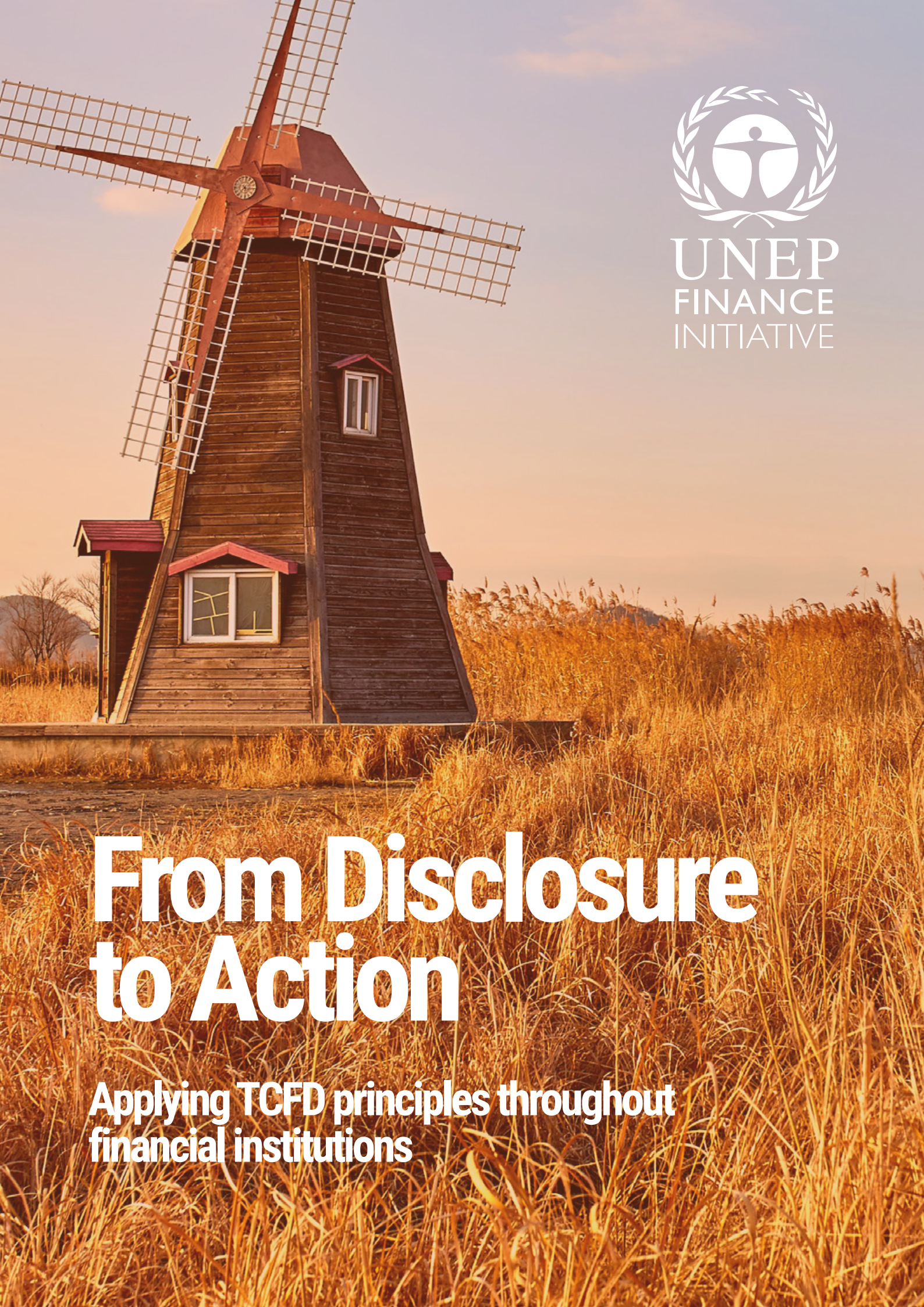

UNEP FINANCE INITIATIVE

From Disclosure to Action

Applying TCFD principles throughout financial institutions

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Contents

1. Introduction

1.1. About this paper

This paper was produced as part of UNEP FI's year-long TCFD banking sector programme. Programme participants explored different aspects of climate risks and opportunities in order to improve their management and disclosure in line with TCFD recommendations. The programme covered climate scenarios and risk assessment methodologies for both physical and transition risks. However, participants also went beyond the assessments themselves to consider how insights gained from these analyses could be integrated into a firm's business and risk management practices.

This paper reflects the lessons learned by programme participants as they considered how to incorporate climate risks into BAU "during the programme". From discussions with the thirty-nine global banks that participated in the TCFD programme, the UNEP FI secretariat aims to provide an updated view on industry good practices regarding climate risk management at all levels of an institution.

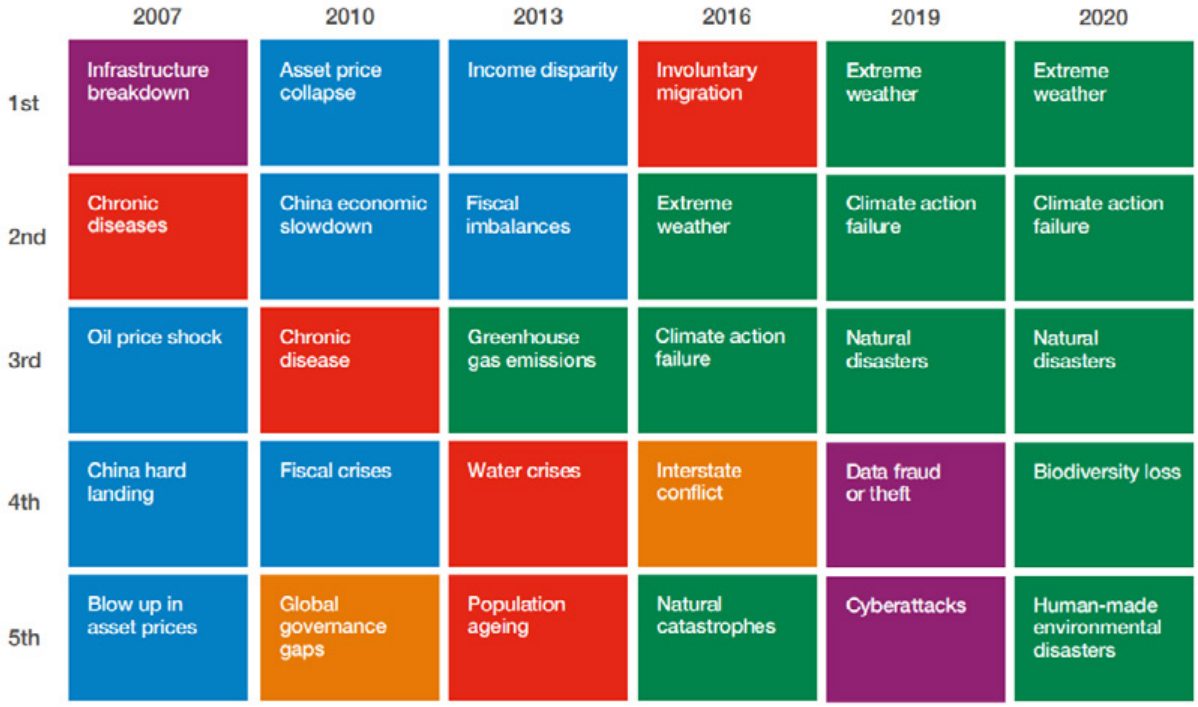
As part of the programme, the thirty-nine global banks were asked a set of questions about their current climate risk practices. These survey results, along with specific anecdotes regarding climate risk practices, complement the guidance offered in this paper. The paper will be useful for all financial sector institutions seeking to respond to new market and regulatory expectations on climate risk integration and reporting.

1.2. Industry Context

The international business and financial community have recognised the various risks climate change poses to society and the global economy. Macroprudential and microprudential regulators are also acting to incorporate these risks into their respective regulatory frameworks. In addition to the direct physical impacts of climate change, the transition to a low-carbon economy across all sectors of the economy presents significant challenges. These physical and transition risks will present existential threats to individual firms as well as entire sectors across different time horizons.

In January 2020, the World Economic Forum released the 15th edition of its Global Risk Report (see Figure 1). For the first time, the top five risks identified were all climate change related. Climate loomed large at Davos, with billionaires and political leaders speaking about the need for urgent, coordinated action. As Mark Carney, outgoing Bank of England Governor and current UN Special Envoy for Climate Action and Finance, put it, "there is a fundamental reshaping of the [financial] system under way." According to Carney, future economic viability will depend on environmental sustainability and "companies that don't adapt [to climate change] will go bankrupt without question." Carney's analysis echoes the language used by BlackRock CEO Larry Fink in his annual letter to shareholders."

Figure 1: The World Economic Forum's Global Risk Report, 2020, Global Risks by Likelihood



Consumers have also demonstrated a growing recognition of the climate crisis and many have demanded that companies, including financial institutions, green their business and operations. Banks and asset managers within the financial sector have faced protests for their financing of fossil fuels and shareholder actions on climate risk disclosure and carbon footprinting. In response to these and other societal pressures, funds have been pouring into ESG-linked funds. In his January 2020 letter to CEOs, BlackRock's Larry Fink underscored the changes taking place in the financial industry, emphasising that "the evidence on climate risk is compelling investors to reassess core assumptions about modern finance" (BlackRock 2020). BlackRock reaffirmed this statement through proxy votes at 53 of its portfolio companies over climate concerns. Beyond the asset managers and banks, insurance companies and pension funds are also experiencing pressure from clients, regulators and civil society to respond to the risks flagged by Larry Fink and Mark Carney.

Financial regulators, along with companies, investors, and consumers, have also recognised the potential for climate change to disrupt the financial sector. In 2017, a consortium of central banks and other regulators founded the Network for Greening the Financial System (NGFS) to "enhance the role of the financial system to manage risks and to mobilise capital for green and low-carbon investments in the broader context of environmentally sustainable development" (NGFS 2017). Since its inception, the group has grown to include over sixty global members. In June 2020, the NGFS published guidance on conducting climate scenario analyses as well as a set of reference climate scenarios, developed in conjunction with leading climate science modelers (NGFS 2020). A number of NGFS members (see Figure 2) have already issued directives regarding climate risk stress testing or announced plans to begin conducting such examinations in the near future.

Bank Perspective: Selected announcements from financial regulators on stress testing

Canada (Bank of Canada): "An ultimate goal of the Bank is to develop climate stress-testing frameworks to assess the resilience of the financial system to hypothetical extreme but plausible scenarios."

Denmark (Danmarks Nationalbank): "By mid-2020, Denmark's National bank expects to be able to present an analysis of transition risks in the coming stress test of credit institutions. The purpose is to get a clearer understanding of these risks in the credit institutions."

Netherlands (De Nederlandsche Bank): "We will also start implementing our new climate strategy. In the short term, this means that we will map the carbon footprint of our own portfolios and carry out a climate stress test."

Singapore (Monetary Authority of Singapore): "MAS is working towards incorporating a broader range of climate change-related risks in thematic scenarios as part of a future Industry-Wide Stress Test."

UK (Prudential Regulatory Authority): "The objective of the BES [Biennial Exploratory Scenario] is to test the resilience of the largest banks and insurers ('firms') to the physical and transition risks associated with different possible climate scenarios, and the financial system's exposure more broadly to climate-related risk."

France (Banque de France): "We will conduct the first climate stress tests in the coming months. The aim of this exercise is twofold: to better identify the resilience of banks and insurers to climate risks, and to speed up the methodological work in order to have quality assessments."

US Federal Reserve System (Governor Lael Brainard): "The Federal Reserve will need to assess the financial system for vulnerabilities to important climate risks. The Federal Reserve has important responsibilities for safeguarding the stability of our financial system so that it can continue to meet household and business needs for financial services when hit by negative shocks. Similar to other significant risks, such as cyberattacks, we want our financial system to be resilient to the effects of climate change."

In addition to climate stress tests, regulators and other financial sector stakeholders are pushing financial institutions to improve their climate risk disclosures. The recommendations put forth by the G20 Financial Stability Board's Task-force on Climate-related Finance Disclosures (TCFD) provide a guide for firms to properly disclose their climate-related risks and opportunities.

Regulators worldwide are strongly encouraging the release of these disclosure reports, with many suggesting that such disclosures will become mandatory in the near future. In an indication of the shift to mandated TCFD disclosure, in March 2020, the UK's Financial Conduct Authority (FCA) proposed a rule requiring TCFD disclosures for its supervised institutions, and the UK Pensions Regulator is expected to require the largest pension schemes to report on climate change risks within their investment portfolios.

Regulators are keenly aware of the role that the financial sector plays in supporting or hindering the transition to a low-carbon economy. Scope 3 "financed emissions"—emissions associated with loans or investments to companies that emit greenhouse gases—are now being assessed by regulators, as is the financing of beneficial or "green" activities. The European Union's Green Taxonomy (see Figure 3) was created to clarify categorisation of economic activities that contribute to climate and environmental goals. Financial institutions within Europe will be required to apply the Taxonomy to their investment portfolios as a regulatory benchmark and disclose the results. The Taxonomy Regulation came into force in July 2020 and is designed to create a benchmark for regulatory reporting and marketing of "green" financial products. According to the new regulation, in order to classify a fund's investment impact as an "environmentally sustainable economic activity," the investment must make a "substantial contribution" to one of the environmental objectives detailed in the Taxonomy Regulation. The EU Taxonomy sets an important precedent for global financial market regulation. While implementation of the Taxonomy is currently focused on investment products, it has implications for regulatory reporting and risk management across banking business segments. Similar initiatives are currently underway in other geographies as well. Malaysia's Central Bank released its own green taxonomy earlier in 2020, and other jurisdictions are expected to follow these leaders heading into COP26.

Figure 3: EU Green Taxonomy criteria

The financial industry, including leading trade associations, has recognised the crucial role it has in enabling progress on the low carbon transition. An increasing number of firms have agreed to curtail or eliminate financing for the most carbon intensive industries, beginning with thermal coal mining, tar sands extraction, and coal-fired power generation (S&P 2019). Others are using their financial stake in portfolio companies to challenge the highest emitters to adopt more sustainable business practices and shift capital allocation decisions in support of a low carbon transition. BP has been the most prominent oil & gas super major to shift course with a bold energy transition strategy in response to investor pressure and unprecedented oil price volatility due to COVID-19. Along with divestment and financial influence, financial sector firms have made plans to reduce financed emissions. Some institutions have even made commitments to carbon neutrality as part of international programmes such as UNEP FI's Net-Zero Asset Owners' Alliance (NZAOA). Industry players are coming together to measure financed emissions, set portfolio alignment targets linked to Paris Agreement emissions reductions pathways, and to manage and report on climate risks. These programs include the Science Based Targets initiative (SBTi), the Partnership for Climate Accounting Financials (PCAF), and UNEP FI's Collective Commitment on Climate Action (CCCA) among others. Rather than slowing the energy transition and associated climate risk reporting, COVID-19 has accelerated the pace of climate action and "just transition" pledges by the largest financial sector players.

There is a growing financial sector consensus on emissions reductions trajectories required to achieve a net-zero future. Most commitments seek carbon neutrality by 2050, in line with most 1.5˚C warming scenarios. However, that distant date is far beyond the expected retirement year of most decision-makers and has limited applicability in capital allocation decisions and executive remuneration formulas. The best available science indicates that the well-below 2˚C goal underpinning the Paris Agreement is best reached through immediate and aggressive emissions reductions. The same is true for mitigating climate risks. Waiting until 2050 to divest or support adaptation after three decades of limited action or inaction would be unacceptably late and will put global climate goals out of reach. Furthermore, such a delay will exacerbate the mounting physical risks to human life, property and infrastructure to a dangerous degree. For these reasons, climate experts are urging financial institutions to accelerate their timelines and commit to accelerating the incorporation of net-zero emissions targets across all banking business units.

The TCFD offers a solid framework for stakeholders to understand a firm's climate risks. Its four pillars, Governance, Strategy, Risk Management, and Metrics & Targets are supported by eleven specific disclosures (see Figure 4) that together provide a comprehensive view of a financial institution or company's exposure to climate-related risks and opportunities. However, while TCFD disclosures will help markets to better understand climate risks and thus, better allocate resources, addressing the full scope of the climate crisis demands much more action. For the financial sector to play its essential role in fostering a sustainable, low-carbon transition, the TCFD framework must be both a disclosure template, and a template for the internal integration and prioritisation of climate considerations by financial sector firms.

Figure 4: TCFD recommended disclosures

Governance	Strategy	Risk Management	Metrics & Targets
Disclose the organisation's governance around climate-related risks and opportunities.	Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning where such information is material.	Disclose how the organisation identifies, assesses, and manages climate-related risks.	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material
a. Describe the board's oversight of climate-related risks and opportunities.	a. Describe the climate-related risks and opportunities the organisation has identified over the short, medium, and long term.	a. Describe the organisation's processes for identifying and assessing climate-related risks.	a. Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process.
b. Describe management's role in assessing climate-related risks and opportunities	b. Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning.	b. Describe the organisation's processes for managing climate-related risks.	b. Disclose Scope 1, Scope 2, and if appropriate Scope 3 greenhouse gas (GHG) emissions, and the related risks.
	c. Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	c. Describe how processes for identifying, assessing and management clmiate-related risks are integrated into the organisation's overall risk management.	c. Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets

The TCFD framework now has over one thousand corporate supporters, including more than 100 banks. Financial institutions continue to improve their TCFD reports, most notably by incorporating quantitative climate scenario analysis into their disclosures (GARP 2020).

2. Top-down leadership: How boards and management address climate risk

As mentioned above, a growing number of banks are increasing their public climate commitments through formal plans to lower the carbon footprint of their own operations, reduce their financed emissions, and support goals of the Paris Agreement. However, specific roadmaps and intermediate metrics en route to these larger goals remain vague. The difference between genuine climate action and greenwashing can be seen in the concrete actions a firm takes to lessen the role it plays in causing climate change. A similar distinction can be drawn between rhetoric to "consider climate," and the proactive identification and management of climate risk. Meaningful action by banks requires board level engagement and CFO participation in modelling the impact of pledged emissions reduction targets on investment planning, capital allocation, and financial reporting.

2.1. Climate risk and the board

Climate action and climate risk management begin at the top of an organisation. On climate risk governance, an engaged and informed board is essential. The TCFD framework recognises the important responsibility that senior stakeholders have in addressing the climate challenge. Both recommended disclosures for the Governance pillar concern the board and executives (see Figure 4).

The board of directors plays a critical oversight role in firm governance. Because of this, governance mandates should include climate risks, particularly those that directly threaten the current or future well-being of a firm and/or key business segments. Climate risk governance at a bank is even more complex than at traditional firms, due to counterparty risk. As a result, bank boards must be particularly well-informed on where climate risks may surface within their bank's portfolio. That requires education for board members on the nature of transition and physical risks and their potential impacts on their clients. Developing this understanding does not require the board to become climate experts, but rather for them to clearly appreciate the nature of this emerging risk.

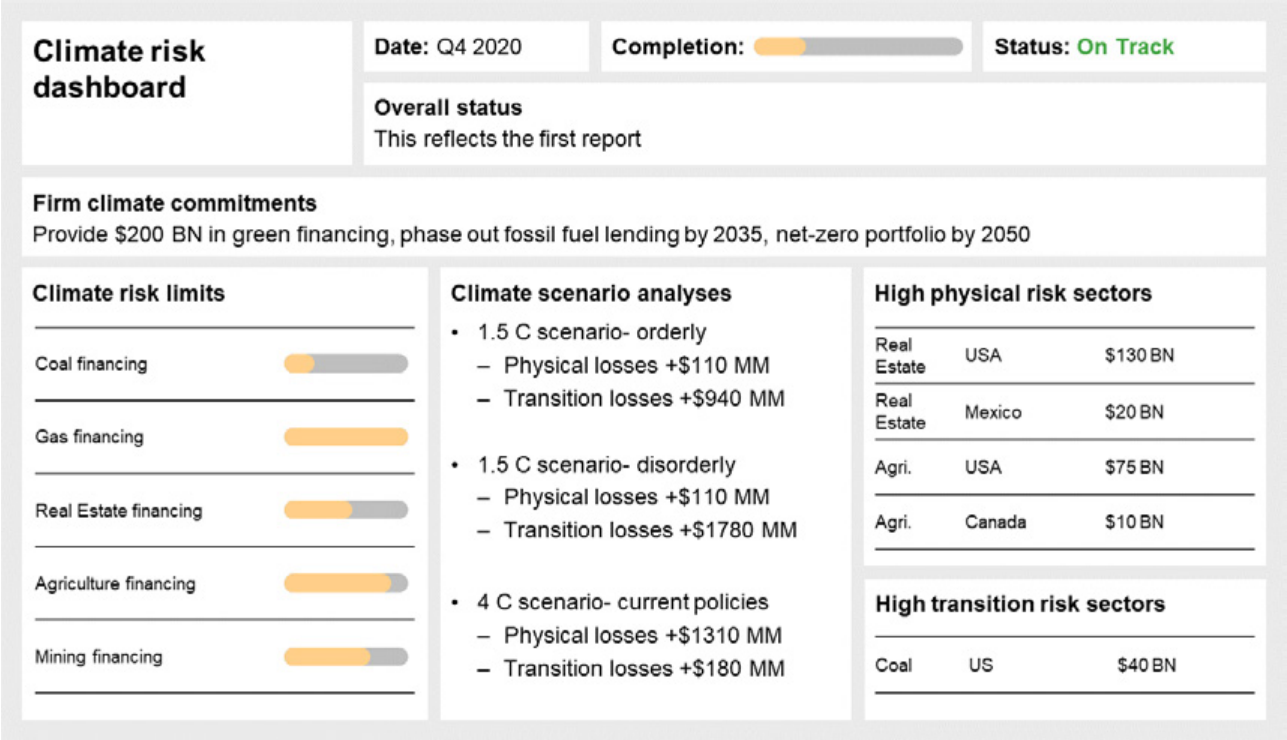
As climate risks do not exist in isolation from other risks, but rather interact with them, board members should consider how climate change exacerbates existing and more traditional risk types (credit, market, operational, etc.). At some firms, boards have created sub-committees with a focus on climate or other ESG risks. This siloed approach may limit the full appreciation of climate impacts on the firm. Instead, boards could discuss how climate is integrated into other risks faced by the firm.

There is a range of effective industry practices when it comes to discussing climate in board meetings. As with other important issues, more frequent board meetings on climate are not inherently best practice. Rather, climate risk should be covered on a regular basis in board meetings, regardless of their frequency. Board meetings can offer board members a chance to evaluate how the firm has progressed on its climate risks and climate goals.

In turn, board members need to have the right tools to effectively assess progress on climate risks and goals. Those tools include a board-level set of metrics that summarise important climate indicators. This "climate dashboard" can provide decision-useful information on climate risks, operating emissions (scope I and scope II), and financed emissions. Figure 5 shows an illustrative climate risk dashboard. The metrics selected enable readers to both track progress against climate goals and identify potential problem areas that require action. Comparisons can not only

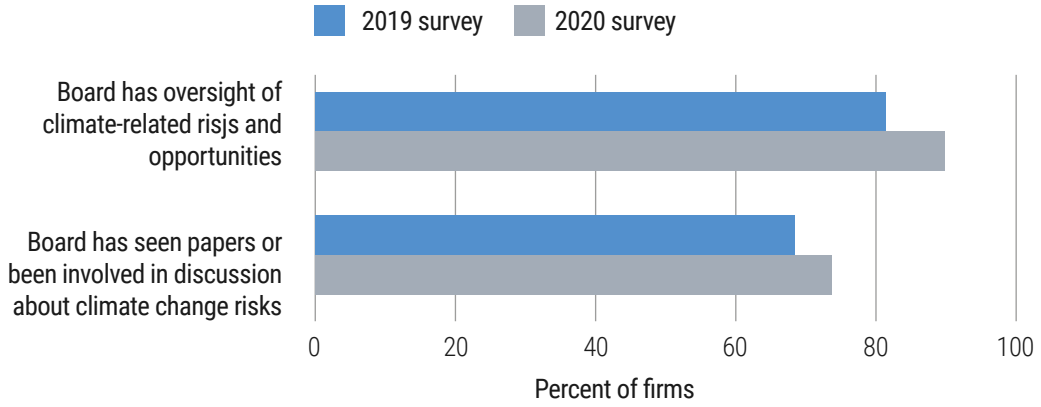
be made to past performance and forward-looking climate goals, but also to external benchmarks (such as the European Commission's Paris-Aligned Benchmark).

Figure 5: Illustrative board-level climate risk dashboard



According to the latest Global Association of Risk Professionals (GARP) Climate Risk Management Report (see Figure 6), a growing number of boards are engaging with climate risks (GARP 2020). However, the depth of that engagement may still be limited for many institutions. In order to effectively oversee company-wide responses to climate risks, the board must both understand climate risks and have adequate visibility on how they are impacting the firm.

Figure 6: GARP report - Board involvement



UNEP FI TCFD programme participants, ING and Scotiabank provided their perspectives on senior level involvement in climate finance below.

Bank Perspective: Excerpt from ING's views on senior level involvement in climate risk

"Climate-related risks and opportunities are overseen by the Climate Change Committee (CCC), chaired by ING's Chief Risk Officer (CRO) and Management Board Banking member, and co-chaired by the board member responsible for Wholesale Banking. The CCC is advised by an internal Climate Expert Group (CEG) made up of experts from various Front Office, Sustainability, Risk and other departments. The CCC meets six times per year and follows an agenda prepared by the CEG, which meets monthly.

More specifically, the CCC is responsible for:

- Mandating appropriate processes by which ING identifies climate-related financial risks and opportunities.
- Mandating appropriate processes by which ING effectively manages climate-related financial risks and opportunities.
- Guiding policies, strategy, performance objectives and monitoring pertaining to climate-related financial risks and opportunities.
- Monitoring and overseeing progress against relevant goals and targets.
- Guiding external communication and transparency requirements.

Within the parameters set by the CCC, climate-related risks are overseen by the Global Credit & Trading Policy Committee (GCTP) and Global Credit Committee – Transaction Approval (GCC(TA)). These executive level committees include the CRO, CFO and other relevant management board members. GCTP and GCC discuss and approve, amongst other topics, ING's Environmental and Social Risk.

Bank Perspective: Excerpt from Scotiabank's views on senior level involvement in climate risk

As the topic of climate change requires a multidisciplinary approach, oversight of the risks and opportunities is a shared responsibility of the Board of Directors, and specific areas are addressed by individual Board Committees.

- Risk Committee: retains primary oversight for climate change risks and opportunities for the Bank. As climate change is identified as an emerging risk, updates are provided to the Risk Committee on a quarterly basis. Environmental Risk (including climate change risk) is a Principal Risk type for the Bank, as documented in the Board approved Enterprise-Wide Risk Management Framework. Climate change risk and opportunities are integrated into the Bank's Environmental Policy, Credit Risk Policy, and Operational Risk Management Policy
- Corporate Governance Committee: Provides oversight of the Social Impact & Sustainability strategy, of which climate change is a key priority, and reviews the annual ESG report, which is a key component of the Bank's reporting on climate change data. The Corporate Governance Committee also evaluates the Bank's ESG performance and benchmarks its performance against industry peers.
- Audit and Conduct Review Committee: Provides oversight of climate change-related disclosure in the Bank's financial reporting, such as the TCFD disclosures within the Annual Report.
- Scotiabank's internal climate risk function lies within Global Risk Management given that credit risk process includes a climate risk assessment. The Chief Risk Officer (CRO) sits on the Operating Committee of the Bank (all members of this committee report to the CEO) and has a functional reporting line directly to the Risk Committee of the Board. The CRO is responsible for global management of risk, including several climate-related issues. For example, these include hurricane damage to our branches, the implementation of the TCFD recommendations, and reviewing our loan portfolio for credit risk from both physical and transition risks. The CRO monitors climate-related issues through regular risk committee meetings and from briefings from the Environmental and Social Risk team.
- Climate-related risk management is also aided through the Climate Change Strategy Steering Committee, made up of senior officers across the business lines and control / stewardship functions. The Committee meets quarterly and their main objective is to support the development and implementation of the Bank's Climate Commitments.

An important component of board oversight is its relationship with executive management. Boards and management should work together to establish firm-wide climate goals. These goals are likely to have significant business and strategic implications, so it is appropriate that they be considered at the highest levels. A further discussion of strategy-setting follows later in this section. However, in addition to setting specific climate goals and targets, the board can help ensure that management works to achieve them. Historically, boards have tied executive compensation and other short-term incentives to performance goals – some institutions are already applying this performance-based approach to climate and ESG goals. This not only aligns executive financial incentives with climate goals, but also sends a powerful message about a firm's values and priorities. Linking executive compensation to climate goals demonstrates not only a desire to take climate seriously, but also a recognition of the fact that climate and performance goals are compatible and often mutually reinforcing.

2.2. Climate risk and executive management

The board provides oversight to ensure that management is addressing climate risks and adhering to climate goals. However, at the end of the day, management is responsible for the implementation of climate initiatives, not the board. Effective implementation relies on a solid organisational structure, which itself depends on well-defined roles and clear reporting processes. The TCFD Supplemental Guidance is instructive in this regard, asking "whether the organisation has assigned climate-related responsibilities to management-level positions or committees," and "how management (through specific positions and/or management committees) monitors climate-related issues," (TCFD 2017)..

The assignment of specific roles and responsibilities to executive management is particularly important. Without executive support, it is nearly impossible to devote adequate resources to addressing climate challenges. Executive sponsorship of climate initiatives has accelerated their adoption and implementation. Those banks who have advanced TCFD and climate risk programmes have integrated climate risk into their organisations from the top-down. The active engagement of executives at these institutions has made them more knowledgeable about climate risks and better positioned to set industry leading strategy.

2.3. Setting a climate risk strategy

For boards and executives, incorporating climate into risk appetite statements and overall firm strategy is a necessary step in managing climate risks. These considerations are echoed by Bank of England guidance that the "PRA considers board-level engagement and accountability important to ensure there is adequate oversight of the firm's business strategy and risk appetite," (BOE 2018). Financial institutions are beginning to heed this advice through reassessments of their existing risk appetite statements.

As mentioned above, climate risks do not exist in isolation of other risks but can instead interact with and exacerbate others. Thus, a risk appetite statement that considers climate will consider how physical climate risks and market and policy transition risks will change the risk profile of the institution. These changes in risk profile may manifest themselves in credit, market, or operational risks. As an example, a bank with significant commercial mortgage holdings will need to consider the physical impacts of extreme weather on its portfolio. Likewise, a bank that provides significant financing to fossil fuel companies should assess how these assets will fare as pressure builds for carbon pricing. Banks that can successfully integrate climate into their risk appetite statements will have a clearer view of the risks they face. That knowledge will put them in a better position to prepare for and respond to climate-driven changes across markets.

Bank Perspective: ING setting its climate risk appetite statement

In addition to the Climate Expert Group, in 2020 we established an internal climate risk working group. It is made up of colleagues from Wholesale Banking, Sustainability and Risk, as well as expertise on scenario development and stress testing. The purpose of the working group is to further strengthen our capabilities on climate risk and speed up the integration of climate considerations into our risk management processes.

We see climate risk as both a strategic opportunity as well as a financial risk. This is why we decided for an iterative approach that allows us to identify, assess, control and monitor climate risk within our existing risk management framework. ING is developing a combination of quantitative and qualitative tools, including activities such as heatmapping, scenario analysis and stress testing. Findings of material climate risk should be brought forward to relevant committees.

To achieve effective climate risk management, we apply a mixture of internal and external expertise. We build on our existing in-house knowledge, gained through established climate programmes, to further identify the risks. Not only do we engage with the relevant risk departments, but we also seek meaningful dialogue with our sector teams. For instance, to better understand the sector implications caused by physical and transition risk (e.g. heatmapping).

As ING, we engage in several climate-related risk industry working groups to refine methodologies, conduct pilot testing and standardise disclosures. In addition, we chose to partner with a reinsurer for a pilot on our mortgages' portfolio on physical risk. Although we have been tracking climate risk (mainly transition risk) for a while, activities such as scenario analysis are very different for climate change.

Our approach to the management of climate risk continues to develop and ING still has some way to go in refining our methodologies and incorporating climate risk. We report on our progress in managing climate risk via our Annual Report.

To benefit from climate-driven changes, some institutions are updating their enterprise strategies. Institution-specific strategies will vary based on the objectives of the bank and on its current and projected exposure to different types of climate risks and opportunities. However, there are some common considerations in the development of climate-resilient strategies.

The impacts of physical risks and transition risks will vary significantly by geography. For physical risks, these variations are due both to geographically differing climate impacts, and to existing infrastructure and resiliency differences between affected societies. Likewise, the pace of policy, regulation, and technology that affects transition risks will also depend on government and societal actions. Firms should consider their footprints and determine which geographic areas are most at risk of climate disruption (physical or transition). From here, additional focus can be given to material and high-risk areas, while still considering climate impacts across the full portfolio.

A helpful way to integrate climate into strategic decision-making is to examine the physical and transition risks and opportunities present for each sector and geography and then split these risks into supply-side and demand-side categories. Figure 7 shows some of the guiding questions that can be asked for each risk type.

Figure 7: Guiding strategic questions for risk identification

	Supply-side	Demand-side
Transition Risk	▪ What climate policies are likely to be enacted? ▪ How will new policies increase supply-chain costs? ▪ How will production costs or methods need to change? ▪ How much investment is required to bring business into compliance with new standards?	▪ How sensitive are consumers to price in this market? ▪ Are lower cost or greener technologies widely available? ▪ Are consumer perceptions shifting towards greener options? ▪ Are overall consumption habits shifted by other policy or technology factors?
Physical Risk	▪ How will raw inputs and intermediate goods be impacted by extreme events or incremental changes? ▪ How will physical assets and final production be impacted by extreme events or incremental changes? ▪ What investments are required to adapt to climate change?	▪ How will population and growth assumptions change demand? ▪ Are products in this sector resilient to climate impacts? ▪ How will changing physical conditions impact consumer behaviour and demand?

Financial institutions are paying greater attention to how climate interacts with their strategies. However, according to the GARP Climate Risk Management survey, while over 70% of institutions believe climate will impact long-term strategy, fewer expect climate risks to play a significant role in the short-term (GARP 2020). This is unfortunate due to the need for immediate climate action, as well as the rapid and unpredictable nature of both physical and transition risks. Volatility in the oil & gas sector during the COVID-19 pandemic has shown that market trends can rapidly accelerate, and environmental factors can prove remarkably disruptive. In the context of volatility and decline for segments of the oil & gas sector, bank strategic planning must incorporate climate to both enable long-term planning and to bolster short-term resilience. In Figure 11, ING offered insights into their climate strategies and how they set about implementing them.

Bank Perspective: ING's insights on climate strategy setting

Climate change has been part of ING's agenda for years. Through our board-level committees as well as internal working groups, we ensure that our climate-related activities are aligned and contribute to ING's strategic direction. This include our climate-related commitments, policies and programmes.

Climate change impacts companies and companies have an impact on climate change. As banks, we need to understand the risk climate change poses for our clients and be ready to safeguard our business by taking the implications of climate change into account in our risk processes. We also have a role to play in financing the transition to a low-carbon, climate-resilient economy.

At ING, we have chosen an integrated strategy. On the one hand, we have developed an approach to align our lending portfolio with the goals of the Paris Agreement, financing the changes needed for tomorrow's world. We call this approach Terra. On the other hand, we are working on an end-to-end risk framework for climate risk management, which should ultimately translate into financial risk metrics embedded in our credit risk assessment. These represent two sides of the same coin which together can help to climate-proof ING's lending portfolio.

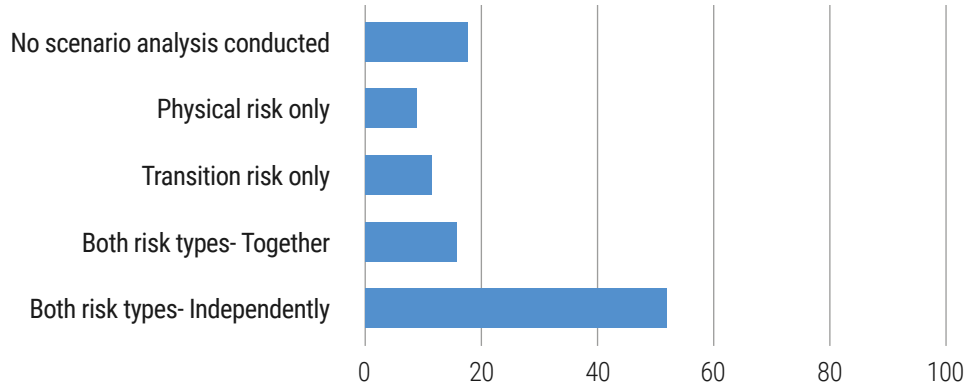
3. Analytics and Reporting: Inside the climate risk function

The TCFD Risk Management Pillar asks for information on "how the organisation identifies, assesses, and manages its climate-related risks." Likewise, the Metrics & Targets Pillar inquires about the "metrics and targets" used in climate risk assessment and management (TCFD 2017). These two pillars and their accompanying six disclosures (see Figure 4) provide critical insights into a firm's climate risks. Executive leadership can use these metrics to set strategy around climate risk and track progress. Quantitative and qualitative disclosures can also inform stakeholders and regulators about a firm's climate risk exposure.

3.1. Composition of the climate risk function

To address the challenges of climate risk assessment and disclosure, banks are investing resources to produce climate risk analyses that will empower stakeholders and better inform regulators and their investors. This process often involves working with new tools and data, whether in the form of heatmapping exposure to climate-sensitive sectors, leveraging integrated assessment models (IAMs) for transition risk analyses or geospatial mapping for physical risks. For both transition and physical risk, climate scenario analysis has become an essential means of exploring how firms will perform under future climate change scenarios. For banks to appropriately manage their climate risks, they need staff who can not only conduct the necessary analyses, but also communicate the results of those analyses through effective internal reports and external disclosures (see Figure 8).

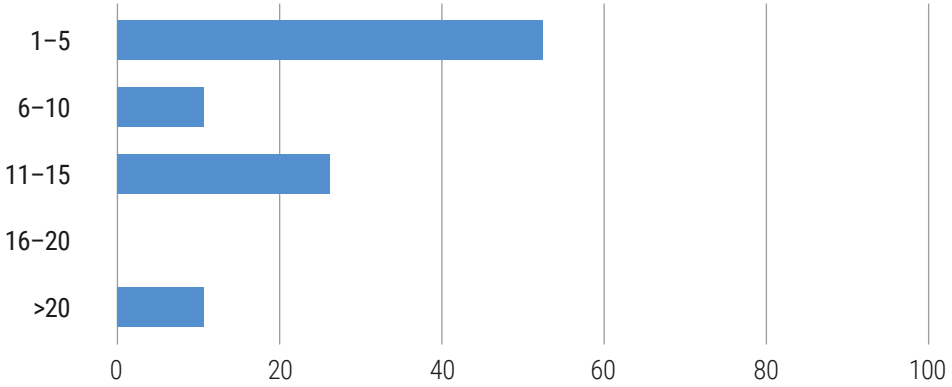
Figure 8: UNEP FI TCFD participants' scenario analysis practices



Across the financial industry, institutions are building internal climate risk capacities to execute the important analytical and reporting tasks noted above. This can take a variety of forms depending on the structure and needs of the institution itself. On one end of the spectrum are dedicated climate risk teams with a specific mandate that includes conducting climate scenario analyses and issuing the firm's TCFD report. On the other end of the spectrum, climate risk assessment and reporting fall under different departments and divisions. For instance, the Risk team may conduct climate scenario analyses, the Sustainability team may write the TCFD report, and an ESG Compliance team may ensure that new climate policies are being followed. The "climate risk function" of most institutions falls somewhere in between centralised and fully diffused "ownership" of climate risk.

For UNEP FI TCFD programme participants, the average number of people involved in climate risk was 9, but half of respondents had fewer than 5 people involved. However, 89% of respondents indicated that they planned to expand their climate risk team in the next year.

Figure 9: Number of people involved in climate risk for UNEP FI TCFD participants



An important consideration for climate risk functions is the nature of staff engagement that follows research and analysis. Climate risk functions with a skew towards executives will be more focused on questions of governance and strategy. Climate risk functions with more junior and mid-level staff will likely be more analytical in nature. Another distinction is apparent between full-time and part-time dedication of staff time to climate risk assessments and communication. Firms whose climate risk functions are more diffuse or have more senior staff members involved in the work will typically rely on more of a part-time model, where staff dedicate a portion of their time to climate risk while engaged in other responsibilities.

Below, Citi described the evolution of their climate risk program and a North American bank provided a view on their expectations for how future climate risk teams will develop.

Bank Perspective: Citi climate program outputs

Citi released its first Climate Change Position Statement in 2007 and has been driving climate positive financing and climate risk management through the bank's Sustainable Progress Strategy and Environmental and Social Risk Management (ESRM) framework since then. This effort and focus have accelerated notably in recent years following the 2017 release of the Task Force on Climate-related Financial Disclosures (TCFD) recommendations. Prior to Citi's CEO Michael Corbat signing a statement of support for the TCFD recommendations, Citi conducted a gap assessment versus the TCFD recommendations and identified climate scenario analysis as an area of development for Citi. Citi's ESRM and Corporate Sustainability teams assembled representatives from risk management and banking who worked over 2017-2018 to conduct a climate scenario analysis as part of the UNEP FI Phase 1 TCFD pilot project for banks. Following this, Citi published its first TCFD report, Finance for a Climate-Resilient Future, in November 2018, becoming one of the first banks to do so.

With growing regulatory and investor interest in climate risk and the TCFD, Citi decided to take additional steps to embed climate risk management within the risk management function. In 2019, Citi's Chief Risk Officer formed a cross-functional Climate Risk Working Group to explore further integration of climate risk into Citi's risk management frameworks, policies and processes. In 2020, Citi appointed a new Global Head of Crisis Management and Climate Risk, a senior member of Citi's Risk Management Executive Committee, who was charged with oversight of Citi's approach to meeting growing regulatory expectations on climate risk management.

Following this appointment, the Climate Risk Working Group has grown to become the central forum that brings together expertise from credit risk, quantitative risk & stress testing, ESRM, operational risk, banking, markets, legal, compliance, government affairs, and sustainability to progress on climate risk integration across the spectrum of Citi's businesses and material legal entities globally. In addition to regular monthly meetings, members of the working group participate in targeted climate risk work streams focused on risk management, climate stress testing, regulatory monitoring and assessment, tagging & taxonomy, and regulatory disclosures.

Citi has also established a Climate Risk Advisory Council, comprised of senior Citi leaders, to provide guidance, feedback and support to the overall climate risk management program. The Climate Risk Advisory Council facilitates engagement with senior global leadership, ensuring senior commitment, and providing assistance to help coordinate resources across the bank.

Citi's longstanding, dedicated ESRM team continues to serve as internal subject matter experts to the integration process and on client and transaction reviews under the ESRM Policy, which is part of Citi's broader credit risk management policy. The ESRM Policy sets a framework to assess the potential climate risks and impacts of project-related lending, and includes sector standards for carbon-intensive sectors such as thermal coal mining, coal-fired power, forestry, oil and gas, and palm oil that have a greater impact on climate change.

Citi's plans to continually enhance its approach to climate risk management – both the financial risk and the risk to the global community – is a central pillar of Citi's broader 2025 Sustainable Progress Strategy launched in July 2020.

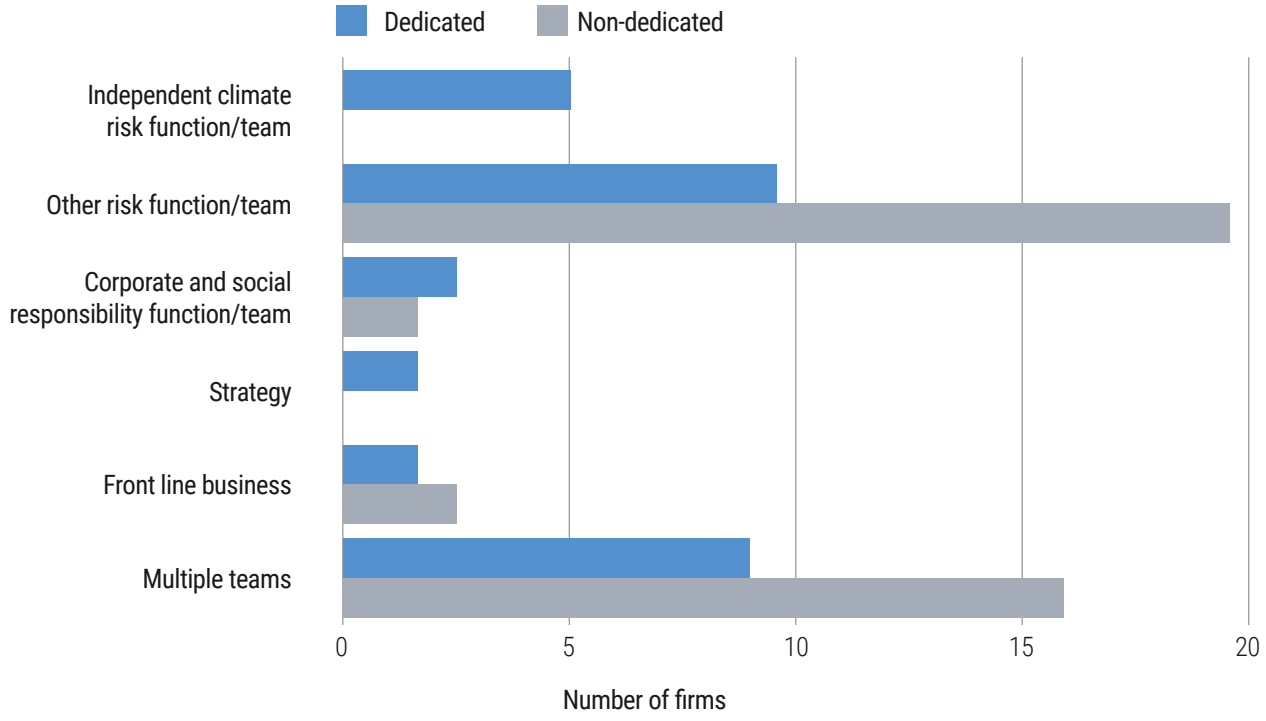
Bank Perspective: North American Bank's views on the future development of climate risk teams

"Climate change teams have different responsibilities depending on the extent to which the organisation's climate-related risks and opportunities fall within their purview. At their core, these teams need to maintain up-to-date knowledge of current trends seen in the impacts of climate change, as the reputational risk of climate inaction increases and policy action towards curbing climate change continues to excel. Climate risk teams need to be able to articulate the distinctions and overlaps between the topics of greenhouse gas reduction, climate change mitigation, and climate change adaptation. They should have the organisational knowledge to bring key climate considerations to bear on the organisation's operations, strategic planning, risk mitigation, and stakeholder engagement. Additionally, they should be able to provide insightful thought leadership for both clients and internal stakeholders including market commentary, opinion pieces, recommendations, and ad hoc analysis. Going forward, we speculate that climate risk teams could evolve in three succinct ways:

- Expand to include traditional finance roles that would perform economic risk assessments and credit scenario analysis of climate change impacts that the organisation can use to inform its risk mitigation actions and plans.
- Fully integrate climate risk into enterprise risk management function through the development of a climate risk framework, climate change risk appetite, and performance metrics/KPIs.
- Expand to include risks associated with sustainable finance, of which climate is one component. This will result in the team broadening its mandate to maintain detailed databases of evolving ESG and global sustainable finance market developments."

The GARP Climate Risk Management survey provides useful insights about the structure and location of climate risk functions within organisations as shown in Figure 10 (GARP 2020). While over half of respondent firms indicated that they only had senior staff or part-time resources focused on climate change, most respondents indicated that expansion of their climate risk function was underway or would happen soon.

Figure 10: GARP report results on the climate risk function composition



Increases in specialisation and dedicated staff are likely to follow buildouts of climate risk functions. Given the rising regulatory demands around climate risk disclosures and climate stress testing, the improvement of company-level climate data, and the continuing development of risk assessment tools, climate risk functions will need a variety of skill sets. Climate risk practitioners will require experience in statistical testing methods, risk and financial modelling, scenario analysis, and data analysis. This knowledge will need to be augmented with an understanding of climate science and the potential interactions between climate and financial/economic factors. Additionally, big picture thinking and communication skills are vital for transforming climate analyses into thorough climate reporting, comprehensive climate risk management, and organisational change and transformation.

3.2. Climate risk function responsibilities

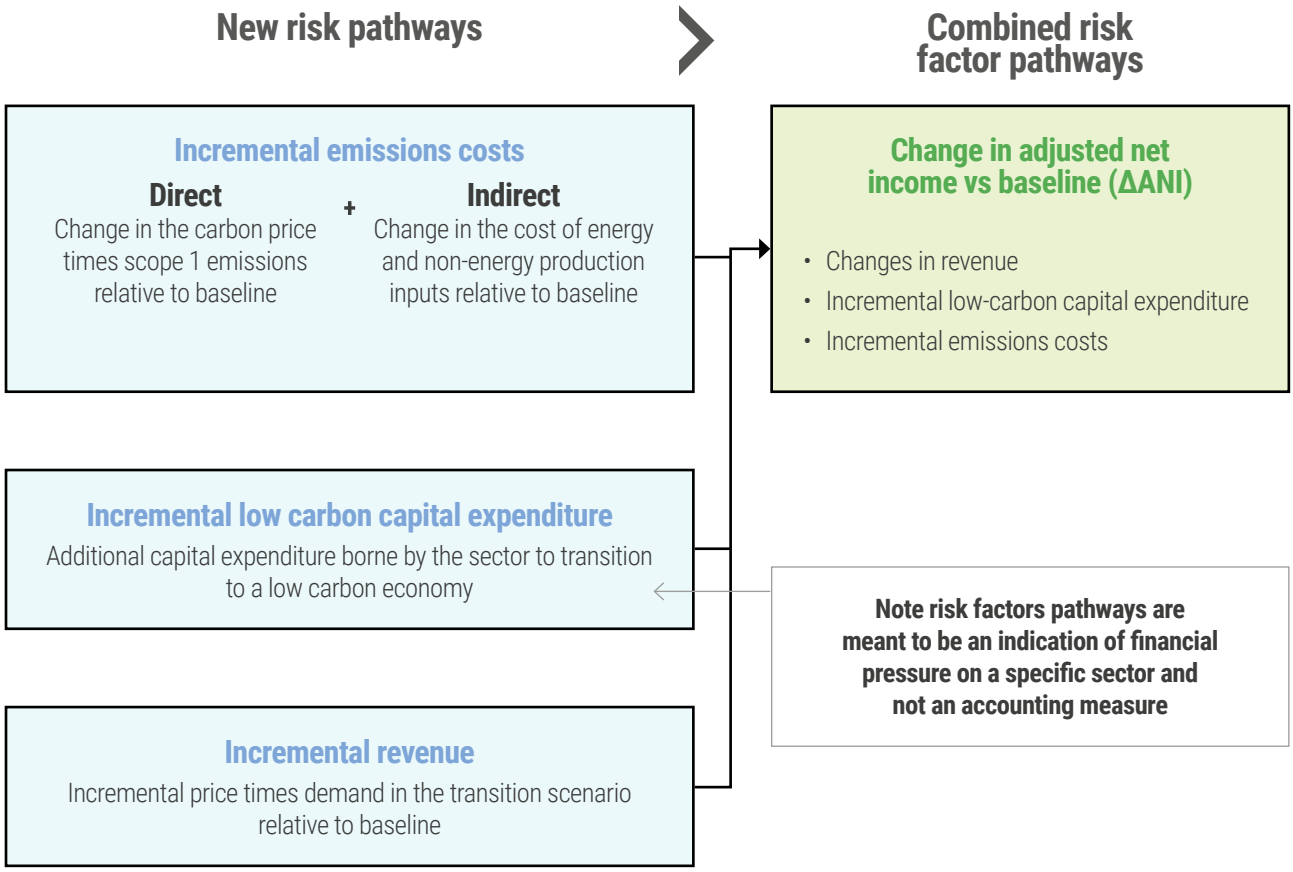
The role of a climate risk function may vary based on the institution, but its two general responsibilities are to provide climate risk assessment and climate risk reporting. Assessment and reporting are closely linked but require distinct skills. Assessment demands knowledge of climate impacts, risk modelling, and other technical knowledge. Reporting requires an ability to synthesise assessment outputs, identify key findings, and communicate with internal and external stakeholders. A deeper exploration of assessment and reporting provides insights into the evolving work of climate risk functions across the financial sector.

Climate risk assessment involves determining portfolio impacts from both physical and transition risks. These assessments have been central components of the UNEP FI TCFD programs.

For physical risks, assessments will consider the effects of both extreme events (hurricanes, wildfires) and incremental risks (decreasing crop yields, rising sea levels) that will pose challenges to borrowers. Given that the degree of threat is largely determined by location, climate risk functions need to look at highly detailed geographical data to identify areas of risk. Assessments have also incorporated granular data from catastrophe models from the insurance sector to determine potential losses, modifying these with forecasts of future impacts. Performance under physical stressors can be influenced by the borrower's idiosyncratic factors, the sector in which the borrower operates, overall resiliency of the area, and interaction effects between different impacts. UNEP FI and Acclimatise (a climate consultancy), have elaborated on the varied aspects of physical risk assessments that financial institutions should consider in their reports Navigating a New Climate (UNEP FI & Acclimatise, 2018) and Charting a New Climate (UNEP FI & Acclimatise, 2020).

For transition risks, assessments are likely to consider multiple transition drivers including policy changes, technological advancements, and market shifts. A climate risk function will need to identify the degree to which these transition drivers affect particular sectors as well as their specific borrowers. Rather than considering a variety of drivers in isolation, assessments may use climate scenarios (typically from energy models or integrated assessment models) to display the effects of these factors in tandem. This scenario analysis frequently connects climate variables (total emissions, energy prices) with macroeconomic and other financial indicators that can be used to determine losses. Different tools have been developed both in-house and by third party providers to establish linkage between the climate scenarios and the forecasted losses. An example of this transformation process can be seen in the UNEP FI/Oliver Wyman transition risk methodology developed as part of Phase I of UNEP FI's TCFD Banking pilot program. In that approach, risk factor pathways (RFPs) are created from climate scenario variables to represent pressures on costs and revenues for different sectors (see Figure 11). The full transition risk methodology is described in significantly greater detail in UNEP FI and Oliver Wyman's Extending Our Horizons Report (UNEP FI & Oliver Wyman, 2018).

Figure 11: Phase I UNEP FI risk factor pathway development

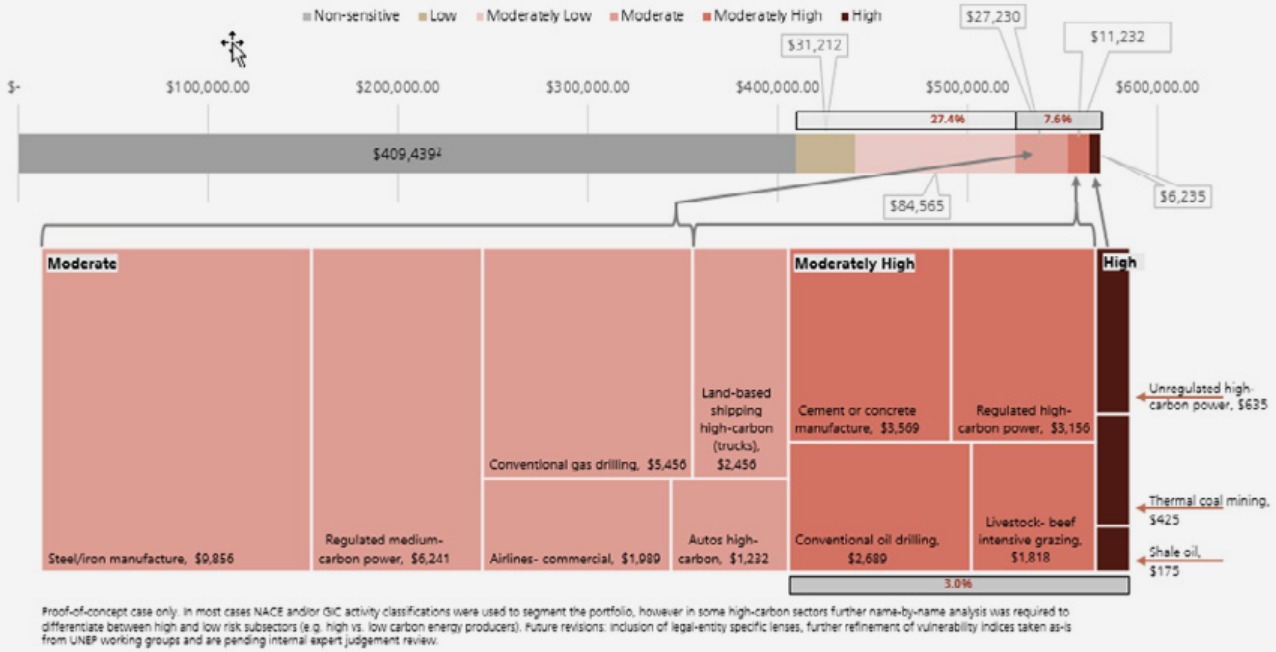


One of the challenges of a climate risk function is communicating the implications of these physical and transition risk assessments. That communication can take place internally in the form of board or executive-level dashboards and risk reports or in an externally facing TCFD report. Reports can enable decision-makers to manage climate risk more effectively and inform stakeholders of ongoing and emerging climate risks.

Internal reports typically aim to provide information about where climate risks have been identified (both in terms of geographies and sectors). These reports may also cover the specific sources of recent or emerging climate risks including policy decisions, physical events, or technological shifts. In addition, internal reports may provide overall metrics regarding high-risk exposures that can be used to set strategy. At a counterparty level, these reports may capture information about large clients with significant climate risk exposure and suggest ways to mitigate these risks.

Below, a European bank provided details on the applying a proof-of-concept heatmap, developed by the banking sector programme participants, to address aspects the risk function's climate responsibilities.

Bank Perspective: A European bank's high-level heatmap of credit-risk exposure to economic activities, ranked by vulnerability to risks (policy, technology, and demand shifts), millions USD



To inform the further development of its transition risk management strategy, one bank piloted the transition risk "heatmap," developed in collaboration with the other working group banks in the programme. The heatmap is based on ratings presented by ratings agencies, regulators, and expert consultants. It ranks credit risk exposure to climate-sensitive sectors, through a segmentation process. The working group discussed how to segment and rate gradations of winner to losers within sectors, rating them from non-sensitive to high for their vulnerability to climate policy and technology risks, and demand shifts under an aggressive approach to meeting the well-below 2˚C Paris goal. An overall rating from low to high was also designated for each segment and is used in the graphic above.

The heatmap was found useful by the piloting bank, for several reasons:

1. Identifying types of clients at-risk in the transition to low-carbon economy. These are clients who may be in need of capital support towards executing transition strategies, and therefore present opportunity.
2. Alternately, where clients do not have such strategies, these exposures could be assessed for potential credit risks. The heatmap helps prioritize sectors for further credit risk analysis. By prioritizing relevant sectors, the bank is able to optimize resources while delivering on approach based on materiality.
3. Identify and monitor concentrations of direct exposure to sectors with high transition risk, for internal reports to executive and board leadership and external reports to stakeholders.

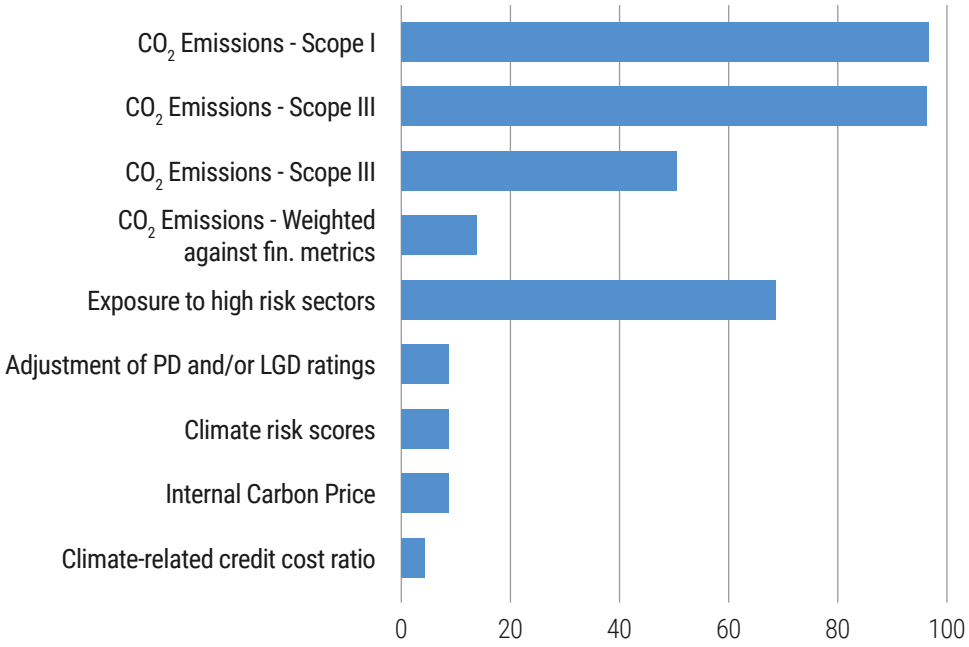
Next steps include Internal expert judgement review and challenge of individual vulnerability ratings to the different risk factors and segmentation, expanding the heatmap to include a view on market risk and exposure to collateral (including net effects)..

External reports must balance the release of decision-useful information with requirements of client confidentiality. TCFD disclosure guidance suggests that institutions discuss their climate risk governance and strategy, but also target specific risk management actions and metrics and targets. The Governance and Strategy pillars provide an opportunity for the firm to discuss its climate goals and the actions taken to address climate risks. Quantitative disclosures can include a heatmap showing high-low risk exposures to climate-sensitive sectors, forward-looking portfolio alignment metrics with Paris Agreement objectives, backwards-looking financed emissions inventories as well as projected losses under a variety of climate scenarios. These scenarios have the benefit of showing climate risk under a variety of futures and of introducing an element of comparability across the industry. The development of the NGFS's reference scenarios in June 2020 with leading climate scientists was a strong step towards standardisation.

The number of metrics disclosed by financial institutions in their TCFD reports has grown over time. These disclosures initially focused on emissions metrics but are now increasingly including risk metrics such as exposures. A survey of the participants in UNEP FI's TCFD Phase II programme reflected this observation as many firms have integrated climate-related financial metrics related to emissions and alignment in their TCFD reports. Fewer institutions have included risk metrics in their current disclosures, but many indicated a willingness to do so in the near future. Figure 12 shows the set of metrics disclosed by the institutions.

However, a lack of clear international reporting standards, such as a common definition for financial institutions' Scope 3 (indirect emissions) data, makes full comparability of banks' TCFD reporting challenging.

Figure 12: Metrics disclosed by UNEP FI members



3.3. Guidance on an effective climate risk function

A climate risk function must have adequate resources. This is particularly important given the rapid development of regulatory requirements and assessment methodologies. Furthermore, the relative novelty of climate risk typically means that many within an institution may not be knowledgeable about the wide range of climate impacts. In meeting this challenge, a climate risk function needs to not only identify and assess risks but also explain the implications of these emergent risks to others across the bank. This broad mandate demands skilled individuals with technical, financial, and environmental expertise. In addition to staff, necessary resources also include relevant climate data from borrowers as well as climate scenarios and spatial maps. Climate risk assessment tools, like high-level climate risk heatmaps or bottom-up credit risk models (whether internally or externally developed), can also further the work of climate risk functions. A bank's willingness to devote resources to developing their climate risk function is a good indicator of how committed it is to confronting the climate threat.

While full-time staff, improved data, and technical tools are valuable, so is the integration of the climate risk function into the organisation. Dealing with climate risk requires collaboration across departments and divisions. Environmental and Social Risk Management (ESRM) or ESG colleagues can articulate the policies and assessment criteria that currently go into evaluating the environmental acceptability of a deal. Underwriters will have knowledge of borrowers that can inform their resilience to climate impacts. Credit analysts will be able to provide detailed outlooks on the challenges and opportunities facing a given sector. Economists can consider the effects of climate-related stress on the macroeconomy. Risk modelers can apply their knowledge of scenario analysis to incorporate climate into loss forecasts. A climate risk function will need to leverage the knowledge of the whole organisation to get a full picture of the climate threats the firm faces. As the TCFD's 2019 Status Report stated, "mainstreaming climate-related issues requires the involvement of multiple functions," (TCFD 2019).

Part of being well-integrated within an organisation is the ability of the climate risk function to express its findings to executives and to the business line. Clear communication with executives is necessary if climate risk is going to be incorporated into overall strategy. As mentioned in the prior section, this communication can come in the form of internal reports and executive or board-level dashboards on climate risk. With those on the business line, communication should flow openly in both directions, with the climate risk team receiving data on borrowers to enable their assessments and the business line receiving evaluations of the climate-related risks and opportunities of their activities. Executives and those on the business line should be versed in climate risk terminology in order to be able to make the best use of climate risk insights when making business decisions.

4. Climate risks and opportunities for business lines

Integrating climate risk throughout a firm goes beyond high-level strategy and effective climate risk reporting. Climate risk principles must also be applied at the business line. Colleagues who work directly with the bank's clients have a critical role in making climate risk principles actionable. There are three primary ways in which climate risk can be incorporated at the business line level. A business line can execute a specific approach in accordance with the firm's climate risk appetite and climate goals. An example of this would be changing the client acquisition focus of the energy business from fossil fuels to renewables. A bank's business lines can also incorporate climate risk into new underwriting and credit risk assessments of potential and current clients. An example of this would be the development of a new scorecard approach for rating borrowers in the utilities sector. Businesses can also work closely with existing clients to support their efforts at transparency and transition. An example of this would be collecting emissions data from a major client and then having the ongoing relationship be contingent on the client hitting emissions reductions targets.

4.1. Implementing climate strategy

Individual business lines are the places where a firm's climate strategy is put into practice. As financial institutions increase their climate commitments and feel growing pressure for climate action from stakeholders, it will fall to those in the business line to incorporate these new priorities into their normal operations. The past year has seen multiple global banks back away from heavily emitting projects such as tar sands and off-shore drilling. Restrictions on specific clients will impact business lines that will need to change their approach to align with the new policies. Where volume was once made up by emitters, businesses will need to transition their existing clients, or target new, greener clients for their portfolios. This creates risks, as well as opportunities. Identifying the best opportunities will require knowledge of the low-carbon transition and market assessments on which low-emitting sectors are likely to grow. Beyond negative policies (restrictions on activities), institutions have made major commitments to finance transition technologies and climate resiliency. Similarly, the business line will need to identify the best candidates to finance in order to meet these funding goals.

Below, ING provided a deeper exploration of their Terra Approach (mentioned previously), which combines overarching climate strategy with direct client engagement.

Bank Perspective: ING's Terra Approach

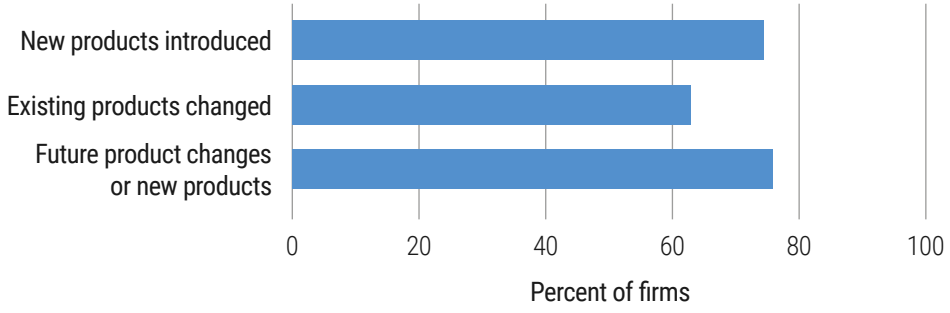
Following ING's commitment to steer its lending portfolio towards the well-below two-degree goal of the Paris Agreement, ING developed an inclusive, forward-looking and engagement-driven approach. The Terra Approach draws on two main methodologies, the Paris Alignment Capital Transition Assessment (PACTA) and the Science Based Target Initiative's Sectoral Decarbonization Approach (SBTi SDA). These methodologies allow the bank to show how its lending portfolio is aligned with science-based climate scenarios or transition pathways per sector and to set targets, visualised in Climate Alignment Dashboards.

Terra adheres to a number of underlying principles. First, the portfolio is steered per sector. This respects the fact that each sector has its own transition pathway, or 'technology roadmap', for it to contribute to a low-carbon world. Second, we prioritise 'asset-level data' (ALD) for accurate measurement because the impact our clients make is driven by the types of vehicles, buildings, aircraft, ships and plants that they own, operate or produce.

This approach also creates opportunities for ING to engage with clients, providing them detailed insights and facilitating discussions about their own strategies and supporting their transition journey. Ultimately, this sector-based approach allows ING to be more effective in steering each sector portfolio towards Paris, either through client engagement or through making choices about who and what we do or do not finance.

The changing nature of finance, particularly in highly emitting sectors, has led banks to consider new products in order to finance the low-carbon transition and to better serve the needs of customers. These new products have included the origination of green bonds and loans, infrastructure bonds for climate resilience, and ESG funds. In many instances, existing products were adapted to meet the new demands of the marketplace (such as the conversion of an existing fund into an ESG fund). The latest evidence suggests that these new products are gaining momentum and seeing strong demand. The first half of 2020 saw record inflows into ESG funds, and over half of banks queried in GARP's 2020 Climate Risk Management Survey reported that they had created new products in response to climate risks

Figure 13: GARP report- new product creation



Below, Scotiabank shared perspectives on how they are using new product offerings in order to help fulfil their climate commitments.

Bank Perspective: Scotiabank's perspective on new products and climate commitments

Scotiabank recognizes that climate change is significantly impacting natural systems and communities across the globe and poses a significant risk to the global economy and society.

In 2019, Scotiabank developed an enterprise-wide climate strategy and announced the Bank's five Climate Commitments. The Commitments outline how the Bank will continue to support customers and communities in the transition to a low-carbon economy while enhancing the integration of climate risk assessments in business activities and decarbonizing its own operations.

Notably, the Bank committed to mobilizing $100 billion by 2025 to reduce the impacts of climate change. This includes lending, investing, finance and advisory, as well as investments in the Bank's direct operations and communities where it operates, and will help the Bank capitalize on the financial opportunity of the transition to a low-carbon economy. This commitment is supported by the Scotiabank Green and Transition Taxonomy and includes the creation of new products and services, including the issuance of the Green Bond (USD$500 million 3.5 year senior unsecured)

4.2. Supporting the low-carbon transition

The development of "green" products is one way the business line can play a role in the firm's climate strategy and climate risk management efforts. However, business line colleagues can also leverage their relationships with clients in order to support the low-carbon transition and mitigate the firm's climate risk. Active support for client transitions is one of the most powerful ways banks can contribute to climate goals. Work undertaken by the Cambridge Institute for Sustainability Leadership (CISL) and several global banks elaborated on ways that banks could play this vital role.

In their 2020 report as part of the Banking Environment Initiative, CISL outlined a series of specific actions for institutions to take. These recommendations included the expansion of new products (as noted above) such as green loans and green bonds (CISL 2020). The CISL analysis also recommended dedicated financing for innovation and deployment of green technologies. A number of other valuable proposals are included in Figure 14 below. Fundamentally, each of these recommendations aspires to three goals for the financial sector outlined by CISL:

1. Ensure capital acts for the long term.
2. Price capital according to the true costs of business activities.
3. Innovate financial structures to better serve sustainable business.

These three objectives (and particularly the first two) are consonant with the TCFD framework and the desire to ensure that the financial sector plays a constructive role in the low-carbon transition. Business lines will have the knowledge and relationships with their clients to identify their needs and help them to become greener and more sustainable.

Figure 14: Recommendations from CISL in their Bank 2030 report

...evole the product offer

Transition finance

- Create and mainstream transition finance offerings (i.e. KPI bonds, KPI loans, conditional debt) that will encourage clients to transition to a low carbon economy
- Find ways to offer lending with preferential terms, e.g. blended finance for de-risking
- Broaden the leasing offer to deepen penetration of green assets (e.g. electric vehicles)
- Structure instruments to aggregate smaller ticket size projects (e.g. small-scale renewable generation)
- Securitise the assets or future cash flows of service companies offering individuals and SMEs access to the low carbon economy of the future, e.g. ESCOs (energy service companies)
- Increase the bank's lending capacity for new green opportunities
- Create instruments for carbon offsetting and carbon sequestration

Collaborative finance

- Connect sector experts ith corporates to stimulate demand for low-carbon
- Strive to create and realise a shared vision of the future with others (i.e. clients, experts, capital)
- Engage with DFIs, regulators and policymakers to create an enabling environment for collaborative finance
- Directly support early stage innovations
- Facilitate crowd funding to help make funding of smaller projects possible

...expand coverage

Low carbon economy for all customers

- Broaden investment in renewable power generation and in the energy efficiency of industry and buildings
- Encourage the transition of agricultural practices
- Help hard-ti-abate sectors be a part of a low-carbon transition (e.g. cement or shipping)
- Improve the extent to which individuals and SMEs are supported to transition

Financial institutions can take an important leadership role in helping their clients to more effectively manage and mitigate their climate risks. In doing so, these institutions can manage and mitigate their own risks. Several institutions in the UNEP FI TCFD programme described the ways in which they incorporate climate risk considerations into the relationship between their business line colleagues and their clients. Below, the European Bank for Reconstruction and Development (EBRD) shared a detailed example of how they applied TCFD framework and climate risk principles in the diverse client settings in which they operate.

Bank Perspective: The EBRD's perspective on client engagement with climate risk

The EBRD considers that efforts to improve the assessment and disclosure of climate-related financial risks must take into account the links between the financial system and the real economy. This is because it is typically in the real economy—for example primary production, manufacturing, infrastructure or property—where climate-related risks become material. They may then be transmitted into the financial system, for instance through the weakening of revenue streams, heightened credit risks, or the devaluation of assets. Financial institutions therefore rely upon disclosures made by real economy firms in order to assess the risks—and sometimes opportunities—associated with how climate change affects economic activity.

This is why, as well as beginning to apply the TCFD recommendations within the Bank's own internal business and risk management functions, The EBRD has begun to support its corporate clients across a range of sectors to shift towards improved climate corporate governance practices. This typically includes adopting measures to assess and disclose climate-related risks and in some cases involves full alignment with the TCFD recommendations. The EBRD operates in emerging economies, where national frameworks for climate-related disclosures often do not yet exist. Supporting emerging market firms to reflect best international practices on climate-related disclosures and climate corporate governance is fully aligned with the Bank's core mandate as a transition bank.

The EBRD provides advice, resources and technical support to its clients to adopt the knowledge, practices and procedures needed to make these shifts. So far, this has entailed supporting more than 15 firms from industries ranging from power and energy, to mining and agri-processing, and in countries ranging from North Africa to Eastern Europe. While the EBRD has developed a framework of good practice principles to support clients to improve their climate corporate governance, these are applied in differentiated ways that reflect the specific needs of each client. For example, depending on the sector, geography and specific nature of their business operations, different clients will encounter different configurations of carbon transition risks and physical climate risks. Different firms will also be at different levels of capacity and readiness or operate in markets and regulatory environments with different levels of advancement with respect to climate-related disclosures.

An example of how The EBRD engages with its clients on these topics is a recent US $100 million transaction with the Louis Dreyfus Company (LDC), a leading merchant and processor of agricultural products and a long-standing partner of the EBRD. This project will facilitate the company's regional growth in eight of the EBRD's countries of operation: Bulgaria, Egypt, Kazakhstan, Poland, Romania, Tajikistan, Turkey and Ukraine. The facility will therefore help to connect many regional small and medium-sized grain farmers and cotton ginners with LDC's value chains, which is important for their development and planning activity.

The project will also advance LDC's adoption of an enhanced climate corporate governance approach in line with TCFD guidelines, seen as the next evolution in corporate thinking about climate action. This approach will include the development of new methodologies and processes for assessing carbon transition risks and physical climate risks in two key value chains – cotton in Turkey and grain in Ukraine. This will include developing ways of integrating climate risk management into decision-making, such as using climate scenarios to understand how climate change may affect crop yields, and decarbonisation scenarios to understand how these operations will fare under the transition to a low-carbon economy. Once these are developed, the expectation is to apply them elsewhere in LDC's operations around the world.

The cotton value chain is an interesting test case for physical climate risks, especially water stress, as cotton is a thirsty crop that uses a lot of water, and Turkey is located in a region with growing water shortages. The focus on grain in Ukraine will shed light on risks associated with decarbonisation. Grain production is to some degree carbon-intensive – fertiliser is used, which is made from natural gases and emissions are involved in its production, and further emissions may be associated with logistics – and Ukraine is a carbon-intensive country whose electricity largely comes from burning coal.

The EBRD's work with clients like LDC on improving climate corporate governance and encouraging the integration of climate-related information and risk assessment into business planning is becoming a major organising principle for the EBRD's Green Economy Transition financing approach. By helping our clients better understand and disclose these risks, we at the Bank also learn to better assess and reduce our own exposure to physical climate risk and carbon transition risk through our investments. For example, as LDC begins assessing and disclosing its exposure to physical climate risks in Ukraine and Turkey, this will help The EBRD understand its own exposure to these risks.

4.3. Enhancing assessment criteria

In risk management, the business line is considered the first line of defence. Climate risk is no different. With the development of improved climate risk assessment methodologies, financial institutions can provide business lines with more tools to evaluate the climate risk in their activities. The analyses done by the climate risk function can be used to create metrics and targets for business lines to apply. These metrics can include simple exposure to high-risk sectors or more complex climate value-at-risk outputs from scenario-based models. A growing number of firms have seen their businesses apply some of the quantitative measures developed by climate risk functions to make decisions about client risks. Importantly, the relationship between the business line and the climate risk function is dynamic. While the outputs provided by climate risk functions can inform businesses, the unique knowledge that business line colleagues have about their clients can improve the assessments of the climate risk functions.

Beyond metrics and targets, financial institutions are considering how climate risks should be integrated into their underwriting and credit evaluations. For many institutions, there has been a recognition that the existing underwriting process does not adequately capture climate risks. Thus, it is possible for a risky borrower to be mis-rated as safe even if they are highly exposed to transition or physical risks. To address this issue, a few firms have incorporated climate criteria into their internal credit ratings. This can be accomplished in a variety of ways. Underwriters can adjust financial scores to account for costs of adaptation or transition. Underwriters can give specific weights to climate-related factors in their rating. At a more basic level, underwriters can provide a qualitative override for specific high-risk sectors or activities. According to a recent study by Oliver Wyman and the International Association of Credit Portfolio Managers (IACPM), more work needs to be done to incorporate climate risks into underwriting as the majority of firms surveyed did not explicitly capture climate risks or captured them only with qualitative overrides (Oliver Wyman and IACPM 2018).

During the UNEP FI TCFD Phase II programme, participating institutions applied the Transition Check methodology for assessing transition risks. In that methodology, developed by UNEP FI and Oliver Wyman, participants are asked to provide updated ratings for a sample of borrowers under different climate scenarios. This process had participants engage their credit analysts to look at the ways in which the climate scenario impacted the ratings of borrowers. Credit analysts could identify "climate-sensitive" factors within the rating (meaning factors that change due to the impacts of the transition scenario). An illustrative example is provided in Figure 15. Ideally, ratings methodologies themselves will be enhanced to ensure that climate risks, both physical and transition, are captured when assessing the creditworthiness of a borrower.

Figure 15: Illustrative application of transition scenario to adjust borrower rating

Type	Category	Weight	Rating factor	Current (12/31/2016)	2 degree	1.5 degree
Quantitative	**Reserves and production characteristics**	25%	**Production (Mdoe/d)**	1,100	760	700
			PDP (Mboe)	6,000	6,000	6,000
			Total proved reserves (Mboe)	8,000	8,000	8,000
	Operating & capital efficiency	20%	**Leverage full-cycle ratio**	3x	2.5x	2.2x
	Leverage & cash flow coverage	30%	**EBITDA / interest expenses**	30x	25x	20x
Qualitative	**Industry**	15%	**Short-term industry outlook**	Strong	Weak	Weak
	Competition	10%	Competitive position	Leader	Leader	Leader
			Rating	AA	AA-	BBB

Criteria not impacted by scenario

Criteria impacted by scenario

Metrics to estimate

4.4. Guidance on business line engagement

An engaged business line is an important pillar in a firm's climate risk management. A set of principles for effective business line engagement can be discerned from industry leaders in climate risk management. These principles concern both how the business line engages with clients and how it communicates within the firm.

The business line should be informed about the types of climate risks that have the potential to impact their clients. These may be any combination of transition and physical risks and will likely differ significantly depending on the sectors and geographies covered. Knowledge of these risks will empower the business line to ask the right questions and determine the right data to collect from clients. That will not only help business line colleagues to do their jobs, but also provide necessary inputs for broader climate risk analysis throughout the firm.

Understanding the climate risks facing clients is an important first step for the business line, but it is the actions that follow from that knowledge that will make the greatest difference. In terms of credit ratings and underwriting criteria, it may be the case that climate risks are already indirectly captured through existing tools. An example of this would be a rating scale that incorporates questions on future business outlook and production costs. Those questions could help determine the degree of transition risk. In this instance, the business line should consider how answers to the existing questions might change due to physical or transition risks. This is an opportunity to undertake climate scenario analysis. However, the business line will likely frequently find that climate risks are not fully captured in their existing credit assessment tools. In this case, the ratings and underwriting processes can be updated to more explicitly capture climate risk factors.

5. Conclusion: Expanding applications of climate risk

In the coming years, managing climate risk will only become more critical for financial institutions. The effects of climate-related physical phenomena will grow more pronounced as the planet continues to warm. Businesses and societies will face new stressors from the changing climate. At the same time, new technologies and policies will continue to drive the trend away from fossil fuels. The impacts of this transition will be felt across economic sectors. A keen understanding of climate risks is necessary to effectively deploy capital in this changing world. Financial regulators have recognised these perils and are developing assessment frameworks to ensure that institutions under their supervision are adequately prepared. Notably, recent guidance has come from the European Central Bank for its supervisees to disclose data on their climate-related risks and integrate those exposures into their risk framework. Furthermore, financial institutions face growing calls from their customers, investors, and staff to play an active role in the low-carbon transition.

As a result of these pressures, climate risk management is undergoing a period of dynamic growth within the financial sector, and a number of significant trends can be identified.

- Strategy: Boards and executives will take climate risks and opportunities into account when developing firm strategy.
- Governance: New strategies will demand new policies and governance at all levels of the institution.
- Risk Management: Resources devoted to climate risk functions will continue to increase. These functions will be given clearer mandates and more full-time specialists to focus on the unique challenges presented by climate risk.
- Metrics & Targets: Advanced analytics will be used to identify emergent climate risks and opportunities. Not only will banks use granular geographical and financial data, but they will also seek insights from the growing fields of artificial intelligence and machine learning.

Over time, practices will continue to evolve as data, tools and methodologies improve and companies and financial institutions more deeply integrate climate into their business and risk operations. UNEP FI's TCFD programs aspire to provide financial institutions with the knowledge and tools to support this integration.

At its heart, climate risk management is about understanding the current world and anticipating future changes. Developing effective practices in this space will enable institutions to seize new opportunities and avoid or limit material losses. Given the magnitude of the risks for global banks who do not act, it is imperative for all financial institutions to consider the impacts of climate throughout their organizations.

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