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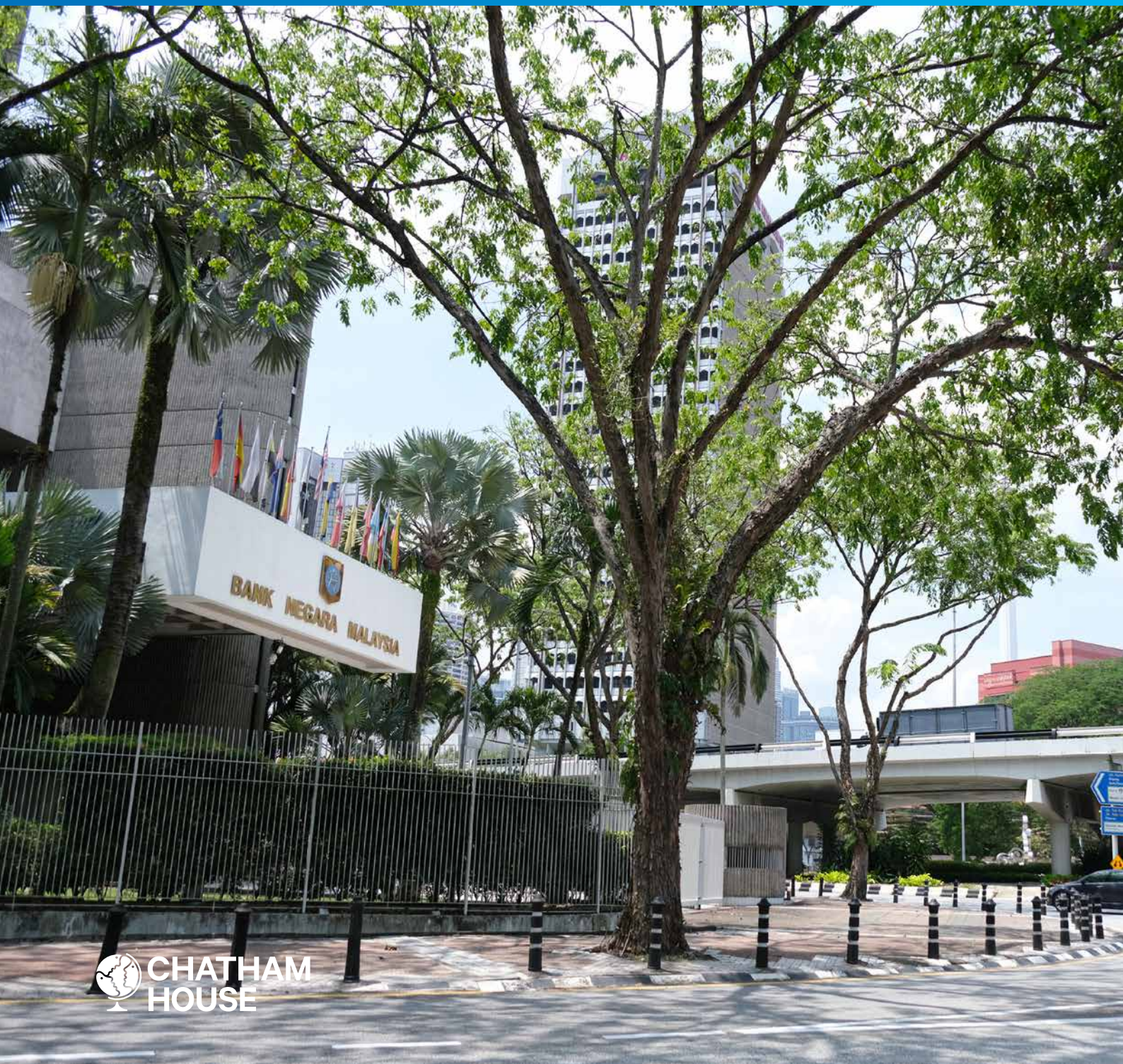
How to boost international private climate finance

The role of central banks, financial regulators and sectoral coalitions

Lilia Caiado Couto



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Summary

- The financial industry is critical to achieving climate goals. The global economy must shift rapidly to a model of 'net zero' greenhouse gas emissions if the 2015 Paris Agreement targets are to be met, and the worst impacts of climate change avoided. Bringing about this transition will rely on massive investment in clean energy and low-carbon assets over the coming decades. By 2050, as much as $195 trillion may need to flow into low-carbon physical assets, accompanied by a reallocation of capital away from high-carbon assets such as those involving fossil fuels.
- For such capital flows to occur, investors will need regulatory certainty and the establishment of deep, liquid markets in climate-friendly financial assets. In most cases, this will mean increasing exposure in emerging or previously niche investment categories. Banks, insurers, asset managers, pension funds and other private institutional investors will need clarity on how net zero portfolio alignment is defined and measured, and on the climate risk characteristics of specific financial assets. Any information regime must be complemented by robust incentives and enforcement – so that in-principle commitments around the 'greening' of portfolios are matched by actual investment.
- A key task is to stimulate the flow of private climate capital into emerging markets and developing economies (EMDEs), where opportunities for renewable energy investment are typically the greatest. Yet around 90 per cent of private climate finance currently stays within national borders, for reasons that include preferential national policy support, differences in regulatory standards, and market information failures. The cross-border capital flows that do occur are concentrated in the West and China. The problem is compounded by broader risk aversion towards many EMDEs, and by global economic headwinds such as inflationary pressures and EMDE debt sustainability concerns.
- Understanding of climate risk in the financial system has advanced in recent years. Significant developments have included the creation in 2017 of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) to develop common approaches on climate-related risk management; the release, also in 2017, of wide-ranging disclosure and governance recommendations by the Task Force on Climate-related Financial Disclosures (TCFD); and the 2022 publication of guidance on net zero transition plans by the Glasgow Financial Alliance for Net Zero (GFANZ). Many central banks, from China to South Africa to Mexico, are developing their own climate investment guidance, along with taxonomies defining the characteristics of net zero-consistent assets.

- But a more uniform global framework of climate investment standards and reporting is needed if the recent proliferation of guidance is not to impair coordination between financial systems and asset classifications. Central banks and financial regulators can lead this process by cooperating on the development of high-level principles. One option would be to build a climate information architecture aligned with the Financial Stability Board's surveillance system.
- Central banks and financial regulators also have roles to play in translating a more 'climate-aware' financial architecture into actual capital reallocation. One effective lever could be to increase capital requirements for loans associated with high-emissions projects or investments (although easing requirements for loans on low-carbon projects or investments is potentially more problematic). Collateral frameworks could similarly be adjusted so that the value of assets used as collateral would be determined in part by their emissions and climate risk profiles – or, more radically, so that certain polluting assets would become fundamentally ineligible for use as collateral.
- Beyond such incentives, central banks have the opportunity to advance climate action through their *own* market operations and investments, potentially creating a multiplier effect in stimulating capital flows to the low-carbon economy. In monetary policy, asset purchase programmes could give preference to net zero-compliant assets. Although the global economic situation as of early 2023 renders quantitative easing (QE) less relevant, central banks could still move markets through their *divestment* choices – selling off high-carbon assets in the first instance would send a strong signal on climate to institutional investors. Central banks could also reweight their foreign exchange reserves in favour of low-carbon holdings, and even incorporate a formal net zero target in their reserve management objectives.
- Central banks and financial regulators should explore making net zero transition plans mandatory for multinational financial institutions. Firms' progress would be measured against milestones set out in such plans, and there would be an associated requirement for transparency in the composition of portfolios and the climate risk assumptions underlying investment strategies. The idea would be for disclosure not only to produce data but to feed into financial decision-making. One issue, however, would be whether such a system would conflict with central banks' traditional mandates, such as on price stability.

01 Introduction

To avoid the worst effects of climate change and support Paris Agreement decarbonization targets, the global economy needs to shift rapidly to a 'net zero' emissions model. In the financial sector, this will require a transformative reallocation of capital from high-carbon assets to low- or zero-emissions ones.

Financial markets have a central role to play in achieving climate goals. To prevent the most catastrophic effects of climate change, the global economy needs to shift rapidly in the coming decades from heavy reliance on fossil fuels to an operating model consistent with 'net zero' greenhouse gas (GHG) emissions.[1] This will require a correspondingly rapid and far-reaching reallocation of capital from high-carbon to low- or zero-emissions economic activities. Financial institutions, simply put, must overwhelmingly invest in sustainable solutions – and divest from fossil fuels – if a net zero economy is to be achieved within the timeframe indicated by scientific modelling.

Estimates vary in methodology and scope, but a 2022 study by the consultancy McKinsey found that $275 trillion needs to be invested in physical assets to achieve net zero carbon dioxide emissions by 2050. Of this, some $195 trillion would need to be directed to low-emissions assets and enabling infrastructure.[2] Meanwhile, modelling by the Race to Zero campaign of the United Nations Framework Convention on Climate Change (UNFCCC) indicates that $125 trillion will need to be directly invested in decarbonization by 2050.[3]

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1 The Intergovernmental Panel on Climate Change (IPCC) defines net zero emissions as being 'achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period'. Matthews, J. B. R. et al. (eds) (2018), 'Annex I: Glossary', in Masson-Delmotte, V. et al. (eds) (2018), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, pp. 541–62, Cambridge and New York: Cambridge University Press, https://www.ipcc.ch/sr15/chapter/glossary.
2 McKinsey & Company (2022), *The net-zero transition: What it would cost, what it could bring,* p. viii, p. xi, https://www.mckinsey.com/business-functions/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring. McKinsey estimates capital spending on physical assets for energy and land-use systems in the net zero transition at around $275 trillion between 2021 and 2050, or $9.2 trillion a year on average. This is equivalent to an annual average increase of $3.5 trillion from current values. Under McKinsey's assumptions, an additional $1 trillion a year would need to be reallocated from high- to low-emissions assets, a further $2 trillion a year would consist of existing investments in low-emissions assets, while $2.7 trillion a year would still flow into high-emissions assets.
3 Race to Zero and Glasgow Financial Alliance for Net Zero (GFANZ) (2021), 'Financing Roadmaps', https://www.gfanzero.com/netzerofinancing.

Box 1. Regulatory 'firefighting' and its impact on climate action

The financial market fallout from the collapse of Silicon Valley Bank (SVB) and the emergency takeover of Credit Suisse by UBS in March 2023 offers a powerful reminder that one of the continuing challenges of 'greening' the financial system is to ensure that the complex, multi-stakeholder initiatives that underpin climate action are not set aside every time a market shock or even larger financial or economic crisis occurs.

SVB's failure and the collapse in Credit Suisse's stock price renewed investor attention on possible systemic financial vulnerabilities, including those associated with higher interest rates and maturity mismatches in some banks' balance sheets. A potential concern is that the urgent need to deal with these risks could prompt policymakers to suspend the development of climate-related regulations, redirect internal resources away from climate initiatives to tackling current concerns over financial market stability, or consider the introduction of emergency measures without taking a fuller, longer-term perspective that includes the impacts such measures might have on action *vis-à-vis* climate change.

On the other hand, the recent market turbulence also underlines the point that central banks and financial regulators will *always* face financial shocks of one kind or another, and that successfully re-engineering the international financial architecture will thus critically depend on finding ways to continue such work even while dealing with other disruptive events. It is also a reminder that climate-related regulatory measures will need to be consistent with maintaining financial stability and should be developed with an awareness of the need to avoid unintended market consequences.

The task goes beyond securing financial institutions' commitment to net zero investment strategies. Indeed, the value of assets under management held by financial institutions (including asset managers, asset owners and insurers) which have already announced net zero targets was recently estimated at around $130 trillion – potentially enough, on paper, to cover much or all of the investment requirement for the transition to net zero, depending on the methodology used.[4] The challenge is to ensure that commitments in principle translate into actual capital flows.

In most cases, a realignment of portfolios will require financial institutions to increase their exposure to emerging or relatively untested investment categories. For this to occur, investors will require regulatory certainty and the establishment of deep, liquid markets in climate-friendly financial assets. As this paper elaborates, central banks and financial regulators can facilitate the process through reform of regulatory frameworks, asset classifications, and climate disclosure rules and criteria. Central banks can also send important market signals by increasing the proportion of 'green' investments in their own portfolios. At the same time, such work is invariably vulnerable to economic and financial shocks: it will

4 Solomon, M. (2022), *Private Financial Institutions' Paris Alignment Commitments: 2022 Update,* Climate Policy Initiative, June 2022, p. 6, https://www.climatepolicyinitiative.org/wp-content/uploads/2022/06/Private-Financial-Institutions-Paris-Alignment-Commitments-l-2022-Update.pdf.

be incumbent on central banks and financial regulators to ensure that efforts to develop new processes for the net zero transition do not conflict with their responsibilities for market stability (see Box 1).

The case for reform is highlighted by the fact that, despite the pledges mentioned above, the actual amounts invested in net zero alignment to date have been modest. Estimates vary, but broadly speaking the largest total climate-related financial flows in a single year have been $632 billion in 2020, according to the Climate Policy Initiative;[5] or $817 billion in 2020, according to the UNFCCC's Standing Committee on Finance.[6] Both figures are much lower than the $6.5 trillion per year in new and ongoing spending on low-emissions assets implied by the McKinsey estimates above.[7]

Actual spending aside, some progress on aligning the global financial system with climate goals has occurred in the past five years or so. In 2017 the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) was created as a group to develop common approaches on climate-related financial risk management, and as a forum for promoting cultural change by mainstreaming the net zero transition across the financial industry. The NGFS started with eight institutions, but its membership has increased rapidly and stood at 116 as of July 2022.[8]

An ability to work closely with financial markets arguably makes central banks and financial regulators better placed than government departments to direct international financial flows towards climate action.

Also in 2017, the Task Force on Climate-related Financial Disclosures (TCFD)[9] launched recommendations on climate-related governance, strategy, risk management, and metrics and targets around climate risk disclosures. The recommendations are designed to support all organizations requiring decision-useful, forward-looking information on the financial impacts of climate change, including in financial filings.[10] They offer a starting point for the private sector and financial regulators in understanding how to assess and address climate-related risks.

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5 Naran, B. et al. (2022), *Global Landscape of Climate Finance: A Decade of Data: 2011-2020*, Climate Policy Initiative, https://www.climatepolicyinitiative.org/wp-content/uploads/2022/10/Global-Landscape-of-Climate-Finance-A-Decade-of-Data.pdf.
6 UNFCCC (2022), *UNFCCC Standing Committee on Finance: Fifth Biennial Assessment and Overview of Climate Finance Flows,* Technical Report, https://unfccc.int/sites/default/files/resource/J0156_UNFCCC%20BA5_2022_Report_v4%5B52%5D.pdf.
7 McKinsey & Company (2022), *The net-zero transition: What it would cost, what it could bring.*
8 Network of Central Banks and Supervisors for Greening the Financial System (NGFS) (2022), 'Membership', https://www.ngfs.net/en/about-us/membership.
9 The Task Force on Climate-related Financial Disclosures (TCFD) was created at COP21, in Paris in 2015, by the Financial Stability Board (FSB) to develop 'consistent climate-related financial risk disclosures for use by companies in providing information to lenders, insurers, investors and other stakeholders'. TCFD (2022), 'History', https://www.fsb-tcfd.org/about/#history.
10 TCFD (2017), *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 2017, https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf.

As such developments illustrate, central banks and financial regulators worldwide increasingly recognize the threat climate change poses to financial stability. They are starting to explore the potential of levers such as climate-related macroprudential regulation and innovative monetary policy to support the net zero transition. Moreover, an ability to work closely with financial markets arguably makes central banks and financial regulators better placed than government departments to direct international financial flows towards climate action. The TCFD's recommendations have already been adopted in several countries, and some central banks and financial regulators have started implementing climate stress-testing and green bond purchase programmes.

While these advances are significant at the level of certain individual countries, much more must be done globally. A key challenge is to stimulate private cross-border financial flows into net zero-consistent investments. Most financial resources reside in advanced economies, yet most renewable energy investment opportunities are in emerging markets and developing economies (EMDEs). For this reason, much of the focus of this paper is on the challenge of increasing climate-related cross-border private capital flows to EMDEs specifically. Such markets often have little fiscal space for public spending, limiting the ability of their governments to fund the net zero transition and thus increasing the need for private capital. Yet private investors typically see EMDEs as riskier than advanced economies.

An illustration of the complexity and sophistication of reforms needed is that the free flow of climate finance across borders will require the establishment of a more comprehensive system of disclosures around climate risk. Yet this could have the unintended consequence of precipitating capital flight from EMDEs vulnerable to climate change if new disclosure requirements cause investors to assign higher risks to such markets (see Chapter 2 for more detail). EMDEs already have more difficulty than advanced economies in accessing capital markets, yet they often have the greatest need of external finance for climate change mitigation and adaptation.[11] In other words, although an effective system of disclosures and regulations is a necessary condition for the growth of global net zero finance, it is insufficient on its own to ensure wide geographical coverage and market stability. New compliance requirements will need to be complemented by policies that can correct for market distortions and reduce risk aversion so that climate investment – in EMDEs in particular – can grow.

About this paper

In the context of the above factors, the rest of this research paper outlines steps to accelerate investment in climate action and overcome obstacles to wider geographical coverage of such investment. It assesses how private cross-border

11 Bolton, P. et al. (2022), *Climate and Debt*, Geneva Reports on the World Economy 25, CEPR Press, https://cepr.org/system/files/publication-files/173807-geneva_25_climate_and_debt.pdf; Beirne, J., Renzhi, N. and Volz, U. (2021), 'Feeling the heat: Climate risks and the cost of sovereign borrowing', *International Review of Economics & Finance*, Volume 76, pp. 920–36, https://doi.org/10.1016/j.iref.2021.06.019; and Klusak, P. et al. (2021), *Rising Temperatures, Falling Ratings: The Effect of Climate Change on Sovereign Creditworthiness,* Bennett Institute Working Paper, March 2021, https://www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/Rising_Climate_Falling_Ratings_Working_Paper.pdf.

financial flows may be galvanized and shaped by climate-focused changes in financial regulation. In particular, the analysis explores the options available to central banks and financial regulators in directing institutional capital to net zero-consistent investments (and away from high-emissions assets). It also assesses the efforts of recent private sector initiatives – such as the Glasgow Financial Alliance for Net Zero (GFANZ) – to support banks, asset managers, pension funds, investment consultants and other financial firms in 'greening' the financial system.

The findings presented here are based on an extensive desk review of almost 200 academic and policy publications, as well as on bilateral discussions and a roundtable of climate finance experts explicitly convened to feed into this research.

The chapters are organized as follows:

- Chapter 2 reviews the current state of net zero financial flows, and outlines the principle obstacles to their expansion into EMDEs in particular. It makes the case for increased portfolio investment, which is underutilized (relative to foreign direct investment) as a source of cross-border climate finance into EMDEs.
- Chapter 3 examines the opportunity for central banks and financial regulators to incentivize and stimulate net zero-aligned private international financial flows. Among other proposals, it asks whether central banks might expand their operating mandates beyond traditional goals such as price stability, and underlines the need for common standards and consistent taxonomies of climate-sustainable financial products. It also explores how central banks could lead market changes directly by adjusting their asset portfolios or prioritizing climate-friendly instruments in areas such as monetary policy operations.
- Chapter 4 reviews recent initiatives among private investors, including large financial institutions, to move towards net zero. It considers the integrity of financial institutions' climate pledges, discusses the need for private institutions to publish credible net zero transition plans, and looks at the limits of climate modelling and the consequent implications for financial planning cycles.
- Chapter 5 offers some concluding thoughts and recommendations to strengthen climate action. It identifies three particular points of leverage that could be exploited to unlock growth in international climate finance: mandatory net zero transition plans; central bank asset purchases and reserve management; and international cooperation outside the climate-specific international policy architecture.

02
Current trends and obstacles

Emerging markets and developing economies (EMDEs) are among the most vulnerable to the effects of climate change, and have the greatest need for climate investment. However, most climate-related private capital still flows to advanced economies.

Foreign direct vs foreign portfolio investment

The amounts of climate-related finance potentially available to countries at different levels of development, and the nature of financial sector reforms required to realize such investments, will be determined to a significant degree by the type of finance that works best in a given environment and its overall availability.

International private finance flows can be divided into foreign direct investment (FDI) and foreign portfolio investment (FPI).[12] On a global aggregate scale, the largest FDI flows are usually between advanced economies, mainly through mergers and acquisitions. However, FDI is also the primary source of international finance for EMDEs, which receive larger FDI inflows than they do portfolio inflows.[13] Most of this FDI consists of greenfield investment.[14]

FDI is popular in EMDEs because it leads, with greater certainty, to the establishment of new enterprises or operations, and offers several advantages to both recipient countries and investors. These include its facilitation of technology transfer while offering protection for proprietary information (particularly for new technologies, as is usually the case for renewable energy); and its potentially catalytic effect on human capital development (e.g. through employee training in newly established enterprises). FDI also boosts domestic fiscal revenue

12 Foreign direct investment (FDI) establishes a lasting interest in, and a significant degree of influence over, a business resident in another economy. Foreign portfolio investment (FPI) consists of investments in securities and other financial products issued in a foreign country.
13 UN Conference on Trade and Development (UNCTAD) (2022), *World Investment Report 2022: International tax reforms and sustainable investment,* https://unctad.org/webflyer/world-investment-report-2022.
14 Greenfield investment is a type of FDI in which a company establishes a subsidiary in the recipient country.

(as investment projects start to earn income) because new companies contribute to receipts of corporate tax, income tax and royalties. In addition, FDI is less volatile than FPI and therefore less susceptible to sudden reversals of flows. The share of FDI in total international inflows is normally higher in countries with higher country risk indicators, and where the quality of institutions is perceived as lower. FDI is more likely to flow to these countries than other forms of capital due to their inefficient financial markets, since in these cases foreign investors prefer to operate directly instead of relying on local arrangements.[15]

To date FDI into EMDEs has historically focused on projects associated with harmful climate impacts, including in manufacturing, mining and other natural resource extraction sectors.[16] In particular, FDI in the last few decades has been linked to oil and gas exploration, with companies from advanced economies investing in resource-rich EMDEs such as Angola and Nigeria.

Even if FDI is refocused on net zero-consistent assets, it seems unlikely that there will be enough finance of this type available to meet overall requirements for green investment.

This is beginning to change: in recent years, the importance of the primary sector in FDI has waned, while investment in renewable energy projects has risen. In 2019, the number and value of greenfield FDI projects in renewable energy reached a record high.[17] However, these capital flows were still concentrated in developed markets rather than in EMDEs.[18]

But even if FDI is refocused on net zero-consistent assets, it seems unlikely that there will be enough finance of this type available to meet overall requirements for green investment. Total global FDI flows in 2021 amounted to $1.6 trillion,[19] far below the $3.5 trillion annual increase in capital spending on physical assets potentially needed. Even if FDI went predominantly into 'greener' assets and projects, an increase in *portfolio* investment would still be needed to close the net zero financing gap.

How to increase portfolio flows into net zero-consistent assets in EMDEs – albeit not to the exclusion of FDI – is therefore a critical task for financial policymakers. Institutional investors have recently shown some responsiveness to the climate crisis. However, their activities continue to focus on advanced economies, while financial institutions are reorienting their portfolios too slowly relative to the timeframes advocated by climate policymakers.

The next section explores the major obstacles for both FPI and FDI in more detail.

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15 Loungani, P. and Razin, A. (2001), 'How Beneficial Is Foreign Direct Investment for Developing Countries?', *Finance and Development*, Volume 38, Number 2, June 2001, Washington, DC: IMF, https://www.imf.org/external/pubs/ft/fandd/2001/06/loungani.htm.
16 OECD (2022), 'Inward FDI flows by industry', OECD Data, https://data.oecd.org/fdi/inward-fdi-flows-by-industry.htm#indicator-chart (accessed 20 Jul. 2022).
17 UNCTAD (2021), *World Investment Report 2021: Investing in sustainable recovery,* https://unctad.org/publication/world-investment-report-2021.
18 Ameli N. et al. (2021), 'Higher cost of finance exacerbates a climate investment trap in developing economies', *Nature Communications* 12, 30 June 2021, https://doi.org/10.1038/s41467-021-24305-3.
19 UNCTAD (2022), *World Investment Report 2022,* p. 2.

Obstacles to net zero finance

Inconsistent regulation and government policy

Net zero commitments currently cover around 32 per cent of financial institutions' assets under management.[20] In other words, 68 per cent of global assets are *unconnected* to a net zero target. This may partly reflect inconsistent climate-related financial regulations – and a lack of uniform definitions of net zero compatibility – across different jurisdictions. Because commercial financial institutions are typically multinational, they cannot commit to targets that are interpreted very differently across the countries in which they operate. (This issue is covered in more depth in Chapters 3 and 4.)

Obstacles to international climate finance also include the effects of uneven or preferential national policy support, such as feed-in tariffs (see Chapter 3) and interest rate subsidies offered by national development banks (NDBs) for solar and wind power project finance, exchange rate uncertainty, political and governance risks, and market information failures.

As a result of such factors, around 90 per cent of private climate finance stays within national borders.[21] Where international climate finance flows occur, their geographical distribution is highly unequal. According to the Climate Policy Initiative, 67 per cent of such flows in 2019/20 were concentrated in Western Europe, the US, Canada and China.[22] The relative lack of capital flows to EMDEs other than China is a function of the uneven availability of private investment in particular. Whereas climate investment in advanced economies (Western Europe, the US, Canada and Oceania) was primarily funded from private sources in 2019/20,[23] EMDEs relied mainly on public sector financing. Non-OECD countries, in particular, obtain most of their climate finance from domestic public sector sources. A prominent example is sub-Saharan Africa, where climate investment was 88 per cent publicly funded in 2020.[24]

Risk aversion towards EMDEs and climate investment

EMDEs hold most of the world's potential for renewable energy generation and nature-based climate solutions. These countries also tend to be the most vulnerable to the physical impacts of climate change. However, EMDEs usually also suffer from higher political, regulatory and macroeconomic instability compared to advanced economies. This is often reflected in lower sovereign credit ratings and a reduced capacity to access debt markets.[25]

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20 Solomon (2022), *Private Financial Institutions' Paris Alignment Commitments: 2022 Update,* p. 6.
21 Ibid. See also Kreibiehl S. et al. (2022), 'Investment and Finance', Chapter 15, *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change,* IPCC, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter15.pdf.
22 Naran et al. (2022), *Global Landscape of Climate Finance: A Decade of Data: 2011-2020*.
23 Ibid.
24 Ibid.
25 Ameli, N., Kothari, S. and Grubb, M. (2021), 'Misplaced expectations from climate disclosure initiatives', *Nature Climate Change*, 917–24 (2021), 7 October 2021, https://doi.org/10.1038/s41558-021-01174-8.

In addition, net zero-consistent energy investment is usually perceived as riskier than traditional investment.[26] Most net zero-consistent investments are in infrastructure, an asset class treated by investors as especially risky due to high upfront costs and long payback periods. Investors are particularly wary of projects around adaptation to climate change, as these not only generally involve large-scale infrastructure but also suffer from an 'agency' issue: that is, the investments are in public goods for which the ultimate financial benefit, while potentially very significant, is hard to measure and accrues to the country as a whole.

The issue of risk aversion was illustrated in a 2021 joint study by the International Energy Agency (IEA) and Imperial College Business School, which assessed global risk and return data for renewable energy and fossil fuel investments. Although renewable energy produces higher returns in EMDEs than fossil fuel assets do (136 per cent for renewables versus 114 per cent for fossil fuels), annualized volatility (a measure of investment risk) is higher for renewable energy (at 6.9 per cent) than for fossil fuels (5.4 per cent).[27] This can deter investment or force EMDEs to secure climate investments on less favourable terms than developed economies.

A related dilemma for policymakers in EMDEs is that improved climate risk transparency and disclosure – while desirable in principle to ensure that net zero alignment is factored into financial decision-making – may ultimately deter investors by identifying climate risks. Although a more nuanced understanding of exposures can help financial institutions manage climate risk, there is also a chance of such information precipitating capital withdrawal from countries where physical climate impacts are highest. This is particularly the case if conventional approaches to assessing credit risk and investment risk – rather than approaches that perhaps might incorporate innovative or more holistic climate action metrics – continue to determine financial decision-making.

An example of the impact of prevailing risk exposure methodologies can be seen in the 2017 announcement by Moody's Investors Service, a credit rating agency, that it might downgrade island states' sovereign credit ratings due to physical climate risks that were likely to increase government borrowing costs.[28] A separate example concerns a study by Beirne et al., which tested the effects of climate vulnerability on fiscal sustainability and the pricing of sovereign risk for a sample of 40 developed and developing countries.[29] The results of the study suggested that climate risks significantly increase the cost of sovereign borrowing.

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26 International Energy Agency (IEA) (2022), *World Energy Investment 2022*, https://www.iea.org/reports/world-energy-investment-2022.
27 IEA and Centre for Climate Finance & Investment (2021), *Clean Energy Investing: Global Comparison of Investment Returns*, March 2021, https://www.iea.org/reports/clean-energy-investing-global-comparison-of-investment-returns.
28 Moody's Investors Service (2017), 'Announcement: Moody's: Medium-term climate change vulnerabilities factored into small island sovereign credit profiles, but climate trends pose longer-term risks', 5 December 2017, https://www.moodys.com/research/Moodys-Medium-term-climate-change-vulnerabilities-factored-into-small-island-PR_376346; and Zamarioli, L., Pauw, P., König, M. and Chenet, H. (2021), 'The climate consistency goal and the transformation of global finance', *Nature Climate Change* 11, 578–83 (2021), 5 July 2021, https://doi.org/10.1038/s41558-021-01083-w.
29 Beirne, Renzhi and Volz (2021), 'Feeling the heat: Climate risks and the cost of sovereign borrowing'.

Macroeconomic weakness and energy security responses

Prospects for net zero investment are complicated by the economic fallout from the COVID-19 pandemic and Russia's war in Ukraine.

The fiscal pressures associated with the pandemic have worsened many EMDEs' debt vulnerability. This has limited many governments' ability to invest in climate action, as well as their capacity to leverage private finance. According to the IMF, about 55 per cent of countries in the G20's former Debt Service Suspension Initiative (DSSI)[30] are at high risk of, or already in, debt distress.[31] This underlines the importance of debt relief in reducing impediments to climate investment in EMDEs. Proposals for 'debt for climate' swaps are re-emerging. Such swaps involve a debtor nation agreeing to certain climate action – such as investing in decarbonization or climate change adaptation – in return for receiving debt relief.[32] Such arrangements allow debtor nations to finance climate projects domestically, in local currency, instead of making further external debt payments in a foreign currency. This enables countries to reduce their indebtedness while freeing up fiscal space for climate investment.[33]

The conflict in Ukraine has heightened policy concerns about energy security. Some countries have sought to shore up their energy supplies in the short term by increasing imports of fossil fuels from non-Russian markets, or by investing more in hydrocarbon exploration.

The economic effects for EMDEs of Russia's war in Ukraine include higher commodity prices, supply chain disruptions, systemic inflationary pressures and policy uncertainty. Among climate-specific impacts, the critical minerals used in renewable energy applications have become less affordable.[34] In many cases, EMDEs are net importers of such raw materials, potentially rendering climate investment vulnerable to imported inflation and/or supply shortages.

The conflict in Ukraine has also heightened policy concerns about energy security. In principle, the war has strengthened the case for investment in renewables, as it has highlighted the risks of relying on imports of Russian fossil fuels. However, in practice, some countries have sought to shore up their energy

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30 The IMF made the following observation: 'The Debt Service Suspension Initiative (DSSI) means that bilateral official creditors are, during a limited period, suspending debt service payments from the poorest countries (73 low- and lower middle-income countries) that request the suspension. It is a way to temporarily ease the financing constraints for these countries and free up scarce money that they can instead use to mitigate the human and economic impact of the COVID-19 crisis.' IMF (2021), 'Questions and Answers on Sovereign Debt', last updated 8 April 2021, https://www.imf.org/en/About/FAQ/sovereign-debt#s2q2.
31 IMF (2023), *Fiscal Monitor: On the Path to Policy Normalisation*, 12 April 2023, https://www.imf.org/-/media/Files/Publications/fiscal-monitor/2023/April/English/text.ashx.
32 Chabert, G., Cerisola, M. and Hakura, D. (2022), 'Restructuring Debt of Poorer Nations Requires More Efficient Coordination', IMFBlog, 7 April 2022, https://blogs.imf.org/2022/04/07/restructuring-debt-of-poorer-nations-requires-more-efficient-coordination.
33 Singh, D. and Widge, V. (2021), 'Debt for Climate Swaps', Climate Policy Initiative, 10 May 2021, https://www.climatepolicyinitiative.org/publication/debt-for-climate-swaps.
34 Kim, T.-Y. (2022), 'Critical minerals threaten a decades-long trend of cost declines for clean energy technologies', IEA, 18 May 2022, https://www.iea.org/commentaries/critical-minerals-threaten-a-decades-long-trend-of-cost-declines-for-clean-energy-technologies.

supplies in the short term by increasing imports of fossil fuels from non-Russian markets, or by investing more in hydrocarbon exploration. The result is that some EMDEs could become even more locked into fossil fuel-reliant infrastructure, with the war in Ukraine risking reversing years of progress on investment in clean energy.

A similarly challenging picture is evident in the broader sustainable development space. Data from the UN Conference on Trade and Development (UNCTAD)[35] show a collapse in investment flows to sectors relevant to progress on the UN Sustainable Development Goals (SDGs). The value of SDG-aligned greenfield projects in EMDEs announced in 2021 – although 10 per cent higher than in the previous year – was well below pre-pandemic levels, and 41 per cent lower than in 2020 in least developed countries (LDCs).[36] Although renewable energy project finance has remained stable in the past two years, 60 per cent of such investment has stayed in advanced economies, with 85 per cent of this coming purely from private sources.[37] This underlines the idea – noted earlier – that private capital is not flowing to where it is most needed: it finances climate-sustainable investment in developed economies even as most opportunities for such investment are widely known to reside in EMDEs.[38]

ESG compliance requirements

Another challenge to institutional climate investment in EMDEs concerns the fiduciary duties associated with financial institutions' environmental, social and governance (ESG) responsibilities. ESG issues can be acute in countries with inadequate or unstable regulatory systems, making it hard for private investors to enter otherwise promising markets for climate finance while still meeting their ESG obligations.[39]

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35 UNCTAD (2021), *World Investment Report 2021*.
36 UNCTAD (2022), *World Investment Report 2022*.
37 Ibid., p. xii.
38 IEA (2021), *Financing Clean Energy Transitions in Emerging and Developing Economies*, Paris: IEA, https://www.iea.org/reports/financing-clean-energy-transitions-in-emerging-and-developing-economies.
39 Sullivan, R., Martindale, W., Feller, E. and Bordon, A. (2019), *Fiduciary Duty in the 21st Century,* UNEP Finance Initiative, https://www.unepfi.org/fileadmin/documents/fiduciary_duty_21st_century.pdf.

03
The role of central banks and financial regulators

Central banks and financial supervisory bodies have uniquely close links to capital markets, and so are well positioned to promote net zero alignment in the financial sector. Options for leading the transformation include both regulatory measures and more direct participation in markets.

Climate action cannot be adequately financed using current approaches. It is true that existing risk-mitigation instruments such as guarantees, feed-in tariffs[40] and government loans (for example, through national development banks – see Box 2) are already considered effective, up to a point, for scaling up finance through public financial mechanisms. But they are insufficient on their own to drive the transformation of global private finance needed to accelerate the net zero transition.

This is where central banks and financial regulators have potential catalytic roles. There is increasing recognition among public financial authorities that climate change threatens financial stability, and that climate-related macroprudential regulation and innovative monetary policy could provide levers for systemic change. Central banks and financial regulators are also uniquely positioned to send market signals and set rules to drive the reallocation of private capital into low- or zero-emissions assets. Such agencies may be better able than

40 Feed-in tariffs reduce risk by providing long-term certainty to renewable energy investment through 30- or 40-year contracts at subsidized rates.

government departments to work through capital markets to affect the behaviour of institutional investors.

At the same time, central banks and financial regulators are often on the front lines when it comes to dealing with *non-climate-specific* financial challenges, and there is a possible tension between this task and promoting investment in climate action. Although the two should, in theory, complement each other – nothing is more likely than unabated climate change to be disastrous for financial markets – in practice central banks and financial regulators are often obliged to take a narrow view of their responsibilities. Where a response to a financial market crisis or similar event may exclude or be incompatible with innovative climate-related measures, there is a risk that the former may take precedence in policy agendas. It is too early to tell whether the recent financial market turbulence following the collapse of Silicon Valley Bank (SVB) and the severe market pressure on Credit Suisse will sideline climate-related financial reforms, but these episodes underline the need for central banks and financial regulators to build resilience to wider systemic financial vulnerabilities into any plans for stimulating climate finance (see also Box 1, Chapter 1).

Box 2. How national and multilateral development banks can mobilize private sector climate investment

National development banks (NDBs) and multilateral developments banks (MDBs) can support the net zero transition by providing public equity capital and debt to complement private sector equity and debt finance. For instance, they can help to set up public–private partnerships for long-term concessions in the power sector (including in renewable generation, transmission and distribution). Given the implicit government backing of such banks through their shareholders, when NDBs or MDBs co-finance infrastructure projects with private partners, this can reduce borrowing costs and increase the amounts of private sector funding made available, with positive implications for investment in climate action and sustainable development in the destination country.[41] The participation of NDBs and MDBs also ensures some level of public sector control over investment decisions.

Notwithstanding such considerations, the global dimension of capital markets arguably presents an opportunity for central banks and financial regulators to make a difference where others might not be able to. National climate policies operate on territorial emissions defined by national geographical boundaries, and do not necessarily factor in the carbon emissions associated with a country's domestic financial institutions holding high-emitting assets located abroad. GHG emissions mitigation policies in some developed economies have excluded the financing and insuring of fossil fuel assets abroad, even though the latter contribute to climate change and may be a large source of national income. In the EU, for example, emissions cuts in the real economy are not matched by efforts on the

41 Griffith-Jones, S., Attridge, S. and Gouett, M. (2020), *Securing climate finance through national development banks*, ODI Report, London: Overseas Development Institute, https://www.econstor.eu/handle/10419/216988.

part of EU companies and financial institutions to reduce the emissions profiles of their global investment portfolios. More prosperous economies are, in effect, 'outsourcing' high-emitting activities to other jurisdictions in order to keep profiting financially from such activities without recording a corresponding increase in territorial emissions.[42]

One way to start addressing this problem would be for central banks and financial regulators worldwide to adopt the TCFD's recommendations on climate-related financial reporting to improve investors' ability to assess and price climate-related risk and opportunities, and to increase transparency across jurisdictions.[43] This would be consistent with most central banks' primary mandates, which (with some variation between jurisdictions) are typically to preserve monetary and financial stability. It would also be consistent with the mandates of financial regulators where they are not embedded in central banks.

However, such a move would not automatically compel capital reallocation or break the 'path dependency' of investments in fossil fuels and energy-intensive assets. If reporting is not accompanied by the mandatory incorporation of climate risk criteria into financial institutions' risk assessment processes, it is unrealistic to expect a large-scale reallocation of capital from high- to low-carbon assets.[44] In current industry practice, assessment of investment risk usually considers climate risks as exogenous to the financial system. This needs to change, given that the finance sector is critical to determining the speed and scale of the net zero transition.

Institutional mandates and climate change

Further research is needed to determine how central banks and financial regulators can best promote investment in the net zero transition. Nevertheless, there is already a growing consensus that climate change should be considered an intrinsic factor in such authorities' decision-making. Many central banks recognize that climate change and the transition to a net zero economy have substantial implications for macroeconomic indicators such as inflation and employment. The climate crisis also has material implications for financial markets (vital for monetary transmission), the stability of financial institutions (which central banks or financial regulators often supervise), and the integrity of the financial system (relevant to macroprudential mandates).

However, there is substantially less agreement on how far the existing mandates of central banks and financial regulators allow for proactive measures to tackle climate change – or what the appropriate measures should be. For example, a central bank with an embedded financial regulator could conceivably adopt any or all of the following measures: incorporating climate risk criteria into prudential

42 Vaze, P., Meng, A. and Giuliani, D. (2019), *Greening the financial system: Tilting the playing field. The role of central banks,* Climate Bonds Initiative, https://www.climatebonds.net/resources/reports/greening-financial-system-tilting-playing-field-role-central-banks.
43 TCFD (2017), *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*.
44 Ameli, Kothari and Grubb (2021), 'Misplaced expectations from climate disclosure initiatives'.

regulation; adjusting capital requirements in accordance with the emissions profiles of investment portfolios (e.g. requiring financial institutions to set aside more capital for high-carbon assets); directly purchasing climate-friendly assets through quantitative easing (QE) programmes; adding climate criteria to the collateral frameworks used in lending; and providing additional liquidity for climate-friendly activities.

A complication is that the use of these measures potentially raises concerns over central banks' ability to maintain their market neutrality and independence. There is also the question of where climate-specific mandates or 'sub-mandates' would rank in relation to traditional mandates such as those related to price stability.

The NGFS has created a series of workstreams, led by specific central banks and financial supervisory agencies, to try to address these questions. Its 2020–22 programme of research included a workstream on 'microprudential regulation and supervision' and a 'macrofinancial' workstream. Through these, the NGFS aimed to develop climate scenarios for central banks and supervisors, integrate climate risk analysis into macroeconomic and financial stability surveillance, and estimate climate-related risks and their macrofinancial impact. An additional workstream, on 'scaling up green finance', focused on promoting the adoption of climate-related financial disclosures by central banks. Finally, a workstream on 'bridging data gaps' identified a list of data still needed; determined the availability and sources of such data, and any access limitations; and produced a public list of missing data items along with a call for help from external stakeholders to fill in the gaps.[45]

The workstreams announced for 2022–24 cover the following topics: (i) supervision, (ii) scenario design and analysis, (iii) monetary policy and (iv) net zero for central banks.[46]

The need for common definitions of net zero-consistent assets and their characteristics

To facilitate international flows of private finance from high-carbon into low-carbon assets, one of the most important steps will be to develop a consistent global framework of climate investment standards, definitions and reporting requirements. This is needed to provide clarity on which financial products can be treated as net zero-consistent, and on the technical characteristics of such instruments, so that banks, insurers, pension funds, asset managers and other institutional investors can adjust their portfolios accordingly.

Central banks and financial regulators can help to lead this process. Through the NGFS as well as non-climate-specific economic forums, central banks and financial regulators should cooperate on establishing high-level principles on the net zero transition. These principles could then inform the design of consistent taxonomies

45 NGFS (2021), *Progress report on bridging data gaps,* May 2021, https://www.ngfs.net/sites/default/files/medias/documents/progress_report_on_bridging_data_gaps.pdf.
46 NGFS (2022), 'NGFS publishes its 2022-2024 work program', press release, 30 May 2022, https://www.ngfs.net/en/communique-de-presse/ngfs-publishes-its-2022-2024-work-program.

of climate investments, with definitions harmonized across jurisdictions to create a consistent and comparable framework.

Contrary to some perceptions, EMDEs rather than advanced economies are currently leading the way in establishing climate investment principles. The central banks of China, Malaysia and Mongolia were among the first to create regulations or guidance on low-carbon investment. The South African Reserve Bank has a draft version of a green taxonomy under consultation. The ASEAN Taxonomy Board[47] and the central banks of Bangladesh, Chile, Colombia, the Dominican Republic, India and Kazakhstan all have taxonomies under development. Discussions on a possible climate investment taxonomy are also under way at the Banco de México.[48]

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These developments underline the interest central banks have in clarifying the opportunities for green or net zero-aligned investment. A key challenge, however, is that most current regulations focus on generating disclosures in relation to the corporate assets held by financial institutions. Disclosure should serve not only to produce data but also to feed into investor decision-making. At the same time, systems of prudential disclosure on climate-related risks – meaning the risks to financial institutions themselves – are only in place in the EU, the UK and a few countries in Asia. Expanding prudential regulation to a more extensive geographical area is an important agenda item for future consideration in the NGFS and other global forums.

Data quality considerations

Central banks and financial regulators can play a key role in improving information gathering. They can work collectively to systematize climate data production in the financial system, and to ensure the accumulation of high-quality, granular, reliable and comparable climate-related data. The NGFS's creation of a climate scenario repository for the financial system, and its efforts to identify data gaps through a dedicated workstream, are examples of early progress in this area.

47 ASEAN Taxonomy Board (2021), 'ASEAN Sectoral Bodies Release ASEAN Taxonomy for Sustainable Finance – Version 1', media statement, 10 November 2021, https://www.sfinstitute.asia/wp-content/uploads/2022/07/Media-statement_10-Nov_.pdf.
48 Future of Sustainable Data Alliance (FoSDA) (2022), 'Taxomania! International Overview Update 2022', last updated 26 October 2022, https://futureofsustainabledata.com/taxomania-international-overview-update-2022.

Central banks and financial regulators can also promote cooperation between financial institutions and other stakeholders to improve data quality and actionability. This could involve integrating climate-related risks into prudential supervision. The Financial Stability Board (FSB) has been working to identify the relevant metrics – based on the materiality of climate risks and their cross-border and cross-sectoral relevance – for inclusion in its global surveillance framework.[49] There is an opportunity here for global coordination that could involve central banks and financial regulators building a climate information architecture that aligns with FSB surveillance.

Are mandatory transition plans the way forward?

The FSB has also identified mandatory disclosure of financial institutions' net zero transition plans as an area for future work. Transition plans would measure reporting institutions' progress towards net zero alignment, and the impact of different climate scenarios on their investment strategies. A UK government proposal, released in late 2021 when the country became the first to announce it would make the publication of transition plans mandatory, illustrates the sort of details that might be included: (i) high-level targets for mitigating climate risk, including a net zero commitment; (ii) interim milestones; and (iii) actionable steps which the reporting organization plans to take towards meeting its targets.[50]

Transition plans should also provide transparency on the economic and climate change assumptions behind long-term targets, and on the scenarios and tools used to generate financial and climate-related estimates. The UK's system – which was due to come into effect in 2023 but has been delayed[51] – will initially apply to the entire portfolios of asset managers, regulated asset owners and publicly listed companies. However, some commitments under the UK scheme cover only parts of financial institutions' portfolios.

By making the publication of net zero transition plans mandatory for financial institutions, especially if such an approach is globally coordinated, central banks and financial regulators have an opportunity to establish a 'gold standard' for climate disclosures. They could set specific requirements on the scope and timing of reporting, and also oblige reporting entities to identify transition risks and declare roll-out schedules of relevant measures. (The latter would specify how financial institutions plan to rebalance their portfolios according to the principles laid out in the investment taxonomies.)

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49 Financial Stability Board (2022), *FSB Roadmap for Addressing Financial Risks from Climate Change: 2022 progress report*, https://www.fsb.org/wp-content/uploads/P140722.pdf.
50 HM Treasury (2021), 'Fact Sheet: Net Zero-aligned Financial Centre', 2 November 2021, https://www.gov.uk/government/publications/fact-sheet-net-zero-aligned-financial-centre/fact-sheet-net-zero-aligned-financial-centre.
51 Jones, H. (2022), 'Britain hits pause button on 'green' taxonomy plans', Reuters, 14 December 2022, https://www.reuters.com/business/sustainable-business/britain-hits-pause-button-green-taxonomy-plans-2022-12-14.

'Active' measures: prudential regulation and monetary policy

While enhancing information disclosures and coordinating data regimes globally can be considered 'passive' measures for promoting decarbonization, central banks and financial regulators can make more active interventions in markets to accelerate the net zero transition. The two main areas for potential action are in prudential regulation[52] and monetary policy.[53]

Prudential regulation: adjusting capital requirements in line with climate factors

In theory, central banks and financial regulators might usefully promote net zero alignment by establishing disincentives and incentives around different types of investment depending on each financial product's climate impact. A so-called 'brown' penalizing factor, in the policy jargon, would increase minimum capital requirements for loans to projects directly exposed to GHG emissions or associated with systemic climate risks. The increased capital requirements would, in effect, categorize such loans as having a higher risk weighting, making it costlier to finance the investments in question.

In contrast, a 'green' supporting factor would lower capital requirements and reduce the risk weighting of loans or investments for low-carbon projects. However, the viability of such an approach remains uncertain. The lowering of capital requirements for low-carbon investments could have the unintended consequence of undermining financial stability if the risks of such investments are not properly accounted for. Moreover, although exposure to high-emitting assets can increase financial risk (as portfolios would be more susceptible to changes in valuations associated with physical climate impacts and transition risks), it is unclear whether increased portfolio exposure to 'greener' investments would necessarily reduce non-climate-related financial risks sufficiently to justify lower capital requirements. An easing of capital requirements for low-carbon assets could also unintentionally increase exposure to other risks.[54] This underlines the importance of having a climate investment taxonomy that systematically separates 'green' from 'brown' assets, and of fully integrating climate risk considerations in the broader risk framework.

Monetary policy: collateral frameworks and investor 'haircuts'

Another policy option could be for central banks to adjust their collateral requirements in line with the GHG emissions profiles of different investments. This mechanism would essentially involve lowering the market value of an asset used as collateral for a loan (i.e. increasing the 'haircut' taken by the borrower)

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52 Prudential regulation has the potential to change investment decision-making by creating strict rules that would, for example, penalize further exploration of fossil fuels. The use of minimum capital adequacy ratios is the principal measure explored by recent academic literature in this regard. Capital adequacy requirements can be used to ensure firms' alignment with supervisory expectations related to climate risks, and to encourage financial institutions to change their investment profiles by replacing high-emissions assets with low- or zero-emissions ones.

53 In November 2021, the Bank of England announced plans to 'green' its corporate bond purchase scheme. In July 2022, the European Central Bank released a plan for incorporating climate change criteria into its monetary policy operations by means of adjusting its corporate bond holdings and collateral framework.

54 Bolton, P. et al. (2020), *The green swan: Central banking and financial stability in the age of climate change,* Bank for International Settlements (BIS), January 2020, https://www.bis.org/publ/othp31.pdf.

if the emissions or climate risks associated with that asset exceed a certain threshold. The same approach could theoretically be applied in the opposite direction: reducing the haircut associated with greener assets. Central banks could arguably even go further and determine the underlying eligibility of assets for use as collateral according to each instrument's emissions profile: assets associated with higher emissions would be ineligible, while greener assets would be eligible for inclusion as collateral.[55]

There is the potential for synergies between climate-aligned collateral requirements and carbon taxes. Modelling indicates that a carbon tax would be lower if complemented by a parallel collateral framework than would be the case without such a framework.

Increasing collateral requirements according to climate-related criteria would protect central banks' balance sheets from climate risks. And it should be straightforward, according to the academic literature, to integrate this aspect of a new approach into existing collateral frameworks. There is also the potential for synergies between climate-aligned collateral requirements and carbon taxes. Modelling indicates that a carbon tax would be lower if complemented by a parallel collateral framework than would be the case without such a framework. On the other hand, *reducing* the haircut associated with greener assets could conflict with the market neutrality principle mentioned above, and is not currently considered broadly implementable.[56]

Monetary policy: asset purchase programmes and central bank reserve management

One of the most 'active' climate finance interventions is to move markets directly. Central banks have the potential to do this through their monetary policy operations, as well as through management of their investment portfolios and reserves. By buying low-carbon assets and selling high-carbon ones, central banks can align their own holdings with net zero-compatible criteria. At the same time, such portfolio changes would send market signals that private investors are likely to emulate – thus creating a multiplier effect in stimulating capital flows to the low-carbon economy.

The debate in this area initially developed around the use of so-called 'green' quantitative easing (QE)[57] by central banks in the aftermath of the 2008–09 global financial crisis. It advanced between 2018 and 2020, with policymakers

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55 Dafermos, Y. (2021), *Climate change, central banking and financial supervision: beyond the risk exposure approach,* SOAS Department of Economics Working Paper No. 243, London: SOAS University of London, https://www.soas.ac.uk/sites/default/files/2022-10/economics-wp243.pdf.
56 McConnel, A., Yanovski, B. and Lessmann, K. (2021), 'Central bank collateral as a green monetary policy instrument', *Climate Policy*, Volume 22 Issue 3, 14 December 2021, pp. 339–55, https://doi.org/10.1080/14693062.2021.2012112.
57 Quantitative easing (QE) consists of central banks buying government or corporate bonds. This increases bond prices, which decreases the bond yields or 'interest rates' which holders of these bonds get. The lower-interest bond yields then feed through to lower interest rates on loans across the economy, helping to boost spending and keep inflation at target. Bank of England (undated), 'Quantitative easing', https://www.bankofengland.co.uk/monetary-policy/quantitative-easing.

even ultimately considering the use of green QE in response to the COVID-19-related economic crisis. Green QE means prioritizing the purchase of 'green bonds' (a type of debt security incorporating a commitment to finance climate-related activities) or other bonds associated with climate-friendly sectors and assets.

However, current global economic conditions potentially render QE less relevant for the time being. QE was developed to tackle deflationary conditions, but many countries are now experiencing high inflation due to global supply-chain problems and the economic impact of Russia's war in Ukraine, which has raised commodity prices. Central banks are tightening monetary policy in response, so they are not expected to engage in much QE of any kind – green or otherwise. Indeed, a kind of reverse process could start happening as QE asset purchases are unwound, resulting in what is sometimes referred to as 'quantitative tightening' (QT).

QT may still fulfil a useful role for the net zero transition, however. While central banks may not be buying as many green bonds as before, the very act of prioritizing which bonds to sell and which to keep in their portfolios is crucial in a period of economic turbulence. By choosing to sell assets associated with high emissions first, central banks could signal their net zero intentions to markets. This could produce a wider international realignment of private institutional holdings around environmentally sustainable financial products.

Central banks could also use management of their foreign exchange reserves to impact international financial flows.[58] Traditionally, such management has sought to balance three objectives: liquidity, safety and returns. However, some analysts and observers have recently proposed adding a fourth objective: climate sustainability. This would oblige central banks to consider climate sustainability as a fundamental investment objective of foreign exchange reserve management. It would almost certainly result in their reserves containing more net zero-consistent assets. For such an idea to make progress, however, the global 'green bond' market needs to increase issuance and establish internationally consistent criteria to protect against 'greenwashing'. Increasing the weighting of climate indicators in the ESG criteria associated with bonds in general – not just green ones – would also be essential.[59]

Reserve managers will need to integrate climate risk – alongside existing factors such as credit risk – into their risk assessment processes. New approaches will have to reflect accurate understanding of the exposure of a bond issuer's financial position to changes in carbon regulations or physical climate risks. In this regard, Fender et al. highlight the example of De Nederlandsche Bank, the central bank of the Netherlands. The study observes that understanding environmental criteria (along with social and governance factors) enhances the knowledge of long-term risks and opportunities.[60]

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58 Fender, I., McMorrow, M., Sahakyan, V. and Zulaica, O. (2020), *Reserve management and sustainability: the case for green bonds?*, Bank for International Settlements, BIS Working Papers N° 849, March 2020, https://www.bis.org/publ/work849.htm.
59 Ibid.
60 Ibid, p. 8.

Implementation issues

As discussed earlier, a key question in implementing *all* these possible approaches – both passive and active – will be whether they are sufficiently covered by the existing mandates of central banks and financial regulators. This is likely to vary according to the jurisdiction and the action being proposed.

For example, given the strong link between climate risk and financial risk, a limited degree of mandatory climate risk disclosure is likely to be covered already in most jurisdictions.

But making the development and disclosure of full net zero transition plans mandatory may require the introduction of secondary climate action mandates in some jurisdictions. This could require a big step politically in some countries. It is therefore possible that such a change may be easier to undertake in systems where financial regulators are *not* embedded in central banks because it would be more readily perceived as part of regulatory action, which is widely accepted as a means to deliver net zero, rather than macroeconomic policy, where the need for change in response to climate change is so far less widely accepted.

04
Industry initiatives for greening the financial system

Coalitions of private investors are assembling to address the climate crisis, and are starting to make investment decisions to support the net zero transition. But more work is needed to ensure the integrity of their climate finance pledges, and to improve information systems and climate-related financial modelling.

As mentioned, private financial flows are critical to financing the net zero transition. Around 70 per cent of finance for clean energy in EMDEs will need to come from the private sector by 2030, according to the IEA.[61] The Climate Policy Initiative estimates that private sources accounted for 50 per cent of climate finance in 2020, with 20 per cent coming from corporations, 19 per cent from commercial financial institutions, and 10 per cent from households, individuals and others.[62]

There is also broad agreement that public funds are insufficient to cover climate finance needs. But just as importantly, closing this finance gap will not achieve a net zero transition if private capital is still being directed to fossil fuels and other high-emitting assets. The whole financial industry needs to withdraw investment from high-carbon assets at the same time as investing more in climate action. Article 2.1c of the 2015 Paris Agreement on climate change states that the

61 IEA (2021), *Financing Clean Energy Transitions in Emerging and Developing Economies.*
62 Buchner, B. et. al. (2021), *Global Landscape of Climate Finance 2021,* Climate Policy Initiative, December 2021, https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021. UNFCCC (2021), 'Report of the Standing Committee on Finance', https://unfccc.int/sites/default/files/resource/cp2021_10a01_cma2021_07a01.pdf.

agreement 'aims to strengthen the global response to the threat of climate change' by making finance flows 'consistent with a pathway towards low greenhouse gas emissions and climate-resilient development'.[63]

Efforts are under way to assemble groups of private investors willing to address this issue. The leading such initiative in the run-up to the COP26 climate summit in late 2021 was the Glasgow Financial Alliance for Net Zero (GFANZ),[64] a coalition of financial institutions that have committed to participating in the UN 'Race to Zero' initiative. GFANZ unites seven net zero financial sub-sector alliances: the Net-Zero Banking Alliance, the Net-Zero Asset Managers Initiative, the Net-Zero Asset Owner Alliance, the Paris Aligned Asset Owners, the Net-Zero Insurance Alliance, the Net Zero Financial Service Providers Alliance and the Net Zero Investment Consultants Initiative.

GFANZ has 451 members, accounting for a combined $130 trillion in assets under management. By some estimates, the value of these holdings is already theoretically sufficient, assuming they were translated into actual investments, to cover the entire requirement of the net zero transition.[65] In reality, the full $130 trillion will not necessarily be used for that purpose, and implementation of GFANZ pledges – i.e. the disbursement of actual funds – is far from assured. Some of the capital will doubtless remain invested in existing assets (including, presumably, those linked to fossil fuels), and GFANZ also advises that decarbonization finance may be diluted by 'potential overlap across initiatives, institutions and assets across GFANZ and its sub-sector alliances'.[66] Nonetheless, GFANZ offers a potentially useful mechanism for galvanizing climate investment, as each participating financial institution has committed to its own separate net zero target.

Other relevant financial sector commitments include those of the Climate Action 100+, a coalition launched in 2017 whose membership currently consists of 700 investors with around $68 trillion in assets under management.[67] Climate Action 100+ was created to 'ensure the world's largest corporate greenhouse gas emitters take necessary action on climate change'.[68]

Coordinating different initiatives and measuring their progress and impact remains a challenge, in part because of the potential for duplication and overlap cited by GFANZ. Assets under the management of investors in different initiatives cannot be summed. This underlines the need for clearly defined transition pathways, so that individual investors can plan changes to their strategies and portfolios over the coming decades and so that clarity exists on what a viable trajectory to net zero looks like for each sector in each country.

63 UN Framework Convention on Climate Change (UNFCCC) (2015), 'Paris Agreement', p. 3, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.
64 https://www.gfanzero.com.
65 https://www.gfanzero.com/netzerofinancing.
66 Ibid.
67 Climate Action 100+ (undated), 'About Climate Action 100+', https://www.climateaction100.org/about.
68 Ibid.

Each transition pathway will need interim milestones, which investors will need to achieve to remain on course for meeting long-term commitments (e.g. full net zero alignment by 2050, according to the Intergovernmental Panel on Climate Change[69]). But information gaps continue to create challenges in this area: investors need to know what a 'Paris-aligned' pathway looks like, for example, so that they can determine the percentage of their portfolios that must contain certain asset types (and the precise climate characteristics of those assets) in order to meet Paris targets. This means there is a need for accurate information on whether an asset is net zero-consistent at a given point in time, so that portfolios and investment criteria can be adjusted accordingly if necessary. Financial institutions cannot buy suitable assets if they don't know whether a particular instrument meets climate criteria or not – indeed, asset owners often use the claim that they can't find suitable bankable projects in developing countries to justify climate inaction to their shareholders.

Policy will shape investment, so governments themselves must also be more explicit on how they plan to get to net zero, and on what private investors must do to conform to these changes.

A sophisticated system of financial regulation is needed to address this issue, as there are many conceivable pathways to net zero. Policy will shape investment, so governments themselves must also be more explicit on how they plan to get to net zero, and on what private investors must do to conform to these changes. Again, the need for a comprehensive global framework on climate investment, including detailed and consistent taxonomies setting out the characteristics of net zero-aligned assets, is evident.

Integrity, interim targets and credible transition plans

The integrity of private financial institutions' net zero pledges remains a subject of considerable debate and scrutiny. There was an initial period of excitement around COP26, when hopes were raised by investor commitments. But this has given way to pessimism as fears of empty promises and failure to meet long-term climate targets have increased.

An example of the challenges can be seen in the recent rollback of GFANZ criteria for climate compliance. Initially, membership of the sub-sectoral alliances comprising GFANZ was conditional on following the minimum criteria of the UN Race to Zero initiative, namely: (i) using science-based guidelines to develop

69 IPCC (2018), 'Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments', press release, 8 October 2018, https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments.

plans to reach net zero emissions, covering all three categories ('scopes') of emissions under the Greenhouse Gas Protocol;[70] (ii) setting interim targets for 2030; and (iii) committing to transparent reporting and accounting.[71] Notably, pledges had to include emissions indirectly embedded in firms' portfolios. This was critical because emissions not directly generated by financial firms but associated with their holdings account for 97 per cent of such institutions' total emissions,[72] whereas emissions from their own operations are almost negligible.

However, in October 2022, after disagreements on the stringency of coal investment phase-out timelines, GFANZ dropped the UN Race to Zero requirements.[73] The GFANZ 2022 progress report now states only that 'the Alliances will *take note of the advice and guidance* [author's italics] of the UN Climate Change High Level Champions and the Race to Zero as well as relevant international bodies'.[74] This contrasts with the 2021 progress report, which stated: 'Member commitments are … *anchored* [author's italics] in the United Nations Framework Convention on Climate Change's (UNFCCC) Race to Zero net zero criteria, including the requirements to set near-term decarbonisation targets, release plans to support their longer-term pledges and report progress annually.'[75]

The controversy around GFANZ membership criteria and the resistance of some participants to meeting the UN Race to Zero requirements have increased fears that private sector initiatives will amount to little more than greenwashing, and that genuine commitment to net zero in the financial system is weak. Finding the right balance between stringent conditions and attractive incentives is a dilemma for climate-related initiatives: on the one hand, if such coalitions penalize or remove members who fail to present net zero targets by the required deadline, this could discourage new financial institutions from joining. On the other hand, fears of greenwashing increase the pressure on climate alliances to remain stringent in holding private financial institutions to account.

GFANZ is aware of the risks to net zero should it fail to enforce the use of robust transition plans. In June 2022, it sought to address this by publishing guidance on financial institutions' net zero transition plans.[76] The guidance recommends that financial institutions, at a minimum, set net zero objectives that align with the commitments of their respective sub-sector alliances on climate action in the real economy. In addition, it calls on member institutions to set interim targets and establish accountability mechanisms. GFANZ also published introductory

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70 World Business Council for Sustainable Development and World Resources Institute (2004), *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*, https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf.
71 Race to Zero (2022), 'Defining the "Starting Line"', https://unfccc.int/sites/default/files/resource/Minimum-criteria-for-participation-in-RTZ.pdf.
72 Lütkehermöller K. et al. (2020), *Unpacking the finance sector's climate related investment commitments,* New Climate Institute, https://newclimate.org/wp-content/uploads/2020/09/NewClimate_Unpacking_Finance_Sector_Sept20.pdf.
73 Mundy, S., Bryan, K. and Temple-West, P. (2022), 'Gfanz drops its Race to Zero requirements', *Financial Times*, 28 October 2022, https://www.ft.com/content/26aa3014-6dad-4acb-b88a-c065bf8f5707.
74 GFANZ (2022), *The Glasgow Financial Alliance for Net Zero: 2022 Progress Report*, https://assets.bbhub.io/company/sites/63/2022/10/GFANZ-2022-Progress-Report.pdf.
75 GFANZ (2021), *The Glasgow Financial Alliance for Net Zero: Our progress and plan towards a net-zero global economy*, November 2021, https://unfccc.int/documents/461542.
76 GFANZ (2022), *Financial Institution Net-zero Transition Plans: Fundamentals, Recommendations, and Guidance,* November 2022, https://assets.bbhub.io/company/sites/63/2022/09/Recommendations-and-Guidance-on-Financial-Institution-Net-zero-Transition-Plans-November-2022.pdf.

notes[77] and guidance on the use of sectoral pathways[78] to promote engagement between financial institutions and companies in the real economy in setting net zero targets and creating transition plans.

Separately, in March 2022 the Climate Policy Initiative published guidance on factors financial institutions should consider when developing transition plans.[79] The paper outlined six crucial elements to make transition plans credible, advocating that such documents: (i) include progress benchmarks on mitigation with clearly defined timeframes, consistent with a 1.5°C trajectory; (ii) set out a clear implementation process outlining how policies, products, tools, services and relationships could deliver the transition; (iii) cover the whole organization in question, including details on how the transition will be supported by in-house capacity-building and integrated into budgeting and investment plans; (iv) include sustainability targets to avoid negative side-effects; (v) set out transparency, verification and accountability frameworks; and (vi) include regular reviews and revisions, with the level of ambition updated according to progress.[80]

Closing the information gap

The IPCC notes that data on private climate finance flows are still not organized, systematized and used in ways that facilitate decision-making.[81] The consensus seems to be that the problem reflects a deficit of 'usable information', rather than merely a data production gap, around the emissions embedded in financial institutions' portfolios (particularly in relation to private international climate-related financial flows). In other words, although a lot of data is being produced, it is not systematized and analysed in useful ways to orient investment decision-making. This is particularly relevant to the debate around developing new policies and guidance on attracting private finance to climate-friendly investment.

The European Central Bank (ECB)[82] and GFANZ[83] have recently observed that the financial sector is still failing to address climate risks adequately or produce transition pathways that are fit for purpose. The ECB and GFANZ say that most banks lack robust climate risk stress-testing frameworks and relevant data, that such data as are generated are not in usable formats, that the underlying assumptions in climate stress-testing are not transparent, and that transition pathways lack sectoral, temporal and geographical granularity.

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77 GFANZ (2022), *Introductory Notes on Expectations for Real-economy Transition Plans*, https://assets.bbhub.io/company/sites/63/2022/06/GFANZ_Introductory-Note-on-Expectations-for-Real-economy-Transition-Plans_June2022.pdf.
78 GFANZ (2022), *Guidance on use of Sectoral Pathways for Financial Institutions*, https://assets.bbhub.io/company/sites/63/2022/06/GFANZ_Guidance-on-Use-of-Sectoral-Pathways-for-Financial-Institutions_June2022.pdf.
79 Pinko, N. and Ortega Pastor, A. (2022), *What Makes a Transition Plan Credible? Considerations for financial institutions,* Climate Policy Initiative, March 2022, https://www.climatepolicyinitiative.org/publication/what-makes-a-transition-plan-credible-considerations-for-financial-institutions.
80 Ibid.
81 Kreibiehl et al. (2022), 'Investment and Finance', Chapter 15, *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, pp. 24–25.
82 European Central Bank (2022), *2022 climate risk stress test*, July 2022, https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.climate_stress_test_report.20220708~2e3cc0999f.en.pdf.
83 GFANZ (2022), *Guidance on use of Sectoral Pathways for Financial Institutions*.

There is also widespread agreement that the development of multiple different disclosure frameworks risks creating an undue administrative burden, as each will require the collection of data from financial institutions and their counterparties in the real economy.[84] Although the TCFD's recommendations offer a potential overarching framework for climate-related risk disclosures, other parallel frameworks exist and more are being developed. These include, but are not limited to, frameworks under the Global Reporting Initiative's Climate Disclosure Standards Board,[85] the CDP disclosure platform[86] and the Sustainability Accounting Standards Board.[87] Some financial system practitioners characterize the situation as one in which financial institutions are being asked to provide an 'alphabet soup' of data to different bodies.

This ultimately means that a large amount of climate disclosure data continues to be produced inefficiently and in an uncoordinated way. The logical conclusion is (i) that relevant databases need to be systematized and made openly available to become useful for financial decision-making; and (ii) that an urgent need exists for shared, consistent frameworks to define portfolio alignment with a net zero pathway.

There is widespread agreement that the development of multiple different disclosure frameworks risks creating an undue administrative burden, as each will require the collection of data from financial institutions and their counterparties in the real economy.

The lack of internationally consistent frameworks applies to both climate *risk* data and climate *impact* data. The former estimates the impact of climate change on financial institutions' profitability and balance sheets; the latter measures the effects of financial institutions' own activities on the climate itself. Fragmented policy development compounds the problem. As mentioned in Chapter 3, a variety of efforts are under way to create 'green' taxonomies and classifications, with regulations and guidelines already in place in four Asian countries – China, Japan, Malaysia and Mongolia – and the EU. Multiple other geographies either have draft taxonomies awaiting approval (three countries), under development (14 countries) or under consideration (two countries).[88] This raises concerns over a potential lack of coherence between taxonomies, and over difficulties in coordinating between different systems and asset classifications.

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84 This is an issue that the International Financial Reporting Standards Foundation (IFRS Foundation) is addressing through the Exposure Draft IFRS S2 Climate-related Disclosures (Climate Exposure Draft). This document builds on the recommendations of the TCFD and incorporates industry-based disclosure requirements derived from International Sustainability Standards Board (ISSB) standards.
85 Climate Disclosure Standards Board (2022), *CDSB Framework for reporting environmental and social information: Advancing and aligning disclosure of environmental and social information in mainstream reports*, January 2022, https://www.cdsb.net/sites/default/files/cdsb_framework_2022.pdf.
86 CDP (undated), 'CDP Capital Markets', https://www.cdp.net/en/investor.
87 IFRS Foundation (2023), 'Climate-related Disclosures', updated February 2023, https://www.ifrs.org/projects/work-plan/climate-related-disclosures.
88 Ibid.

It also potentially adds to the risk of greenwashing, and even regulatory arbitrage by investors who might seek to take advantage of jurisdictions where carbon neutrality is defined less strictly. This could allow some financial institutions to seek out jurisdictions that admit controversial investment types into their product classifications, potentially resulting in 'carbon leakage' as polluting investments are transferred from more stringent jurisdictions to less stringent ones. Such concerns are currently evident in the intense debates around the EU's taxonomy for sustainable activities, as the system would potentially define natural gas assets and nuclear power plants as sustainable investments.[89]

The final critical aspect of the climate finance information gap is the need for standard methods and tools to integrate metrics on climate-related risks (both physical and transition-related) into financial risk assessment and impact modelling. Traditional financial risk management techniques usually rely on backwards-looking statistical tools, yet the radical uncertainty associated with climate change makes such methods less suitable. More work is needed in two areas: (i) generation of granular, openly available data; and (ii) the development of reliable analytical and modelling methods for assessing empirical evidence and exploring future scenarios.[90]

Scenarios for climate change and climate policy are currently produced through integrated assessment models (IAMs). This is a long-established approach with decades of technical development and use. However, IAM-based scenarios are usually incompatible with economic and financial analysis. As the IAM-based climate change mitigation pathways on which investors currently rely do not model the financial system, there is no direct feedback loop between financial system decision-making and impacts on climate pathways.[91] In other words, IAMs fail to factor in how financial sector actions affect net zero transition pathways, or how changes in such pathways affect the financial system.

This can create misleading assessments of risk. Battiston et al. (2021) explain that the specific NGFS net zero transition scenario which considers an orderly transition (as opposed to those which consider delayed or disorderly transitions)[92] can give investors the impression that there is a low risk of fossil fuel assets becoming 'stranded'.[93] But if investors wrongly perceive high-emitting assets to be only slightly riskier than low-emitting ones, they may fail to reallocate sufficient capital to the latter.

Furthermore, IAM scenarios are typically not granular enough to be useful for investor decision-making. Most such scenarios model outcomes at a global level, aggregate multiple sectors into their estimates, and are calculated for long-term

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89 ClientEarth (2022), 'EU Taxonomy: Environmental groups start legal action against 'sustainable' gas classification', press release, 19 September 2022, https://www.clientearth.org/latest/press-office/press/eu-taxonomy-environmental-groups-start-legal-action-against-sustainable-gas-classification.
90 Campiglio, E. and Lamperti, F. (2021), 'Sustainable Finance Policy-Making: Why and How', *European Economy – Banks, Regulation, and the Real Sector*, p. 59–74, https://european-economy.eu/2021-2/sustainable-finance-policy-making-why-and-how.
91 Battiston, S., Monasterolo, I., Riahi, K. and van Ruijven, B. J. (2021), 'Accounting for finance is key for climate mitigation pathways: Investors' expectations can hamper a low-carbon transition', *Science*, Vol. 372 Issue 6545, pp. 918–20, https://www.science.org/doi/abs/10.1126/science.abf3877.
92 NGFS (undated), 'Scenarios Portal', https://www.ngfs.net/ngfs-scenarios-portal/explore.
93 Battiston, Monasterolo, Riahi and van Ruijven (2021), 'Accounting for finance is key for climate mitigation pathways', p. 919.

time horizons (such as 2050–2100) in five-year intervals. This means that results are only available for five-year blocks, rather than on a year-by-year basis or with any greater temporal specificity. All this means that such scenarios are of little use in assessing individual assets, and do not fit into financial decision-making cycles. In addition, many IAM-based models do not include uncertainty analysis, and so are less suitable for modelling potential impacts on the financial system.

Adding climate change to financial planning cycles and time horizons

In September 2015, less than three months before the adoption of the Paris Agreement, Mark Carney, then governor of the Bank of England, made a speech in which he introduced the concept of the 'tragedy of the horizon'.[94] By this, Carney meant that although the threat from climate change is unequivocal, it is seen mainly as an intergenerational issue beyond normal business and political cycles. It is also beyond the time horizons of technocratic authorities such as central banks. For this reason, many consider the net zero commitments of financial institutions to lack credibility. Sceptics question the integrity of long-term pledges from institutions whose planning is designed for cycles of hardly more than three years.

Yet since 2015, when Carney made his speech, events have made it ever clearer that the physical and transition risks associated with the climate crisis are not only intergenerational but have tangible effects in the near term. This has discredited the idea of a tragedy of the horizon. Significant short-term financial risks are associated with the existing impacts of climate change, visible in many regions. Recent examples have included deadly floods in Germany, extensive wildfires in Australia, and prolonged droughts in Brazil that have reduced hydropower generation. In the latter case, this has impaired clean electricity generation and energy security, leading to higher electricity prices and wider inflationary pressures. Other relevant examples include recent heatwaves in India and Pakistan (where temperatures hit 50°C in May 2022, with impacts on food security),[95] record high temperatures of over 40°C in the UK in July 2022, and floods in Pakistan in August 2022 that left millions of people homeless.[96] Physical climate risks are thus material for financial institutions even on their relatively short investment horizons.

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94 Bank of England (2015), 'Breaking the tragedy of the horizon – climate change and financial stability – speech by Mark Carney', 29 September 2015, https://www.bankofengland.co.uk/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability.
95 World Meteorological Organization (2022), 'Climate change made heatwaves in India and Pakistan "30 times more likely"', press release, 24 May 2022, https://public.wmo.int/en/media/news/climate-change-made-heatwaves-india-and-pakistan-30-times-more-likely.
96 Baloch, S. M. (2022), "There is nothing for us': Pakistan's flood homeless start to despair', *Guardian*, 7 September 2022, https://www.theguardian.com/world/2022/sep/06/we-screamed-our-hearts-out-for-help-homeless-escape-pakistan-floods.

In addition to physical climate risks, *transition risks* are material in the short term. Policies and strategies implemented by governments, central banks and financial regulators in line with the Paris Agreement have potentially immediate implications for asset valuations and earnings across several high-emitting sectors. These sectors include, but are not limited to: coal, oil and gas; hard-to-abate industrial segments such as steel, cement and some chemicals; road transportation; and aviation.[97] Moreover, the lack of preparedness of financial investors in terms of accurately assessing emissions throughout their portfolios and complying with new environmental regulations has the potential to worsen threats to financial stability.

97 Bank of England (2019), 'Climate change: what are the risks to financial stability?', last updated 10 January 2019, https://www.bankofengland.co.uk/knowledgebank/climate-change-what-are-the-risks-to-financial-stability.

05 Conclusions and recommendations

Action is needed on multiple fronts to align the financial sector with the net zero transition. Three immediate priorities include establishing a system of mandatory transition plans for multinational financial institutions, encouraging central banks to invest in 'green' assets, and promoting institutional cooperation outside the existing climate-specific mechanisms.

Building on the analysis in the previous chapters, this concluding chapter outlines areas demanding rapid action. It recommends principles for how central banks and financial regulators can propel the energy transition – in particular, what needs to be done to increase cross-border private investment in net zero-consistent financial products.

The principles for action cover three areas: (i) mandatory transition plans for multinational financial institutions; (ii) central banks' management of their asset portfolios; and (iii) international cooperation beyond the climate-specific policy architecture.

Mandatory transition plans for multinational financial institutions

To ensure compliance with net zero targets, transition plans need to be made mandatory for multinational financial institutions. This will require a large number of central banks and financial regulators worldwide to establish approaches covering the *entire asset portfolios* of regulated financial institutions, not only the shares of such portfolios committed to net zero so far. Mandatory plans would help to ensure that financial institutions present short- and long-term climate

targets, and well-defined schedules for achieving these targets across the multiple countries in which their assets are located.

Central banks and financial regulators should establish formal requirements for the credibility and comparability of transition plans. These requirements should include: (i) a science-based interim target for 2030, covering scope 3 emissions under the Greenhouse Gas Protocol;[98] (ii) a clear schedule of the steps financial institutions must take to deliver on their plans; (iii) commitment to comprehensive coverage, in the sense that transition plans should cover participating institutions' entire portfolios; and (iv) the establishment of benchmarks, with annual progress reports and revisions of targets based on progress.

By making the publication of transition plans mandatory, central banks and financial regulators will have a pool of comparable targets and plans to achieve them. This will make it easier to define best practice in portfolio alignment. Competition also drives action, so financial institutions globally will have a better sense of what others in their sector are doing and may feel driven to keep up with those showing more rapid progress towards net zero. Lastly, but importantly, the data from transition plans should be made openly available. This would enable statistical analysis and allow information production to inform decision-making and further policymaking.

Central bank asset purchases and portfolio management

Central banks need to lead the way on global portfolio realignment by decarbonizing their *own* investment portfolios. This particularly applies to their holdings of foreign exchange reserves. Ideally, in the future central banks would also develop their own net zero transition plans, which would include not only scope 1 and 2 emissions but also scope 3 emissions.[99]

The 40 per cent of central banks whose mandates include supporting government policy priorities could add climate criteria to their reserve management processes without necessarily changing their underlying operating missions.[100] But a bolder move would be for governments and central banks to consider explicitly integrating climate action into central bank mandates and defining the achievement of net zero compatibility as one of the purposes of reserve management.

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98 For more information on scope 1, 2 and 3 emissions, see World Business Council for Sustainable Development and World Resources Institute (2004), *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*, p. 25.
99 Ibid.
100 Dikau, S. and Volz, U. (2021), 'Central bank mandates, sustainability objectives and the promotion of green finance', *Ecological Economics*, Vol. 184 (2021) 107022, https://doi.org/10.1016/j.ecolecon.2021.107022. The authors state: 'Out of 135 central banks, only 12% have explicit sustainability mandates, while 40% are mandated to support the government's policy priorities, which mostly include sustainability goals.'

Cooperation beyond the climate-specific international architecture

The success of the net zero transition in the global financial system, particularly of efforts to increase cross-border private capital flows to climate investment opportunities in EMDEs, will depend on international coordination to implement the various measures outlined in this paper.

The first step will be to ensure consistency across investment taxonomies. This is a minimum step, as the ideal end point would be the establishment of a single global climate investment framework. All of the specific measures that central banks and financial regulators might hope to implement – including mandatory transition plans, and adjustments to capital adequacy and collateral frameworks – depend on clear and comparable definitions within taxonomic classifications. Coordination between central banks can also allow for the identification and sharing of global best practice on net zero portfolio alignment.

The work of the NGFS will remain vital to this process, but coordination is also needed beyond the climate-specific international architecture.[101] Climate considerations need to be integrated into broader cooperation objectives: financial, economic and development-related. The most decisive push to this process would possibly come from the G7. The establishment of a climate club, an idea first proposed by the German G7 presidency in 2022,[102] and implemented at the end of that year,[103] could aid the coordination of climate-related central banking and financial regulation, the development of consistent climate investment taxonomies and the establishment of mandatory transition plans for multinational financial institutions.

The FSB also has a critical role to play in continuing to set the overarching frameworks and standards for the whole financial system, much as it did by creating the TCFD in 2015. The FSB could, for example, take on the role of setting unified standards for best practice in mandatory transition plans across countries.

Although the G20 faces challenges in the context of Russia's invasion of Ukraine, the group may still play a crucial part in the future. The G20 has already made progress, through its Sustainable Finance Working Group, on developing a transition finance framework across member countries. It should build on this existing work and promote cooperation among major developed and emerging economies whenever possible.

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101 The climate-specific international architecture refers to forums specifically created to cooperate on climate action, such as the UNFCCC, the TCFD, the NGFS and the Coalition of Finance Ministers for Climate Action.
102 G7 Germany (2022), 'G7 Statement on Climate Club', 28 June 2022, https://www.g7germany.de/resource/blob/974430/2057926/2a7cd9f10213a481924492942dd660a1/2022-06-28-g7-climate-club-data.pdf?download=1.
103 G7 Germany (2022), 'Terms of reference for the Climate Club', 12 December 2022, https://www.g7germany.de/resource/blob/974430/2153140/a04dde2adecf0ddd38cb9829a99c322d/2022-12-12-g7-erklaerung-data.pdf?download=1.

About the author

Lilia Caiado Couto is a research fellow with Chatham House's Global Economy and Finance Programme. She previously worked as a researcher at the Institute of Applied Economic Research, as a consultant with the United Nations Environment Programme, and as an adviser for climate change, energy and sustainable finance at the World Business Council for Sustainable Development in Brazil. Lilia served as a contributing author and chapter scientist for the IPCC Sixth Assessment Report. Lilia has a PhD in the economics of energy and climate change from University College London, and a BSc in economics and an MSc in energy planning from the Federal University of Rio de Janeiro. Lilia's research interests are the economics of energy transition and climate policy.

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Cover image: The headquarters of Malaysia's central bank, Bank Negara Malaysia, in Kuala Lumpur in 2022.

Photo credit: Copyright © Samsul Said/Bloomberg via Getty Images

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The Royal Institute of International Affairs
Chatham House
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