

## CLIMATE RISK MANAGEMENT

# Navigating The Complexity

As climate change has increasingly become a focus for investors and regulators, financial institutions have started to assess financial impacts of climate change on their businesses. These assessments, often strategic in nature, now need to expand to include quantitative risk analyses, integrated into existing risk management frameworks.

## Introduction

Full financial impacts of climate change remain uncertain, as the extent to which climate will change is being shaped by current actions taken by governments, corporates and the wider community. However, impacts can already be felt today through shareholder pressure and shifting investor preferences.

To increase transparency on corporates' exposures to climate change-related risks, the Task Force on Climate-Related Financial Disclosures (TCFD) delivered recommendations on how risks and opportunities should be reported in annual financial statements of public companies.<sup>1</sup> Disclosure recommendations include governance frameworks, impact assessments, risk management processes and targets as they relate to climate change.

<sup>1</sup> The TCFD was established in 2015 by the G20's Financial Stability Board, with the mission to develop voluntary, climate-related financial risk disclosures, focusing on the information needed by investors, lenders, insurers and other stakeholders.

<sup>2</sup> The Climate Financial Risk Forum (CFRF) is a joint initiative of the Prudential Regulation Authority (PRA) and Financial Conduct Authority (FCA).

<sup>3</sup> Bank of England, A Transition in thinking and action, Amsterdam, 6 April 2018.

The Bank of England (BoE) issued further recommendations on how the financial services industry should reflect climate change in risk management frameworks, and banking regulators established a forum to enhance the resilience of the UK financial system to climate change.<sup>2</sup>

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*The thinking has coalesced around three channels through which climate risk affects financial stability: the physical risks that arise from the increased frequency and severity of climate – and weather – related events that damage property and disrupt trade; the liability risks stemming from parties who have suffered loss from the effects of climate change seeking compensation from those they hold responsible; and the transition risks that can arise through a sudden and disorderly adjustment to a low carbon economy.*

Mark Carney, 6 April 2018<sup>3</sup>

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## Risks and opportunities for banks

While significant uncertainty exists today, the impact of climate change on financial institutions could be material as risks spread across sectors and geographies, leading to possible contagion effects if left unmanaged. Equally, financial institutions have a key role to play in combating climate change and enabling a successful transition to a low-carbon economy.



*The consideration of low probability, high impact risks is a fundamental component of good risk management, and this applies as much to climate change as it does to other types of risks.<sup>4</sup>*



### Risks

Risks from climate change can be thought of in three categories: physical, transition and liability risks. The first two risks can be incorporated in insurance companies' and banks' existing credit, market and operational risk management processes.

Failure to adequately account for climate risks within traditional risk frameworks, could lead to mispricing, capital shortfall and, in the worst case, bankruptcy.

#### Example mapping between climate risks and risk categories

	Credit	Market	Operational
Physical	Increasing flood risk to mortgage portfolios Declining agricultural output increases default rates	Severe weather events lead to re-pricing of sovereign debt	Severe weather events impact business continuity
Transition	Tightening energy efficiency standards impact property exposures Stranded assets impair loan portfolios Disruptive technology leads to auto finance losses	Tightening climate-related policy leads to re-pricing of securities and derivatives	Changing sentiment on climate issues leads to reputational risks

Source: Transition in thinking: The impact of climate change on the UK banking sector, Prudential Regulation Authority, BoE, September 2018

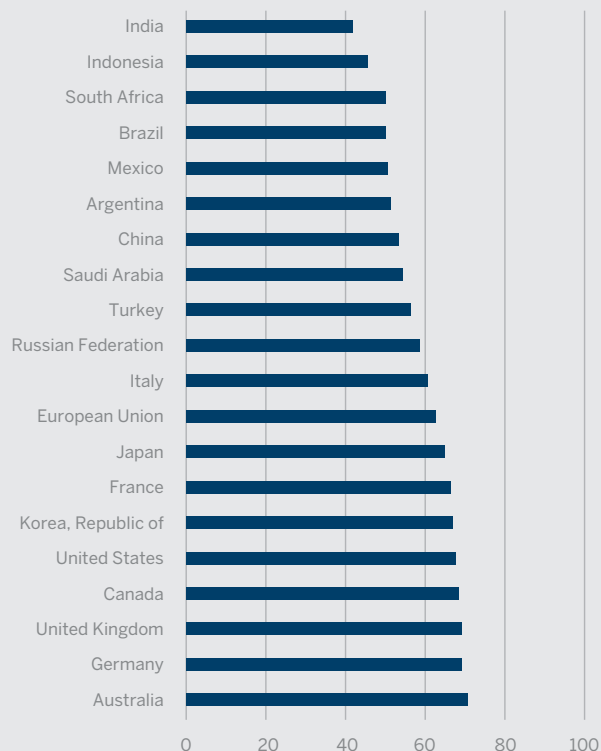
### Physical risks

Physical risks from climate change refer to reductions in asset values and economic output due to increasing extreme weather events. Examples include a reduction in property value due to higher risk of flooding, storm or fire; reduced agricultural output due to droughts; and increased interruption of industrial processes due to disruptions to supply chains. Physical risks, for example, have the potential to drastically increase insurance claims and credit risk.

### Transition risks

Transition risks arise from changes in the economic environment as the transition to a low-carbon economy progresses. These risks will impact a bank's or insurance company's strategic planning, client focus and portfolio structure as capital will be re-allocated to support the adaptation process. Business models that cannot adapt will suffer reduced earnings and disruption.

#### Global Adaptation Index: vulnerability and readiness for adaptation to climate change



Source: 2017 University of Notre Dame Global Adaptation Initiative, FTI Consulting calculations.

<sup>4</sup> Committee on Climate Change, UK climate change risk assessment 2017, July 2016, referencing King et al., Climate change: a risk assessment, 2015.

## Liability risks

Liability risks can take many forms, the Prudential Regulation Authority (PRA) has established three broad categories: failure to mitigate, failure to adapt or failure to disclose.<sup>5</sup> Legal action related to climate change is becoming more widespread across the globe and is starting to be used as a direct means to fight climate change.

While climate risks are thought to mainly materialise in the future, first impacts can already be felt today (see case study on PG&E).

### Case study – PG&E: caught in the cross-fire

#### Background:

PG&E Energy is California's largest utility company, with 16 million customers and 23 thousand employees.<sup>6</sup> Having recently filed for bankruptcy, it represents one of the largest ever bankruptcies of a utility, and the first related to climate change.<sup>7</sup>

#### The facts:<sup>8</sup>

- California experienced two years of wildfires thought to be linked to worsening droughts due to climate change.
- Victims of wildfires began suing PG&E, claiming that it did not adapt sufficiently quickly to the risks from the hot and dry weather.
- PG&E estimated a USD 30 billion liability due to the wildfires and filed for Chapter 11 bankruptcy on 22 January 2019.

#### Contagion effects:<sup>9</sup>

- Shares in California's other utilities are performing below industry average.
- The bonds of a power-plant operator that sells electricity to PG&E have been downgraded.
- There is a potential large liability for five banks that are lenders of last resort for USD 760 million of PG&E bonds.
- There is a possibility that California's credit rating will be hurt, raising borrowing costs.

## Opportunities

The adaptation to climate change brings about a variety of opportunities to the financial services industry. Examples include financing of green projects and technical innovation (e.g. smart electricity grids, electric vehicles) through green bonds, loans, equity stakes or securitisation. Banks that create a competitive edge in this area might be able to capture additional business, e.g. in transactions, re-financing or investment advisory.

Property and casualty insurers as well as reinsurers could gain a market advantage by consolidating and capturing the market for climate-related risks. Given the scale and long-term horizon of climate-related risks, insurance companies would need to maintain a large and diverse base of customers to remain cost-efficient.

## Complexities in climate risk management

The integration of climate risk into existing risk management frameworks is a complex exercise – not least because it requires cooperation between groups with a wide variety of skill sets (industry experts, risk management, strategy, sustainability experts, senior management), including those traditionally not available in financial institutions. To effectively address climate risk and protect against its impact, financial institutions need to expand capabilities and practices of risk management teams accordingly.

Further, banks and insurance companies are required to deal with technical complexities; including data limitations, modelling issues and appropriateness of existing frameworks.

### Data limitations

While data on historical weather or catastrophic events, such as flood risk maps or wind speeds, is usually available in most developed countries, information is often not granular enough to assess the risk faced by a business or property. Further, the potential future physical risk to a geographic area is uncertain and depends on actions taken, such as the extent of global warming and the installation of protection, e.g. flood barriers.

<sup>5</sup> Bank of England, The impact of climate change on the UK insurance sector, September 2015.

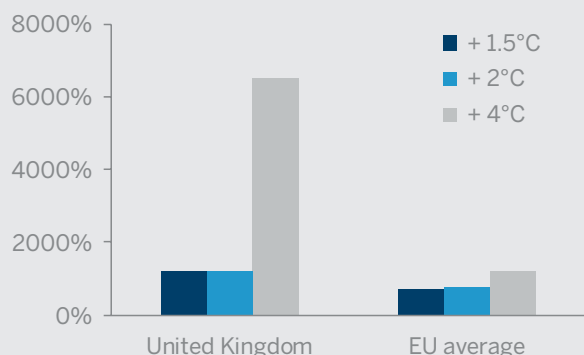
<sup>6</sup> Bloomberg, After PG&E's climate-driven bankruptcy, Who's Next?, 22 January 2019; Bloomberg, PG&E bankruptcy's ripple effects will be felt beyond California, 28 January 2019.

<sup>7</sup> Bloomberg, After PG&E's climate-driven bankruptcy, Who's Next?, 22 January 2019.

<sup>8</sup> Ibid.

<sup>9</sup> Bloomberg, PG&E bankruptcy's ripple effects will be felt beyond California, 28 January 2019.

### Economic damages from river flooding for different global temperature increase scenarios (% change from pre-industrial levels)



Source: Alfieri et al, Supporting information for Global projections of river flood risk in a warmer world, 2017.

## Modelling issues

Modelling methodologies need to be robust and consistent over time to ensure reliable estimates and disclosures of risks. This is challenging in the context of the mutable nature of climate risks, as the examples below show.

Mapping climate risks to traditional risk measures, such as credit or market risks, is non-trivial, and empirical relationships must be assessed. For example, increased flooding risk in a region will reduce collateral values in mortgage portfolios (credit risk) but can also impact sovereign credit spreads or FX rates (market risk).

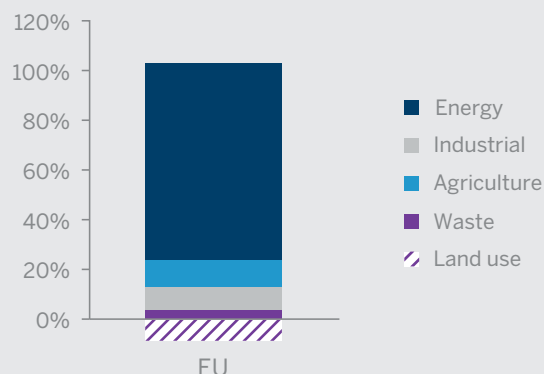
Sustainability experts will need to identify the link between climate scenarios and their impacts on borrowers and policy holders. Risk experts would need to work in conjunction with sustainability experts to quantify the risks.

Temperature scenarios, such as the 2-degree and 1.5-degree scenarios put forward in the Paris Agreement, do not provide enough granularity to test a portfolio's exposure. Industry-specific assessments, including Intergovernmental Panel on Climate Change (IPCC) assessment reports, have been developed. However, such assessments are performed at a macro-level or sector-specific levels.

Transition scenarios, tailored to a financial institution's portfolio, need to be developed to stress industries, geographic areas or asset types as climate risks vary across sectors in terms of underlying causes, magnitude and duration. This complicates model choice and model design.

For example, the energy sector is by far the largest emitter of greenhouse gases (GHG) in the EU but is also the sector that is driving the transition to a low-carbon economy by an increasing penetration of clean electricity production and technological innovation. Transition risk will therefore affect distinct parts of the energy sector in differing ways – this needs to be reflected in modelling approaches.

### Emissions by sector in the European Union (CO2 equivalent)



Note: Land use has a GHG reducing impact in the EU.  
Source: 2016 GHG emissions, UNFCCC Data Interface.

## Appropriateness of existing frameworks

### Stress testing

Stress testing tools, developed after the global financial crisis, already account for macro-economic and systemic risk factors. Therefore, such tools could be adapted to incorporate climate risks at a portfolio level. However, stress testing time horizons are relatively short – usually around 2-3 years, more rarely up to 5 years – as their purpose is to test capital adequacy.

An inclusion of climate risk into the stress testing frameworks requires an extension of time horizons and an associated shift for stress testing to become a more strategic risk management exercise.

Requirements for a successful inclusion of climate risk in existing stress testing frameworks include realistic and quantifiable climate scenarios, new data sources, extended time horizon for stress testing and a framework to link climate scenarios to credit, market and operational risk.

### Environmental, Social, Governance ratings

Credit rating agencies are already incorporating climate risks into companies' environmental, social and governance (ESG) ratings. This entails an assessment of ESG's impact on revenue, reputation, cost of production and financial strength.



However, such risks are currently incorporated through a qualitative analysis as an additional consideration outside of standard scorecards and models used by financial institutions. This makes it difficult to translate them into a quantitative assessment of risk.

A major shift will occur once climate risks are included in quantitative risk assessments.

## Conclusion

Driven by pressure from regulators and investor preferences, financial institutions are starting to engage with climate risk. However, climate risk modelling remains in its infancy and suffers from problems, such as data limitations and modelling issues, which will need to be resolved.

These challenges are complex and will need time to be solved. For this reason, it is pertinent that financial institutions take initial steps to engage with climate risk management today not only to build expertise, data and tools, but also to recognise and monetise opportunities early. At the same time, financial institutions must develop ways to incorporate climate risks into their existing risk management frameworks to ensure that risks are measured and managed in a consistent and integrated way.

Developing integrated and robust risk management frameworks that incorporate climate risks requires coordination and cooperation between stakeholder groups within financial institutions. Engagement with external experts, especially from industries that have been dealing with similar issues for years (e.g. energy), can add significant value and accelerate the development of risk management frameworks and strategic plans.



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