues that "these provisions, although not conferring a specific mandate for ECB climate change action, do require us to take into account the EU's environmental objectives and policies when pursuing both our primary and secondary objectives".

In this context, an important discussion has emerged over the applicability of the 'market neutrality principle' as a guiding principle for the ESCB. The last part of Article 127(1) states that "The ESCB shall act in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources, and in compliance with the principles set out in Article 119." The interpretation of conventions and operational principles, including the 'market neutrality principle', is highly relevant for the ECB and the ESCB central banks in face of a pending climate and environmental crisis about which their mandates have little to say. The concept of market neutrality, which is only vaguely enshrined in the ECB's mandate (de Boer and van 't Klooster, 2020), is one of the most influential conventions that has been discussed as a central obstacle to changing the calibration of monetary policy instruments to contribute to, or at least not impede, a net-zero transition (Matikainen et al., 2017; Schoenmaker, 2021).

In addition to Article 127 (1), the reference to the principle of an open market economy with free competition (mentioned in Article 119 TFEU and Article 2 of the ESCB/ECB Statute), is understood by the ECB, at least implicitly, as the legal foundation for the market neutrality principle (Lagarde, 2019a). In a written response to MEP Ernest Urtasun, Christine Lagarde (Lagarde, 2019b) describes the principle as the "most appropriate concept" to meet the ECB's obligations under Articles 127/119 of the TFEU. However, these vague legal provisions have led to a discussion about whether the principle of market neutrality is enshrined in the EU Treaties at all and ClientEarth has argued that "it is rather a principle developed by the ECB which it previously considered to be the most appropriate concept to ensure the effectiveness of monetary policy while reflecting the requirement to 'act in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources' per Articles 127(1) and 119(2)" (ClientEarth, 2021).

In practice, the ECB, as well as other central banks, utilises the market neutrality principle as a core concept guiding the implementation of monetary policy. In the context of ensuring policy coherence with climate neutrality, an understanding of market neutrality by central bankers that defines being neutral as closely aligning their interventions with the allocation prevailing on capital and debt markets will have to be rethought in the context of other shortcomings (Senni and Monnin, 2020). The traditional market-neutral stance fails to recognise the double materiality of climate-related financial risks: central banks themselves would contribute to climate-related risks by not aligning their monetary policies and accepting exposition to transition risks (Oustry et al., 2020). In the context of the persistent market failures that have caused the climate crisis, the traditional market-neutral approach to asset purchase and refinancing reproduces a high-carbon status quo. Based on the recognition of this fundamental shortcoming of the market neutrality principle, the need for alternatives at the EU level is being discussed. Olaf Sleijpen, Executive Board Member of De Nederlandsche Bank, argues that "market failures that distort relative prices may be a reason to use other concepts of market neutrality that better reflect climate-related risks and externalities" (Sleijpen, 2021a).

The objectives outlined in the Treaties are present in Article 2 of the ESCB/ECB Statute and apply to the ECB as well as the NCBs of all EU member states. The NCBs within the Eurosystem are bound by the provisions of the TFEU and the ESCB/ECB Statute, and must operate according to the guidelines and instructions of the ECB, which means they are bound by all legal acts adopted by the ECB decision-making bodies (TFEU, Article 132 and ESCB/ECB Statute, Article 34). This means that they cannot conduct independent national monetary and exchange-rate policy, but are limited to the implementation of EU policies within their territories. The relationship between the ECB and the NCBs is governed by the 'principle of decentralisation': the ECB may, to the extent deemed appropriate and possible, turn to the NCBs to carry out the tasks that fall to the ESCB and the Eurosystem (Gortsos, 2020). In addition, the NCBs may undertake other functions on top of the ones provided for by the ESCB/ECB Statute, except if the Governing Council considers them incompatible with the objectives and tasks of the Eurosystem (ibid.). This is relevant insofar as the national mandates of some NCBs comprise a secondary objective to support national government policies (Table 1), which in some cases may go beyond the European goals. In any case, the ECB and the NCBs ought to ensure policy coherence with European and, if applicable and in line with ESCB policies, also national goals.

4. Recommendations

Based on this analysis, we recommend that the ESCB institutions update their current approaches and measures in line with climate neutrality. Specifically, this involves action in seven areas:

i
- **Strategy:** European central banks and supervisors need to develop a climate neutrality roadmap including long-term expectations and near-term actions. This would include the promotion of close liaison with between policymakers and central banks. The mission statement of the ECB should be updated to include the EU climate neutrality objective.

ii
- **Prudential regulation:** Prudential supervisors in the EU should make climate neutrality a core element of supervisory practice at micro and macro levels, aligning supervisory expectations and prudential instruments with net-zero. This would involve requiring all regulated financial institutions to submit net-zero transition plans.

iii
- **Scenarios:** Forward-looking scenarios used by EU central banks and supervisors need to become more consistent with a climate neutrality pathway to limiting warming to 1.5°C and complemented with short-term outlooks.

iv
- **Monetary policy:** The ESCB needs to consistently integrate climate neutrality into monetary frameworks and models to adequately account for the impacts of climate change on macroeconomic outcomes. In addition, central bank instruments and policy portfolios need to become operationally aligned with net-zero.

v
- **Portfolio management:** Sustainable and responsible investment practices in all EU central banks' portfolios should include a climate neutrality target, and each central bank should publish a transition plan to achieve this.

vi
- **Just transition:** EU central banks should assess the implications of net-zero for jobs and livelihoods and explore policy options to mitigate potential downside sectoral and regional consequences.

vii
- **International cooperation:** Climate neutrality needs to be incorporated into the way that EU central banks operate within key international financial and regulatory frameworks and processes. The EU's central banks have the potential to be global leaders in climate-neutral central banking.

i) Strategy

The ECB, other ESCB institutions, and EU supervisors need to develop a net-zero roadmap that includes long-term expectations and near-term actions. This needs to be based on liaison and coordination between central banks, supervisors and policymakers at the EU and national levels to align operations with the EU's climate neutrality plan. As part of this roadmap, the mission statement of the ECB should be updated to include supporting the policies of the EU and its member states that are aimed at aligning the financial system with climate neutrality.

Providing independent advice to governments on what the financial system needs to do to facilitate the transition will be a vitally important role for EU central banks and supervisors in terms of both real economy policies (e.g. carbon pricing), but also in terms of financial system reforms to achieve an effective intermediation of net-zero investment. Close cooperation in delivering net-zero will be crucial to deliver the financial shift at speed and scale. Retrofitting Europe's building stock is a case in point, where building regulations, energy labelling, public finance as well as the prudential supervision of mortgage portfolios need to be aligned.

In order to build a high-level net-zero strategy, the ESCB and its member institutions must set out the direction and speed for climate action of the financial industry and systems they oversee to move towards alignment with the EU's climate neutrality ambitions. A high-level roadmap that includes steps to achieve alignment of central banks' own operations, as well as wider capital flows within the EU's financial system, is needed.

Finally, it is important to recognise data availability as a strategic topic. Central banks do not find themselves in a situation where all the desired information is available within the timeframe in which the transition to climate neutrality will have to be achieved. On a strategic level, central banks will have to get used to operationalising action in the context of uncertainty, and imperfect data quality and availability. A common bottleneck for the implementation of most of these recommendations is the availability and accuracy of data, which constrains the development of risk-metrics (NGFS, 2021). While central banks are able to play a catalytic role in improving data quality and availability (e.g. by introducing data disclosure requirements), it will be necessary for central banks and supervisors to define their tolerance to data uncertainty. While some have argued that there is already enough robust data and metrics available on carbon emissions, climate risks and environmental sustainability, it will be important to recognise that, given the urgency to adapt to and mitigate climate change, waiting for 'perfect' data before acting is not a feasible possibility. Clearly, central banks and supervisors ought to play an important role in improving the data situation by identifying existing fit-for-use metrics that they, but also financial institutions, can then use to address informational market failures.

ii) Prudential regulation

Prudential supervision should be built around the EU's climate neutrality target and net-zero should be made a core element of supervisory practice at the micro and macro levels, aligning supervisory expectations and prudential instruments with net-zero.[7] Financial stability in the EU is a policy area where EU-level as well as national authorities, expert bodies and politically accountable institutions need to cooperate, with no one having exclusive responsibility (Mersch, 2018). In this context, the ECB is well suited to offer, in its contributing advisory capacity, guidance on the incorporation of the high-level net-zero targets of the EU.

Increasing efforts by banking supervisors

ECB Banking Supervision is signalling action specifically with regard to supervisory expectations of how private banks should manage climate risks through conducting a climate stress test, as well as action on integrating climate risk in all risk management processes of banks. Prudential rules in the EU require banks to identify, manage and disclose all material risks to which they are exposed. In view of this, the ECB published a guide on climate-related and environmental risks in late 2020, outlining how banks are expected to perform self-assessment on ECB expectations, and setting out the ECB's plans to fully review banks' practices in 2022, and conduct a supervisory stress test in 2022 that will also focus on climate-related risks (ECB, 2020b). At the national level, Banco de Portugal has, for example, established supervisory expectations on the management of climate- and environment-related risks, building on the expectations outlined by the ECB (Banco de Portugal, 2021).

In its report on institutions' climate-related and environmental risk disclosures, the ECB found that banks are lagging behind on these disclosures and argued that banks need to make significant efforts to better support their disclosure statements with relevant quantitative and qualitative information (ECB, 2020c). ECB research is exploring the implications of climate change for the stability and performance of the financial sector (Belloni et al., 2020; Pagliari, 2021).

Building on its *Action Plan on Sustainable Finance*, the European Banking Authority has launched a consultation on incorporating ESG risks into the governance, risk management and supervision of credit

[7] Supervision in the EU is conducted under the network of the European System of Financial Supervision (ESFS), which includes EU-level (the three European Supervisory Authorities, and the European Systemic Risk Board [ESRB]) as well the national supervisors.

institutions and investment firms (EBA, 2020). The other European supervisory authorities – the European Securities and Markets Authority (ESMA) and the European Insurance and Occupational Pensions Authority (EIOPA) – have also begun to address climate risks. ESMA has developed a *Strategy on Sustainable Finance* (ESMA, 2020), while EIOPA has worked on developing a stress test framework on climate change (EIOPA, 2020). NCBs and national supervisory authorities across Europe have also worked on integrating climate risks into prudential frameworks.

European central banks and supervisors need to go further and make sure that prudential approaches are aligned with the EU's net-zero target across banking, investment, insurance and capital markets. Proposals to enhance the identification and assessment of climate-related financial risks in the EU (Faiella and Malvolti, 2020) can serve as a foundation to further strengthen disclosure and understand the implications of net-zero alignment. A crucial next step would be to require all regulated financial institutions (banks, insurance firms, pension funds, asset managers) in the EU to disclose climate-related financial risks and to submit net-zero transition plans setting out how portfolios and loan books could become progressively compatible with a move to a climate-neutral economy (Caldecott, 2020; Robins, 2020).[8]

The critical role of mandatory transition plans

Transition plans are important for microprudential supervision as they help to establish a strategic approach to climate risk management, but they also help to develop an aggregate assessment of the financial system as a whole (Bank of England, 2020). Transition plans can also serve as an important forward-looking risk management tool and should be required by European supervisors from financial institutions as evidence of the ability to manage the risks from a net-zero transition. They would also help supervisors to move from a primary focus on historical data towards forward-looking indicators, thereby aiding mitigation of the significant limitations in terms of data and methodologies on physical and transition risks that can lead to an assessment that finds these climate risks to have only a limited and non-critical impact (e.g. Bernardini et al., 2021). To ensure that transition plans are meaningful and to avoid greenwashing, clear guidance is needed. Central banks or supervisors could play an important role in the assessment of the credibility of the net-zero transition plans submitted by financial institutions. Finally, European prudential authorities need to systematically integrate climate risks in microprudential polices, and especially also into the ECB's comprehensive macroprudential policy framework aimed at containing systemic risk and thus ensuring financial stability (Cabral et al., 2019).

Strengthening net-zero disclosure

Disclosure requirements provide the basis for numerous prudential measures. Here, the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) are the most widely accepted framework. The TCFD's most recent guidance on scenario analysis (TCFD, 2020a) and its consultation on forward-looking metrics (TCFD, 2020b) acknowledge the relevance of net-zero due to growing demand from investors. However, to make the TCFD an adequate disclosure framework for net-zero prudential policy and for helping manage systemic climate risk in the financial system, net-zero needs to be made a core component of all four pillars of the TCFD recommendations. Common disclosure standards are also necessary for financial supervisors to assess climate risk exposures across financial institutions, as well as for providing decision-useful information to them.

Disclosure requirements are a key step for financial institutions to better manage climate risks and for financial supervisors to assess them in the financial system. However, to mitigate them, financial supervisors must also ensure the financial institutions' capitalisations fully reflect their exposure to climate risks. The determination of capital adequacy ratios must include an assessment of financial institutions' exposure to these risks. Furthermore, the concept of 'double materiality' needs to be incorporated into the TCFD. This concept has been introduced by the European Commission as part of the Non-Binding Guidelines on Non-Financial Reporting Update (NFRD) to address financial as well as environmental and social materiality and account for the fact that an organisation's impact on environmental and social outcomes can have financially material consequences over time (European

[8] The Spanish government was the first to initiate legislation that will require large companies to publish climate transition plans with five-year emissions reduction targets and specific actions to achieve them.

Commission, 2019a). While there is an ongoing debate about how to utilise climate risk disclosure as a foundation to directly support the transition to net-zero, further coordinated efforts by central banks and supervisors are needed "to create internationally consistent, comparable, and decision-useful reporting that the financial system needs" (Schapiro, 2021). On a global level, the strengthening of disclosure and sustainability standards is key and the announcement by the International Financial Reporting Standards (IFRS) Foundation that it may establish a sustainability standards board at the meeting of the UN Climate Change Conference, COP26, in November 2021 is an important step.

iii) Scenarios

Scenario analysis and stress testing are vital tools rooted deeply in European financial supervision. The forward-looking climate scenarios used by European institutions now need to become more consistent with the EU's net-zero target and pathway to limiting warming to 1.5°C. Central banks and supervisors need to clearly signal that they are not indifferent to the outcome (e.g. whether net-zero is achieved or not) and complement long-term scenarios with short-term outlooks.

The ECB is currently conducting an economy-wide stress test, encompassing almost all monetary financial institutions in the Euro area and covering a period of 30 years into the future (De Guindos, 2021), while previous efforts have focused on the near-term (Allen et al., 2020; ESRB, 2020; Vermeulen et al., 2018). The stress test assesses the exposure of Eurosystem banks to future climate risks by analysing the resilience of their counterparties under various climate scenarios. Preliminary results point towards the benefits of an orderly and early net-zero transition. The ECB is also developing a separate supervisory climate stress-test of individual banks that the ECB Banking Supervision will carry out in 2022 (ECB, 2020c) and has outlined expectations from financial institutions to determine which climate-related and environmental risks impact their business strategy in the short, medium and long term. The underlying limitations and benefits of scenario analysis have also been explored by the European Banking Association (2020).

Building on the reference scenarios from the NGFS (NGFS, 2020b), it is important for European central banks and supervisors to develop, deploy and refine their own climate scenarios that are consistent with the EU's climate neutrality pathway to limiting temperature rise to 1.5°C. This means highlighting the implications of alternative routes to net-zero, those which are either more or less disruptive for the financial system (e.g. early or late action). It will be essential to request firms to take into consideration both the mean and the tail of the probability distribution of climate risks in undertaking their assessments and for the scenarios to also account for the aspects of climate risks that are difficult to incorporate into models (e.g. tipping points, thresholds and existential risks such as mass migration and conflicts). This is particularly important because these are the factors that could potentially lead to the most severe impacts (Pierfederici, 2020).

Overcoming these limitations by improving the estimates and potentially creating a new generation of models or tools for assessing hard to model impacts might take years. It is therefore important to acknowledge the significant limitations of the current generation of models and to highlight the potential impacts that are left out of the analysis and make clear that the real risks (if we were able to account for all of them) might be much more severe than those estimated.

Finally, these long-term scenarios could be usefully supplemented with short-term outlooks that can be used to test the positioning of both regulated firms and the system at large over five-year periods. This would be an important way of connecting efforts to future-proof the financial system with key policy milestones (such as 2025 and 2030).

iv) Monetary policy

The ECB and NCBs need to consistently integrate climate neutrality into their monetary framework and models to adequately account for the impacts of climate change on macroeconomic outcomes. The ECB also needs to operationally align its monetary instruments and policy portfolios with the EU's climate neutrality target and the European Green Deal by taking the carbon intensity of assets into account in the context of monetary policy (Schoenmaker, 2021).

The latest monetary policy report by the NGFS clearly shows how sustainability objectives, such as climate neutrality or net-zero, can be incorporated into monetary policy operations and specifically into credit operations, collateral frameworks and asset purchases (domestic quantitative easing programmes, as well as foreign exchange management) (NGFS, 2021). As the NGFS stresses, this should and can be done without impairing the monetary policy transmission mechanism and, at the same time, have a real environmental impact as well as reduce the exposure of central banks to climate risks. They must also make sure that their own exposure to climate risks is kept in check, and, in the best case, mitigated.

What is missing so far, but urgently needed, is the development of an overall strategy to mainstream net-zero across all operations and policy portfolios of the ESCB with a clear view towards supporting and not hampering the EU's climate-neutrality objective. Small steps towards including certain categories of green bonds in specific operations are important, but not sufficient to achieve financial sector alignment. In this context, it is now important to explore how the operations of the ESCB can be operationally aligned with climate neutrality:

- First, there is increasingly widespread acknowledgment that climate change has direct implications for the ESCB's primary mandate, namely price stability, for example by negatively affecting the monetary transmission due to stranded assets, by affecting potential growth and the natural real interest rate, or by causing greater macroeconomic volatility (Schnabel, 2021a). It is acknowledged that these risks and implications could manifest much faster than expected, requiring the ECB to take climate change into account in its actions under the primary objective, because climate change will, at least to some degree, affect price stability and the transmission of monetary policy to the real economy, especially – but not only – in a disorderly transition scenario (Elderson, 2021).
- Second, there is growing pressure and recognition of the need for the ECB to design a strategy for aligning its monetary policy operations (e.g. refinancing operations) and portfolio (e.g. for asset purchases) with climate neutrality to ensure policy coherence, as enshrined in TFEU Article 7. As discussed above and highlighted by Frank Elderson, the ECB has the "obligation 'to support the general economic policies in the Union'" (Elderson, 2021). This provides the foundation for the discussion of alignment of operations and coherence with net-zero goals and the principle of environmental integration (TFEU Article 11). The inclusion of carbon emissions disclosure as a requirement in asset purchase programmes has been suggested as a first step for central banks (Sleijpen, 2021b), followed by further efforts to ensure alignment with climate neutrality.

The greening and climate-neutrality alignment of the ECB refinancing operations would have a significant impact on the EU economy given that it is largely reliant on bank funding. There have been increasing discussions around targeted green refinancing operations based on the examples of the Bank of England's Funding for Lending Scheme, the Hungarian Central Bank's Funding for Growth Scheme and the ECB's Targeted Longer-Term Refinancing Operations (TLTROs) (Breitenfellner et al., 2019; van 't Klooster and van Tilburg, 2020).

Furthermore, the ECB has already announced plans to accept sustainability-linked bonds, as identified under the EU Taxonomy, as collateral with potential eligibility also for asset purchases under the Asset Purchase Programme, specifically the Corporate Sector Purchase Programme (CSPP) and the Pandemic Emergency Purchase Programme (PEPP), subject to compliance with programme-specific eligibility criteria (ECB, 2020a). Concerning its CSPP and PEPP, the ECB has also highlighted that it is already buying eligible green bonds and is currently holding around 20 per cent of the eligible green corporate bond universe (Schnabel, 2020).

However, proposals to green monetary policy operations, specifically quantitative easing or refinancing operations, are potentially at odds with a specific interpretation of the 'market neutrality principle' (Kyriakopoulou, 2021), which will have to be rethought in light of a 'climate-neutrality principle'. Of particular interest in this context is the identification of assets aligned with net-zero and the potential function of the EU Taxonomy (TEG, 2019) in enabling the alignment of central banking operations. For the alignment with net-zero, it would be necessary to move from current labels for green bonds, which do not necessarily signal that issuers have a lower or decreasing carbon intensity, measured as emissions relative to revenue (Ehlers et al., 2020), to a framework allowing for the identification of 'high-exposure' assets that are not aligned with, in the case of the EU, its climate neutrality goal. An option for the ESCB would be to exclude carbon-intensive assets of entities without credible net-zero plans from asset purchase programmes. Given their forward-looking nature, the use of transition plans would be a way of ensuring that assets held by the central bank are aligned with the EU's climate policies.

The ECB and NCBs have also considerably strengthened their research around the macroeconomic consequences of climate change and the implications for monetary policy (Andersson et al., 2020). Research inside and outside of the ESCB is investigating how specific sustainability considerations can inform the calibration of monetary frameworks or instruments, specifically also focusing on the Eurosystem collateral frameworks (Dafermos et al., 2021; Monnin, 2020; Oustry et al., 2020) and the quantitative easing programme, where it is vital to account for the climate impact of the issuers of the bonds (Dafermos et al., 2020; Ferrari and Landi, 2020; Matikainen et al., 2017; Monnin, 2018a, 2018b). The Eurosystem collateral framework also assigns a key role to internal credit rating facilities for non-marketable assets – here too the ECB should incorporate physical as well as transition climate risks to contribute to the greening of the framework (van 't Klooster, forthcoming).

v) Portfolio management

As well as monetary policy portfolios, central banks manage other portfolios, notably their own assets, foreign exchange reserves (which are effectively 'policy portfolios' for exchange rate-targeting central banks), and pension funds. The sustainable and responsible investment practices for the ECB and NCBs' non-policy portfolios should include an explicit climate neutrality target and all EU central banks should publish transition plans to achieve this.

European central banks have been increasingly active in this area of sustainable portfolio management, with the De Nederlandsche Bank (DNB) as the world's first central bank to sign up to the UN's Principles for Responsible Investment (PRI) in 2019. The work of the Banque de France (BdF) over recent years shows how a net-zero-aligned approach can be developed as part of an investment strategy. The BdF adopted a Responsible Investment Charter in March 2018, an innovative initiative at the time (Banque de France, 2018). The charter applies to the BdF's own fund and pension portfolios, for both of which the BdF is solely and fully responsible. Based on the charter, the BdF published a first annual *Responsible Investment Report* in 2020 (Banque de France, 2020). The report outlines the bank's responsible investment strategy, as well as an analysis of its portfolios following the provisions of Article 173 of the French law on Energy Transition for Green Growth (LTECV) and the recommendations of the TCFD. It also outlines the changes in the BdF's investment policy to align with the objective of a trajectory that limits global warming to 2°C above pre-industrial levels, as per the commitment set out in the Paris Agreement. The BdF also established a Responsible Investment Committee in 2020, which regularly reviews the responsible investment strategy in light of emerging issues, such as fossil fuel exclusions, biodiversity and broader social aspects (NGFS, 2020c).

The incorporation of sustainability considerations into the management of their other portfolios, notably their own assets, foreign exchange reserves (which are effectively 'policy portfolios' for exchange rate-targeting central banks) and pension portfolios, has offered a starting point for many ESCB central banks. Importantly, the Eurosystem has agreed a common stance for climate change-related sustainable investments in non-monetary policy portfolios in February 2021, and intends to start climate-relate disclosures for these types of portfolios within two years. This is also done with the aim of signalling and promoting disclosures and an understanding of climate-related risks in the financial system (ECB, 2021b). Furthermore, the ECB is set to use its own fund portfolio to invest in the Bank for International Settlements (BIS) euro-denominated green bond fund, which invests in renewable energy production and energy efficiency projects (ECB, 2021c).

However, the ESCB needs to go further and commit to fully aligning portfolios with net-zero. This should include, among others, excluding carbon-intensive assets of entities without credible net-zero plans. Although this does not involve net-zero, the Swedish Riksbank has provided an example by adopting, with effect from January 2021, norm-based negative screening when purchasing corporate bonds, aligning with international standards and norms for sustainability (Andersson and Stenström, 2021).[9]

[9] The Riksbank's negative screening is based on the principles behind the UN Global Compact, the OECD Guidelines for Multinational Enterprises, and the UN Guiding Principles on Business and Human Rights.

Adopting the EU's climate neutrality target and outlining in published transition plans how alignment can be achieved would allow the ESCB to 'lead by example' and to send an important signal to the financial sector. For the assets held on behalf of government, clear guidance and targets from government are needed.

vi) Just transition

EU central banks also have a role in assessing the socioeconomic implications of achieving net-zero and the role that the financial system could play to ensure that the process is inclusive in terms of employment and regional development. The just transition is included in the Paris Agreement and, as a core element, in the European Green Deal. The EU's Just Transition Mechanism (JTM) is being developed as a key tool to ensure that the transition towards a climate-neutral economy happens in a fair and inclusive way by providing targeted support for the most affected regions in order to alleviate negative socioeconomic impacts of the transition (European Commission, 2020d). The JTM builds on three central pillars as dedicated financing mechanisms for different aspects of the just transition, namely the Just Transition Fund, the InvestEU scheme and an European Investment Bank loan facility (European Commission, 2021b). Investors are starting to incorporate the just transition into their shareholder engagement, capital allocation and policy dialogue on climate change (Finance for Tomorrow, 2020; Robins et al., 2020).

For EU central banks and supervisors, the just transition connects climate risk and net-zero with long-established roles in economic surveillance, notably in terms of monitoring the economy in terms of output, employment and well-being as well as the performance of key sectors and regions. The COVID-19 crisis has underscored the importance of addressing inequality across the economy, and central banks need to account for the potential effects of their policies on inequality.

Placing net-zero within the broader context of inclusive growth and socioeconomic development could potentially help to address some of the understandable hesitancy among a number of EU central banks over the implications that applying carbon screens in their COVID-19 crisis response measures could have for jobs and regional development. One place to start would be to use the results of climate stress-testing exercises to identify potential concentration risks for key sectors and regions across the EU, and signal to policymakers and development finance institutions (such as the European Investment Bank) the importance of developing effective just transition financing plans.

vii) International cooperation

Beyond the EU, European monetary and supervisory authorities should use their weight to work towards the integration of net-zero into key international financial and regulatory frameworks and processes. As members of the NGFS, European central banks and supervisors have been instrumental in building a global consensus among monetary and financial authorities that climate change is a material risk to financial and macroeconomic stability. International cooperation now needs to focus on operationalising monetary and prudential policies that are aligned with the Paris climate goals. Furthermore, European central banks and supervisors should engage with key financial system standard-setting and oversight bodies, including the International Monetary Fund, the Bank for International Settlements, the Financial Stability Board, the International Association of Insurance Supervisors, the International Organisation of Securities Commissions, and the Organisation for Economic Co-operation and Development, to shape international standards and highlight best practice in line with the net-zero goal.

Moreover, European central banks and supervisors should offer support to their counterparts in the rest of the world, and particularly in the Global South, in aligning their monetary and prudential policies and frameworks with net-zero. The sharing of best practice and involvement in capacity building, for instance through workshops, training programmes (including through central bank training centres), and staff exchanges, can make important contributions to help central banks and supervisors in developing and emerging economies to be better placed to mitigate and manage climate-related risks. A good example in this respect is a digital workshop on central banking, climate change and green finance that the ECB offered in March 2021 for Bank of Mauritius staff.

5. Conclusions

EU central banks and supervisors have been clear that responding to climate change is in line with their existing mandates. Against the backdrop of the proposed European Climate Law and the EU's objective to make Europe the first climate-neutral continent by 2050, central banks and supervisors now need to introduce explicit strategies to align their policies and operations and support the transition to net-zero. In the context of the ESCB mandate, objectives, conventions and interpretations, EU prudential and monetary authorities will have a crucial role to play in translating a high-level alignment strategy, which still has to be developed, into universal practice across the financial system.

By highlighting the crucial role that central banks and also supervisors ought to play, we do not want to diminish the leading role that governments must play in setting the policy frameworks, as without this a net-zero transition cannot succeed. Indeed, there are many areas in which central banks will have to rely on government policies and regulations.

Still, as guardians of the European financial system, the ECB and the NCBs, as well as supervisors, have a clear responsibility to act to complement, catalyse and amplify the net-zero policies agreed by the European Council, the European Parliament and national governments and ensure that the financial system is aligned with climate neutrality. 2021 is the moment for the EU's central banks to make this commitment.

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