
Climate change risk: The next frontier in banking risk management

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Abstract Extreme weather events are becoming more frequent, more intense and, to a certain extent, more predictable, according to global climate research. Over time, the effects of climate change could alter dramatically the environment upon which communities, societies and economic activity depend. Meanwhile, a correlating impact on firms, sectors and geographies could render traditional business models ineffective or obsolete. Rapid developments in environmental, social and governance (ESG) initiatives, and rising stakeholder demand for improved sustainability performance, will require banks to take a more integrated and strategic approach to climate risk management. This paper explores the practicalities of integrating climate-related risks into existing risk management frameworks, strategies and processes. It examines the key components and attributes of an effective climate-risk framework. And it elaborates on some of the unique characteristics and business model adaptations that are needed to incorporate climate-change considerations into decision-making processes, including capital allocation, loan approval, portfolio monitoring and reporting. In this way, business models can become more economically efficient and strategically resilient to climate risk and equipped to deliver long-term sustainability and value creation.

Keywords: *ESG, climate change, environmental risk, climate risk management, banking business model sustainability, strategic resilience*

INTRODUCTION

Climate-related and environmental risks are expected to have material impacts on the business environment in which banking institutions operate. These can be seen as both standalone risks and as amplifiers of existing and inherent risks and vulnerabilities within the banking sector. Given the interconnections between the banks and the firms, sectors and geographies they serve, these risks could become systemic.

Banks must consider how climate-driven risks can be embedded effectively into their existing risk

management frameworks, strategies and processes. They need to become better equipped to navigate emerging risks and uncertainties and to build long-term resilience.

Defining climate risk

Climate-related and environmental risks are typically defined as:¹

- Physical risks: These stem from the increased frequency and severity of extreme weather

events, such as flooding and wildfires. They also include chronic risks such as sea level rises and temperature changes. They cause physical damage to companies' assets, disrupt supply chains and increase the costs of event mitigation.

- **Transition risks:** These stem from potential disruptions and shifts associated with the transition to a low-carbon or carbon-neutral economy. As the transition accelerates, new policy measures, regulatory and legal obligations and technology innovations are likely to impact business models and the economics of companies operating within certain industry sectors and geographies.

Climate-related and environmental risks could translate into financial losses on banks' balance sheets, due to their lending and asset holdings.^{2,3} Banks tend to hold significant exposures to carbon emission-intensive assets. They face, therefore, increased risks of losses from the transition to a low-carbon economy and from exposure to physical damage, if climate change is not contained or if economies fail to adapt to it. These balance sheet exposures may be concentrated in certain geographical regions and economic sectors, such as coal mining, power generation and oil and gas. Examples of physical risk to the banking sector include:

- Potential increase in borrowers' default rates and credit losses triggered by the lower value of real estate assets that are held as collateral against loans, particularly in sectors or geographies most vulnerable to extreme weather events. The combination of physical damage, diminished asset values and customer default, increases the size of the loss.
- Potential increase in business disruption costs due to physical damage from extreme weather events to bank property, branches, data centres, etc.

A transition risk could include:

- Potential increase in impairment costs or deterioration in asset values due to disruption in many sectors such as power generation, manufacturing, transportation and construction, etc, as the world transitions to a lower-carbon intensity economy.

Traditional risk management tends to consider risks as disparate and easily compartmentalised specialisms. Because risk is constantly changing, and because new risks are emerging all of the time, traditional risk management approaches must evolve too.

A new strategic and dynamic approach to address emerging risks, including risks associated with climate change, is now needed. It must embrace complexity, uncertainty and interdependence and be able to adapt to multiple timescales. This requires risk integration right across the banking value chain and in every component of an effective risk management framework (see Figure 1).

Setting a climate-risk appetite

As part of their strategy review and development process, most banks have declared publicly their target date for becoming 'net zero'. 'Net zero' means that every ton of carbon dioxide (CO₂) the bank emits is matched by a ton that it removes from the atmosphere. It achieves this by making changes to its own operations. It also supports its customers in their efforts to decarbonise and transition to lower carbon-emission business models by offering sustainable financing, investment and advisory support.

Consequently, banks' existing risk strategies and risk-appetite statements must evolve in line with their business strategies and shareholder expectations, and with the economic environment. They should reflect, in particular, any social, environmental and climate considerations, and outline the level of climate-related risk that the organisation is willing to take in pursuit of its strategic objectives. Banks should plan, with regard to individual business models, the desired shape of their balance sheet and their future aspirational risk profile.

In defining their climate-risk appetites, banks can set long-term targets with interim milestones that provide a glide-path towards achieving the optimal balance sheet structure. They can set limits and constraints that will shape their business strategies and guide risk taking in business activities. Effective climate-risk appetite measures should be SMART (Specific, Measurable, Achievable, Relevant and Time bound) and can be expressed across risk types.

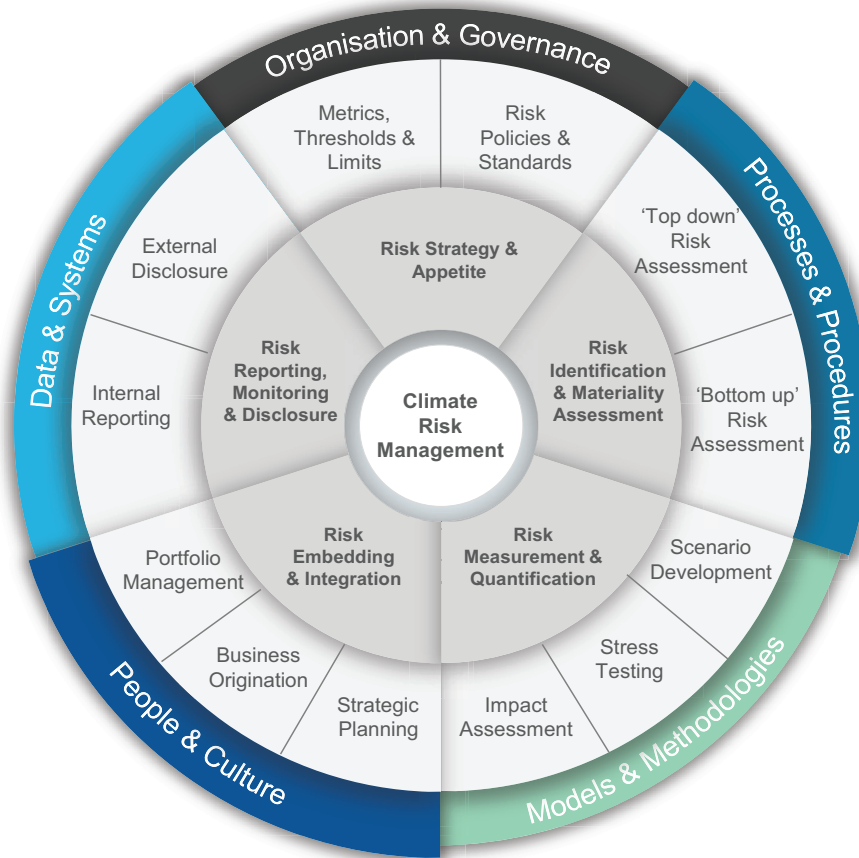


Figure 1: Framework for climate risk management
 Source: Originated by the author.

So, a bank might choose to set limits on its lending to specific sectors or geographies that are highly exposed to climate-related or environmental risks. They might set sub-limits or targets, which could include exposure concentration in CO₂ intensive sectors; minimum levels of sustainable financing; target energy efficiency levels for home loans; minimum share of assets under management that are invested according to a predefined ‘green’ investment mandate, etc.

Once formulated and approved, banks’ climate-risk appetites and associated limits can be underwritten and documented to guide the risk-taking activities of the business. It means front-line lenders can assess how well their customers’ climate-risk profiles align with the bank’s own, and how to ensure greater alignment in the future.

When updating its risk policies to reflect its climate-risk appetite, the bank should consider the types of business in which it will engage in the future. It should think about the products and services it will offer, the types of customers it will serve and the locations from which it will do business, based on environmental criteria. For instance, a bank might not wish to do business with clients that are increasing or planning to increase their thermal coal capacities, or whose turnover from the thermal coal industry exceeds a certain level. Equally, a bank might decline to engage with customers that have not adopted or are not planning to adopt a transition strategy consistent with the objectives of the Paris Agreement.⁴ Similarly, a bank may wish to apply restrictive policy parameters on customers who do not meet minimum sustainability

criteria. They might impose, for instance, a shorter loan maturity or a lower Loan-to-value (LTV) limit on customers operating in sectors that are vulnerable to climate-related and environmental risk.

A forward-looking approach to assessing climate-related risks

Climate change will have different impacts on different industries and sectors, depending on their sensitivity to factors such as weather and natural resource availability.

Sectors that consume a lot of carbon-intensive energy and water in their production processes are likely to be more directly affected by extreme heat and water scarcity than, say, service-based industries. Equally, those sectors most sensitive to climate fluctuations are more likely to experience a reshaping of their markets. They will face new risks, but also new opportunities, as demand patterns shift.

For a start, climate risk should be defined and categorised in the bank's internal risk inventory or register. Climate risk identification needs to be comprehensive. It should span all areas in which the organisation operates, and take account of existing and future activities. In assessing climate risk, two distinct but complementary approaches are considered:

- **Top-down risk assessment:** This portfolio-based approach starts with the identification of exposures in key geographies and sectors most vulnerable to climate-related risks, such as oil and gas; airlines; mining and metals; chemicals; shipping; construction; automotive; commercial and residential real estate; land transportation and logistics. The outcome of this process is a high-level 'heat map'. It aggregates on-balance sheet and off-balance sheet exposure information and other relevant financial and risk metrics, such as asset quality. And it maps key concentrations to climate-risk drivers.

This process helps to identify carbon-intensive 'hotspots' in lending and investment portfolios. It highlights, for instance, the share of CO₂ intensive assets on the balance sheet; the energy-efficiency distribution of commercial and residential real-estate assets and the geographic distribution of

real-estate collateral, including in 'high-risk' flood areas. And it serves as a baseline to inform and enable scenario analysis and stress testing to give the bank a better understanding of the significant risks that could face an organisation under various transition scenarios.

- **Bottom-up risk assessment:** This approach is typically led by the frontline business to drive early and active engagement with customers and counterparties operating in sectors and geographies that are most exposed to climate risk. It collects relevant forward-looking information at the customer level. It might include customer surveys on companies' preparedness for the transition to a low-carbon economy, as well as directional impact assessments of climate risk on key financial items, such as revenues, costs, assets, liabilities, capital and financing needs.

This process helps the bank to better understand the carbon intensities of their customer businesses, and plans put in place to combat and mitigate climate risk (physical and transition).

Quantifying the impact of climate-change risk

The impact of climate-related and environmental risks on banks will depend on their business models, balance-sheet structures and geographic reach. When quantifying the impact of climate-change risk on strategic objectives and plans, banks do not look at discrete forecasts. Instead, they view the future as a range of possible outcomes. This dynamic view of the future is not only vital for assessing business opportunities. It also defines the value-added role that risk management performs in identifying, understanding, managing and navigating the uncertainties an organisation faces as it pursues its value-creation objectives.

Given the nature of climate risk, and its lengthy and forward-looking profile, scenario analysis is emerging as the preferred method for measuring and quantifying it.⁵ Climate-scenario analysis allows banks to test a range of possible future climate scenarios or pathways and to understand the nature and magnitude of the risks they present (see Figure 2). Each scenario includes a trajectory of carbon prices and emissions over time, and an

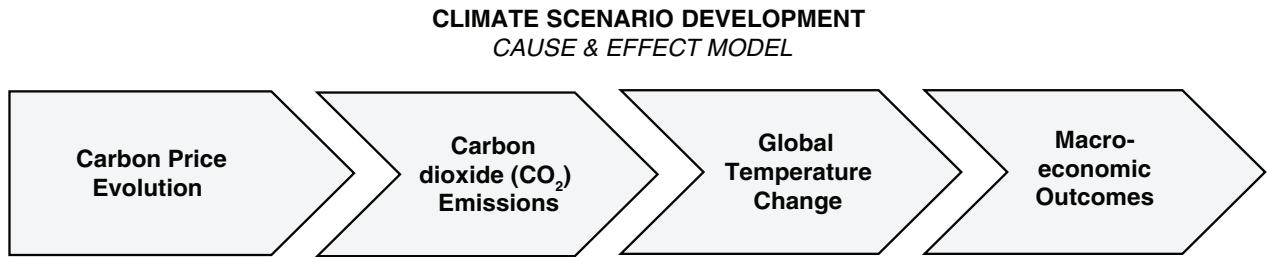


Figure 2: Climate scenario development
Source: Originated by the author.

associated change in global temperature. It includes the impact of potential physical risks (eg, adverse weather and flooding that result from the scenario) and transition risks (eg, economic change that results from the transition to a low-carbon economy) on economic activity and outcomes.

Common climate scenarios⁶ include:

1. **Orderly transition scenario:** In this scenario, immediate and coordinated actions are taken by global standards-setting bodies and governments. They are implemented by way of incremental policy shifts and gradual rises in carbon pricing in order to drive a smooth transition to net-zero carbon emissions by mid-century. In this scenario, impacts from increased transition and physical risks are relatively contained. A significant amount of investment is required to transition to a carbon-neutral economy.
2. **Disorderly transition scenario:** In this scenario, policy actions are delayed until an interim date, and are then followed by a steep increase in investment to transition to a carbon-neutral economy. This leads to larger transition risks for households and corporations.
3. **No new policy scenario:** In this scenario, no new policy actions are taken to reduce greenhouse gas emissions. Existing policies remain in place, leading to significant global warming and severe physical risks. In this scenario, impacts from physical risks will significantly affect lives and livelihoods, and will result in large economic losses.

Each scenario will have implications on the asset and liability sides of banks' balance sheets. They include, among other things, the potential rise in

non-performing loans; losses driven by sudden adjustments in equity and bond valuations; losses from property revaluations; potential rises in the cost of debt; unexpected deposit withdrawals and cash outflows, as well as increased volatility in the levels of liability claims. Climate scenarios will also impact non-financial risks. They include the potential business-disruption costs arising from physical damage of a bank's property, branches or data centres as a result of extreme weather events, or the reputational damage attributed to failure to provide an effective strategy and response to climate change.

Using well-established stress-testing techniques, banks can assess the impact of climate-change scenarios on their business model and balance sheet risks. They can develop appropriate response strategies to futureproof their business models and build long-term strategic resilience.

In assessing the impact of climate-change scenarios, consideration should be given to the long-term nature of climate effects and the time horizon over which they will pan out. Detailed concentration analysis should be taken into account, including any positive or negative correlation risk between industry sectors and geographies exposed to climate change. Equally, it is important to reflect the dynamic nature of balance sheets, including any credible actions that can be implemented to steer the business and mitigate the effects of climate change.

Embedding climate risk in decision-making processes

Effective climate-risk management stretches beyond risk assessment and measurement. It extends to embedding climate-risk considerations in key

decision-making processes across the banking value chain, from strategic planning and target setting to origination and active portfolio management.

As part of the strategic-planning process, the potential decline in the creditworthiness of certain corporate and retail customers could drive banks to adjust the composition of their assets. They might shift capital investments towards less risky assets and reallocate capital to re-balance portfolios in line with their climate-risk appetites.

At the origination level, climate-related risks are expected to be embedded in all relevant stages of the credit approval and management process. They include, but are not limited to:

- Borrower risk rating, possibly as an additional factor in the Probability of Default models.
- Collateral valuations, say as a sensitivity factor in the calculation of loss given default (LGD), which is closely linked to the value of the collateral against the value of the loan. As collateral values may depreciate over time due to physical or transition risks, loans to value (LTV) ratios are expected to increase, leading to higher loss estimates in the event of borrower default.
- Loan pricing, by differentiating the loan prices for exposures according to their energy efficiency, or by offering discounts on the interest rate of an environmentally sustainable loan, or by linking the interest rate of the loan to the achievement of specific sustainability targets by the client.

Once originated, asset performance is actively managed with sectoral and geographic concentration analysis, exposure limits, portfolio optimisation and deleveraging strategies. Climate-sensitive exposures are likely to drive higher expected credit loss (ECL) provisioning and capital allocation. Banks are expected to assess whether climate risk would cause higher unexpected losses under 'Pillar 2' of the Basel Framework, requiring additional capital requirements to be held against it in the Internal Capital Adequacy Assessment (ICAAP) process.

Equally, banks are expected to assess whether climate risk would cause higher net-cash outflows or depletion of liquidity buffers. If that is likely, they must incorporate these factors into their liquidity risk management and liquidity buffer calibration

under the Internal Liquidity Adequacy Assessment (ILAAP) process.

Moreover, banks are expected to consider how climate-related and environmental events could impact their business continuity and the extent to which their own activities could increase operational and reputational risks. Business continuity plans will have to be reviewed, updated and tested to ensure that critical functions – servers and data centres, for instance – are geographically dispersed in order to reduce physical risks to their operations.

Climate-risk reporting, monitoring and disclosure

Consistent, transparent and regular reporting on climate-related and environmental risks ensures that key internal and external stakeholders are kept informed of the bank's exposure to climate risk and the extent to which they are aligned with the bank's stated risk appetite and net-zero emission goals.^{7,8}

Internal reporting on climate risk provides point-in-time and forward-looking insights on the bank's risk exposure profile and its adherence to climate-risk appetite limits. It summarises the outcome of the risk identification and materiality assessment process. It also highlights the 'top risks' facing an organisation from climate change, as well as any response strategies to remediate or mitigate those risks.

External disclosure focuses on driving global consistency and comparability of qualitative and quantitative climate-risk information. It includes for example the amount or percentage of carbon-related assets in bank portfolios; the average carbon intensity of each portfolio; the volume of exposures by sector of the counterparty, as well as collateral by geography. This will help promote transparency and more informed decision making by investors and market participants. Most banks disclose ESG information on a voluntary basis today. However, external disclosure is expected to become mandatory in the future as part of the 'Pillar 3' disclosure requirements of the Basel Framework.

Integrating climate risk in existing risk governance structures

Effective risk governance enhances strategy execution and decision making. It enables and

reconciles the setting of risk appetite, the cascading of limits, the evaluation of activities that create or destroy value and the optimisation of long-term value creation for the organisation.

At the top of the risk-governance pyramid is the board. It has ultimate oversight and accountability for the bank's risk- and related-control environment, including risks associated with climate change. Aspects of climate-risk governance in banking can be delegated to existing board-level committees, such as the risk or audit committees, or assigned to a dedicated climate-change committee that assumes primary responsibility for all aspects of climate-related risk and disclosures. Through their governance role, boards can help to ensure that climate risks and opportunities are embedded into business-strategy reviews, risk-appetite setting and futureproofing the business model by ensuring social, environmental and climate considerations are balanced in the decision-making processes of the bank.

Boards often rely on a robust and effective 'three lines of defence' model, in which ownership of risk is functionally independent from oversight and assurance. As such, the model ensures segregation between direct accountability for risk decisions (1st line of defence), independent oversight and challenge to risk decisions and setting the risk-management policies and frameworks (2nd line) and independent assurance on the effectiveness of risk management, control and governance processes (3rd line). It is important to identify climate-risk roles and responsibilities across all three lines of defence so that ownership and accountability are clear and coordinated.

Integrating climate risk within existing risk governance structures ensures accountability for climate-related risks across all layers of the organisation.⁹ This includes formal escalation procedures for reporting risk-appetite breaches and management actions to relevant committees and the board.

CONCLUSION

Climate change is a source of both financial risks and opportunity for banks. Substantial investment in clean, low-carbon technologies will be required

between now and 2050 to enable the transition to a lower-carbon economy.¹⁰ With it will come new demand for sustainable financing. Demand is accelerated by technological progress in the fields of renewable energy, such as solar, wind and geothermal; in energy efficiency, such as power storage, fuel cells and carbon capture and storage; and in efficient mobility solutions and the circular economy.

Most banks have either started or plan to start a significant expansion of their product offerings in these areas. A growing trend is emerging in Green mortgage lending, funding for Green infrastructure projects, financing for Green businesses, and the issuance of Green bonds and sustainability-linked loans.

Given the significant role that the financial services industry is expected to play in supporting the transition to a low-carbon economy, the need to integrate climate-related and environmental risks into banks' risk management frameworks, investment decisions and capital allocation will be critical. Banks that can actively identify and address climate-related risks and opportunities will be better positioned to respond to, recover from and adapt to climate change, and build their resilience to the changing business and future economic environments.

AUTHORS' NOTE

Any views expressed in this paper represent those of the author only.

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