

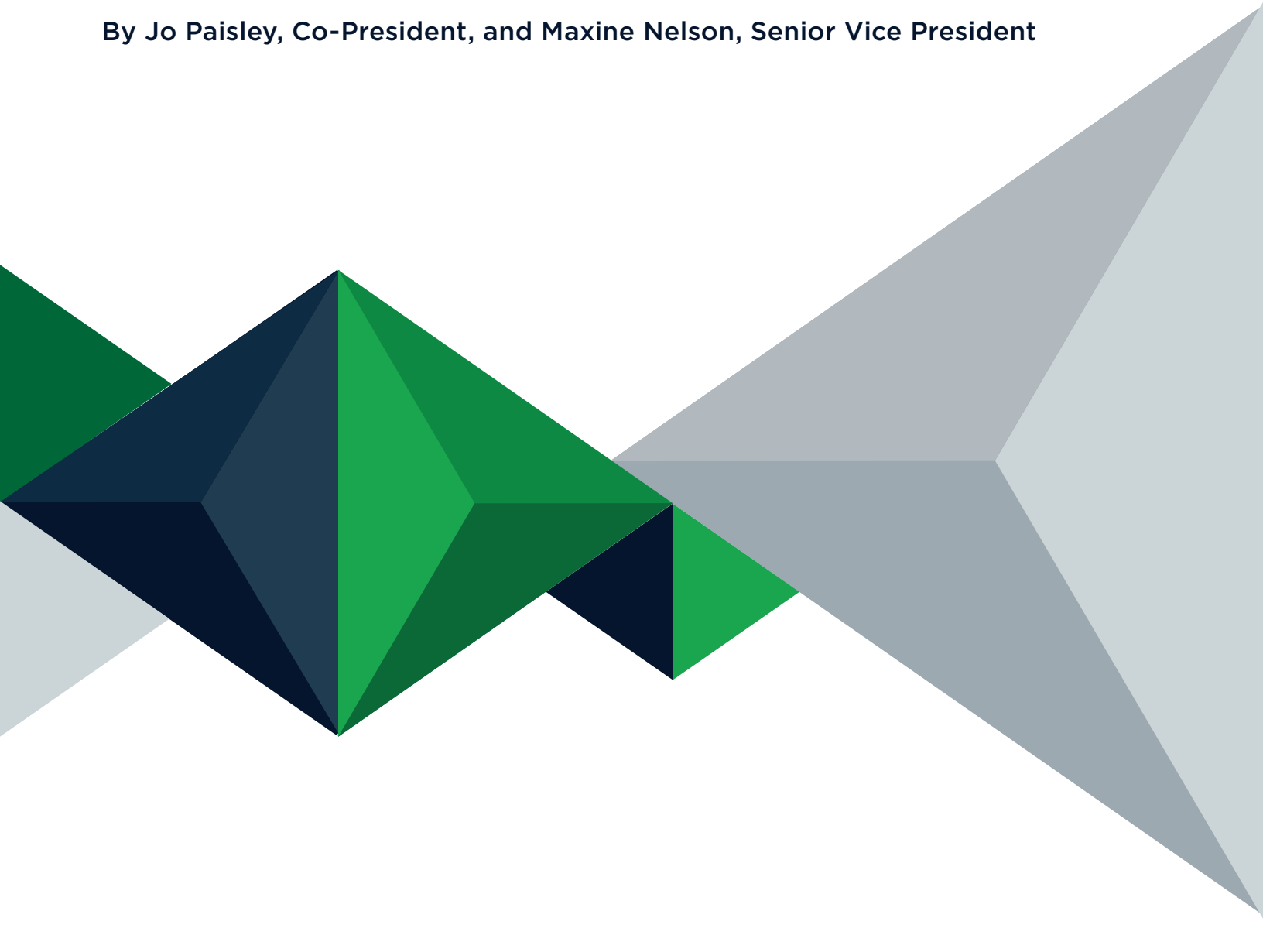


GARP Risk Institute

CLIMATE RISK MANAGEMENT AT FINANCIAL FIRMS

Challenges and Opportunities

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Foreword

The treatment of climate risk at financial institutions has changed significantly over the past five years. Whereas it used to be viewed mostly as a reputational risk that could be addressed through the environmental, social and governance (ESG) agenda, climate change is now seen by many firms as a financial risk that needs to be integrated into existing risk management frameworks.

This shift can be at least partially attributed to increasing regulatory attention. But even without this focus, it makes sense for risk managers to consider climate-related risks and opportunities. Research by [Mercer](#) and [427](#), for example, indicates that financial institutions will be among the industries most impacted by climate change. Firms will need to adapt their business strategies in response.

Climate risk will affect different types of firms — e.g., insurers, banks and asset managers — in different ways, reflecting the diverse nature of their business models. As climate risk manifests itself through existing risk types (like credit risk and operational risk), practitioners need to consider how climate-driven financial risks can be embedded into current financial risk management frameworks.

The GARP Risk Institute (GRI) recently undertook a global, cross-sectoral survey of firms' approaches to managing the financial risks associated with climate change. That survey indicated that climate risk management is generally in its infancy, but that firms want to learn and improve their practices. This paper provides a guide to the risk implications of climate change, starting with a brief overview of the current scientific and regulatory context, and then examining the financial risks for different types of financial institutions. It concludes with some practical next steps.

Understanding Climate Change

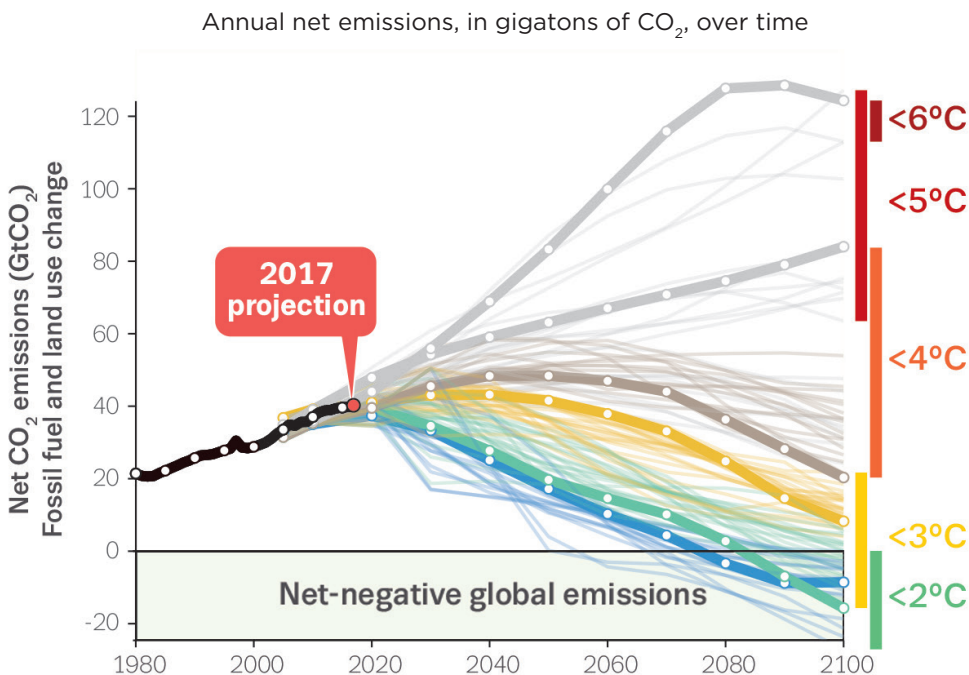
While risk managers do not need to be climate experts, an understanding of the basic climate science and range of possible outcomes and sources of uncertainty is helpful. Though some are skeptical of the magnitude and relevance of climate change, it is important for risk managers to recognize that even an unlikely no-climate-change scenario would involve risks. Asset prices would change and policies already in place likely would be reversed. As always in risk management, what is important is to explore and be prepared for the full range of possible outcomes for businesses and portfolios.

Although the earth's climate has changed over time, there is a body of scientific research that indicates that the increase in the earth's temperature we are currently witnessing is man-made (IPCC, 2014), caused by the

release of greenhouse gases into the atmosphere. The most prevalent of these gases is carbon dioxide (CO₂), associated with burning fossil fuels, industrial processes, forestry and other land uses, but other gases — such as methane (CH₄) and nitrous oxide (N₂O) — are also contributing. The convention of using CO₂ equivalent emissions to measure greenhouse gas emissions is used in this paper.

Figure 1 shows projections of different possible CO₂ emission pathways and the associated potential global temperature increases. It illustrates uncertainty over how emissions will evolve over future years. The evolution will depend upon many factors, such as population and income growth, the energy sources that are used, the energy intensity of production, and policy changes.

Figure 1: Possible CO₂ Emission Pathways and Global Temperature Increases



Source: Global Carbon Project (2017)

In the 2015 [Paris Agreement](#), national governments agreed to strengthen the global response to the threat of climate change through three main actions. First, to keep global temperature rises well below 2°C (degrees Celsius) above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5°C. Second, to strengthen the ability of countries to adapt to climate change and develop low greenhouse gas emission technology. Third, to make finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development. Financial institutions have a key role to play in meeting the third objective.

Scientific studies indicate a relationship between cumulative CO₂ emissions and global temperature change. To limit global warming to 2°C, as per the Paris Agreement, CO₂ annual global emissions need to decrease over time to be near, or below, zero by the year 2100.

As the [European Systemic Risk Board \(ESRB\)](#) explained in 2016, reducing carbon emissions requires economies to reduce their carbon intensity, which implies a shift away from fossil-fuel based energy and its related physical capital. In a world where this transition occurs gradually, there may be a scenario in which the adjustment costs are manageable, and the repricing of carbon assets does not entail systemic risk.

There are, however, many possible scenarios in which the transition to a low-carbon economy occurs later in the century and hence requires a more abrupt transition, which in turn may impose significant costs on firms and households, raising the prospect of increased systemic risk. As the ESRB notes in its report, these amplified systemic risks could manifest themselves via three main channels: the macroeconomic impact of sudden changes in energy use, the revaluation of carbon-intensive assets, and a rise in the incidence of natural catastrophes.

Given the risks involved and their material consequences, it is not surprising that regulators are now increasing their focus on the implications of climate change for financial institutions.

Regulatory Focus

The discussion about how climate risk affects the financial sector has gained significant momentum over the past five years. Since the Paris Agreement was adopted, regulators have become increasingly interested in both the micro- and macroprudential implications of climate change. Warnings about the potentially destabilizing effects of climate change have been issued by The Financial Stability Board and the G20, as well as central banks, including those in the UK, France, Italy, Australia and The Netherlands.

At a macroprudential level, when China held the G20 presidency in 2016, it added green finance to the agenda. The People's Bank of China has since followed up on the climate initiative by including green finance in its macroprudential assessment, providing incentives for banks to lend to green finance initiatives and to increase green deposits. The PBOC, in conjunction with other China ministries, is also standardizing green disclosures and green credit ratings, and has been trialing an assessment of the green performance of banks since 2018.

In December 2017, to contribute to the development of environment and climate risk management in the financial sector, and to mobilize mainstream finance to support the transition toward a sustainable economy, eight central banks and supervisors established the [Network for Greening the Financial System \(NGFS\)](#). Since its establishment, the NGFS has grown to 36 members and six observers from international organizations. NGFS has organized three workstreams focused on the following areas:

- Mapping existing supervisory practices and disclosures, and assessing whether "green" and "brown" loans have different financial risks;
- Developing an analytical framework for assessing climate-related risks;
- Outlining the role that central banks and supervisors could play in promoting the scaling up of green finance.

On the microprudential supervisory front, in 2016, DeNederlandsche Bank established a Climate Risk Working Group to manage the financial consequences of climate change-related risks. And in 2019, the UK's regulators — the Prudential Regulation Authority and the Financial Conduct Authority — established the [Climate Financial Risk Forum \(CFRF\)](#). The CFRF aims to advance financial sector responses to the financial risks from climate change, partly by building capacity and sharing best practices across financial regulators and the industry. Its membership comprises senior representatives from across the financial sector (including banks, insurers and asset managers), as well as senior PRA and FCA representatives.

The PRA also recently became the first regulator in the world to publish supervisory expectations that explain how banks and insurance companies need to develop an enhanced approach to managing financial risks derived from climate change. Its [Supervisory Statement](#) details how firms can address these risks in their governance and risk management frameworks (see Figure 2).

Figure 2: The PRA's Expectations for the Management of Climate-Driven Financial Risks

AREA	PRA EXPECTATIONS IN BRIEF
Governance	<p>A firm’s board should understand and assess the financial risks from climate change... and be able to address and oversee these risks within the firm’s overall business strategy and risk appetite.</p> <p>The Risk Appetite Statement (RAS) should include the risk exposure limits and thresholds, and should take into account factors such as the long-term financial interests of the firm; the results of stress and scenario testing across shorter and longer time horizons; uncertainty around the timing and the channels; and the sensitivity of the balance sheet to changes in key risk drivers and external conditions.</p> <p>Responsibility for identifying and managing climate-related financial risks should be allocated to the relevant existing senior management functions.</p>
Risk management	<p>Firms should address the financial risks from climate change through their existing risk management frameworks, in line with their board-approved risk appetite.</p> <p>Firms should identify, measure, monitor, manage, and report on their exposure to these risks. They should, moreover, be able to evidence this in their written risk management policies, management information and board risk reports.</p> <p>Material exposures should be included in their Internal Capital Adequacy Assessment Process (ICAAP) or Own Risk and Solvency Assessment (ORSA).</p> <p>Firms should consider a range of quantitative and qualitative tools and metrics to monitor their exposure to financial risks from climate change.</p> <p>Firms should provide evidence of how material risks will be mitigated and have credible plans or policies to manage these exposures.</p> <p>Firms should seek to understand the potential current and future impacts of the physical and transition risk factors on their clients, counterparties and organizations in which they invest or may invest.</p> <p>Risk reporting should enable boards to discuss, challenge and take relevant decisions.</p>
Scenario analysis	<p>Scenario analysis should also be used to explore the resilience and vulnerabilities of a firm’s business model to a range of outcomes, based on different transition paths to a low-carbon economy, as well as a path where no transition occurs.</p> <p>It should, where appropriate, include short-term assessments, covering the existing planning horizon, and longer-term assessments of a firm’s exposures based on its current business model. These longer-term exercises are not intended to be a precise forecast, but a qualitative exercise used to inform strategic planning and decision making.</p>
Disclosure	<p>Disclosures should be as insightful as possible, reflecting the firm’s evolving understanding of the financial risks from climate change.</p>

Source: [PRA Supervisory Statement SS3/19](#)

The ECB's [supervisory risk assessment for 2019](#) describes how climate-related risks are not a short-term financial stability threat for the euro area, but do pose risks to banks. The regulator cites the risks from physical and transition risks to both banks and their customers, and notes that banks need to take adequate action to manage their exposures to such risks.

There has also been a great deal of work on improving disclosures. This not only forces institutions to manage their own climate risks but also provides the market with potentially useful information. One high-profile framework was created by the [Task Force on Climate-related Financial Disclosures \(TCFD\)](#) under the auspices of the Financial Stability Board.

In most G20 jurisdictions, companies with public debt or equity have a legal obligation to disclose material information including climate-related data in their financial filings. Moreover, [IOSCO](#) has stated that, when ESG matters are considered material, issuers should

disclose the impact or potential impact on their financial performance and value creation. These disclosures should help investors' consideration of climate-related risks.

Central banks are also starting to lead by example by including climate-related risks in their own processes. For example, in 2019, DNB became the first central bank to sign the UN-supported [Principles for Responsible Investment \(PRI\)](#) and the Banque de France became the first central bank to publish information about its own greenhouse gas emissions. This is indicative of policy risk: as more authorities incorporate climate risk in their own processes, there is an increased likelihood that government and regulatory policies will change.

This steadily increasing regulatory interest and focus is requiring firms to address and ultimately demonstrate how they deal with — or plan to deal with — financial risks related to climate change.

Incorporating Climate Change into Risk Management

Risk Identification

Many studies of financial risks stemming from climate change look at those risks as arising through two main channels: physical risk and transition risk (see [TCFD](#) and [PRA](#)).

Physical Risks

Physical risks arise from climate- and weather-related events. Under all emission scenarios developed to date, the earth's temperature is predicted to increase. The result of that temperature increase will very likely be a more regular occurrence of longer-lasting heat waves and more frequent and intense extreme precipitation events in many regions around the globe. The ocean will continue to warm and acidify, and the global mean sea level will rise ([IPCC, 2014](#)). These changes in the physical environment will create physical risks that will impact individuals, businesses and economies, consequently affecting a variety of financial transactions.

This physical risk transmission channel can be further broken down into specific weather events (such as heatwaves, floods, wildfires and storms) and longer-term shifts in climate patterns (such as changes in precipitation and extreme weather variability, rising sea level and increasing mean temperatures). The TCFD refers to the specific weather events as *acute risks* and the longer-term shifts in climate patterns as *chronic risks*.

Transition Risks

Transition risks arise from the process of adjusting toward a lower-carbon economy. Policy, technology and laws relating to climate change could alter, prompting a reassessment of the value of a large range of assets as costs and opportunities become apparent. This reassessment could modify the value of assets and liabilities, thereby altering the risk profile of financial institutions.

If voluntary and stepped actions to reduce carbon emissions are delayed into the future, the likelihood of aggressive government policy requirements addressing climate-related issues will rise. As the opportunity to take voluntary steps lessens, the more immediate and demanding government requirements may become, thus increasing transition risks. An informed and

steady implementation of policies and initiatives toward reducing global CO₂ emissions, resulting from regulatory and corporate actions and incentives, can assist in the timely identification and appropriate management of climate-related transition risks.

Firms will need to examine their portfolios to gain a better understanding of which exposures are most at risk from climate change. Scenario analysis can play a part in this risk identification process, as well as the quantification of those risks.

Scenario Analysis

Given the uncertainty around the future path of emissions, and their associated economic and financial impacts, a natural tool for analyzing these risks is scenario analysis. Indeed, in 2017, following the release of the [TCFD paper](#) on scenario analysis, the TCFD and the Bank of England hosted a conference on the use of scenario analysis in assessing climate-related risks and opportunities.

As the [conference summary](#) explains, there are two primary types of scenarios fit for this purpose: climate-impact (physical risk) scenarios and transition scenarios. Climate-impact scenarios investigate the effects climate change could have on economies, societies and ecosystems, given an assumed level of emissions; transition scenarios model how economies might adjust given a temperature target and government policy.

These types of scenarios have been piloted by a number of financial institutions. For example, [UNEPFI and Oliver Wyman Mercer](#) piloted the use of scenario analysis to assess the transition risk component of a portfolio's credit risk. [UNEPFI and Acclimatise](#), on the other hand, piloted scenario analysis to assess credit risk due to physical risks in part of a loan portfolio, while [UNEPFI and Carbon Delta](#) piloted a method asset managers can use to assess the physical and transition risks and opportunities in investment portfolios. (Existing scenario analysis methods for physical and transition risks are reviewed in Section 2 of the report on the UNEPFI/Carbon Delta project.) Meanwhile, risks and opportunities for infrastructure investments are explored in the [ClimateWise transition risk framework](#).

While existing scenario analysis or stress testing frameworks can be leveraged, climate risk scenario analysis differs from the traditional use of these

tools in a number of ways. Climate change scenarios typically need longer time horizons, for example, than the three- to five-year time horizons that banks traditionally use to assess their business and their risks.

Moreover, many existing climate change scenarios were constructed to aid policymakers and are described in terms of physical variables such as CO₂ emissions, temperature change and sea level rise. They do not generally include specific economic parameters. As such, extensive work is required to translate the changes in the environment they describe into macroeconomic and financial outcomes (e.g., GDP, unemployment and interest rates) that are generally used for stress testing or scenario analysis.

The think tank, [2° Investing Initiative](#), examined this challenge in its report, [Storm Ahead - A Proposal for a Climate Stress Test Scenario](#). For example, the report notes how the estimated impact on GDP of the physical risks arising from climate change can vary wildly, depending on the modelling approach taken. It also explains how many of the existing climate-risk studies focus on assessing the impact of a “likely” transition, rather than stressing the tail risks. These scenarios may not be appropriate for regulators, who are more likely to want to understand the tail risks from, say, a “too late, too sudden” transition scenario.

It is perhaps not surprising that the recent GARP Risk Institute survey indicated that scenario analysis is the least mature aspect of firms’ approaches to managing the financial risks from climate change. An intermediate step, before full scenario analysis, is to consider case studies. A couple of examples are provided below.

Case studies can help raise awareness of the potential impacts on business and supply chains, which could then be developed into more sophisticated scenarios that are relevant for a firm’s particular business model or geographical location.

Case Studies

Physical Risks

Changes to the climate are predicted to increase the frequency and severity of storms and precipitation. This will have both direct and indirect impacts.

Direct Effects

An increase in the frequency and severity of storms will impact both residential and commercial real estate: more properties will be flooded, properties in current flood zones will be flooded more often and floods will be more severe. (See the [ClimateWise paper](#) for a detailed, flood-related case study.) This will decrease the value of those properties that are

held as collateral against loans, thereby increasing the loss given default if the customer cannot repay his or her loan.

Moreover, non-life insurance companies’ losses will increase, and to maintain margins insurers will need to raise premiums. If premiums are increased too much, they will become unaffordable or may require government subsidies. Alternatively, if they cannot increase premiums sufficiently to maintain a profit, non-life insurers may simply pull out of markets.

The value of commercial real estate that is held as a long-term income stream by insurers and asset managers will also be impacted.

Changes to the climate are predicted to increase the frequency and severity of storms and precipitation.

Indirect Effects

As supply chains become more global, events in parts of the world far away from a company’s headquarters or manufacturing sites can have unforeseen impacts on the business. For example, floods in Thailand in 2011 directly affected computer hard-disc drive manufacturers and car manufacturers. The disruption to the hard-disc drive manufacturers, in turn, [impacted the manufacturers of electronic goods in a range of companies](#), from phone manufacturers to electronic equipment manufacturers in the European Union, Japan and the United States.

[Aon Benfield’s](#) report on the flooding noted that companies that were forced to halt production in Thailand included Toyota, Honda, Mazda, Nissan, Mitsubishi, Sony, Nikon, Sanyo Semiconductor, Canon, Western Digital, Hitachi, Hutchinson, Microsemi, ON Semiconductor and Matsushita. Flooding adversely affected the profitability of all these companies.

Obviously, insurers that provided coverage for these companies suffered business contingency-related losses. And for banks doing business with the companies, the impact on profitability may have translated into a higher probability of default.

Transition Risks

A transition to a lower carbon intensity economy will involve changes across many sectors, including power generation, manufacturing, transportation and construction. The speed at which the transition occurs will affect the scale of disruption for affected industries.

Direct Effects

A study by [University College London](#) concluded that about two-thirds of existing coal reserves may need to stay in the ground, as their extraction and use is inconsistent with a 2°C emissions scenario. This will create stranded assets – that is, in industries that currently emit carbon intensively (such as carbon-powered electricity generation), assets will be written down or written off before the end of their useful life. For example, if existing coal investments continue, China could have \$90 billion of stranded coal assets by 2030.

According to the [Institute for Sustainable Development and International Relations](#), only about 20 to 25 percent of coal-fired plants constructed since 2005 would have made back their investments by 2030. In the future, if there is a change in government policy that forces coal-fired power stations to stop production, this could result in losses to banks that have provided loans to these companies. If insurers and asset managers are holding bonds that these power stations have issued, they could also suffer losses.

Many different industries could be directly impacted by a transition to a low-carbon economy.

Indirect Effects

Many different industries could be indirectly impacted by a transition to a low-carbon economy. For example, if governments decide that the cost of carbon emissions needs to be priced into manufactured products, construction costs will rise due to increased cement and steel costs from the use of coal in their manufacturing process.

The cost of diesel- and petrol-based transport will also increase, which will raise the cost of transporting products to market and may increase their cost to the consumer. This would reduce consumers' cashflow and/or the profitability of the manufacturer, increasing their probability of default and, correspondingly, reducing the market value of the manufacturer.

However, there are also opportunities in expanding industries, such as electric cars and motorbikes, and more efficient solar, wind and hydroelectric power generation.

Risk Assessments Across Different Financial Institutions

A paper published earlier this year by the [CRO Forum \(2019\)](#) – a group comprised of chief risk officers from large, multi-national insurance companies – argues that transition risk is likely to be the biggest area of influence on asset values in the shorter term, whereas the physical effects are likely to be the driving factors influencing asset values and economic performance in the medium to longer term.

Financial risks from climate change will impact firms differently, depending on their business models and particular balance sheets. Banks' assets and liabilities, for example, will likely be affected by physical and transition risks – including impacts on counterparties' operations; the viability of businesses that they are lending to or receiving funds from; changes to collateral values; and changes in customers' ability to repay loans.

When considering the impact of climate change on insurers, an increase in liability risk is a natural first assumption. However, since the investment implications of climate change for insurers are equally as diverse as the insurance implications, insurers, like banks, also need to assess how climate change affects the assets in which they invest.

Asset managers, meanwhile, are facing increased pressure from investors and regulators for climate-related disclosures such as those in the TCFD and the [CDP](#). What's more, the [Principles for Responsible Investment](#), a not-for-profit asset management advocacy group supported by the UN, has also thrown its weight behind climate-related disclosures.

Asset managers, according to the PRI, should show that they have recognized relevant risks (even if they are climate change skeptics); analyze how climate change might affect investment returns over the short, medium and long-term; explicitly manage the risks; interrogate and challenge those who are managing the assets and the companies that are being invested in to ensure that these risks are being effectively managed; and establish

processes that enable them to demonstrate the actions they have taken. While these principles may, in some cases, be aspirational, they provide a helpful path forward for investment managers to be able to address climate-related issues on behalf of their firms and their clients.

Section B3 of the [final TCFD report](#) provides a useful analysis of the key factors to be considered when assessing climate-related financial risks.

How Climate Risk Impacts Existing Risk Types

To meet regulators' expectations, financial institutions will need to identify, measure, monitor, manage and report on climate risks. Firms will also be expected to disclose any of these material risks, both publicly and to their regulators.

Climate risk is not a new risk type, but a transverse risk that manifests itself through existing risk types. While the risks for each firm will be different, a useful exercise is to examine existing risk types and consider whether

climate risk is sufficiently material to be incorporated and embedded into established risk frameworks. Figure 3 (following page) provides an example of how this might be achieved for some key risks.

Financial risks will typically be greater for long-lived assets and liabilities (e.g., infrastructure, pensions) than for short-term contracts, where risks and pricing can be more readily adjusted. But reputational risks can arise quickly in unpredictable ways and can rapidly affect firms.

There may also be consequential risks, such as concentration risk and asset-liability mismatches. For example, reduced lending to sectors or geographies may lead to increased concentrations in the rest of the financial institution's portfolio.

The more that these types of transverse considerations are embedded into firms' day-to-day governance and risk management processes, the better firms will be able to manage and mitigate the financial risks of climate change.

Figure 3: Examples of Risks and Opportunities

EVENTS/ SHOCKS	EXAMPLES OF IMPACTS	EXAMPLES OF RISK TYPES AFFECTED
More frequent and severe weather events - e.g., storms and floods	<ul style="list-style-type: none"> • Disruption to firms' own operations and supply chain, as well as to those of their counterparties. • Physical damage to real estate and physical assets (affecting collateral value), and heightened risks to infrastructures built in affected regions. • Impact on counterparties' business viability, particularly for those with inadequate insurance. • New businesses that offer adaptation tools (e.g., sea defenses) may thrive. 	Operational, Credit, Underwriting and Reserving
Rising sea level	<ul style="list-style-type: none"> • Homes and commercial properties in flood prone areas become uninsurable. 	Credit, Operational, Underwriting and Reserving
Changes in temperature	<ul style="list-style-type: none"> • Impacts will depend on geography - e.g., mortality rates might fall if colder countries get warmer. • Longer term effects on tourism revenues - e.g., skiing resorts season may shorten, and new areas may become tourist attractions. 	Credit, Underwriting and Reserving
New laws	<ul style="list-style-type: none"> • Impact will depend on the speed of adjustment required. • Costs required for adaptation may make some firms and industry sectors unviable. • New firms, without legacy business infrastructure, may be able to gain quick advantages. 	Credit, Reputational
Changes in consumer tastes and preferences	<ul style="list-style-type: none"> • Quick changes in consumers preferences, encouraged by social media, could quickly undermine business models. • But these can also create opportunities for new players. 	Credit, Reputational
Class action and legal cases	<ul style="list-style-type: none"> • Firms seen as contributing to climate change or associated environmental damage may face legal action from companies or jurisdictions that are affected. 	Legal, Reputational
Failure to identify and disclose relevant risks	<ul style="list-style-type: none"> • Material risks that were foreseeable but not disclosed will invite the scrutiny of investors, regulators and other stakeholders. 	Legal, Regulatory, Reputational

Conclusion

Climate risk is firmly on the agenda of regulators and is now front-and-center for firms to address. It's important for risk managers to understand some basic climate science in order to appreciate the financial risks that may arise from climate change, as well as the scale of uncertainty, as the risks relate not only to firms' clients and counterparties but also to their own processes, procedures and operations.

Climate risk is a "transverse" risk; that is, not a risk in its own right but one that will manifest itself through existing risk channels. Firms can, therefore, use their current risk frameworks to begin to assess the impact of climate change. The recent GRI Survey of Climate Risk Management, which examined the maturity of firms' climate risk management practices, showed a wide range of practices and progress, with many firms only at the start of their journey.

Climate change scenario analysis is one of the least advanced areas. This may partly reflect the difficulty of devising scenarios in terms that are meaningful for understanding financial risks. Linking climate science to macroeconomic and financial outcomes is not an easy task and subject to much debate and analysis.

Firms that have yet to start considering the financial risks arising from climate change should be aware that as global temperatures rise, physical risks will inevitably change the risk profile of a financial institution's balance sheet. Furthermore, the risks to the firm will increase if policy, business or societal pressures demand a faster transition to a low-carbon environment.

Next Steps

To move forward, financial institutions should create and adhere to leading practices for climate risk management. The [Dutch Central Bank](#) has offered the following suggestions:

- Climate-related risks should be systematically identified;
- New climate risk indicators should be created, and relevant data (including internal data) on climate-related risks should be incorporated into risk management systems;
- Forward-looking methods, including scenario analyses, should be applied more frequently;
- Climate change should be factored into existing risk models.

At a practical level, firms need to start by establishing board-level governance and the appropriate senior management ownership. Given the nature of the risk, establishing an internal cross-disciplinary working group can also help bring together different parts of the business to start identification and assessment of climate-related risks. It is preferable for this to be led by the business or the risk management function, rather than the corporate social responsibility team.

Reviewing the resources highlighted in this report can provide a broad overview and context, before focusing on the specific risks affecting a particular firm. Distinguishing physical and transition risks can be helpful in identifying the channels of impact. Moreover, prioritizing asset classes, geographies and sectors that are high risk can improve focus on the most material areas of concern.

Developing in-house expertise on scenarios is also important, not only for risk management but also for disclosure. In summary, much work is still to be done before climate risk management becomes embedded in day-to-day operations.

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The Global Association of Risk Professionals is a non-partisan, not-for-profit membership organization. GARP offers risk certification — the Financial Risk Manager (FRM®) and Energy Risk Professional (ERP®) — and educational programs for professionals at financial institutions, government agencies, central banks, academia and corporations. Through the GARP Benchmarking Initiative and GARP Risk Institute, GARP sponsors research in risk management and promotes collaboration among practitioners, academics and regulators to promote a culture of risk awareness.

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