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What can central banks do to take the Paris Agreement seriously?

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Executive summary

SINCE THE PARIS AGREEMENT on climate change was signed in 2015, its 195 signatories have seen financial instability resulting from the climate transition increase by approximately one third, in the context of still-increasing global emissions. In the European Union, emissions have fallen but banks have not fully internalised the costs of transitioning to net-zero. Banks continue to finance the expansion of the fossil-fuel industry. At the systemic level, this is trading a pretence of financial stability now for a more disorderly transition scenario with greater financial instability later.

CENTRAL BANKS ARE increasingly using microprudential supervisory tools to address climate-related financial risks. These tools include reviewing banks' risk-management processes and giving warnings over shortcomings in banks' risk models. This approach is helpful, but has so far failed to address the build-up of climate-transition-related imbalances in the financial system. This situation echoes the run-up to the 2007-2008 global financial crisis, when supervisors were busy reviewing the implementation of the latest Basel risk models by individual banks, while failing to see increased imbalances in the financial system caused by rising housing prices.

THIS POLICY BRIEF proposes that central banks should take a macro approach to managing system-wide risks stemming from the climate transition. It is necessary to treat climate as an endogenous, and in many jurisdictions legally-mandated, transition, rather than an exogenous risk. The policy aim for central banks, in their macroprudential supervision capacity, should be to minimise financial instability during that transition. This Policy Brief argues that, all other things being equal, the steadiest path towards net-zero offers the greatest amount of financial stability. Current proposals to impose systemic risk buffers for climate-related concentration risk may fail to provide such a steady reduction.

A GUIDED TRANSITION is recommended for banks that have been reluctant to hive off profitable loans to high-emitting companies. A requirement for the financial sector to reduce financed emissions by four percentage points annually from 2025 to 2050 would deliver net-zero with the least amount of financial instability.

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1 Introduction

The tenth anniversary of the Paris Climate Agreement (UNFCCC, 2015) in 2025 is an opportune moment to take stock of the financial-sector response to it, with a particular focus on supervision of the banking sector by central banks. Favourable developments since the Paris Agreement include improved methods to calculate and report on financed carbon emissions, the practice of treating climate risk as a financial risk and the general understanding that central banks have a greater role to play. However, financial institutions worldwide have over the same period issued $7 trillion in loans to fossil-fuel companies (Banking on Climate Chaos, 2024), and emissions globally have increased (UNEP, 2023).

Within the European Union, which is often considered leading on climate policy, overall emissions have decreased by 17 percent since the Paris Agreement was signed (IEA, 2024). However, even the planned policies and measures of EU countries "*are not yet sufficient to meet the 2030 net emission target*" (EEA, 2023). Moreover, the European Central Bank notes "*substantial misalignment*" within the euro-area banking sector and that "*while for the oil and gas sector, production is declining within the euro area, banks are continuing to finance the expansion of production outside the euro area*" (ECB, 2024).

With indicators trending in the wrong direction, it is important to better understand the relationship between the Paris Agreement and financial stability

With a number of important indicators trending in the wrong direction, it is important to better understand the relationship between the Paris Agreement and financial stability. The Paris Agreement is an international treaty to limit global warming that in jurisdictions across the world has been translated into local legal commitments. For example, the EU's 2021 European Climate Law (Regulation (EU) 2021/1119) requires the EU to achieve net-zero by 2050[1]. Countries including Australia, Canada, Chile, Japan, New Zealand and South Korea have legally binding climate laws, with the legal status of net-zero varying across the Paris Agreement's other signatories.

The Paris Agreement is first and foremost an endeavour to avoid climate catastrophe, and its effect is to reduce physical risk[2]. Perhaps counterintuitively, the agreement has also resulted in a decrease in transition risk[3], if the risk is understood to be a disorderly transition to a low-carbon economy. By making the net-zero goal clear, explicit and enshrined in an international treaty, the Paris Agreement should make the transition to a low-carbon economy more orderly and predictable than in the absence of such an agreement. In other words, for the 195 signatories of the Paris Agreement, climate is no longer just an exogenous risk but also an endogenous transition commitment.

Viewed through this lens, the source of instability that the agreement has introduced into the financial system is not the result of climate change as a risk, but rather the climate transition cost that has been imposed on, but which is still not fully internalised by, the financial sector. Portfolios continue to comprise the financing of corporate assets that may soon become stranded assets (UNEP, 2023)[4]. Profitable sources of new carbon-intensive business will have to be foregone. Potential new 'green' business has not yet always been available in sufficient quantity to make up the shortfall.

1 Note: in line with common parlance, this article uses net-zero 2050 and Paris somewhat interchangeably, but it is important to note that they are not the same. In fact, the net-zero 2050 goal is not in the Paris Agreement text. The agreement from Glasgow (COP26) in November 2021 is not binding but "*urges parties… of the Paris Agreement towards just transitions to net zero emissions by or around mid century*" (paragraph 32). Globally, guidance from policymakers varies. In the EU however, the expectation of policymakers is unambiguous. Article 2.1 of the European Climate Law stipulates that "*Union-wide greenhouse gas emissions and removals regulated in Union law shall be balanced within the Union at the latest by 2050, thus reducing emissions to net zero by that date*".

2 Physical risk refers to environmental events including floods and storms arising from climate change, or workplace injuries due to unsafe factories. Physical risk can affect companies directly through damage/loss of assets and injuries/deaths of employees, and indirectly through its effects on value chains and customers.

3 Transition risk arises from changes in policy and new technologies.

4 UNEP (2023) stated that: "*Avoiding new fossil fuel capacity will limit the existing infrastructure that must be retired early to achieve Paris Agreement goals*".

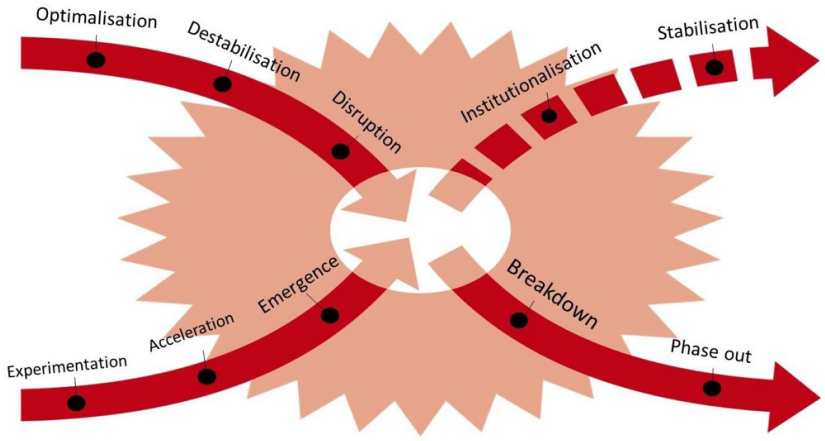
Much of the academic literature correctly focuses on the complexity of integrating climate into financial-stability monitoring. Bolton *et al* (2020), in a major contribution ('The green swan: Central banking and financial stability in the age of climate change'), stated that this integration is "*challenging because of the radical uncertainty associated with a physical, social and economic phenomenon that is constantly changing and involves complex dynamics and chain reactions*". Put simply, there are too many variables to deal with. Within their mandates, banking supervisors also find it difficult to make trade-offs between shorter- and longer-term financial stability objectives. Former Bank of Canada and Bank of England governor Mark Carney wrote in 2016 that "*rapid and ambitious measures may be the most desirable from the point of view of climate mitigation, but not necessarily from the perspective of financial stability over a short-term horizon*" (Carney, 2016).

This uncertainty has held back central banks from acting more decisively on climate. However, such limitations are all predicated on a treatment of climate as exogenous, an external variable that may have to be dealt with at some point. This Policy Brief proposes an alternative and more limited analytical approach: taking the complexity of climate as a risk out of the equation and instead focusing more narrowly on the legally-mandated certainty of the climate transition. Central banks could take a macro approach towards the management of the build-up of climate-related transition imbalances in the financial system. This Policy Brief sets out the characteristics of the climate transition that are commensurate with the greatest amount of financial stability.

2 Transition and financial stability in context

The climate transition required under the Paris Agreement will be a process of creative destruction. New technologies and business models will have to replace the old ones (Schumpeter, 1942). Figure 1 depicts the dynamics of socio-technical transitions as iterative processes of build-up and breakdown over time (Loorbach *et al*, 2017). In a changing climate context, optimised carbon-intensive businesses will be disrupted because 'green' or low-carbon businesses will have to emerge. The actual transition is disruptive because carbon-intensive businesses that do not transform will be broken up and phased out.

Figure 1: The x-curve of transition dynamics



Source: Bruegel adapted from Loorbach *et al* (2017).

To serve this 'real economy' transition, banks[5] will have to get better at two things. First, they need to get better at financing the new green economy. This is hard. Banks' risk models make low-carbon financing opportunities more expensive because of the newness and uncertainty related to the green economy. Moreover, data from the European Banking Authority (EBA) show that existing financial accounting frameworks might inadvertently create disincentives for investment in low-carbon assets, as banks are accounting for nearly double the loan loss provisions for lending to low-carbon sectors compared to high-carbon sectors (Gasparini *et al*, 2024). Although recent research indicates that banks on average discount lower-emission firms by 14 basis points (Altavilla *et al*, 2024), generally speaking companies and products involved in the 'experimentation' and 'emergence' phases have a harder time getting financed than those that are currently 'optimised' (ECB, 2024)[6].

Banks need to absorb expected transition losses related to the carbon-intensive economy

Second, banks need to absorb these expected transition losses related to the carbon-intensive economy. Schoenmaker and Schramade (2022) developed a model that formalises such transition losses. A key variable in this model is the probability of transition over a certain period, which differs by sector. However, even if some variables feeding into this probability are external (technological innovation or changing customer preferences), for the financial system achieving net-zero should be considered as endogenous. The net-zero transition depends on the stepwise reduction in the financing of high-carbon activities.

Over the last few years, banks have made significant advances in terms of being able to better account for climate in their risk models. However, no bank so far incorporates fully the ECB recommendations on the integration of climate risks (Elderson, 2024). Moreover, the enthusiasm with which new carbon-intensive loans continue to be issued is testimony to the fact that these capabilities are not being used to inform financing or pricing decisions. There is in fact a strong disincentive for banks to do so. Including climate transition costs would have the net effect of decreasing the apparent profitability of banks' carbon-intensive portfolios. The market is not yet mature enough to value the increase in expected transition losses from carbon-intensive loans. This means there is a first-mover disadvantage problem to overcome. The first bank to include climate transition costs will price itself out of the market and lose market share.

3 Maintaining financial stability under Paris

The policy aim of any climate transition supervisory framework should be to maintain financial stability during that transition. Here it is best to start with 'knowns' and to build uncertainty and risk into the framework subsequently. It is known that policymakers have legally determined that net-zero needs to be achieved by 2050. With the destination and the timeframe essentially fixed, the only uncertainty is when to take the hit: go early, go late or go steady. That the speed of transition is inversely correlated to financial stability is understood intuitively. An abrupt reallocation of assets from high-carbon to low-carbon assets would leave the real economy less time for adaptation and the financial sector with more stranded assets. As Carney (2016) put it, "*too rapid a movement towards a low-carbon economy could materially damage financial stability*". This will be just as true in 2049 as it is now.

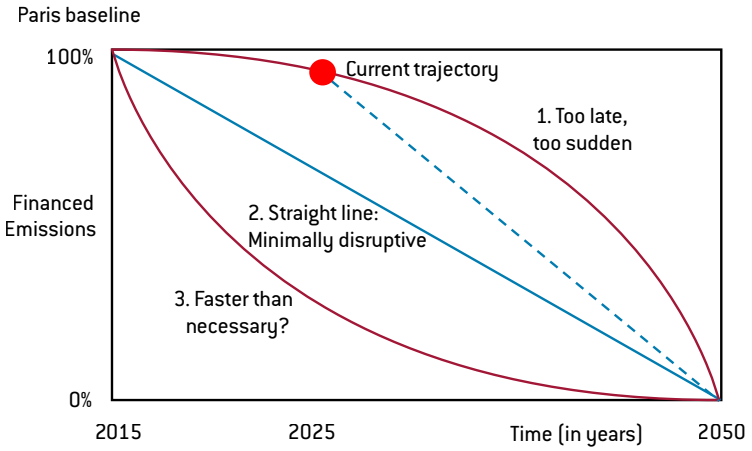
We therefore postulate that, all other things being equal, there is an inverse correlation between the speed of transition and financial stability, and it is the steadiest path towards net-zero that offers the greatest amount of financial stability. At any point in time, the straight-line

5 Banks are taken as the focus for this analysis but a similar logic can be applied to all regulated financial entities – pension funds, insurance companies and investment funds – as argued in section 5.

6 The ECB 2024 assessment found that "*banks are providing larger loans to misaligned corporations with the average size of the exposure to a misaligned corporation being more than double that of an aligned corporation*".

path towards the Paris net-zero objective will result in the least amount of financial instability (Figure 2). The world is currently, however, on the 'too late, too sudden' pathway (ASC, 2016). Internalisation of the cost of the Paris Agreement is being delayed. In other words, an illusion of financial stability now is being traded for a more rapid transition with greater financial instability later.

Figure 2: Financed emissions pathways and financial stability



Source: Bruegel.

Had the 'minimally disruptive' pathway (Figure 2) been followed globally starting in 2015, the annual percentage point decrease in financed emissions would have needed to be approximately three percent (100 percent divided by 35 annual steps towards 2050). Now (the red point in Figure 2), with little progress so far, the annual percentage point decrease is now approximately four percent. Following this logic, the inaction that has persisted under the current supervisory framework since 2015 has caused a build-up by a third (ie the difference between three percent and four percent) in the financial instability that results from the Paris Agreement. Should the next five years see as little progress as the last decade, the annual percentage point decrease in financed emissions will have to increase to five percent, a build-up of financial instability by two thirds (compared to starting in 2015). Although these numbers will vary by jurisdiction depending on progress towards net-zero, the fact is that very few central banks (if any) collect the data to measure financial stability in this way.

Note that Figure 2 is a deliberately limited abstraction of the impact of the climate transition on financial stability. It only focusses on the known Paris Agreement requirement to achieve the 2050 goal, not on the physical and transition risks associated with climate change. The unknown tipping points and feedback loops that may result from 'physical', 'social' or 'economic' phenomena add more complexity.

Technological innovation reducing the cost of renewables is the most likely candidate to justify a slower pathway towards net-zero. This argument would make the case that green-economy alternatives take time to develop and it therefore makes sense to delay transition until they are mature. The speed of technological innovation, however, is not independent of the amount of finance dedicated to it. The absence of hard carbon 'budget' constraints will inhibit the finance available for low-carbon technology development (see section 2). At any rate, depending on unproven technology as a foundation for a supervisory framework to preserve financial stability seems reckless, to say the least.

On balance the argument to move faster seems stronger. Overall, there are likely to be more downside than upside risks. Physical risks will increase as climate tipping points are reached, such as permafrost collapse, icesheet loss and rainforest dieback. The frequency and severity of physical climate events (eg major floods, droughts or storms) are already increasing in the run up to 2050, causing both human tragedy and financial losses. In terms

of a global just transition, historically wealthy countries are calculated to require a decarbonisation pathway faster than the straight-line approach we propose. For example, in the EU there is a proposal to reduce emissions by 90 percent already by 2040 (European Commission, 2024). These combinations of risks may trigger a disorderly transition.

Accounting for these certainties and risks, central banks should act. First, central banks could apply the precautionary principle: scientists argue for staying within the safe operating space of the earth system, as there are many uncertainties about climate effects (Richardson *et al*, 2023). The best proxy for measuring financial instability currently available is the annual required decrease in financed emissions in excess of four percent (represented by the dotted line in Figure 2). Note that aiming for net-zero by 2050 has an advantage over aiming to limit global warming to 1.5 degrees Celsius above pre-industrial levels. It has the merit that it is measured in real time, is not dependent on the less-certain impact of a natural phenomenon and will not be called into question as the world is on track to fail at achieving the 1.5°C goal. Over time, as climate risks become better understood as financial risks, they must be added to the model.

4 Central bank instruments

How central banks, in their capacity as macroprudential supervisors, measure, manage and, if necessary, enforce financial stability objectives in line with the climate transition is far from settled. Bolton *et al* (2020) commented on the tension over central bank supervisory mandates. There is a recognition that central banks must do more and that they "*may inevitably be led into unchartered waters*". But central banks also "*can only do so much*" and should avoid the "*risk of overburdening existing mandates*" (Bolton *et al*, 2020). Nevertheless, the treatment of climate as a transition allows central banks to do more within their existing financial stability mandate, as we argue in this section.

An 'all-hands-on-deck' approach is needed to deal with climate, in which both policymakers and policy takers must take action that is mutually reinforcing. Central banks, as policy takers, should take the net-zero commitment of the policymakers as the foundation of such an approach.

4.1 Measurement

Although methodologies that can measure financial stability related to climate transition are available, they are not universally applied. Our point of departure is that what should be known isn't – not the baseline for financed emissions, while absolute targets to achieve net-zero are partially known. Consequently, central banks are partially blind to the build-up of financial instability resulting from climate transition. This is something central banks must redress at both macroprudential (ie systemic) level and microprudential (ie bank) level, if they are to provide effective supervision.

A number of industry-led standards could be built on to achieve this goal. For example, the Partnership for Carbon Accounting Financials (PCAF)[7] is an industry-led initiative that, amongst other things, allows banks to understand their financed emissions and related exposure to climate transition risk. Across seven asset classes, PCAF has developed methods to apportion emissions between debt and equity. The Science Based Targets initiative (SBTi) is piloting a Financial Institutions Net-Zero (FINZ) standard that provides banks with a framework to set science-based near-term and net-zero targets on their Scope 3 Category 15 emissions, in a manner that is consistent with the temperature goals of the Paris Agreement

7 See https://carbonaccountingfinancials.com/.

(SBTi, 2024)[8]. The open-source Paris Agreement Capital Transition Assessment (PACTA) methodology enables supervisory authorities to evaluate whether corporations are transitioning towards lower-carbon production. The technological (mis)alignments from PACTA can be aggregated to present a net alignment rate for each bank (ECB, 2024).

In the EU, the Corporate Sustainability Reporting Directive (CSRD, 2022/2464/EU) requires companies, including banks, to disclose absolute values for financed emissions and to set targets. The first disclosures will be in 2025 for the financial year 2024. However, many banks are expected to use the allowed phase-in period to delay full target-setting, and may for the time-being use a mix of partial portfolio disclosures and relative targets instead. Moreover, financial sector-specific guidance is still some years away. The result is that complete and accurate information to measure climate transition as a financial-stability issue is still some years away.

Given the importance to financial stability, there is a strong argument for central banks to take a greater role in requiring banks to apply internally and disclose externally metrics and targets related to financed emissions. There is also more work to do to clarify the treatment of financed emission in certain circumstances. For example, central banks should have a view on how they will adjust baselines and targets in the event of a merger, acquisition or disposal of certain books of business.

4.2 Management

Of course, government regulation and taxation, such as carbon taxes, are first best responses to the need to cut emissions. In this context, Tirole (2023) argued that "*the central bank can act as a 'climate-change fighter of last resort'*". Following from their financial-stability mandate, the question for central banks (as policy takers) is what they should do to minimise financial instability when policymakers have determined a clear outcome (net-zero).

Current climate stress tests give a false sense of security by underestimating the impact of climate shocks on the financial system

The main macroprudential instrument to date has been climate risk stress tests. While climate risk stress tests are a useful tool to make potential financial losses in the financial system transparent, they do not in themselves reduce financed emissions. Moreover, current climate stress tests give a false sense of security by underestimating the size of climate shocks and the impact of climate shocks on the financial system (ignoring feedback loops) (Reinders *et al*, 2023).

Another recent prudential instrument is the development of bank transition plans, as required by the latest amendments to the EU Capital Requirements Directive (CRD, 2013/36/EU). Banks should assess and embed forward-looking climate (and other environmental, social and governance) risk considerations in their strategies, policies and risk-management processes through transition planning, for the short-, medium- and long-term time horizons (Article 76 of the amended CRD). Banks should demonstrate their overall resilience towards climate risks. Smoleńska and Van 't Klooster (2022) argued that bank transition plans are a hybrid instrument half-way between risk management (internal to banks) and guided transition from supervisors. The ECB, as banking supervisor of the euro-area banks, could implement a guided transition by requiring banks to include annual reductions in financed carbon emissions in their prospective transition plans, on the basis that supervisors (including the ECB) will be entitled to assess the robustness of banks' transition plans under Article 87a(4) of the amended CRD[9].

There is a need for further policy tools that require banks (and other financial institutions) to reduce financed emissions in line with the Paris goal. The preferred instrument of many macroprudential policymakers is the imposition of systemic risk buffers. ECB/ESRB (2023)

8 Category 15 of Scope 3 refers to investments and includes equity, debt, project finance and managed investments and client services. See https://ghgprotocol.org/sites/default/files/2022-12/Chapter15.pdf.

9 Moreover, Article 104(1)(e) CRD, as most recently amended, will grant supervisors the power to "*restrict or limit the business, including with regard to the acceptance of deposits, operations or network of institutions or to request the divestment of activities that pose excessive risks to the soundness of an institution*".

proposed a systemic risk buffer (called concentration charges) for climate-related concentration risk. If and when carbon-intensive exposures exceed a concentration threshold, the systemic risk buffer kicks in, as greater concentrations are associated with larger bank losses.

The main challenge is to set the appropriate size of the systemic risk buffer. First, estimates of the impact on aggregate credit growth of a one percentage point increase in capital requirements vary from a one to ten percentage-point decrease in credit growth (ECB/ESRB, 2023). This large variance in expected impact makes it difficult to calibrate the exact size of the systemic risk buffer.

Second, policymakers tend to set capital buffers at the lower level, making them less effective. A case in point is the countercyclical capital buffer, implemented after the global financial crisis, which is not regarded as sufficiently substantial to be able to counter the credit cycle when activated.

Third, the buffer has to be large enough to tilt the balance from carbon-intensive to low-carbon loans (Oehmke and Opp, 2023). In the current outlook, with energy shortages and high interest rates, fossil-related loans are more profitable than loans for renewable-energy projects, which need high upfront investment at currently high interest rates. So, just like the counter cyclical capital buffer, a systemic risk buffer for climate concentrations is likely to have limited effect, unless it is set at a variable and sufficiently high level (which is unlikely to happen for political-economy reasons).

An alternative to buffers (which are basically pricing tools) is to cap financed carbon emissions by means of a large exposure rule limit (Schoenmaker and Van Tilburg, 2016). Such a hard budget constraint would directly 'limit' the amount of financed carbon emissions in an effective way. As Kornai (1986) noted, "*the softer the budget constraint, the weaker the compulsion to adjust demand to relative prices … demand management works only if it is associated with sufficiently hard budget constraints. This is one of the important relationships between macro- and microeconomics*". Hard budget constraints overcome the first-mover disadvantage problem by creating a level playing field for all banks and better price signals for financed emissions.

Given the limitations of buffers, we explore the possibility of applying bank-specific macro limits for financed emissions, starting with a baseline and applied forwards to 2050. Bank-specific means a limit based on a bank's absolute financed emissions, taking into consideration the actual portfolio baseline at a certain date. Macro means that the aim of the limit is to reduce financed emissions in the wider financial system. Within the constraints of such hard limits, a price for financed emissions will emerge. This will help banks steer towards Paris-aligned loan and investment portfolios that limit bank-specific and systemic losses resulting from the climate transition. Limits beat buffers on efficacy, even if they require central banks to align more with policymakers in order to implement and enforce.

5 Calibrating the guided transition

There is no reason why central banks couldn't immediately require better measurement of climate transition risks. While there may be work to do to develop standards for financed-emissions accounting, existing methodologies and industry-led initiatives are sufficiently well advanced to allow for quick implementation. Quality of disclosures should improve rapidly over time as financed-emissions accounting will fall under assurance by auditors. Nevertheless, central banks should be mindful of banks seeking to game the system. Existing supervisory instruments could be deployed to close loopholes. Efforts to improve measurement would seem a low-effort, no-regret priority for all the central banks in the 195 jurisdictions that have signed the Paris Agreement.

The proposal for a guided transition to manage and enforce a hard limit on financed

emissions requires urgent work for it to be developed and operationalised. The case for more active management of the transition is currently most obvious for jurisdictions that have net-zero commitments enshrined in law. In those jurisdictions, central banks can follow the stated aims of policymakers and extrapolate from their financial-stability mandates. In other jurisdictions, there is still a case to be made for guided transition, but in the absence of a legal mandate, the case will depend on a better understanding of climate as a risk. Regardless of the legal status quo, central banks are advised to better understand how a guided-transition instrument would have to be implemented in case an event-driven acceleration needs to take place. Our recommendations include:

5.1 Design of the guided-transition instrument

Hard limits on financed carbon emissions to reach net-zero in 2050 could be designed top-down from a system perspective. As indicated in Figure 2, the starting point is the amount of today's financed emissions as a percentage of bank capital. This prudential limit should be tightened to achieve absolute emission reductions of four percentage points per year, relative to the base year 2025[10]. Given this tightening, banks have an incentive to lend to companies that adapt to greener business models as they will contribute to reduced financed emissions (Schoenmaker and Schramade, 2022). Lending to companies that do not adapt will be hard to come by as these companies will never contribute to reduced financed emissions. The aim should be to achieve timely reductions, not to punish high-carbon companies that are on a credible and timely path to reduce their carbon emissions.

The aim should be to achieve timely reductions, not to punish high-carbon companies that are on a credible path to reduce their carbon emissions

The aim of the prudential limit should be to steer the climate transition in an even-handed way to net-zero by 2050, over time and across banks[11]. All banks, no matter what their baseline of financed emissions, will have to set annual steps towards net-zero. Under the auspices of the European Systemic Risk Board (ESRB), limits could be set for all regulated financial entities: pension funds, insurance companies and investment funds. The result of the limit will need to be a decline in finance to companies that are unable to adapt and thus to prevent climate-transition losses to the financial system.

5.2 Clarification of the legal basis

We have argued that central bank action to guide the climate transition stems from the central banks' financial-stability mandates. The imposition of a four percentage-point annual reduction in financed emissions will nevertheless result in some market upheaval. It is important to understand this as part of a process of internalising the Paris goal in the steadiest way possible: upheaval now to avoid greater financial instability later.

In the EU, the new bank transition plans under the amended CRD provide a good legal base. The ECB, as banking supervisor of the euro-area banks, could implement the guided transition by requiring banks to include annual reductions in financed carbon emissions in their prospective transition plans, as supervisors (including the ECB) will be entitled to assess the robustness of banks' transition plans under the new Article 87a(4) of the amended CRD[12]. EBA draft guidelines (EBA, 2024) provide some guidance to the financial sector on the contents of these transition plans, but will require future clarifications on time horizons and treatment of financed emissions.

10 100 percent divided by 25 annual steps towards 2050. So, a prudential limit of 100 percent (of 2025 emissions) in 2025, 96 percent (of 2025 emissions) in 2026, 92 percent (of 2025 emissions) in 2027, to 0 percent in 2050. The annual 4 percent reduction in the starting limit should be adjusted for increases in aggregate bank capital. So, in case bank capital grows by 10 percent (in comparison to the bank capital in the starting year), the annual reduction should increase to 4.4 percent (4 percent x 1.1).

11 The design of the instrument has to consider accounting rules, which need to be developed to deal with the complexities of mergers and acquisition, and consideration needs to be given to the financing of transitional activities and interim measures for high-impact sectors.

12 See footnote 9.

5.3 Mitigation of global leakages

Although the transition to net-zero will need to happen globally, it is important to mitigate leakage of emissions financed by EU financial institutions to foreign financial institutions, and to minimise opportunities for arbitrage between supervisory jurisdictions. This is perhaps the greatest challenge. The instrument may well be successful at improving the Paris-alignment of European banks' portfolios, but will fail at improving alignment of the real economy if corporates finance their high-emitting activities elsewhere. Solutions could include making the prudential limit location-based, just like the countercyclical capital buffer. Non-EU institutions operating in the EU would then also fall under the prudential limit. To prevent international leakage, these prudential limits would have to be implemented at global level through the Financial Stability Board (FSB) and the G20[13].

Operationalising the framework will require a formidable effort, but should not be impossible. The infrastructure to deal with climate issues is much stronger now than it was a decade ago. At the international level, FSB, G20 and annual UNFCCC conferences are opportunities to clarify international treaty requirements and to overcome collective action problems. Knowledge networks such as the Network for Greening the Financial System (NGFS), the European Systemic Risk Board and the Glasgow Financial Alliance for Net Zero (GFANZ) can be mobilised to expand on our recommendations.

6 Conclusions

To many professionals working on sustainability at banks and the companies they finance, it feels like an enormous amount of effort has been undertaken in the decade since the Paris Agreement. From stress-testing to disclosure, from changes in governance to development of green-finance offerings, much has been achieved. Yet, globally, financed emissions have not come down. Leading jurisdictions, including the EU, are still following the 'too late, too sudden' pathway. Difficult decisions are being postponed, which will result in a more disorderly transition as 2050 approaches. Sceptical readers may think that 2050 is far away and that 'something' will be sorted out to avoid crisis. Perhaps the Paris objectives will be relaxed or their non-compliance will go unenforced. Alternatively, the planet may be saved by some yet-to-be-invented miracle technology.

But this can hardly be the basis for a supervisory framework. It is time to flip the default around and, until we are told otherwise, treat the Paris net-zero commitment as the will of policymakers. Financial stability must be managed accordingly, with a guided transition.

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13 If international coordination is not possible from the start, further mitigation actions aimed at European companies could be implemented to prevent them splitting up to evade the prudential limits.

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