



BANK OF ENGLAND

# Quarterly Bulletin

2017 Q2

Topical article

The Bank of England's response to climate change



# The Bank of England's response to climate change

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- Climate change, and society's responses to it, present financial risks which impact upon the Bank's objectives. These risks arise through two primary channels: the physical effects of climate change and the impact of changes associated with the transition to a lower-carbon economy.<sup>(2)</sup>
- The Bank's response has two core elements. First, engaging with firms which face current climate-related risks, such as segments of the insurance industry. Second, enhancing the resilience of the UK financial system by supporting an orderly market transition.
- Forming a strategic response to the financial risks from climate change helps ensure the Bank can fulfil its mission to maintain monetary and financial stability, both now and for the long term.

## Overview

Central banks and financial regulators have a core responsibility to understand risks to financial stability and the financial institutions which they supervise. There is growing recognition and evidence of the financial risks from climate change and their relevance to central bank mandates.

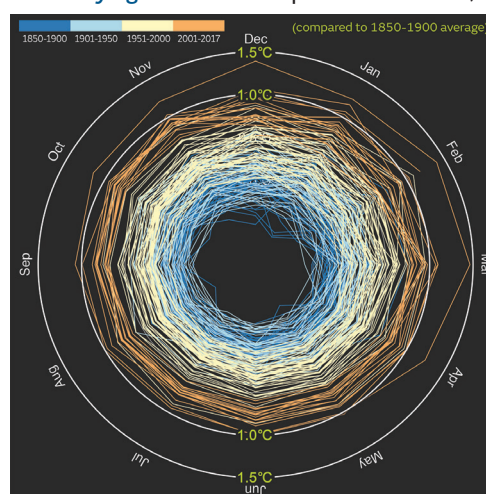
The Bank's work to assess the financial risks from climate change is focused on two primary risk factors (or channels). First, physical risks, which can arise from climate-related events, such as droughts, floods and storms. The frequency and severity of these events can increase as a result of rising global temperatures (**summary figure**).

Second, transition risks, which can arise from the process of adjustment towards a lower-carbon economy, such as developments in climate policy, new disruptive technology or shifting investor sentiment. The financial implications of the low-carbon transition are significant, implying the reallocation of tens of trillions of dollars of investments.

The Bank's response to mitigating the financial risks from climate change has two core elements. The first involves engaging with regulated firms on climate-related risks through prudential supervision, including deepening activities in insurance and beginning work in banking.

The second involves enhancing the resilience of the UK financial system by engaging with initiatives to support an

**Summary figure** Global temperature increases, 1850–2017<sup>(a)</sup>



Source: Compiled by the Met Office/UEA from the HadCRUT dataset. With thanks to Ed Hawkins (University of Reading, @ed\_hawkins) for the design concept.

(a) Spiral shows the rise of monthly global temperatures over the period from 1850 to 2017, compared to base period 1850–1900. See animated version at [www.bankofengland.co.uk/publications/Pages/quarterlybulletin/2017/q2/a2.aspx](http://www.bankofengland.co.uk/publications/Pages/quarterlybulletin/2017/q2/a2.aspx).

orderly market transition to a lower-carbon economy. This includes taking a close interest in the Financial Stability Board's private sector Task Force on Climate-related Financial Disclosures (TCFD) and co-chairing the G20 Green Finance Study Group on behalf of the United Kingdom.

A strategic response helps ensure the Bank is playing its part, in line with its mandate, to address the financial risks from climate change, both now and in the future.

(1) The authors would like to thank Sarah Breedon, Vishal Desai, Edd Denbee, Tanveer Hussain, Matthew Manning, James Orr, Nicolas Pondard, Michael Sheren and Misa Tanaka for their help in producing this article. The authors are also grateful for contributions from external parties, including the Met Office and Munich Re.

(2) The Bank continues to consider liability risks, which can arise from parties who have suffered loss from climate change seeking compensation from those they hold responsible, as a second-order effect within the Bank's overall climate risk framework.

## Introduction

The Bank of England's mission is to promote the good of the people of the United Kingdom by maintaining monetary and financial stability. The Bank takes a forward-looking approach to discharging its responsibilities taking into account a range of factors which could have an impact on its statutory objectives.

For example, the Bank's forward-looking, judgement-based approach to microprudential supervision assesses firms not just against current risks, but also against those that could plausibly arise in the future. Where the Bank, through the Prudential Regulation Authority (PRA), judges it necessary to intervene, it generally aims to do so at an early stage.

The Bank's Financial Policy Committee (FPC) has a statutory responsibility to identify, monitor, and take action to remove or reduce risks that threaten the resilience of the UK financial system as a whole.

The Bank's work concerning the financial implications of climate-related risks also takes a forward-looking approach with a view towards early intervention.

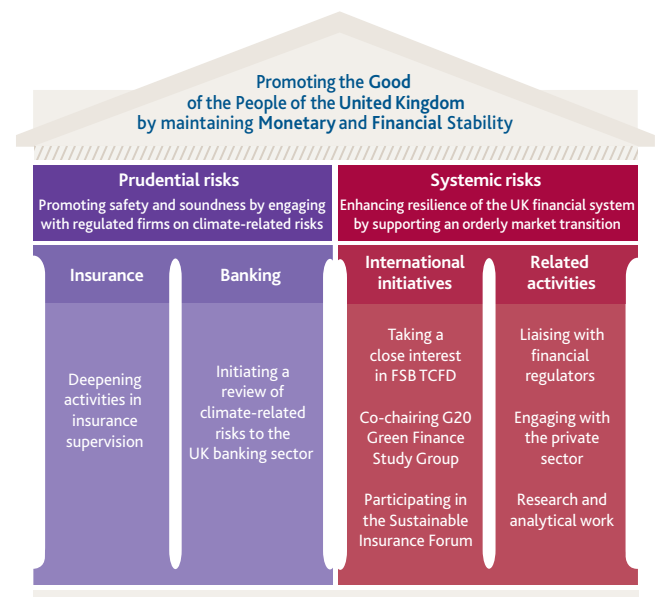
While there are possible implications for monetary policy from climate-related factors, such as increased volatility in headline inflation from food and energy price shocks,<sup>(1)</sup> the Bank's response to climate-related factors is primarily driven by its responsibilities to promote the safety and soundness of regulated firms and to maintain financial stability.

The first section of this article outlines the financial risks which can arise from climate change. It draws heavily on the Bank's existing research and focuses on two primary climate-related risk factors (or channels): physical risks, such as storms and floods; and transition risks which can arise from the process of adjustment towards a lower-carbon economy.

The second section discusses the Bank's strategy for responding to climate change, which has two core elements (**Figure 1**). The first element aims to promote safety and soundness by engaging with regulated firms on climate-related risks. This engagement focuses on firms where the Bank views the risks, or links to wider climate-related initiatives, to be most relevant. It includes deepening activities in insurance and beginning work in banking.

The second element of the Bank's strategy seeks to enhance the resilience of the UK financial system to climate change by supporting an orderly market transition to a lower-carbon economy. This includes the Bank's engagement with international activities, such as taking a close interest in the Financial Stability Board's (FSB's) private sector Task Force on Climate-related Financial Disclosure (TCFD), co-chairing the

**Figure 1** The Bank's strategic response to climate change and current activities<sup>(a)</sup>



(a) The Bank is also committed to reduce the carbon footprint of its own operations. More details on our environmental programme 'Greener Bank' will be available in our *Annual Report* due for publication on our website end of June 2017.

G20 Green Finance Study Group (GFSG) on behalf of the United Kingdom, and participating in the Sustainable Insurance Forum (SIF). Each of these is discussed in more detail later in the article. It also includes a number of related activities, such as liaising with other financial regulators and engaging with the private sector on climate-related issues. The Bank is also considering related research and analytical work, for instance, reviewing frameworks for understanding the impact of climate change on the wider economy.

## Broader context

The Bank's increasing focus on the impact of climate-related financial risks sits within a broader context of actions being taken by central banks and financial regulators globally,<sup>(2)</sup> and by the wider international community.

These include actions relating to risk assessment, such as research by the European Systemic Risk Board (ESRB), Dutch and Swedish financial authorities and German Ministry of Finance to examine the financial risks from climate change.<sup>(3)</sup>

They also include actions relating to disclosure, such as requirements introduced by the California Department of Insurance relating to public disclosure of investments in fossil fuels.<sup>(4)</sup> In France, institutional investors are required to disclose how their portfolios align with climate targets.<sup>(5)</sup>

(1) Batten, Sowerbutts and Tanaka (2016).

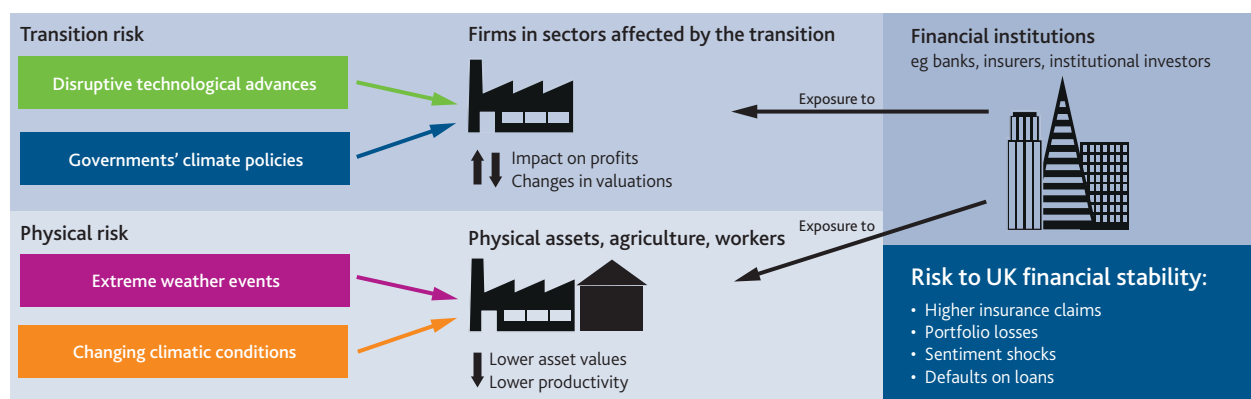
(2) See, for example, UNEP (2016).

(3) European Systemic Risk Board (2016), De Nederlandsche Bank (2016), Finansinspektionen (2016), German Federal Ministry of Finance (2016).

(4) California Department of Insurance (2017).

(5) See French Energy Transition Law, Article 173, Paragraph VI.



**Figure 2** Primary channels for climate-related financial risks

In terms of wider public policy on climate change, on 12 December 2015, nearly 200 nations reached agreement in Paris to keep a global temperature rise this century well below 2°C,<sup>(1)</sup> and to pursue efforts to limit the rise to 1.5°C. The Agreement has since entered into force.<sup>(2)</sup>

A successful transition to a lower carbon future will require the engagement of a wide range of actors, including central banks and financial regulators. The Bank's response, in line with its mandate, can help ensure financial firms have considered their own responses to climate change.

## Financial risks from climate change

Understanding financial risks is a core part of the Bank's responsibilities. In many ways, climate change, and society's responses to it, do not necessarily create new categories of financial risk but translate into existing categories, such as credit and market risk for banks and investors, or risks to underwriting and reserving for insurance firms.

The Bank's work focuses on two primary channels: physical and transition. Each of these have their own characteristics, as shown in **Figure 2**.

They are also related through future greenhouse gas emission pathways. To illustrate this, **Chart 1**, from the AVOID2 programme,<sup>(3)</sup> shows predicted climate impacts for three scenarios: no mitigation, emissions capped at constant 2030 levels, and an emission pathway consistent with the 2°C target agreed in Paris. As can be seen, a no mitigation scenario results in the highest predicted increase in global temperature and most severe climate impacts. These climate impacts, such as flooding, increase the physical risks from climate change and can result in financial losses and economic disruption.

Meeting the 2°C target agreed in Paris requires significant and sustained reductions in greenhouse gas emissions. While mitigating the severe physical impacts of climate change, this scenario could in turn give rise to the potential mispricing of

carbon-intensive assets should market participants not be fully considering the financial impact of a low-carbon transition.

In light of these potential scenarios, a key element of the Bank's response to climate change has been engaging with initiatives to support an orderly market transition to a lower-carbon economy, thus reducing both physical risks (from no transition) and transition risks (from a potential late and sudden adjustment to a future 2°C world).

The rest of this section discusses each risk factor in more detail, drawing upon existing research already published by the Bank<sup>(4)</sup> and related speeches by Governor Carney.<sup>(5)</sup> It also provides a brief overview of liability risks, which continue to be considered as a second order effect within the Bank's overall climate risk framework.

### Physical risks

Physical risks from climate change are those which arise from climate and weather-related events, such as droughts, floods and storms, and sea-level rise. They comprise impacts directly resulting from such events, such as damage to property, and also those that may arise indirectly through subsequent events, such as the disruption of global supply chains. Global and regional changes in climate can also lead to lower productivity of agriculture, human labour and physical assets.<sup>(6)</sup>

Physical risks can potentially result in large financial losses. If losses are insured, they can directly affect insurance firms through higher claims. If losses are uninsured the burden can fall on households and corporates, impairing asset values and reducing the value of investments held by financial

(1) The focus on 2°C arises, among other factors, because expected impacts increase rapidly if global temperatures rise by more than 2°C to a level at which adaptation is considered more challenging. See PRA (2015) or **Chart 1** for more info.

(2) UNFCCC (2015). As of 12 June 2017, 148 Parties have ratified of 197 Parties to the Convention. See UNFCCC (2017).

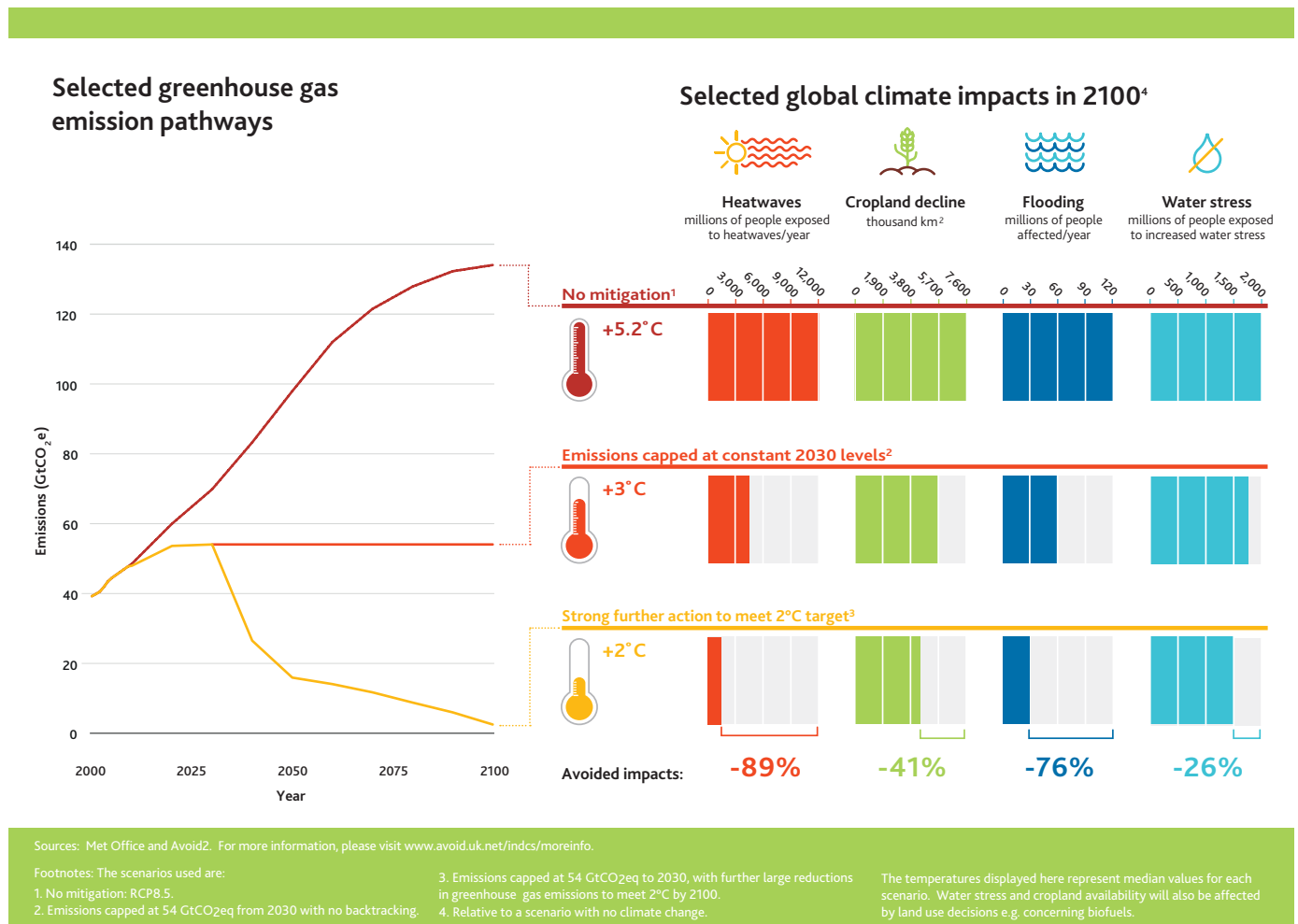
(3) AVOID2 is a UK government funded climate change research programme, led by the Met Office.

(4) PRA (2015), Batten, Sowerbutts and Tanaka (2016).

(5) Carney (2015), (2016).

(6) O'Neill *et al* (2017), Deryugina and Hsiang (2014).

**Chart 1** Greenhouse gas emissions and selected global climate impacts, in 2100, for three future scenarios



institutions. They can also have wider systemic, as well as firm-level impact, for example through economic disruption, lower productivity, and increasing sovereign default risk.

Both insured and direct overall losses from natural catastrophes have increased over recent decades (Chart 2). Insured losses have increased from an average of around US\$10 billion per annum in the 1980s to an average of around US\$45 billion per annum so far this decade. Overall losses have increased roughly three-fold over the past 30 years and are, on average, around four times the size of insured losses. This leads to a significant protection gap, between economic and insured losses, which continues to widen.<sup>(1)</sup>

The increase in these losses is generally considered to be driven primarily by exposure (ie increasing value of property in high-risk areas). For example, according to Aon Benfield, 85% of the trend in insurance losses is accounted for by economic growth and population migration to more coastal and urban areas. Additional factors, including weather and climate, contribute to the remaining 15%.<sup>(2)</sup>

For certain events, there are indications that climate change is becoming a significant contributing factor. For example,

Lloyd's of London estimates that the 20cm of sea-level rise since the 1950s at the Battery in New York increased Superstorm Sandy's (2012) losses by 30%.<sup>(3)</sup>

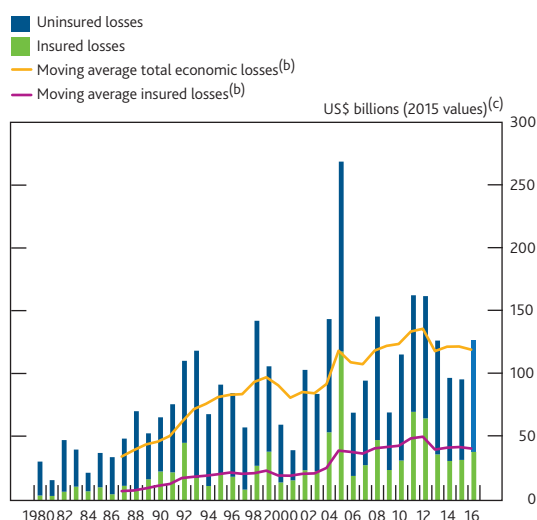
Over the past 20 years, the insurance industry has developed more sophisticated approaches to modelling risks from catastrophes and other weather-related events, although most models are aimed at providing estimates of near-term risk, not to anticipate the impacts of longer-term climate trends.

The application of these models, combined with the predominance of annual contracts, robust regulatory capital requirements and portfolio diversification, means insurance firms are reasonably well equipped to manage the current level of physical risks to the liability (claims) side of their balance sheets. At the same time, continued diligence is required, particularly if, as expected, the impacts of climate change become more severe, driving greater volatility and higher potential losses. This could, in turn, threaten the

(1) Geneva Association (2014).

(2) Aon Benfield (2014). Some estimate socioeconomic growth to account for 90%–95% of loss trend.

(3) Lloyd's of London (2014). Approximately 20cm rise at the Battery, all other factors remaining constant, and ground-up surge losses. Sea level rise largely driven by thermal expansion and ice melt from rising global temperatures.

**Chart 2 Weather-related losses worldwide (1980–2016)<sup>(a)</sup>**

Sources: Geo Risks Research, Munich Reinsurance Company and NatCatSERVICE 2017 (data does not account for reporting bias).

(a) Total Economic Losses = Insured + Uninsured losses.

(b) Eight-year moving average.

(c) Values as at 2015 adjusted for inflation based on country Consumer Prices Index.

insurability of certain risks<sup>(1)</sup> and have important implications for the insurance industry and for public insurance cover.

As noted earlier, physical risks can also have a broader range of impacts on the financial system, particularly where risks are not insured. For example, they can reduce the value of assets held by households, banks and investors, such as property, and also reduce the profitability of firms, leading to a deterioration of corporate balance sheets. This can have a direct impact on the value of investments made by financial institutions and can also increase credit risk for banks if the affected assets serve as collateral for bank loans. If banks do suffer significant losses, they could restrict lending, further exacerbating the financial impact of physical risks through a reduction in credit supply.

Significant uninsured losses from physical risk could also result in economic disruption at a national level, reducing tax revenues and increasing fiscal expenditures. This, in turn, could lead to an increase in sovereign default risk and have a negative impact on GDP. For example, in 2011, Thailand witnessed widespread flooding across many of the country's provinces. The World Bank estimated the economic costs at around \$45 billion, of which only around one quarter was insured.<sup>(2)</sup> In the aftermath of the floods, the Thai finance ministry reduced its 2011 growth forecast and the Bank of Thailand cut policy rates to support the economy's recovery.<sup>(3)</sup>

The case of the Thai floods illustrates the broader economic impact of weather-related events. By some estimates, total modelled economic losses globally from natural catastrophes could amount to US\$1 trillion on a 1-in-100 year basis (1% annual probability).<sup>(4)</sup>

Looking forwards, there is evidence to suggest that, alongside other factors,<sup>(5)</sup> rising global temperatures will significantly increase overall exposures to physical risks.

For example, the Intergovernmental Panel on Climate Change (IPCC) states that 'continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems'.<sup>(6)</sup>

As outlined in the PRA's 2015 report,<sup>(7)</sup> these potential impacts extend beyond weather-related events to include food safety, global security and displacement of people, each with a range of possible financial risks which could ensue.

Ultimately, the size of future physical risks from climate change, at both an individual firm and system level, will be driven by a number of factors. These include measures to adapt to a changing climate (such as improved building codes and flood defences) as well as the success of actions taken to reduce greenhouse gas emissions. However, the latter gives rise to a second category of risk, as explained further below.

### Transition risks

Transition risk is the financial risk which can result from the process of adjustment towards a lower-carbon economy. Changes in climate policy, technology or market sentiment could prompt a reassessment of the value of a large range of assets as changing costs and opportunities become apparent. The speed at which such re-pricing occurs is uncertain but could be important for financial stability and the safety and soundness of financial firms.

The scale of the financial transformation related to this transition is significant. For example, a report by the Global Commission on the Economy and Climate identified the next fifteen years to be critical, as the global economy undergoes a deep structural transformation.<sup>(8)</sup> The report estimated that around US\$90 trillion will likely need to be invested in infrastructure in the world's urban, land use and energy systems until 2030, and discussed how the nature of this investment can determine the future of the world's climate system.

Specific to energy-related investment, the International Energy Agency (IEA) estimates that \$26 trillion of additional investment is needed in renewables and energy efficiency

(1) PRA (2015).

(2) Aon Benfield (2011).

(3) HSBC (2013). The IMF (2016) has found that natural disasters have an increasingly negative impact on growth, fiscal balances and trade, especially for small countries.

(4) AIR Worldwide (2015) and Bank estimates.

(5) For example, increasing economic activity and values of assets in high-risk areas.

(6) IPCC (2014).

(7) PRA (2015).

(8) The Global Commission on the Economy and Climate (2014).

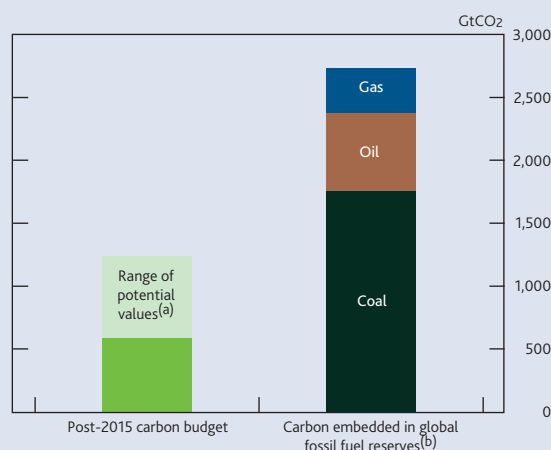
## 'Unburnable carbon'

Meeting the internationally agreed 2°C climate target requires additional efforts to limit global carbon emissions. Scientists have estimated cumulative carbon emissions consistent with maintaining a global temperature rise below 2°C. This is often referred to as the '2°C carbon budget'. For example, a review paper recently published in *Nature*,<sup>(1)</sup> estimates this budget falls within the range of 590 to 1,240 gigatonnes of Carbon Dioxide (GtCO<sub>2</sub>) from 2015 onwards, for a 66% probability of limiting warming below 2°C relative to pre-industrial levels.

The carbon potential of the earth's total reserves of fossil fuels is estimated at around 2,750 GtCO<sub>2</sub>.<sup>(2)</sup> As shown in **Chart A**, the majority of this is associated with coal reserves, followed by oil and gas. This implies that around two thirds<sup>(3)</sup> of the stock of known carbon-based energy reserves could become 'unburnable'. In many transition scenarios consistent with the 2°C goal, such as those produced by the IEA, this means that global oil and coal demand would have to peak by around 2020.<sup>(4)</sup>

Better aligning financial flows with those required for a low-carbon transition can support the efficient allocation of capital and reduce transition risk. While continued investment in fossil fuels may still be required, substantially less investment is needed than under a 'business as usual' scenario. At the same time, investment in end-use energy efficiency and

**Chart A** 2°C carbon budget versus carbon embedded in global fossil fuel reserves



Sources: Heede and Oreskes (2016) and Rogelj et al (2016).

- (a) Carbon budget estimates are uncertain and depend on a number of factors, including the probability with which warming is kept below 2°C; the contribution to warming from non-CO<sub>2</sub> emissions; and uncertainties in climate processes and feedbacks.  
 (b) Values are for end-2013.

renewable energy needs to more than double to \$1.9 trillion annually. If this realisation occurs late and adjustment is disorderly, financial stability could be at risk.

between 2015 and 2040 to achieve the 2°C target, compared to the IEA's current policies scenario.<sup>(1)</sup>

One specific example of transition risk relevant to the fossil fuel extractive sector is the concept of 'unburnable carbon' — the idea that a large share of fossil fuel reserves will need to stay 'unburned' for climate targets to be achieved (see the box on page 103).

As noted in the PRA's 2015 report, the assets which could be impacted are not just limited to sectors involving the production of fossil fuels, such as coal, oil and gas. They could also include utilities, heavy industry, and the transportation sector, among others, whose business models rely upon using fossil fuels or are energy intensive. While some sectors may be more affected than others, the shift towards a lower-carbon, ultimately 'net zero emission'<sup>(2)</sup> economy, is likely to have meaningful implications across multiple sectors of the economy.

There is evidence to suggest the modelling of medium and long-term factors (beyond five years) by financial firms can be limited,<sup>(3)</sup> and that environmental factors are not fully integrated into financial and corporate decision making.<sup>(4)</sup> There are already examples of how disruptive changes, linked

to policy, technology and other economic factors, can indeed cause sharp changes in valuations. For instance, the combined market capitalisation of the top four US coal producers has fallen by 95% since the end of 2010, and three of the top five US firms have recently filed for bankruptcy.<sup>(5)</sup> There has also been a similar, albeit less severe, valuation shift for German utilities which were seen as slow in responding to changes in domestic energy policy (towards renewables and away from nuclear).<sup>(6)</sup>

As part of a highly globalised financial centre, UK financial institutions are exposed to a wide range of sectors across the world, many of which may be affected. Shifts in valuation could, for example, reduce the value of insurance firms' investment portfolios. Similarly they could impact on the balance sheets of UK banks through reduced collateral values or by affecting business models of borrowers. As the United Kingdom implements its targets to reduce emissions

- (1) IEA (2016).  
 (2) 'Net zero emissions' means that some sectors, for which it is extremely hard to reduce emissions, may need to be compensated for by negative emissions in other sectors (for example by bio-energy and CCS) (see IPCC (2014)).  
 (3) 2 Degrees Investing Initiative (2017).  
 (4) From PRA (2015), Eurosif (2014) and Caldecott and McDaniel (2014).  
 (5) Based on the Dow Jones United States Coal Index, as of 30 May 2017, and Reuters (2016).  
 (6) Carney (2016).

from sectors ranging from power, to industry to transport,<sup>(1)</sup> there could also be domestic exposures to transition risk.

While the risk of a sudden and significant system-wide adjustment may not be immediate, the financial risk from an abrupt transition to a lower-carbon economy can increase if, over the coming years, portfolios are not aligned with climate targets. If governments push ahead with climate policies, but investors do not adapt their investment strategies accordingly, misallocation will grow.

This could ultimately lead to a 'climate Minsky moment' — a rapid system-wide adjustment that threatens financial stability, as discussed by Governor Carney in 2015.<sup>(2)</sup> A sudden, abrupt re-pricing of carbon-intense assets could also have systemic implications that go beyond direct financial losses. The allocation of capital and labour to projects not aligned with climate policies and technological changes could be a drag on productivity and economic growth. Conversely, allocating capital and labour to green technologies can be growth-enhancing.<sup>(3)</sup>

All this means that risks to financial stability will be minimised if the transition begins early and follows a predictable path, thereby helping the market anticipate the transition to a 2°C world.

### Liability risks

The Bank's initial work, focused on insurance, included consideration of a third category of risk, liability. Liability risks can arise from parties who have suffered loss or damage from the effects of climate change and seek compensation from those they hold responsible.

Liability risks are of particular relevance to insurance firms given these risks can be transferred by means of liability protection, such as Directors & Officers and Professional Indemnity insurance. The PRA's 2015 insurance report noted three categories of risk: failure to mitigate, failure to adapt and failure to disclose.

The Bank still actively considers the impact of liability risks, as a second order effect, within its overall climate risk framework.

## The Bank's response to climate change

While the mitigation of climate change has traditionally been seen as the remit of government policy, there is growing recognition of the role of participants within the financial system, including central banks and financial regulators, to mitigate financial risks from climate-related factors.

As shown earlier in **Figure 1**, in line with the Bank's overall mission, the Bank's strategy for responding to climate change has two core elements. First, considering climate-related financial risks to regulated firms as part of the Bank's approach to prudential supervision. Second, enhancing the resilience of

the UK financial system to climate change by supporting an orderly market transition to a lower-carbon economy.

On the first of these, the Bank is currently deepening its activities in insurance, and initiating an internal review of the impact of climate change on PRA-regulated institutions in the UK banking sector.

Insurance activities will build upon the PRA's 2015 report. This will involve more granular research into firm-level exposures to physical and transition risks.<sup>(4)</sup> It will also include considering the relevance of climate-related factors to the PRA's existing approach to supervision, including stress testing, business model analysis and other aspects of firm supervision.

The review of the UK banking sector will follow a similar process to that already completed for insurance firms. It will include a mix of internal research and engaging with selected firms through a combination of surveys and bilateral meetings.

On the second, enhancing resilience by supporting an orderly market transition, the Bank's work so far has focused on engaging with international initiatives. Specifically, this includes taking a close interest in the work of the FSB's private sector TCFD, co-chairing the G20 Green Finance Study Group on behalf of the United Kingdom, and co-ordinating with other insurance regulators through the Sustainable Insurance Forum. Each of these are described further below.

The Bank is also engaged in a number of related activities. These include liaising with other financial regulators both in the United Kingdom and abroad on climate-related issues and continuing private sector engagement, such as supporting bilateral work on green finance between the United Kingdom and China. The Bank is also considering further research and analytical work on these issues, as referred to earlier.

### Climate-related financial disclosure

Access by market participants to relevant information is a key factor for the functioning of efficient markets. Currently, investors do not have the information they need to correctly price climate-related financial risks and opportunities.<sup>(5)</sup> At the same time, companies do not know what to report or how to report it. As a consequence, investors cannot fully assess climate-related risks in their portfolios. This must change if financial markets are to allocate capital efficiently to manage the risks outlined earlier in this article, as well as to seize new opportunities relating to a low-carbon transition.

Following a request by the G20, the Financial Stability Board established a private sector Task Force on Climate-related Financial Disclosures, in late 2015, led by Michael R

(1) UK Committee on Climate Change (2016).

(2) Carney (2015).

(3) Carney (2016).

(4) As part of this, the Bank is exploring the use of asset-level data. For more information on this concept, see <https://assetleveldata.org>.

(5) TCFD (2016).



## FSB Task Force on Climate-related Financial Disclosures (TCFD)

### Draft recommendations

In December 2016, the industry-led TCFD published, for consultation, draft recommendations for voluntary, consistent, comparable, reliable and clear disclosures on climate-related financial risks for companies to provide information to lenders, insurers, investors and other stakeholders. These draft recommendations fall in the four areas outlined in **Figure A**.

- **Governance.** The organisation's governance around climate-related risks and opportunities.
- **Strategy.** The actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning. Importantly, this could include discussion of an organisation's strategy under different transition scenarios, including a 2°C scenario.
- **Risk Management.** The processes used by the organisation to identify, assess and manage climate-related risks.
- **Metrics and Targets.** The metrics and targets used to assess and manage relevant climate-related risks and opportunities.

The recommendations also include financial sector metrics and examples of non-financial sector metrics, such as those relating to greenhouse gas emissions and energy and water efficiency. TCFD disclosures could significantly help financial sector analysts to better price climate-related risks and opportunities.

Bloomberg, to address the issue of climate-related financial disclosure. The objective of the Task Force is to help catalyse the information that investors, lenders, insurers and other stakeholders require to manage climate-related financial risks and opportunities. The Task Force published its draft report, for consultation, in December 2016 (see the box on page 105). The TCFD's final report will be published ahead of the G20 Summit in July 2017 and presented to G20 Leaders.

While the TCFD is industry-led, the Bank is taking a close interest in its work and is supportive of their recommendations.

### Green finance

According to the G20, 'on a conceptual level, green finance can be understood as financing investments that provide environmental benefits in the broader context of environmentally sustainable development'. For example, this could include investments which reduce air, water and land pollution or decrease greenhouse gas emissions such as

**Figure A** Four thematic areas of recommendations on climate-related financial disclosure



Source: TCFD (2016).

Scenario analysis, in particular, is a major innovation of the Task Force. The group recommends that firms describe how their strategies are likely to perform under various forward looking, climate-related scenarios. Firms could discuss the degree of robustness of their strategy, or how they can position themselves to take advantage of opportunities, or adapt to risks. This disclosure can help investors make more robust long-term investment decisions.

The TCFD's final report, including final recommendations, will be published ahead of the G20 Summit in July 2017 and presented to G20 Leaders.

investments in renewable energy and energy efficiency. Estimates suggest that tens of trillions of dollars of 'green' investment is required on a global basis to support environmentally sustainable growth.<sup>(1)</sup>

The G20's Green Finance Study Group supports the G20's strategic goal of strong, sustainable and balanced growth. The study group was established during China's recent G20 Presidency to 'identify institutional and market barriers to green finance, and based on country experiences, develop options on how to enhance the ability of the financial system to mobilize private capital for green investment'.

The Group is co-chaired by the United Kingdom and China, represented by the Bank of England and the People's Bank of China, with support from UN Environment as secretariat. It is currently in its second year, continuing under the German G20 Presidency.

(1) See G20 GFSG (2016) and G20 Leaders Summit (2016).

A summary of the Group's work from its first year, the *Green Finance Synthesis Report*,<sup>(1)</sup> was welcomed and published at the G20 Summit in September 2016. The report referred to a number of barriers which need to be addressed to scale up green financing, outlined in **Table A**.

**Table A** Barriers to green finance as identified by the G20 GFSG

Barrier	Description
Internalising environmental externalities	Financial investments can have both positive and negative environmental impacts, which in turn, lead to benefits, or costs, to the economy as a whole. Difficulties in internalising these externalities in financial decision making can lead to a sub-optimal allocation of capital.
Maturity mismatch	Constraints on long-term lending resulting from the need to finance short-term liabilities can particularly impact 'green' projects which often have high up-front costs but whose cost-saving results are manifested in the long-term.
Lack of clarity of green definitions	A lack of clarity on what constitutes a 'green investment' can be an obstacle to allocating financial resources to green projects.
Information asymmetry	A lack of disclosure of environmental-related information by companies can make it challenging for investors to fully assess risks and opportunities.
Inadequate analytical capacity	The level of understanding of the financial implications of environmental risks is still at an early stage.

Source: G20 GFSG (2016).

G20 Leaders recognised that many of these challenges can be addressed by options developed in collaboration with the private sector (**Figure 3**). For example, actions to catalyse the growth of green bond markets (bonds where the proceeds are exclusively used to deliver environmental benefits), or promoting principles of responsible investment.

The two priority areas being advanced in 2017, under the German Presidency, are environmental risk analysis and publicly available environmental data.

### Sustainable Insurance Forum

In 2015, the PRA's insurance report noted the merits of establishing a network to help facilitate collective learning among insurance regulators on sustainability-related issues.<sup>(2)</sup>

In early December 2016, the PRA joined a group of insurance regulators from multiple jurisdictions to establish the Sustainable Insurance Forum, an initiative to strengthen insurance regulators' understanding of, and responses to, sustainability challenges.

The Forum has identified six priority areas to advance in its first year<sup>(3)</sup> and is currently being chaired by the California Department of Insurance.<sup>(4)</sup> The second meeting of the

forum is scheduled for July 2017, to take place in the United Kingdom.

## Conclusion

Climate change, and society's responses to it, present financial risks which impact upon the Bank's objectives. Building on its initial work in insurance, the Bank is continuing to assess the size and scope of these financial risks, focusing primarily on two channels: physical and transition.

In line with its mandate, the Bank's response to mitigating the financial risks from climate change has two core elements. First, considering climate-related factors as part of its approach to prudential supervision, including deepening its work in insurance and initiating a review of climate-related risks in the UK banking sector.

Second, enhancing the resilience of the UK financial system to climate change by engaging with initiatives to support an orderly, market transition to a lower-carbon economy. Recognising the cross-border nature of climate change, these initiatives to date have had a strong international component, such as taking a close interest in the FSB's private sector Task Force (TCFD), co-chairing the G20 Green Finance Study Group and participating in the Sustainable Insurance Forum.

The Bank is supporting this international work through related activities, such as liaising with other financial regulators and continuing to engage with the private sector on climate risk and green finance. The Bank is also considering research and analytical work, such as reviewing frameworks for understanding the impact of climate change on the wider economy.

Responding to climate change will require many different actors to play a role, including those within the financial community. The Bank's strategic response can help to ensure financial firms have considered climate-related financial risks and their role in supporting an orderly market transition. This can enhance the resilience of the United Kingdom's financial system to climate change, and help ensure the Bank can fulfil its mission, both now and for the long term.

(1) G20 GFSG (2016).

(2) There is an analogous network for banking regulators, the Sustainable Banking Network facilitated by the International Finance Corporation.

(3) Access and affordability, capacity building for supervisors, climate risk assessment and analysis, disaster risk reduction, disclosure and sustainable insurance roadmaps.

(4) UN Environment provides support as secretariat to the SIF.

Figure 3 G20 options for scaling up green finance from G20 GFSG Synthesis Report (2016)



Source: Graphic based on G20 GFSG Synthesis Report, available at <http://unepinquiry.org/g20greenfinancerepositoryeng/>.

(a) Building capacity for verification of 'green' use of proceeds, for example, through third-party assurance providers, will support growth of green bond markets.

(b) For example, the International Finance Corporation (IFC) acted as an anchor investor by committing to purchase the first green bond issuance of Yes Bank India. Development banks can also serve as an example by issuing green bonds in local markets (demonstration issuance). For example, IFC's issuance in Peru and the German development bank (KfW) issuance in Germany.

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