

Realizing the low-carbon future

What role for central banks and monetary authorities?

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ABSTRACT

Placing both advanced and developing countries on a low-carbon path requires an unprecedented shift in private investments and new financing models. The financial sector will have to play a central role in this low-carbon transformation, while avoiding destabilizing effects on economic systems. Central banks and other financial institutions are ready to use their extensive knowledge in lending, investment, and smart advisory services to achieve the low-carbon targets expressed in the Paris Agreement. With support from central banks, commercial and national development banks can offer diverse financing products with maximum impact and appropriate risk management.

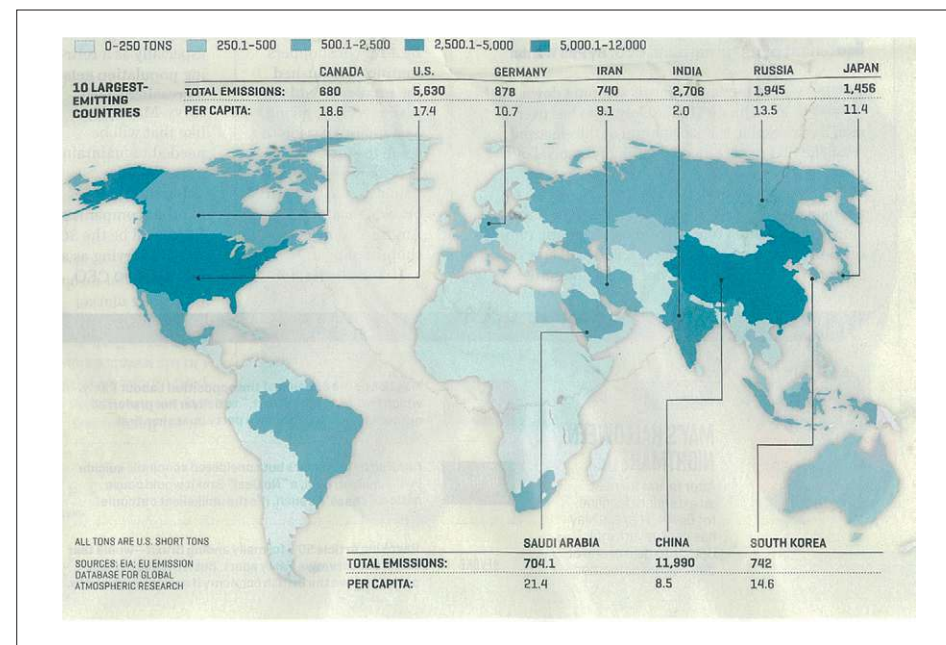
Despite increased calls to reduce global carbon emissions in light of climate change, energy-related carbon dioxide emissions worldwide rose 1.7% last year, hitting a record high (IEA, 2018). It is the fastest rate of growth since 2013. While emissions declined in Europe, they were up in big G20 economies like the US, China and India (Fig 1). Coal, especially in Asia, played a significant role in the increase. At the same time, it is worth noting that ac-

ording to 2017 data, the US still produces twice as much as carbon dioxide per capita as China and nearly nine times as much as India, highlighting the increased environmental impact of higher standards of living. All of this means the Paris Climate Agreement's goal of limiting the global temperature increase to 1.5 degrees Celsius could be a pipe dream if energy investments worldwide do not change.

The economy-wide changes needed to attain a low-carbon future are enormous: a massive reallocation of capital is needed, which presents unprecedented risks and opportunities to the financial system. The International Energy Agency estimates

that a low-carbon transition could require \$3.5 trillion in energy sector investments every year for decades – twice the current rate. Under the agency's scenario, in order for carbon emissions to stabilize by 2050, nearly 95% of the electricity supply must be low carbon, 70% of new cars must be electric, and the carbon-dioxide intensity of the building sector must fall by 80%. For markets to anticipate and smooth the transition to a low-carbon world, they need information, proper risk management and coherent, credible public-policy frameworks. That could be strengthened by central banks and monetary authorities.

Figure 1: Annual CO₂ emissions per country (tons of CO₂, 2017)



CLIMATE CHANGE, A LOW-CARBON FUTURE AND LIABILITY AND REGULATORY RISKS

The investment community faces several kinds of risks as a result of such market-based and regulatory actions. Regulatory risk is most relevant to the financial sector, followed by liability or litigation risk, and finally, reputational risk. These risks are interlinked and interdependent and may encompass physical risks from the adverse impacts of climate change such as natural disasters. Anbumozhi (2017) identified three risk categories for G20 economies: (i) Physical risks include the impact on insurance liabilities and financial assets that result from climate- and weather-related events such as floods and storms which damage property or disrupt trade. The consequences are the greatest for the insurance sector, but also extend more broadly. (ii) Liability risks occur when parties that have suffered loss or damage from the effects of climate change seek compensation from parties they hold responsible. Such claims could come decades in the future, creating liabilities for fossil-fuel extractors and emitters and their insurers. (iii) Transition risks are the financial risks that could result from the process of adjustment towards a lower-carbon economy. Changes in policy, technology, and physical risks could prompt a reassessment of the value of a large range of assets as costs and opportunities become apparent. Particularly rapid repricing could threaten financial stability.

When financial institutions are unprepared to assess or respond to the low-carbon risks described above, they may face additional legal risks from inaction (OECD, 2016). Further, transition risks in

the financial sector are closely linked to adjustments in real sectors and can be triggered by:

- mandatory or voluntary changes in emission-control policies that companies need to comply with, possibly entailing additional costs;
- declining profitability and cash flows of projects underwritten by financial institutions, resulting from higher capital and operating expenditures required to mitigate and adapt to climate change;
- low-carbon technologies and innovations that render previous technologies or products financed by financial institutions obsolete; and
- a shift by consumers away from high carbon-emitting products.

»The economy-wide changes need to attain a low-carbon future are enormous.«

Whether driven by unanticipated policies, technological developments or market preferences, the shift to a low-carbon future will cause a system-wide societal adjustment, during which certain sectors are likely to lose out. For example, respecting the 20 C threshold in temperatures will require a large portion of existing reserves of coal, oil and gas to remain in the ground,

which will be written off the balance sheets of the companies that own them. Other physical assets that could become stranded include part of the fossil fuel-driven electricity-generation capacity stock, residential housing, real estate, transportation infrastructure and other forms of carbon-intensive industrial technology (Anbumozhi et al, 2018). Such asset stranding will not only lead to economic losses and unemployment, but will also affect the market valuation of the companies that own the assets, thus negatively impacting their investors, and potentially triggering cascade effects throughout the deeply interconnected financial system (Table 1).

Hence, the changing role of central banks and monetary authorities is to find a gradually shrinking window of opportunity that would allow societies to achieve a rapid transition to a low-carbon economic

system, while avoiding excessive economic losses and financial instability.

ROLE OF CENTRAL BANKS IN CATALYSING PRIVATE FINANCE FOR A LOW-CARBON TRANSITION

Dikau and Volz (2018) distinguished between central banks' responses to environmental externalities affecting their traditional core responsibility of safeguarding macroeconomic and financial stability, and an activist role for central banks in supporting the development of a low-carbon economy. They also took climate risk into account in the design of monetary policy and financial regulation in the pursuit of the traditional goals of price and financial stability. This can be described as the passive aspect of green central banking because, in pursuing their established goals, central banks may need to incorporate environmental factors

Table 1: The trade-offs in transition to a low-carbon future

	No low-carbon transition	Rapid or orderly transition	Abrupt transition
Short term	No stranded assets	Minimal stranding of assets	Stranded physical assets (e.g., fossil-fuel reserves) and stranded financial assets (e.g., loss in market valuation and cascade effects)
Long term	Climate-induced damages to productive assets, climate-related financial losses	Minimal climate-induced damages to physical and financial assets	No significant climate-induced damages to physical and financial assets

into existing frameworks, e.g. into macro-prudential frameworks, without pursuing a low-carbon agenda. On the other hand, central banks may be mandated to actively use the tools at their disposal to promote green investment or discourage brown investment and play a developmental role.

Central banks in developing and emerging economies in Asia have been at the forefront of using a broad range of instruments to address environmental risk and encourage low-carbon investment. Since 2015, central banks in advanced economies have started to address the implications of low-carbon investment for monetary and financial stability. The Bank of England has played a central role in raising awareness of the implications of low-carbon transition risks amongst central banks. The pioneering central banks apply the following policy instruments.

Disclosure requirements

Effective disclosure requirements for banks and other financial institutions of low-carbon project-related risks can play a central role in ensuring that financial institutions correctly price in the impact of low-carbon policies. TCFD disclosure requirements are a central element of forming a response to climate and environmental risk, since a lack of information on the risk exposure of financial institutions has consequences for financial stability because the misallocation or mispricing of assets may cause abrupt price corrections in financial markets later (FSB TCFD, 2017).

Environmental and social risk management standards

Similar to disclosure requirements, financial regulation that endorses mandatory

environmental and social (E&S) risk management standards requires financial institutions to incorporate E&S risk factors into their governance frameworks. To enforce climate-related risk management beyond disclosure, green E&S risk management standards may also establish E&S rules for banks' lending practices by requiring the assessment of these risks, as well as considering the potentially harmful environmental effects of new financial services and products. Furthermore, mandatory green risk-management standards could oblige banks to include an assessment of E&S risks in the loan origination process as a criterion based on which loans are extended. This would likely also have allocative consequences by reducing the flow of finance to polluting and energy-intensive firms and enhancing the financing of greener projects (Huxham et al, 2017).

Reserve requirements

Reserve requirements determine the minimum amount of reserves that commercial banks must hold. They could be calibrated to create incentives leading to the promotion of green assets or make brown lending less attractive. Differential reserve requirements that are linked to the composition of banks' portfolios, allowing lower (higher) required reserve rates for portfolios skewed towards greener, less carbon-intensive assets (brown, carbon-intensive assets) could influence the allocation of credit and promote green investments (Ng, 2018).

Climate-related stress testing

Climate-related stress tests can fulfil the task of assessing the potential impact that natural hazards may have on the economy,

the health of individual financial institutions, and the financial system as a whole. Apart from enabling the evaluation of the resilience of the financial system to adverse shocks, climate-related stress tests would also be necessary to calibrate green macro-prudential policy instruments and to allow for the incorporation of the identified vulnerabilities into capital buffers, risk weights, and caps (Amerasingh et al, 2017).

»When financial institutions are unprepared to assess or respond to the low carbon risks, they may face legal risks from inaction.«

Countercyclical capital buffers

Countercyclical capital buffers are used to mitigate the financial cycle and can be calibrated with regard to environmental risks to ease the potential effect of pricing in a 'carbon bubble' – the expected sudden repricing of carbon-intensive assets due to stricter emission targets and environmental policy (UN Environment, 2017).

Differentiated capital requirements

Through capital requirements, financial regulators require financial institutions to hold a certain percentage of capital for risk-weighted assets, which is usually expressed in the capital-to-risk (weighted) assets ratio. Capital requirements could theoretically differentiate asset classes based on sustainability criteria and assign higher risk weights to carbon-intensive assets in anticipation of future negative and sudden price developments (World Bank, 2018).

MONETARY POLICY OPERATIONS AND THE FINANCING OF A LOW-CARBON FUTURE BY CENTRAL BANKS

There are several ways in which central banks and monetary policy authorities can engage their supervisory bank with the low-carbon transition (table 2). First, they can favor assessment of climate-related risks, both for single institutions and at the systemic level. This is the strategy currently implemented by some central banks in high-income countries. Second, they can employ policy tools at their disposal to mitigate climate-related risks and support the development of low-carbon activities. While several examples of proactive behavior by central banks are available in emerging G20 economies, this approach has not yet been implemented systematically.

POLICY AND VOLUNTARY ACTIONS DRIVING LOW-CARBON DISCLOSURE

For banks, owners and managers of assets, the quality and availability of relevant information is one of the key barriers to incorporating climate issues into their investment processes. In part to address this

Table 2: Interventions by central banks and financial regulators in support of private financing of the low-carbon transition

Approach	Concept	Current application
Assessment of climate-related risks	Apply methodologies to identify and measure climate-related risks	De Nederlandsche Bank Bank of England
Disclosure of climate-related risks	Develop standard methods of climate-related risk reporting	Task Force on Climate-related Financial Disclosures
Low carbon-aligned prudential regulation policy	Use prudential regulatory tools, e.g., reserve and capital requirements to banks lending to low-carbon projects	People's Bank of China Banco Central do Brasil
Green central bank financing	Provide additional/subsidized liquidity to banks lending to low-carbon activities	Bank of Japan Bangladesh Bank
Lending quotas	Impose a minimum proportion of bank lending to flow to low-carbon sectors	Reserve Bank of India Bank of Indonesia
Inclusion of low-carbon criteria in monetary policy	Include low-carbon criteria in the evaluation of overall risk of an asset purchased or accepted as collateral	State Bank of Vietnam
Green quantitative easing	Purchase green assets as part of quantitative easing programs	European Investment Bank

deficiency, the Financial Stability Board Task Force on Financial Disclosure (FSB TCFD) issued its final report in June 2017, providing recommendations on low-carbon project-related financial disclosures that are applicable to organizations across sectors and jurisdictions. If adopted widely, the recommendations will normalize and improve the standards of corporate low-carbon risk disclosures, allowing investors to better assess their own climate-related portfolio risk and provide this information to their clients and beneficiaries. The FSB TCFD report knitted existing frameworks into a single framework for disclosure on the assessment and management of climate-related risks and opportunities and encouraged board-level engagement with the issue. It strongly recommended using scenario analysis techniques as part of the process. The framework contains the following key elements (FSB TCFD 2017):

- adoptable by all organizations;
- included in financial filings;
- designed to solicit decision-useful, forward-looking information on financial impacts; and
- strong focus on risks and opportunities related to the transition to a lower-carbon economy.

The recommendations focus on four key themes that are aligned with how organizations operate: governance, strategy, risk management, and metrics and targets. The themes are fleshed out with recommended disclosures that organizations should include in their financial filings in each of the four areas, to provide investors and other stakeholders with information that helps them understand the reporting organization's assessment of its climate-related risks and opportunities. The dis-

closing organizations will also benefit from the process, gaining a better understanding of the real financial implications of climate-related risks and their potential impacts on business models, strategy, and cash flows.

The TCFD highlights scenario analysis as its preferred tool for producing forward-looking information with respect to assessing climate risks and opportunities in a way that enhances the robustness and flexibility of strategic plans. It also believes such information is important for investors and other stakeholders in understanding how vulnerable individual organizations are to climate-related risks, and how such vulnerabilities might be addressed.

»Disclosing organizations will gain a better understanding of the financial implications of climate-related risks.«

CONCLUSION

G20 policymakers now face the challenging task of ensuring a structural shift to a low-carbon economy while concurrently

safeguarding economic prosperity and the stability of the financial system. Achieving this goal will require financial markets and institutions to start considering climate-related risks in their financing decisions. G20 central bank governors and monetary authorities can contribute to this process in several ways. First, they can support measures to improve financial markets' ability to consider climate-related risks, e.g. better disclosure of such risks. Second, central banks and financial regula-

tors should further deepen their activities in assessing climate-related financial risk exposures of their regulated firms, including what data and methods they are using in assessing these risks, and take appropriate actions if prudential risks are found to be material. Finally, central banks might wish to consider whether they should account for climate-related factors in determining the eligibility of assets for their asset purchase programs or as collateral in their market operations.

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With or without you

How the G20 could advance global action toward climate-friendly sustainable development

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With a collective responsibility for 80% of global greenhouse gas emissions, while representing 80% of global wealth, the countries of the G20 must throw their weight behind the implementation of both the Paris Agreement on climate change and the 2030 Agenda for Sustainable Development. In the past, the G20 has demonstrated it can do that. The G20 Summit in November 2015 in Antalya, Turkey, provided strong support for the climate agreement signed a month later at the UN Climate Change Conference (COP21) in Paris. In 2016 in Hangzhou, China, the G20 adopted an Action Plan on the 2030 Agenda and committed to "further align its work" with the 2030 Agenda. Even though both agendas have emerged in the multilateral context of the United Nations system, the G20 is expected to exert strong political leadership to address global climate change and to achieve sustainable development.

Yet, since 2017 the G20 has struggled to provide such leadership, as support for multilateral commitments, especially those involving ambitious climate actions, appears to be fading. Crucially, opposition to strong multilateral climate policy in the US and Brazil resorts to outright climate denialism at the highest levels of government. These developments are challenging the G20, and BRICS and the G7 for that