



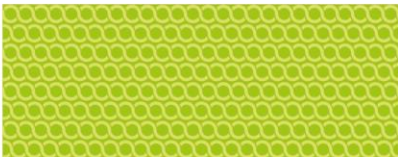
BANK OF ENGLAND

Climate Change



The Bank of England's climate-related financial disclosure 2020

June 2020



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Foreword

The Covid-19 pandemic is causing unprecedented disruption to our daily lives and the global economy. The threat from climate change is just as real and potentially at least as devastating. It will ultimately transform the way we live, our economies, and the planet itself. To meet both challenges we must draw on the collective efforts of industry, scientists, governments, regulators, and each of us as individuals. We all have a role to play, and the Bank is no exception.

In order for governments to make informed policy choices, investors to make informed investments, and consumers to make informed spending decisions, they need to understand how companies' activities contribute to climate change. That is why the Bank has supported the Financial Stability Board's work on climate disclosure through the Task Force on Climate-related Financial Disclosures (TCFD). As of February 2020, more than 1000 organisations, representing a market capitalisation of over \$16.7 trillion and controlling assets of \$138 trillion, have pledged their support.¹ We are working domestically² and internationally³ with industry, government, regulators and other central banks to promote the adoption of TCFD and improve the quality of climate disclosures.

The Bank sits at the heart of the financial system and so it is important we hold ourselves to the same high standards as the firms we regulate. Therefore, in this report, the Bank is disclosing for the first time its own approach to climate risk management for all its operations. We have sought to use the latest techniques available, but this is an evolving science and so our approach will develop over time. The temptation for any organisation is to only reach for tools that already exist and operate within the comfort of precedent, but if we are to encourage others to take a leap forward, for example through our supervisory expectations⁴, then we must also be willing to innovate and break new ground.

I am pleased that, as this report shows, the Bank has exceeded its targets on emissions from its physical activities, such as the production of bank notes, the carbon footprint of its buildings, and business travel.

Using new metrics, we have identified that the Bank's financial activities, including the asset portfolios held for policy and other purposes, are for the most part ahead of G7 emissions benchmarks, reflecting the progress made to date in decarbonising the UK economy. In a similar manner, the carbon intensity of our holdings of UK sterling corporate bonds (2% of the portfolio) reflects the position of the UK market generally. However, there remains a gap between the associated carbon outputs of these holdings and the Paris goals.⁵ This demonstrates the additional work needed to meet the UK's goal of net-zero emissions by 2050.

We have learned much from this process and as our understanding of climate risks continues to improve, we will go further, enhancing our metrics and updating our approach by the time of our next report.

¹ TCFD press release 'More than 1000 global organizations declare support for the Task Force on Climate-related Financial Disclosures and its recommendations', February 2020: https://www.fsb-tcf.org/wp-content/uploads/2020/02/PR-TCFD-1000-Supporters_FINAL.pdf.

² The Bank is part of a UK regulators taskforce led by the UK government to examine the most effective way to approach climate disclosure. The taskforce was created as part of the launch of the 'UK Green Finance Strategy': <https://www.gov.uk/government/publications/green-finance-strategy>.

³ The Bank is a founding member of the 'Network for Greening the Financial System': <https://www.ngfs.net/en>.

⁴ Supervisory Statement 3/19, April 2019: <https://www.bankofengland.co.uk/prudential-regulation/publication/2019/enhancing-banks-and-insurers-approaches-to-managing-the-financial-risks-from-climate-change-ss>.

⁵ As part of the 2016 Paris Agreement, signatory nations committed to limit the rise in global average temperature to well below 2 degrees above pre-industrial levels, and to pursue efforts to limit the increase to 1.5 degrees.

As I set out to the Treasury Select Committee⁶ ahead of my appointment as Governor, it is vital the Bank continues to lead on the financial risks from climate change. My predecessor, Mark Carney, made addressing the financial risks from climate change one of the Bank's strategic priorities – I intend for it to maintain this prominence.

A handwritten signature in black ink that reads "Andrew Bailey". The signature is written in a cursive, slightly slanted style.

Andrew Bailey
Governor of the Bank of England

⁶ Treasury Select Committee oral evidence, March 2020: <https://committees.parliament.uk/work/73/appointment-of-andrew-bailey-as-governor-of-the-bank-of-england/publications/>.

Executive summary

For the first time, the Bank of England (the Bank) is publishing this report on climate-related financial disclosure, setting out its approach to managing the risks from climate change across its entire operations, and the steps taken to improve the Bank's understanding of these risks.

Climate change creates financial risks that are far-reaching in breadth and scope. They will affect all agents in the economy and arise through two primary channels: the physical effects of climate change and the impact of changes associated with the transition to a net zero emissions economy. The Bank has highlighted the urgent need to assess, manage and deepen our understanding of the financial risks from climate change. To ensure the market has the right information to price climate-related risk, the Bank has also been making the case for consistent, comparable, and comprehensive climate disclosures.

As a prominent public institution sitting at the centre of the financial system, and a market participant in its own right, the Bank also recognises the importance of developing a thorough understanding of the climate risks across its own operations and managing these risks appropriately, including those arising from the financial assets it holds for policy and other purposes. In line with its expectations of financial firms, the Bank is for the first time disclosing analysis of its own exposures to climate risks as part of its annual reporting. This report follows the Task Force on Climate-related Financial Disclosures' (TCFD) framework, which is structured around four core elements: governance; strategy; risk management; and metrics and targets.

Governance

The governance of climate-related financial risks is included within the Bank's governance structures. These have been complemented with climate-specific governance and risk processes where required. As part of this, climate-related risks are discussed regularly at the Bank's senior committees prior to decisions being implemented by management across the Bank. To ensure there are clear roles and responsibilities, the Bank has assigned an Executive Sponsor for climate-related risks – this position is held by Sarah Breden, Executive Director for UK Deposit Takers Supervision. The Executive Sponsor is responsible for recommending to the Governors the Bank's strategy for addressing the risks that climate change poses to the Bank's objectives, and overseeing the implementation of that strategy.

Strategy

The Bank's climate strategy is focused on understanding and mitigating the financial risks from climate change, which directly impact both its outward-facing policy remits, and its own operations. Reflecting the importance of this work, climate change was made one of the Bank's strategic priorities in January 2020. The UK Government has also recognised its importance through explicitly including climate change in the Financial Policy Committee's (FPC) remit letter in March 2020 and setting out its intention to include it in the Prudential Regulation Committee's (PRC) next remit letter.

The Bank's climate strategy is structured around three themes: risk, reporting and return. **Risk** is focused on ensuring firms and investors can measure and manage the financial risks from climate change. **Reporting** is focused on improving the quantity and quality of climate-related disclosures by implementing a common framework built on the TCFD. And **return** is focussed on helping better equip firms and investors to identify the frictions and the opportunities in the transition to a carbon-neutral economy. Supporting all three strands of our strategy is analytical and research work to further understanding of the issue across all the Bank's policy functions and international cooperation with other central banks and regulators.

Under its strategy of risk, reporting and return, the Bank has issued a range of expectations and undertaken a variety of exercises that are designed to ensure financial firms manage these risks effectively. In April 2019, the Prudential Regulation Authority (PRA) published its [supervisory expectations for banks' and insurers' approaches to managing the financial risks from climate change](#). This supervisory statement, a world first, set out how firms should consider climate change in their governance, risk management, scenario analysis, and disclosures. To support firms in addressing these expectations, in March 2019 the PRA and the Financial Conduct Authority set up the Climate Financial Risk Forum, through which a group of industry representatives build capacity and share best practice on managing these risks. In 2021, building on the [2019 Insurance Stress Test](#), the Bank will also stress test the largest banks and insurers to the financial risks from climate change that could arise in a variety of different climate scenarios.⁷

At an international level, the Bank actively promotes collaboration on climate-related risks via its work as a founding member of the [Central Banks and Supervisors Network for Greening the Financial System](#) and the [Sustainable Insurance Forum](#). The Bank has also played an active role in encouraging coordinated action on risk assessment and disclosures internationally, particularly through the Financial Stability Board, and TCFD; and it is working domestically and internationally to explore methods to enhance disclosure, including possible paths to making it mandatory. This work will also be addressed as part of the UK government's COP26 programme, which the Bank will actively support.

Risk management, metrics and targets

The Bank actively monitors its own exposure to climate change and how that exposure could impact the resilience of its operations. The process for managing these risks is now established, but will continue to develop as data, methodologies and understanding of the underlying risks evolve. For this report, the Bank has assessed the financial risks from climate change across its entire operations, spanning both its physical activities (such as the production of bank notes and the carbon footprint of its buildings and travel) and its financial activities (including the asset portfolios, held for policy and other purposes). This report sets out the risks from climate change to these operations, how they are managed and the steps that have been taken to improve the Bank's understanding of them.

The Bank had a target to reduce the carbon footprint of its physical activities by 20% between 2015 and 2020, it has exceeded this by cutting back emission from gas, fuel, electricity and business travel by 33% over the period. The Bank has set a new target for 2030 – to reduce its carbon footprint consistent with temperature warming of 1.5°C above pre-industrial levels, which will require a 63% reduction in emissions relative to the 2016 baseline. The Bank uses 100% renewable energy across all its sites.

This year, for the first time, an in-depth exercise has been undertaken with external data providers to assess financial risks from climate change in the Bank's financial asset portfolios. This has been undertaken through the use of a range of metrics that assess the carbon footprint and exposures arising from both transition and physical risks. These measures use relevant and available information, but this is a relatively new field, and these measures are subject to a number of caveats related to partial data availability, the use of unaudited data, modelling assumptions and methodological differences. Nevertheless, this report sets out a range of metrics that seek to estimate climate risks in financial portfolios, as part of supporting further development of these methods. The Bank advocates disclosing in line with the best available information to aid transparency and to catalyse advancement of the field.

By far the largest proportion (96%) of assets held in the Bank's financial asset portfolios is held in a separate legal vehicle known as the Bank of England Asset Purchase Facility Fund (BEAPFF), indemnified by HM Treasury, to implement the Monetary Policy Committee's (MPC) asset purchase programme. Of this, based on end-February 2020 data, 98% was invested in UK sovereign government bonds and 2% in UK sterling corporate bonds. The Bank's portfolio is therefore materially aligned with that of the United Kingdom. The UK has a low carbon footprint relative to other large (G7) nations, measured on a production basis broadly consistent with international standards, and this is reflected in the estimates of the carbon footprint of the Bank's financial

⁷ 'The 2021 biennial exploratory scenario on the financial risks from climate change', December 2019: <https://www.bankofengland.co.uk/paper/2019/biennial-exploratory-scenario-climate-change-discussion-paper>.

asset holdings. The Bank's largest portfolio – the BEAPFF UK sovereign government bond portfolio – has a weighted average carbon intensity of 202 tonnes of carbon dioxide (CO₂) equivalents per £ million of GDP, compared to a G7 reference portfolio of 336.⁸ However, as is widely accepted, despite this favourable starting position, the pace of change in the United Kingdom will need to increase to meet forward-looking national and international climate targets.

Estimates of transition and physical risk in this portfolio also reflect those of the UK overall. On transition risk, the UK has some exposure to the risk of stranded oil and gas assets through its remaining North Sea reserves. But the overall reliance on natural reserves is relatively low, at under 0.5% of GDP.⁹ And the UK is ahead of where it needs to be in its mix of power generation in the short term, given its low reliance on coal. But as organisations such as the Committee on Climate Change suggest, there is more for the UK to do over the longer term to support the transition across the economy more broadly. On physical risk, estimates suggest that extreme rainfall and a rise in sea levels pose the most material physical risks to the Bank's sovereign asset holdings. But risks are in the bottom half of those faced by the range of countries assessed by the external data provider, reflecting the UK's relatively moderate climate (page 22 of this report).

The BEAPFF's much smaller corporate asset holdings, made up of bonds purchased in proportion to total outstanding sterling investment grade debt issuance across eligible sectors, reflects the overall position for that market. Direct comparisons with the holdings of others are more difficult given available reference portfolios use different calculation methods. But estimates suggest that the weighted average carbon intensity of the BEAPFF corporate bond portfolio is 294 tonnes of CO₂ equivalents per £ million of revenue, in between two reference portfolios provided by the external data providers, 316 from S&P Trucost and 263 from MSCI ESG Research LLC (page 24 of this report). In this report, a more experimental estimate is also shown, of the levels of warming with which the corporate asset portfolio is consistent. This suggests the portfolio is consistent with an average temperature increase of 3.5°C above pre-industrial levels by 2100,¹⁰ in line with estimates of the overall market, and within a range from data providers of 1.75°C to 4°C. This illustrative estimate is materially above Paris agreement goals, reflecting that a whole economy transition will be needed if internationally agreed climate goals are to be met, and with companies being required to reduce their annual carbon emissions materially.¹¹ Estimates suggest that transition and physical risks to the portfolio are modest in the short term – but given this is a partial analysis, the Bank will seek to improve its understanding as methodologies develop.

This report shows that substantial progress has been made towards embedding climate change in all aspects of the Bank's policy and operational work. Over the next year, the Bank will continue to engage domestically and internationally to develop its TCFD disclosure further. The Bank's approach will also evolve further, reflecting the dynamic nature of the risks. As an example, Andrew Bailey set out in March¹² that over the coming years, the Bank will consider how to incorporate climate factors into decisions on the mix of financial assets that it holds, whilst still ensuring the policy aims of the relevant portfolios. As with the similar governance arrangements for the FPC and PRC, the framework for the MPC's asset purchases is determined by the Committee's remit given to it by the Chancellor. Due to the outbreak of Covid-19, aspects of this work have been postponed. But the Bank will provide an update on its approach by the time of its next climate report in 2021.

⁸ © S&P Trucost Limited 2020 all rights reserved; for a more detailed description, see page 20 of this report. Note that the so-called 'production basis' on which this number is calculated does not account for the emissions generated in the production of goods that the UK imports, since this would lead to material double counting when compared with other countries – see page 19 of this report.

⁹ Source: © S&P Trucost Limited 2020 (all rights reserved).

¹⁰ Source: Certain information ©2020 MSCI ESG Research LLC reproduced by permission, based on coverage of 90% of the Asset Purchase Facility corporate portfolio by portfolio weight. Please see footnote 42 for additional information on MSCI data.

¹¹ Speech given by Mark Carney, 'The Road to Glasgow', February 2020: <https://www.bankofengland.co.uk/-/media/boe/files/speech/2020/the-road-to-glasgow-speech-by-mark-carney.pdf>.

¹² Treasury Select Committee oral evidence, March 2020: <https://committees.parliament.uk/work/73/appointment-of-andrew-bailey-as-governor-of-the-bank-of-england/publications/>.

1 The Bank's approach to disclosure

The recommendations of the [Task Force on Climate-related Financial Disclosures](#) (TCFD) are increasingly becoming the global standard for climate disclosures. Established in 2016 by the Financial Stability Board (FSB), the TCFD developed a framework for climate disclosures that focuses on four core elements: governance; strategy; risk management; and metrics and targets (see **Figure 1.1**). Its recommendations provide a foundation to improve investors' and others' ability to assess and price climate-related risk and opportunities appropriately. Although primarily aimed at private sector organisations, the TCFD recommendations represent a framework that the Bank of England (the Bank) can use to set out its own approach to managing the financial risks from climate change. This document follows the structure of the TCFD's recommendations, adapting the framework where it does not map directly to central banking policy activities and operations.

Figure 1.1 Core elements of the TCFD recommendations



Source: [Final TCFD recommendations report, June 2017](#).

This report covers each of the TCFD core elements in turn, setting out how the Bank considers climate-related risks across its governance, strategy and risk management. It also describes the metrics the Bank uses to monitor and manage those risks. To inform that analysis, the Bank has engaged external climate data providers to supplement the data it already held in-house and receives from the private sector. These external parties¹³ provided metrics on the carbon footprint, transition risks and physical risks present in the Bank's sovereign and corporate holdings. The necessity to commission third party providers illustrates the data challenges that remain in this area, despite the improvement in the quantity and quality of private sector disclosures. The Bank is a strong advocate for widespread adoption of climate-related financial disclosure to help ensure climate risks can be considered in each financial decision.

¹³ S&P Trucost, MSCI ESG Research LLC, Moody's Analytics and Four Twenty Seven.

2 Governance

The Bank includes considerations of climate issues within its governance structures, alongside climate-specific governance and risk processes where this is required given the unique characteristics of climate-related risks. The Bank has a robust and well-established risk management framework that spans all functions and seeks to fully integrate climate-related risks.¹⁴ These risks are discussed regularly at the Bank's senior committees and the Bank has assigned an Executive Sponsor to hold responsibility for climate risk issues – this position is held by Sarah Breeden, Executive Director for UK Deposit Takers Supervision. The Executive Sponsor is responsible for recommending to the Governors the Bank's strategy for addressing the risks that climate change poses to the Bank's objectives, and overseeing implementation of that strategy. The Bank voluntarily complies with the core principles of the Senior Managers and Certification Regime (SM&CR) framework and responsibility for climate risk will be captured as appropriate in the Bank's next annual review of the SM&CR. This is in line with the Prudential Regulation Authority's (PRA's) expectation that banks and insurers assign a Senior Management Function responsible for the financial risks from climate change.¹⁵

The Bank's Court of Directors (Court) acts as a unitary board, setting its strategy and budget, and taking key decisions on resourcing and appointments. Court is responsible for matters that concern the Bank as an organisation with policy responsibilities reserved for policy committees. The Audit and Risk Committee, a sub-committee of Court, assists in its responsibility for maintaining effective risk management, internal control and financial reporting. In line with these responsibilities, both Court and the Audit and Risk Committee discuss the Bank's approach to climate risk management and disclosures regularly. Court took the decision to undertake a climate disclosure in line with the TCFD recommendations to promote transparency around the Bank's exposure to, and management of, climate-related risks. At a minimum, Court will review the Bank's progress against climate-related risk targets on an annual basis as part of its review of the Bank's Annual Report.

The Bank's senior policy-making body beneath Court is the Executive Committee, comprising the Governor and Deputy Governors. On a regular basis, this committee reviews the Bank's strategy for responding to climate-related risks, and ensures that the approach is consistent across the Bank. During the 2020 reporting year the Executive Committee regularly considered climate-focussed papers.

The policy committees of the Bank have responsibility for overseeing risks relating to their respective functions where they judge them to be materially relevant to their objectives:

- The Prudential Regulation Committee (PRC) has the primary objective to promote the safety and soundness of the credit institutions, insurers and investment companies that the PRC regulates. It monitors the approach to climate-related financial risks in firms and took the decision in April 2019 to issue expectations on how climate-related financial risks should be embedded into banks' and insurers' risk frameworks through a supervisory statement.¹⁴ Embedding consideration of climate-related risks into domestic and international supervisory frameworks will ensure that they are subject to the same standard of governance as other supervisory issues. In June 2019, it was announced that the PRC and Financial Policy Committee (FPC) had agreed to stress test banks' and insurers' resilience to climate change using the Biennial Exploratory Scenario (BES) exercise in 2021.¹⁶

¹⁴ Bank of England Annual Report and Accounts 2020, June 2020: <https://www.bankofengland.co.uk/annual-report/2020>.

¹⁵ Supervisory Statement 3/19 'Enhancing banks' and insurers' approaches to managing the financial risks from climate change', April 2019: <https://www.bankofengland.co.uk/prudential-regulation/publication/2019/enhancing-banks-and-insurers-approaches-to-managing-the-financial-risks-from-climate-change-ss>.

¹⁶ Discussion Paper 'The 2021 biennial exploratory scenario on the financial risks from climate change', December 2019: <https://www.bankofengland.co.uk/paper/2019/biennial-exploratory-scenario-climate-change-discussion-paper>.

- The Financial Policy Committee (FPC) is responsible for identifying, monitoring and taking action to remove or reduce systemic risks to the UK financial system, with a view to protecting and enhancing the resilience of the UK financial system. In line with this, it discusses the risks that climate change poses to the financial system and took the decision, jointly with the PRC, to improve transparency around the size of those risks by stress testing banks, insurers, and the UK financial system's resilience to climate change and the transition to a carbon-neutral economy.
- The Monetary Policy Committee (MPC) has responsibility within the Bank for setting monetary policy. To ensure it is informed about issues that may affect the economy, the MPC is briefed by staff numerous times a year through eight policy cycles on any relevant risks. This has included risks from climate change. The Bank has also undertaken analysis of the impact of climate change on the macroeconomy.¹⁷

In summary, the Bank's approach to the governance of risks to its objectives aims to provide a comprehensive framework that can identify, manage, and respond to risks as they develop. Although the drivers of climate-related risks are captured by that framework, it has chosen to enhance the measures in place by setting up additional dedicated climate risk structures. These, and the broader functioning of our risk structures, are set out in more detail in Chapter 4.

¹⁷ For example, see analytical work on page 13 of this report.

3 Strategy

The Bank's climate strategy is focused on understanding and mitigating the financial risks from climate change. These risks have a direct impact on the Bank's strategy across all of its policy and operational activities. Its importance is reflected in the decision to make climate change one of the Bank's strategic priorities, through which it receives an elevated level of executive focus. Alongside this, the Bank has enhanced its approach to identifying and managing climate risks across its functions, helping to ensure that it is taking the forward-looking, long-term perspective necessary to address these risks proactively.

The importance of embedding climate change into the Bank's strategy has also been recognised by the UK Government. In the FPC's remit letter, the Chancellor set out the Committee's role in protecting and enhancing the resilience of the financial sector to climate risk.¹⁸ Specifically, the Remit letter notes that 'the FPC has a role in protecting and enhancing the resilience of the financial sector to climate risks.' The Government's Green Finance Strategy states that similar considerations will be included in the PRA's next remit letter.¹⁹

Climate-related financial risks

The Bank's climate strategy is designed to understand and mitigate the financial risks from climate change. These risks impact banks, insurers and the wider financial system (including the Bank itself) via two main channels:

- Transition risks arise from the adjustment towards a carbon-neutral economy, which will require significant structural changes to the economy. These changes will prompt a reassessment of a wide range of asset values, a change in energy prices, and a fall in income and creditworthiness of some borrowers. In turn, this will give rise to credit losses for lenders and market losses for investors. The resultant risks would be more pronounced in the case of a sudden adjustment and could, dependent on scale, be a source of financial instability. The transition to a carbon-neutral economy also presents some opportunities for the financial sector, for example, financing investments in building energy efficiency, renewable energy and carbon-neutral transportation.
- Physical risks arise from increasing severity and frequency of climate and weather-related events. These events severely damage property and other infrastructure, disrupt business supply chains, impact agricultural output and more broadly can lead to loss of life and migration. This reduces asset values, results in lower profitability for companies, damages public finances, and increases the cost of settling underwriting losses for insurers. Indirect effects on the macroeconomic environment, such as lower output and productivity, exacerbate these direct impacts.

There is clear evidence that banks, insurers, and the financial system will be impacted by climate change and the transition to a carbon-neutral economy. For example, just under 10% of the value of mortgage exposures in England is on properties in flood-risk zones;²⁰ loan exposures to fossil fuel producers, energy utilities and emission-intensive sectors amount to around 70% of the largest UK banks' common equity Tier 1 capital; and

¹⁸ Remit letter to the Financial Policy Committee, March 2020: <https://www.bankofengland.co.uk/letter/2020/remit-for-the-fpc-2020>.

¹⁹ HM Government Green Finance Strategy, July 2019: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820284/190716_BEIS_Green_Finance_Strategy_Accessible_Final.pdf.

²⁰ 'Transition in thinking: The impact of climate change on the UK banking sector', September 2018: <https://www.bankofengland.co.uk/prudential-regulation/publication/2018/transition-in-thinking-the-impact-of-climate-change-on-the-uk-banking-sector>.

for UK insurers, around 12% of equity and 8% of corporate bond portfolio exposures are in 'high-carbon' technologies.²¹

The Bank has identified that transition and physical risks from climate change have distinct characteristics, which mean that addressing them presents unique challenges:

- The impact is far-reaching in breadth and magnitude: climate change risks will affect all agents in the economy, across all sectors and geographies. The risks will probably be correlated and their impact non-linear and irreversible.
- The risks are foreseeable: while the exact outcome is uncertain, some combination of transition and physical risks will crystallise.
- The magnitude of the future impact is dependent on actions today: this includes actions by governments, central banks and regulators, businesses and households, and financial firms.

While the characteristics above mean that climate risks present some unique measurement challenges, the Bank's strategy has been focussed on ensuring that institutions invest now to develop capabilities as soon as possible. This strategy recognises that any delay in the development of these capabilities will impair organisations' abilities to both measure the risks that they are taking in the short term and assess the long-term consequences of those decisions. We will continue to monitor firms' implementation of projects in this area as part of our supervisory work.

Impact of climate-related financial risks on business, strategy, financial planning

The Bank has been a thought-leader among central banks in identifying and responding to the financial risks from climate change across its objectives. The rest of this section covers the Bank's work as it relates to policy towards external parties. **Tables 4.A** and **4.B** in the following section provide a summary of the risks from climate change to the Bank's own operations, and the steps the Bank is taking in response. Under its overarching climate strategic priority, the Bank has structured its work around three themes: risk; reporting; and return. Risk refers to ensuring firms and investors can measure and manage the financial risks from climate change, both physical risks that arise from continued carbon emission and the transition risks that arise in the transition to a world that emits net-zero carbon, where the amount of carbon emissions released into the atmosphere is balance by that removed from it. Reporting is focused on improving the quantity and quality of climate-related disclosures by implementing a common framework built on the TCFD. Return is focussed on using the Bank's policy and regulation work to better equip firms and investors to identify the frictions and the opportunities in the transition to a carbon-neutral economy. Supporting all three strands of our strategy is analytical and research work to further our understanding of the issue across all the Bank's policy functions and international cooperation with other central banks and regulators.

Risk

The Bank's work aims to ensure that firms and investors can measure and manage the financial risks from climate change. This is delivered through working domestically and internationally to develop and embed thinking and capabilities across firms.

In April 2019, the PRA published its [supervisory expectations for banks' and insurers' approaches to managing the financial risks from climate change](#). This supervisory statement, a world-first, set out how firms should consider climate change in their governance, risk management, scenario analysis, and disclosures. It aims to enhance firms' responses to these risks to safeguard their safety and soundness as climate-related risks start to crystallise. To support the implementation of the supervisory statement, the PRA has been undertaking a comprehensive training programme for supervisors. This training provides the skills and knowledge necessary to effectively monitor and address firms' adherence to the supervisory statement.

²¹ Financial Stability Report, July 2019: <https://www.bankofengland.co.uk/financial-stability-report/2019/july-2019>.

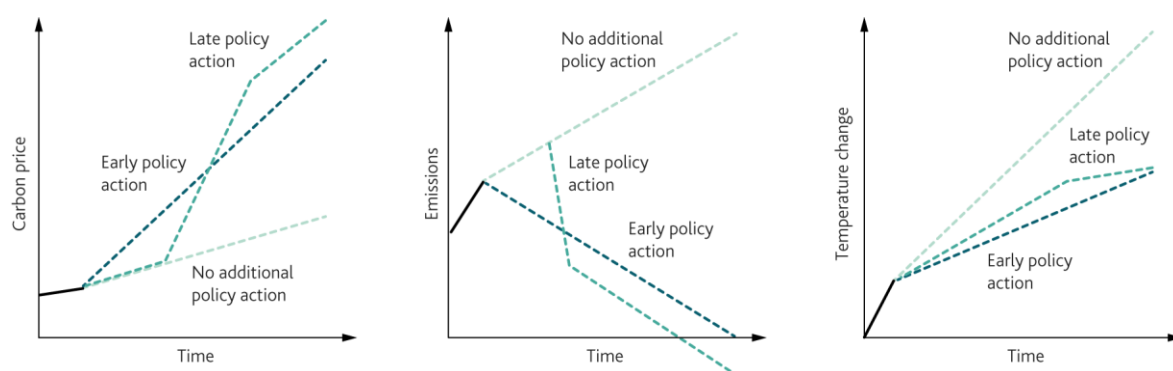
When publishing its supervisory expectations, the PRA acknowledged that firms still face barriers to implementing the forward-looking, strategic approach necessary to minimise the risks. To reduce these barriers, in March 2019, the PRA together with the Financial Conduct Authority (FCA) set up the Climate Financial Risk Forum (CFRF). The CFRF brings together a small group of senior industry representatives and financial regulators to build capacity and share best practice with the aim of advancing financial sector responses to the financial risks from climate change. The CFRF develops practical tools and approaches that are shared with the wider market. The first of these outputs will be published in summer 2020 and will focus on risk management, scenario analysis, disclosure and innovation.

The PRA took similar steps to support general insurers' ability to quantify the impact of physical risks. Working with a group of representatives from the general insurance sector, in May 2019 the PRA published [a framework for assessing financial impacts of physical climate change](#). The paper provides an aid for practitioners to use to assess climate-related financial risks, using tools that are already available within the general insurance sector. The framework is designed as a starting point for firms to assess the physical risk impacts in the context of their business decisions and disclosure requirements.

The future path of climate change is inherently uncertain. Scenario analysis is therefore a key tool for firms to be able to assess and manage the financial risks from climate change risk, under different future pathways. As such, the Bank's strategy includes a focus on the development of frameworks to undertake scenario analysis.

In addition to requiring firms to conduct their own scenario analysis under its supervisory expectations, the Bank is utilising its stress-testing framework to assess the impact of climate-related financial risks on UK financial firms and the financial system. In the [2019 Insurance Stress Test \(IST\)](#), the PRA included an exploratory exercise in relation to climate change. The set of climate scenarios explored the impacts to both firms' liabilities and investments stemming from transition and physical risks. Building on the IST, the Bank announced plans to test the UK financial system's resilience to the financial risks from climate change as part of the 2021 BES. Recognising current pressures on firms, and in light of the responses to the December 2019 Discussion Paper on the Climate Biennial Exploratory Scenario, the PRC and FPC have agreed to postpone the launch of the exercise until at least mid-2021. The proposal for the Climate BES was set out in a Discussion Paper²² published in December 2019 and included three proposed scenarios covering a range of transition and physical risks, as shown in **Figure 3.1**. These charts show corresponding pathways for carbon price,²³ greenhouse gas emissions²⁴ and temperature outcomes for three scenarios. In each chart, the blue line illustrates a scenario where early policy action is taken to address climate risks, the orange line assumes that action is late and abrupt, and the purple line represents a scenario where no additional action is taken.

Figure 3.1 Indicative pathways for scenario variables in the 2021 BES exercise



²² Discussion Paper 'The 2021 biennial exploratory scenario on the financial risks from climate change', December 2019: <https://www.bankofengland.co.uk/paper/2019/biennial-exploratory-scenario-climate-change-discussion-paper>.

²³ Carbon pricing is an instrument that captures the external costs of greenhouse gas emissions and ties them to their sources through a price, usually in the form of a price on the carbon dioxide emitted. The external costs are the costs of emissions that the public pays for, such as damage to crops, health care costs from heat waves and droughts, and loss of property from flooding and sea level rise.

²⁴ Emissions of any gas that has the property of absorbing heat energy emitted from the Earth's surface and reradiating it back to the Earth's surface, therefore contributing to the warming of the Earth known as the 'greenhouse effect'.

The BES will allow the Bank to better understand the risks to financial stability and firms' safety and soundness from climate change and the transition to a carbon-neutral economy. By testing both insurers and banks, the Bank can aggregate results, helping the FPC to understand where there may be vulnerabilities within the financial system. A better understanding of the risks enables the Bank to ensure the financial system is resilient under different future scenarios, and can support the Government's transition to a carbon-neutral economy by 2050.

The Bank is leading work within the Network for Greening the Financial System (NGFS), a group of international central banks and regulators to develop an analytical framework for assessing climate-related risks.²⁵ This work will support the development of scenarios that can be used by central banks and regulators who want to size the impact of climate change on their economies. It will look at the different possible outcomes for climate change and the policies to mitigate it, assessing the financial impact and determining the timeframes during which risks could materialise.²⁶ The Bank will use the NGFS reference scenarios as the basis for those that firms are asked to model in the 2021 climate BES.

The Bank will also use the scenarios and results from the 2021 BES to assess any vulnerabilities it may face on its own balance sheet. This will build on the work done to analyse the exposure of the Bank's investment portfolios to the risks from climate change, which are set out in Chapter 4.

Reporting

The Bank has been working to improve the transparency of companies' exposure to climate-related risks. This is driven by an observation that consistent and comparable financial disclosures allow markets to assess, price and manage the financial risks from climate change more effectively. Management of these risks help institutions to understand their risk profiles and could help to mitigate a sudden re-pricing that impacts financial stability. The Bank's strategy on reporting is focused on encouraging disclosure across the firms it regulates and the broader private sector. It is working with domestic and international regulators and government to explore the benefits of mandatory reporting and possible paths for its implementation.

The Bank is a prominent supporter of the TCFD and has worked closely with the Task Force since its inception. It has supported widespread adoption through a number of channels: drawing attention to TCFD in the PRA's supervisory expectations (outlined above); hosting conferences to share best practice, for example on [scenario analysis in November 2017](#); and committing to undertake its own TCFD disclosure. Acknowledging the need for climate disclosures to occur across the real economy, the Bank is working with the UK Government and other regulators to achieve the Government's aim of all listed companies and large asset owners disclosing in line with the TCFD recommendations by 2022, as set out in its [Green Finance Strategy](#).

Return

The aim of the Bank's strategy on return is to better equip firms and investors to identify the frictions and the opportunities in the transition to a carbon-neutral economy.

The Bank complements its work on risk and return with market intelligence on relevant financial markets. The Bank has a dedicated [market intelligence function](#) that provides crucial insights beyond publicly available data, which are essential in helping to identify actual and incipient sources of monetary and financial instability. It also leads work on [fair and effective markets](#), alongside the FCA and HM Treasury. Market intelligence from both these activities allows the Bank to monitor the development of green and sustainable financial markets, and helps inform the Bank's policy response to climate-related risks affecting monetary and financial stability.

The Bank is also working to help deliver the Government's return-focussed elements in its Green Finance Strategy. These elements, characterised as 'financing green', are largely being taken forward by the Green Finance Institute, which the Bank supports through a number of channels. Associated with this, the Bank will

²⁵ 'Network for Greening the Financial System': <https://www.ngfs.net/en>.

²⁶ Further detail can be found in the NGFS's first comprehensive report 'A call for action', April 2019: <https://www.ngfs.net/en/first-comprehensive-report-call-action>.

play a key supporting role in the delivery of COP26,²⁷ which has workstreams devoted to return and to identifying innovative ways to finance green activities.

International cooperation

Climate change is a global issue that requires global solutions. Therefore, to complement the domestic work outlined above, the Bank has been actively promoting international collaboration on climate-related risks. The Bank has played an active role in encouraging coordinated action on risk assessment and disclosures internationally, including in the Basel Committee on Banking Supervision's Taskforce on Climate-related Financial Risks and through the G20 and FSB. In its February 2020 Communiqué, the G20 recognised FSB work to examine the financial stability implications of climate change and welcomed private sector disclosures. The Bank is a founding member of the [NGFS](#). The Network was co-founded by eight central banks and supervisors in December 2017. As of April 2020, membership has grown to over 65 members and 12 observers representing countries responsible for approximately 60% of global carbon emissions. Through the NGFS, the Bank aims to support central banks across the globe implementing consistent and effective responses to climate-related risks. This includes looking at the impact of climate change on supervisory, financial stability, and monetary policy objectives. The Bank also co-founded the [Sustainable Insurance Forum](#) (SIF) to advance supervisory responses to climate change in the insurance sector across the globe. SIF is a global network of insurance supervisors and regulators working together on sustainability challenges facing the insurance sector, including climate change.

Analytical work

To identify longer-term risks to its objectives, the Bank launched the Future of Finance project to consider how financial services might evolve over the next decade, and what this could mean for those who use, provide or regulate them. The [findings were published in June 2019](#). The Bank set out its [response to the Future of Finance review](#), committing to take action to support an orderly transition to a carbon-neutral economy.

Analysis of the impact of climate change on the financial system and the economy as a whole is still in its infancy. In addition to the analytical work done to support the three strands of the Bank's strategy, the Bank also commissions additional research to further the understanding of these risks. This research has included:

- [Staff Working Paper](#) on mortgage lenders' valuation of housing collateral after extreme weather events, published in March 2020. This finds that UK mortgage lenders do not value housing collateral against local price declines following flood events, resulting in upward-biased valuations.
- [Staff Working Paper](#) on risk differential of brown vs. green assets, published in January 2020. This finds evidence of a risk differential: mortgages against energy-efficient properties are less frequently in payment arrears than mortgages against energy-inefficient properties.
- [Joint article in Nature Climate Change on the climate change challenges for central banks and financial regulators](#), published in May 2018. This article presents the key controversies in central banks' and regulators' response to climate change, and potential areas for future research and policy;
- [Staff Working Paper on climate change and the macro-economy](#), published in January 2018. This focuses on the key theoretical and empirical modelling issues in the analysis of the macroeconomic risks deriving from climate change.
- [Staff Working Paper on the impact of climate change on central banks](#), published in May 2016. This paper examines the channels via which climate change and policies to mitigate it could affect a central bank's ability to meet its monetary and financial stability objectives.

The Bank is also promoting understanding of the importance of these risks via conferences with academia and industry. For example, in July 2016, the Bank held a joint [workshop with the Met Office](#) on climate risk and

²⁷ 'Launch of COP26 private finance agenda', February 2020: <https://www.bankofengland.co.uk/events/2020/february/cop26-private-finance-agenda-launch>.

financial stability; in November 2016, it held a joint conference, '[Central banking, climate change and environmental sustainability](#)' with the [Council on Economic Policies](#); and in January 2019, it hosted an NGFS conference on 'the macroeconomic and financial stability impacts from climate change'.

4 Risk management, metrics and targets

The Bank has a robust and well-established risk management framework²⁸ that spans all its functions, and sets out how risks are identified, assessed, managed, monitored and reported. The Bank's approach to climate-related risk management seeks to include climate risks within this existing risk management framework, complementing them with specific climate risk-related processes where necessary.

To capture the far-reaching and foreseeable nature of these risks, the Bank takes a forward-looking approach to risk management. Its current approach aims to improve its understanding of the impact of these risks across its functions to allow it to identify and assess them effectively. This includes collecting information on the climate exposures of its key suppliers. Although the Bank has already taken action to manage these risks across its functions, for example setting an ambitious emissions reduction target for its own premises, it intends to take further steps to enhance its current risk management processes to address climate-related risks more fully.

The analysis supporting this report and the climate-related disclosure in the 2019/20 Annual Report focused on identifying and assessing climate-related risks across the Bank's operations. This analysis has been separated into two distinct areas:

- risks relating to the Bank's institutional functions; and
- risks relating to policy implementation, in particular through financial asset holdings.

The rest of this chapter deals with each of these areas in turn.

Climate risk management, monitoring and reporting has been considered in the Bank's work but will be revisited and is expected to evolve significantly over the coming years as global standards develop and understanding of climate science and the underlying risks deepen.

Climate-related financial risks relating to the Bank's institutional functions

We have identified a number of areas where climate change could potentially generate risk in relation to institutional functions, and recorded the mitigation currently in place. These findings have been presented to the Executive Risk Committee as part of the Bank's Quarterly Risk Reporting process. Overall the direct risks facing the Bank's operations at present are considered to be managed appropriately. However there are some actions that the Bank plans to take to build further resilience to climate-related risk, including those listed in **Table 4.A** below.

The Bank's carbon footprint

In 2016 the Bank set the target of reducing its overall carbon emissions by 20% by 2020, against a 2016²⁹ baseline. In fact it achieved a 33% reduction for the year 2020, a reduction in emissions beyond that required for the Bank's target.

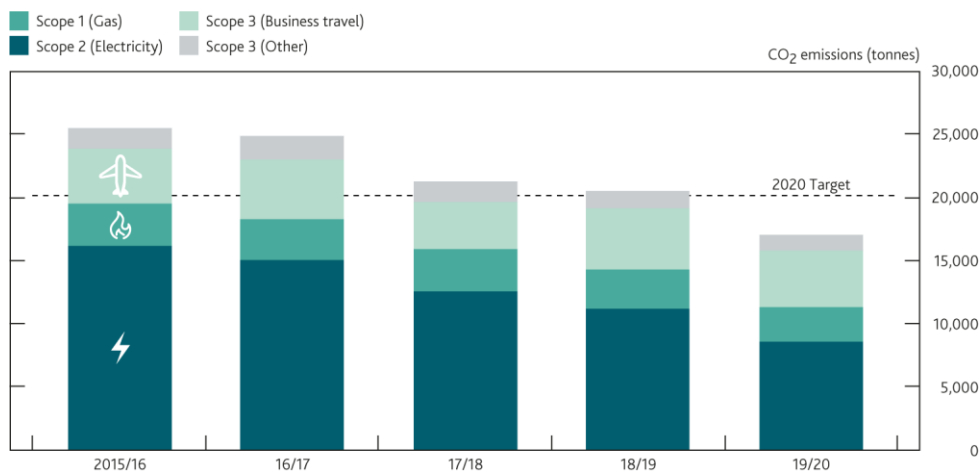
²⁸ Bank of England Annual Report and Accounts 2020, June 2020: <https://www.bankofengland.co.uk/annual-report/2020>.

²⁹ All references to the baseline relate to the financial year 2015/2016.

Table 4.A Processes for identifying, assessing, and managing climate-related financial risks to the Bank’s institutional functions

	Identifying and assessing climate-related risks	Managing climate-related risks
Banknotes	The Bank considers the most likely risks to banknote production from climate change to be the need to align with a carbon-neutral economy. As part of the move from paper to polymer banknotes, the Bank commissioned the Carbon Trust to study the carbon footprint impact. It certified that the lifecycle carbon footprint of polymer is 16% lower for £5 and 8% lower for £10.	A core aspect of managing this risk is reducing the carbon footprint of banknote production. To support this, carbon reduction plans are required as part of the polymer procurement process. Both chosen suppliers for the £50 have committed to carbon neutrality on the polymer substrate by 2021.
Capital investments	The Bank has identified that its long-term capital investments could be impacted by a potential increase in costs if a carbon price was introduced.	To mitigate the risk of future increases in the carbon price on its capital investments, the Bank is implementing an internal carbon price. This aims to support long-term decision-making and investing that is better aligned with a carbon-neutral economy. The carbon price has initially been set at £45/tonne CO ₂ . It will be reviewed at regular intervals.
Property	The Bank performs periodic assessments of its property exposure to climate-related risk. The most recent assessment showed that Bank buildings are located in areas with low flood risk; however, an increase in carbon price could expose the Bank to rising energy costs.	As a demonstration of the Bank’s commitment to combatting climate change, the Bank is supplied with 100% renewable energy (electricity and gas) across all its sites. For its remaining carbon emissions, the Bank has set a target for 2030, informed by current climate science, to reduce emissions in line with 1.5°C warming above pre-industrial levels. The Carbon Trust has independently verified this target.
Procurement	The Bank could be exposed to climate-related risks from its external suppliers for equipment, software, and facilities. To identify these potential risks, the Bank, under its Supplier Code of Practice , collects climate-related information from key suppliers, such as evidence of having considered their exposure to climate-related risk (physical, liability and transition risks).	The information provided by suppliers aids the Bank’s understanding of its supply chain vulnerabilities. In the future, if suppliers are deemed high-risk based on this information, the Bank may consider excluding them from the procurement process.

Chart 4.1 Bank emissions against 2020 target



This year, the Bank set itself a new target in line with the aims of the Paris Agreement and consistent with limiting global warming to 1.5°C above pre-industrial levels. The Bank based its 2030 target on the latest climate science and informed by Science Based Targets.³⁰

This target is to cut the absolute greenhouse gas emissions from our Scope 1 emissions³¹ (use of gas, fuel and refrigerants), Scope 2 emissions (electricity) and business travel by 63% by 2030 compared to the Bank’s 2016 baseline.

³⁰ Further information is provided in Annex 2.

³¹ These ‘scopes’ are further defined on page 23.

The new target reflects a number of developments since the first target was set, including significant improvements in climate science. It remains important that the Bank leads by example in the reduction of its own carbon emissions, so the new target is more ambitious, both in scale of emissions reduction and in time scale. The new target has also been set over a longer time-frame to better inform longer-term investments, such as capital investments in large equipment.

It is important that targets remain relevant, so minor changes to the calculation of our carbon footprint have been agreed. These updates reflect changes in the property estate and in the way that energy is purchased. For more details see annex 2.

Climate-related financial risks relating to the Bank's policy implementation

The Bank has a range of operations for the purposes of implementing policy. When lending money through such facilities, the Bank becomes exposed to its counterparties – in particular, the banks and building societies it lends to. To manage that financial risk, it accepts a wide range of collateral. The Bank has also purchased assets for the purpose of implementing monetary policy, held in its financial asset portfolios.

There are a number of main steps in incorporating climate-related risks into these operations: identifying where those risks could occur; working to understand and assess the nature and size of the risks; assessing their potential impact; and developing further the framework to manage them. The Bank's work to date has been primarily focused on information gathering and identification of potential climate-related risks, ahead of adapting risk assessment methodologies and risk management techniques as they are developed.

This report marks an important step in identifying and measuring the Bank's exposure to climate risks in its financial operations. Alongside development of external data metrics, results from the BES climate stress test should also help with estimating the financial implications of these risks, and how they impact counterparty credit, market and liquidity risks. Estimates such as these are likely to become more robust as climate models develop and as methodologies progress and become more standardised.

Table 4.B sets out how the Bank has made changes to identify and assess the nature of risks across its policy operations, and how these are managed so far.

Table 4.B Processes for identifying, assessing, and managing climate-related financial risks to the Bank's policy implementation

	Identifying and assessing climate-related risks	Managing climate-related risks
Counterparty exposures	The Bank has started to incorporate climate-related risk factors into the methodologies for assessing risks to its counterparties. This considers factors such as the extent to which climate-related risks are factored into counterparty business models and the impact of geographical and sector concentrations on counterparties' long-term loan and trading book performance.	The Bank uses credit assessments, risk committees and a limit and threshold structure to keep its exposures within agreed risk tolerance limits. It will look to refine its counterparty risk management methodologies to incorporate relevant climate-related risk information. Changes to financial risk tolerances could potentially be considered in the future to reflect climate-related risks more closely.
Sovereign exposures	Similarly, climate-related factors have started to form part of the risk assessment methodology for sovereign exposures. For example, transition risks are measured by assessing a sovereign's sectoral dependences, and physical risks are measured via geographic vulnerabilities and financial resilience.	As above, the Bank will look to refine its sovereign risk management methodologies to improve the way in which relevant climate-related risks are reflected, as it gathers more information.
Collateral holdings	The Bank accepts a wide range of collateral through its market operations. Climate-related risk questions are included in the Due Diligence Questionnaire for loan collateral . This includes asking counterparties for information on the expected impact of climate change, how climate-related risks are factored into valuations, and how climate-related risks are integrated into risk management frameworks.	The Bank undertakes through quantitative and qualitative assessments of collateral to determine the eligibility of assets and appropriate haircuts; the information collected in the Due Diligence Questionnaire forms part of that assessment. As more information is collected on climate risks from the due diligence questionnaires, changes to policies related to climate-related risks could be considered in the future.
Pension fund	The Bank invests the majority of its staff pension fund in UK Government or Government-backed bonds.	To manage any potential future climate-related risks to the Bank's pension fund, the Trustees have committed to ensure investments are made with regard to the financial risks from climate change. Therefore, any change in investment strategy would automatically consider these risks alongside other risk-return factors.

The Bank's financial asset portfolios

To assess the climate-related financial risk associated with the Bank's policy implementation, the Bank completed an in-depth exercise, working with external data providers to assess the risks from climate change to the Bank's financial asset portfolios. This analysis was undertaken on the Bank's financial asset portfolios as at end-February 2020, to align with the Bank's Annual Report and Accounts. This means it does not capture extensions to the portfolios as part of the Bank's response to Covid-19. A summary analysis of the work performed is set out below.

Introduction and description of the portfolios

The Bank's financial asset portfolios are held either to implement the Bank's policy decisions, or to fund the Bank's wider activities (**Table 4.C**).

By far the largest proportion of these assets (96%) is held in a separate legal vehicle known as the Bank of England Asset Purchase Facility Fund (BEAPFF), and indemnified by HM Treasury,³² to implement the MPC's asset purchase programme. Because 98% of that portfolio is in UK sovereign government bonds (known as 'gilts'), the climate characteristics of the Bank's financial investments are very similar to those of the United Kingdom overall. The other 2% of the BEAPFF portfolio is invested in UK corporate bonds, which also share characteristics similar to the UK in a number of ways.

The rest of this report is arranged in two parts: the first covering sovereign assets, and the second covering the sterling corporate bonds. For each part, metrics are included on: measures of the **carbon footprint** of the portfolios; measures of **transition risk**, assuming that the economy transitions in line with international climate goals; and measures of **physical risk**, showing exposure of the portfolios to extreme and other weather events associated with climate change.

Table 4.C Financial asset portfolios covered in this section

Investment portfolio	£bn, end-Feb 2020	Purpose	Investments made in:
Asset purchase facility (APF) <i>of which:</i>	509.7	Mandated by the Bank's MPC, as part of its asset purchase programme ³³ . Held in a separate legal vehicle and indemnified by HM Treasury.	Gilts (98%) and sterling investment grade corporate bonds (2%)
<i>APF Sovereign</i>	499.9		
<i>APF Corporate</i>	9.8		
Bank own funds	17.1	For policy implementation, and to fund the Bank's policy functions ³⁴ .	Gilts (72%), other sovereign and supranational bonds
Bank pension fund	4.9	To fund the Bank's staff pension scheme	Bank pension fund
Total	531.7		

Note: The data in this table, and the accompanying section, are as at end-February 2020. This means they do not capture extensions to the portfolios as part of the Bank's response to Covid-19. This assessment covers only non-current investment assets (i.e. >12 months to original maturity) and excludes the Bank's investment in the Bank for International Settlement.

³² BEAPFF Annual Report 2020, June 2020: <https://www.bankofengland.co.uk/asset-purchase-facility/2020/2019-20>.

³³ 'What is quantitative easing?': www.bankofengland.co.uk/monetary-policy/quantitative-easing.

³⁴ This includes the Bank's 'Sterling Bond portfolio': www.bankofengland.co.uk/markets/the-sterling-bond-portfolio.

Box 1

Data quality and limitations

Climate risk analysis for financial investments is still in its infancy. As such, there are currently limitations with data and analysis techniques, and big differences between alternative modelling methodologies. That means there are some important considerations when interpreting the metrics presented below, for both sovereign and corporate assets.

The carbon footprint metrics used depend on the accuracy and completeness of emissions data reported by non-financial companies and other actors, which are unaudited. Where reported data are absent, metrics rely on modelled estimates. The models underpinning these estimates use a range of approaches, for example based on the carbon intensities of comparable companies or estimating the emissions associated with a company's disclosed power generation mix. But the breadth and robustness of these models are untested. As demand for better disclosure increases from investors, the quantity and quality of carbon emissions data should increase, enabling a more comprehensive analysis of investment portfolios.

The transition and physical risk metrics used in this analysis only provide an initial indication of the risks facing the portfolios. Part of the purpose of doing this work is to understand the range of data available and to consider the strengths and weaknesses of alternative approaches. Estimates are likely to become more robust as climate models develop and as methodologies progress and become more standardised. The Bank will continue to monitor developments in climate risk modelling in order to develop and improve its understanding of the climate-related risks facing its investment portfolios and refine the metrics it uses to assess these risks.

Finally, there are also some asset types for which data are less readily available (eg assets issued by unlisted corporates, supnationals, and other government guaranteed issuers). This results in different levels of asset coverage throughout this analysis, and so there is a risk of some skewed results.

Engagement with the TCFD disclosure initiatives by financial firms should encourage the development and standardisation of climate-related risk metrics. And the use of this information for climate-related risk assessment and disclosure is key to promoting the transition to a low-carbon economy. The Bank has actively encouraged the widespread adoption of the TCFD recommendations to encourage progress in this area.

Sovereign asset holdings

Carbon footprint

Carbon footprint metrics provide an assessment of the greenhouse gas (GHG) emissions associated with a given investment portfolio.³⁵ These metrics are an important starting point for climate risk analysis as they provide a current view of the environmental impact of the investments in any given portfolio to date, and an initial indication of how investments may be affected by future climate-related risks.

The preferred metric for assessing the carbon footprint of an investment portfolio, as currently recommended by TCFD, is the Weighted Average Carbon Intensity (WACI). This calculates the average carbon intensity of a portfolio (GHG emissions measured relative to GDP for sovereigns, or total revenues for corporates), weighted by the relative size of the investments in that portfolio. This metric is useful as it allows for comparisons between similar types of assets and portfolios, regardless of investment size.

The metrics in this section look at a country's emissions on a production basis: i.e. emissions from all goods and services produced within a country's territorial boundary and consumed anywhere in the world. This is broadly

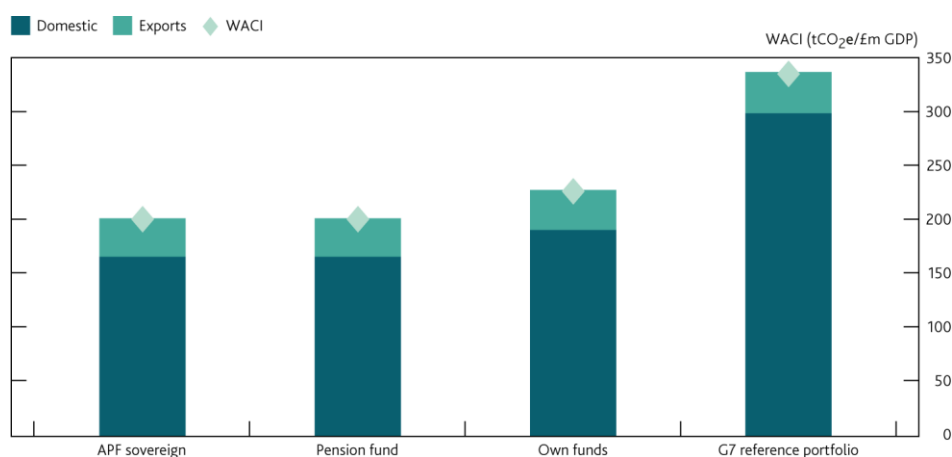
³⁵ In this report, GHG emissions include the seven gases recognised in the 1997 'Kyoto Protocol': https://unfccc.int/kyoto_protocol.

consistent with international standards on climate reporting, for example the National GHG Inventories set out by the Intergovernmental Panel on Climate Change – an intergovernmental organisation whose objective is to provide scientific information to help inform governments' climate policies. This measure does not account for imported emissions, a large component of many developed countries' emissions, owing to a lack of methodological consensus on how to calculate these, and because this would introduce double counting when aggregating across countries.

The UK has a low carbon footprint relative to other G7 nations, and therefore the WACI of the Bank's sovereign asset holdings is lower than that of a representative portfolio of G7 sovereign bonds (Chart 4.2).

The sovereign holdings in the APF and the Pension Fund are comprised entirely of gilts, and so the WACIs of both are the same as those for the UK sovereign. The WACI of the Bank's own funds portfolio is slightly higher than the other portfolios as measured here, though still well below the G7 reference portfolio, reflecting that approximately one third of the own funds portfolio is invested in the debt of sovereigns that have a higher carbon footprint than the UK.

Chart 4.2 WACI of the Bank's sovereign asset holdings



Sources: © S&P Trucost Limited 2020 (all rights reserved), and Bank calculations.

Notes: (a) This assessment is undertaken on sovereign bonds only, which comprise 100%, 71% and 98% of the APF sovereign, pension fund and own funds portfolios respectively, by portfolio weight. Other assets in these portfolios (i.e. supranationals, other government-guaranteed issuers) are not assessed here due to differences in calculation methodologies. (b) The 'G7 Reference Portfolio' represents a market-value weighted portfolio of G7 sovereign bonds. (c) 'Domestic' includes emissions from goods and services produced and consumed domestically. 'Exports' includes emissions from goods and services produced domestically and exported abroad.

Transition risk

The Paris Agreement,³⁶ signed in 2016 by members of the United Nations Framework Convention on Climate Change, sets out a global framework for combating climate change. The primary goals of this agreement are to keep the average global temperature rise this century below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C by 2100. Achieving these targets will require large scale reductions in GHG emissions globally – and those reductions will expose the economy to so-called 'transition risks'.

There are a number of ways of assessing the transition risks facing financial asset portfolios, and how these could be mitigated. One key indicator of transition risk is exposure to fossil fuel related activity. If all proven fossil fuel reserves were to be burnt, global emissions would far exceed the levels required to achieve the Paris Agreement. Therefore fossil fuel-related assets may become 'stranded' (i.e. remain unexploited), causing a fall in their economic value towards zero, as countries look to meet the Paris goals.

A method used to assess the **stranded asset risk** of countries is to estimate the contribution to GDP of activities relating to the extraction and production of natural resources. This can provide an estimate for sovereign bond

³⁶ 'The Paris Agreement', November 2016: unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.

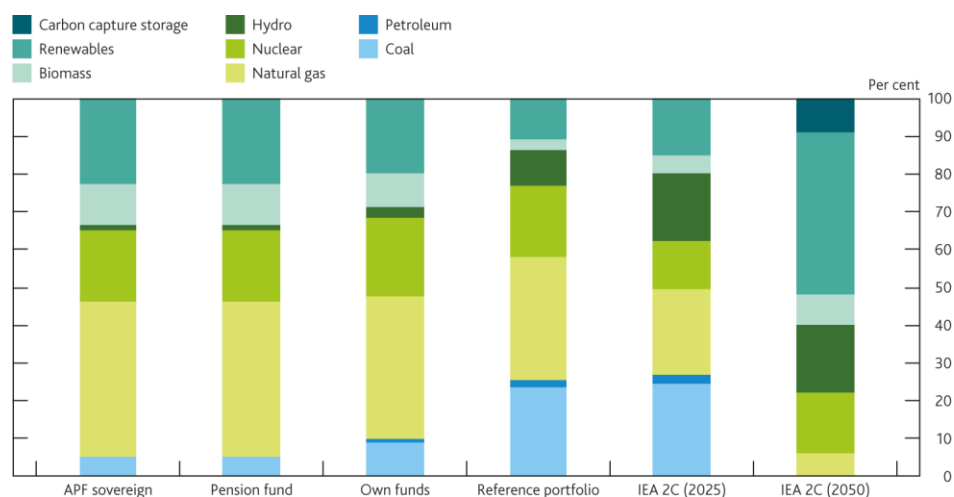
investors of whether stranded asset risk might be sufficient to affect the value of their holdings if those assets declined in value.

The UK has some exposure to the risk of stranded oil and gas assets through its remaining North Sea reserves. But the overall reliance on natural reserves is relatively low, at under 0.5% of GDP.³⁷

A related risk stems from **exposure to power generation activities**. To meet the Paris Agreement, a material shift in the composition of power generation away from fossil fuel combustion will be required. Countries that require a more significant structural shift away from fossil fuels are more exposed to risks associated with the transition.

Estimates of the future energy mix required to achieve <2°C warming can be derived, using data and scenarios from the International Energy Agency (IEA).³⁸ These enable comparisons between the current mix of power generation in a portfolio and where that mix would need to be at certain points in the future to achieve climate goals. **Chart 4.3** assesses the energy mix of the Bank's sovereign holdings against the mix estimated to be required over both a relatively short time horizon (2025) and a longer one (2050).

Chart 4.3 Power generation profile of the Bank's sovereign asset holdings compared with estimated IEA 2°C scenarios in 2025 and 2050



Sources: © S&P Trucost Limited 2020 (all rights reserved), and Bank calculations.

Notes: (a) This assessment is undertaken on sovereign bonds only, which comprise 100%, 71% and 98% of the APF sovereign, pension fund and own funds portfolios respectively, by portfolio weight. Other assets in these portfolios (i.e. supranationals, other government-guaranteed issuers) are not assessed here due to differences in calculation methodologies. (b) For the Bank's sovereign holdings, current power generation is estimated by taking the absolute amount of power produced by each country whose assets the Bank owns, and apportioning this to the portfolio based on the percentage of that country's outstanding sovereign debt owned by the Bank. (c) The G7 Reference Portfolio used represents a market-value weighted portfolio of G7 sovereign bonds. (d) The IEA scenarios aim to set out how the global energy sector can evolve to achieve climate goals.

Using this method, the results suggest that the UK is ahead of where it needs to be in the near term and ahead of the G7 reference portfolio and therefore the immediate exposure of the Bank's sovereign assets to transition risk is low. But, as organisations such as the Committee on Climate Change suggest, there is further for the UK to go over the longer term (Chart 4.3). The energy alignment of the APF Sovereign portfolio and the Pension Fund both reflect the UK more broadly – for example, the teal bars show that over 20% of the UK's power currently comes from renewable sources. This is ahead of the IEA 2025 scenario which suggests 15% of energy needs to come from renewable sources by 2025. Similarly the light blue bars show that the UK has a low reliance on coal, again putting it significantly ahead of the IEA 2025 target. However, significant rebalancing towards renewable and low emission energy sources will be needed over the longer term to

³⁷ Source: © S&P Trucost Limited 2020 (all rights reserved).

³⁸ The IEA scenario used here is based on the 2 Degree Scenario from the 2017 Energy Technology Perspectives paper. This scenario represents only one potential pathway to achieving <2°C of warming by 2100: <https://www.iea.org/topics/energy-technology-perspectives>.

achieve the sort of energy mix shown in the IEA 2050 scenario, in which for example renewable energy accounts for 43% of energy production.

The power generation mix of the Bank’s own funds portfolio is slightly different to that in the other portfolios due to its non-gilt holdings, but follows a similar pattern.

Independent organisations such as the Committee on Climate Change (CCC) publish analysis on the UK’s environmental performance relative to climate targets – in particular, the UK Government’s legislated net zero emissions target – which targets a 100% reduction of GHG emissions by 2050. The metrics published here are consistent with the CCC’s findings from July 2019 that, while the UK is a leader on action to tackle climate change, a material economy-wide transition will still be necessary over the longer term to meet its climate goals.³⁹

Climate-related risks to sovereigns could materialise in several other ways, depending on how they are mitigated. These are not discussed here, but include, amongst other things, international regulatory changes and potential reductions in competitiveness from increased carbon border taxes.

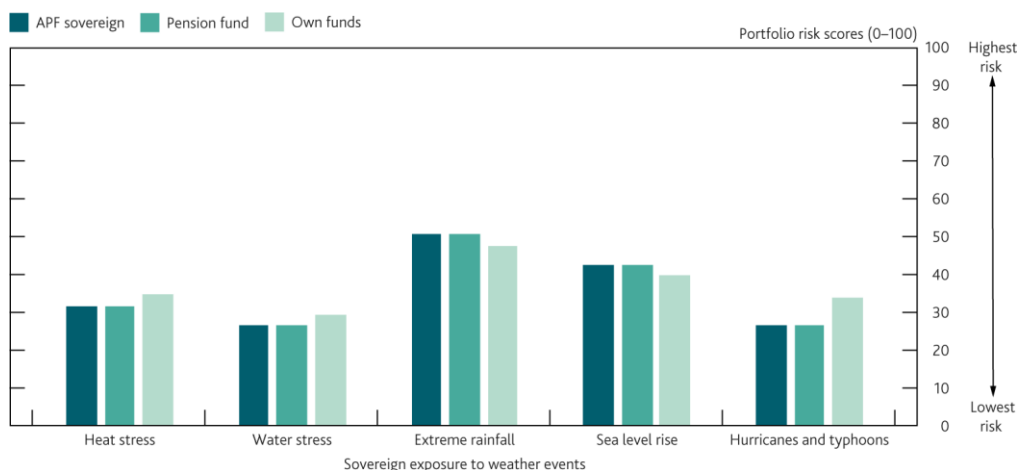
Physical risk

Investors in sovereign bonds will also be interested in a country’s susceptibility to **physical** climate risk, which depends on that country’s direct exposure to climate events and on its ability to withstand, prevent or recover from physical climate damage. The risks to sovereign asset holdings can be assessed based on countries’ historic and future exposure to climate events, the quality of their infrastructure, and the strength of their institutional framework.

One method uses a ranking to provide an estimate of the relative risk of countries across a number of key risk indicators. Each indicator is assigned a score from zero to 100, where zero indicates ‘lowest risk’ and 100 indicates ‘highest risk’, evaluated relative to a wide range of other countries.

Using this method, the results suggest that extreme rainfall and a rise in sea levels pose the most material physical risks to the Bank’s sovereign asset holdings (Chart 4.4). But all of the indicators are at or below 50, indicating that the risks to the Bank’s sovereign holdings are in the bottom half of risks faced by the range of countries assessed. Given the dominance of gilts in the Bank’s portfolios, this again reflects the profile of

Chart 4.4 Exposure to climate events in the Bank’s sovereign asset holdings



Sources: Four Twenty Seven, and Bank calculations.

Note: This assessment is undertaken for all assets in the ‘sovereign’ portfolios (i.e. all bonds issued by sovereigns, supranationals and other government-guaranteed issuers). For the purposes of this assessment, government-guaranteed issuers are assigned the same risk scores as the countries in which they are situated.

³⁹ The Committee on Climate Change (CCC) ‘Reducing UK emissions 2019 progress report’, July 2019: www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament/.

physical risks to the UK – which is in the 25th percentile of global risk scores, reflecting the UK's relatively moderate climate. The Bank's own funds portfolio, which also contains some non-UK sovereign assets, faces marginally greater risks from non-typical UK weather patterns such as hurricanes and typhoons.

Sterling corporate asset holdings

Carbon footprint

Corporate GHG emissions are commonly reported under three 'Scopes' as defined by GHG Protocol⁴⁰ – an industry body aiming to establish a global standardised framework for emissions. 'Scope 1' is a corporate's direct emissions; 'Scope 2' refers to emissions associated with the energy it has purchased; and 'Scope 3' is all other indirect emissions associated with the production and consumption of its products (**Table 4.D**).

Table 4.D The three scopes of GHG emissions reporting

Scope 1 GHG emissions	Scope 2 GHG emissions	Scope 3 GHG emissions
Direct emissions from owned or controlled sources: eg emissions in the manufacturing process of goods, use of company vehicles	Indirect emissions from purchased and consumed energy: eg electricity, steam, central heating and air conditioning	All other indirect emissions that occur through the generation and consumption of a company's goods and services: eg, business travel, waste disposal, consumption of goods, investments

Sources: Bank of England and GHG Protocol.

In this report, the metrics are focused on Scope 1 and 2 emissions. It is plausible that Scope 3 emissions may be the largest component of many companies' carbon footprint in practice. But corporate disclosure of Scope 3 emissions is currently limited, and there is a material risk of double counting when including Scope 3 in portfolio level statistics (one company's Scope 3 emissions is likely to be another's Scope 1 or 2). The Bank's assessment of APF corporate portfolio emissions uses the latest corporate disclosures available at the time of analysis, which are primarily from the 2018 financial year.

The carbon footprint of the APF corporate portfolio, as measured by the WACI metric, is broadly representative of the sterling investment grade corporate bond market. This is because of its investment remit and design (see Box 2 below).⁴¹

Chart 4.5 shows that the APF corporate portfolio's WACI is broadly in the range of comparable reference portfolios provided by external data providers. Precise comparisons to standard industry indices are difficult for a range of reasons. As set out in Box 2, the APF corporate portfolio excludes financial sector bonds and bonds with non-standard features, and requires eligible companies to make a 'material contribution' to the UK economy. As a result, relative performance against alternative indices depends on the inclusion or exclusion in those indices of financial firms, those judged to make a material contribution to the UK economy, and particular types of bonds (in particular, 'callable' bonds). Comparisons also depend on the convention used for the levels of consolidation of firms in different indices, for example whether UK operating subsidiaries have been mapped to their larger international parent companies.

⁴⁰ There are a range of alternative reporting initiatives, which are all broadly consistent, but the 'GHG Protocol' approach is the most commonly used standard: <https://ghgprotocol.org/>.

⁴¹ 'Corporate Bond Purchase Scheme: design, operation and impact', September 2017: <https://www.bankofengland.co.uk/quarterly-bulletin/2017/q3/corporate-bond-purchase-scheme-design-operation-and-impact>.

Box 2

APF corporate portfolio – eligibility criteria

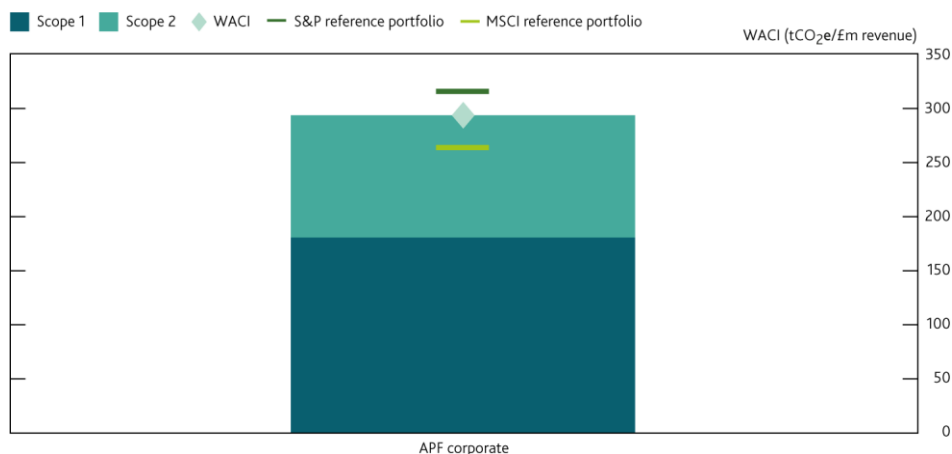
The investments in the APF corporate portfolio are held for policy purposes, and directly reflect the design of the Corporate Bond Purchase Scheme (CBPS) when it was launched by the MPC in 2016.

The CBPS was designed to lower the borrowing costs and support bond issuance of firms that make a material contribution to the UK economy – eg companies with significant employment, or headquarters, in the United Kingdom. Financial sector companies regulated by the Bank or the Financial Conduct Authority are not eligible; these typically have low direct emissions.

An important part of the design of the CBPS was to achieve the MPC's aim of imparting monetary stimulus in a way that was sector neutral: i.e. investments should not create distortions in the relative borrowing costs faced by companies in different sectors, by avoiding creating conditions that favoured one sector economically over another. This is done by investing in sectors in proportion to the total outstanding eligible issuance accounted for by each sector in the UK economy. For example, if the electricity sector accounts for 18% of total eligible bonds in issue, the portfolio aims to have 18% of its final portfolio allocation in the electricity sector.

The Bank's target sector shares are based on the nominal debt outstanding in the eligible universe, which is the eligible bond list as published on the Bank's website.

Chart 4.5 WACI of APF corporate asset holdings, split by emissions type



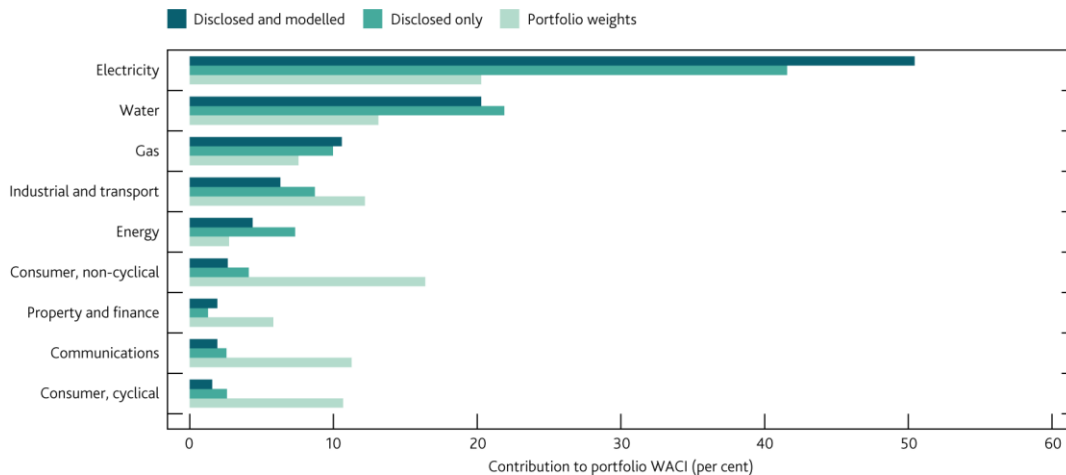
Sources: Certain information ©2020 MSCI ESG Research LLC reproduced by permission,⁴² © S&P Trucost Limited 2020 (all rights reserved) and Bank calculations.

Notes: (a) This assessment is undertaken on 100% of the bonds in the APF corporate portfolio, by portfolio weight. (b) S&P Reference Portfolio is the S&P U.K. Investment Grade Corporate Bond Index, which seeks to track the performance of debt issued by any investment-grade corporation denominated in GBP, regardless of domicile and market of issuance. (c) MSCI Reference Portfolio WACI numbers provided by MSCI ESG Research LLC, based on a hypothetical market-value weighted portfolio of sterling-denominated non-financial sector investment grade bonds. See www.MSCI.com/disclaimer.

⁴² For MSCI data used throughout this report: Although the Bank of England's information providers, including without limitation, MSCI ESG Research LLC and its affiliates (the "ESG Parties"), obtain information (the "Information") from sources they consider reliable, none of the ESG Parties warrants or guarantees the originality, accuracy and/or completeness, of any data herein and expressly disclaim all express or implied warranties, including those of merchantability and fitness for a particular purpose. The Information may only be used for your internal use, may not be reproduced or re-disseminated in any form and may not be used as a basis for, or a component of, any financial instruments or products or indices. Further, none of the Information can in and of itself be used to determine which securities to buy or sell or when to buy or sell them. None of the ESG Parties shall have any liability for any errors or omissions in connection with any data herein, or any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages.

Within the aggregate APF corporate WACI, there is significant variation in the carbon intensities of the sectors held in the portfolio (**Chart 4.6**). For example, the utility sectors (electricity, water and gas) constitute 40% of the portfolio by weight but account for just over 80% of the WACI. **Chart 4.6** shows that these results are broadly similar whether you include or exclude modelled emissions.

Chart 4.6 Sector contributions to APF corporate portfolio WACI, and sector weights



Sources: Certain information ©2020 MSCI ESG Research LLC reproduced by permission and Bank calculations.

Notes: (a) The 'Disclosed + modelled data' bar includes emissions data for all companies in the APF corporate portfolio, including publicly disclosed data by firms and modelled emissions where published data are not available. This covers 100% of the APF corporate portfolio by portfolio weight. (b) The 'Disclosed data' bar relies on disclosed data only and covers 70% of the portfolio's holdings by portfolio weight. (c) The 'Portfolio weights' bar represents the share of each sector in the APF corporate holdings as at end-February 2020. These weights are periodically disclosed on the Bank's website: www.bankofengland.co.uk/markets/bank-of-england-market-operations-guide/results-and-usage-data. (d) 'Energy' primarily relates to natural resource extraction and production activities.

Emissions performance against climate goals

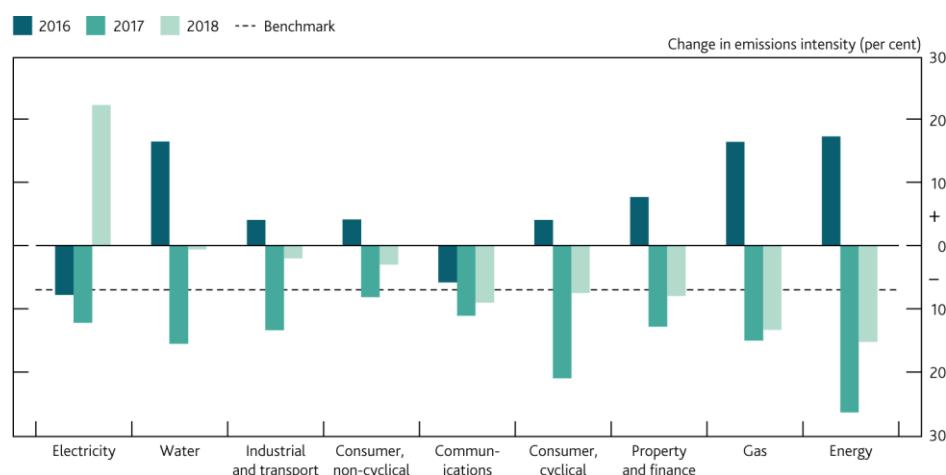
As the Bank's former Governor Mark Carney set out in February 2020,⁴³ achieving net zero emissions by 2050 will require a whole economy transition – companies will be required to reduce their annual GHG emissions materially if internationally agreed climate goals are to be met. In addition to the point in time estimates provided by the WACI, metrics that attempt to estimate a company's environmental performance against these goals can also provide useful information for investors. Many approaches are under development by the private and public sector to try to assess alignment of investment portfolios with Paris climate goals. These approaches range from simple backward looking estimates to more complex forward looking assessments.

One such simple approach is to look at historic reductions in carbon intensity. A year-on-year reduction of around 7%⁴⁴ is considered a very rough benchmark for cutting emissions in line with the Paris Agreement. At an aggregate level, estimates suggest that the average annual reduction since 2016 in carbon intensity of companies in the APF corporate portfolio is 3.5%.⁴⁵ But there are again material sectoral differences within this: around 30% of companies in the portfolio, and five out of the nine sectors, achieved a >7% average reduction in emissions intensity in 2018 (**Chart 4.7**), following across the board reductions greater than 7% in 2017. The measured increase in carbon intensity in the electricity category in 2018 was driven in part by a change in accounting standards impacting revenue recognition rather than by an increase in emissions in that year alone. This volatility – driven by revenue rather than emissions – is a weakness of using intensity metrics.

⁴³ Speech given by Mark Carney 'The Road to Glasgow', February 2020: www.bankofengland.co.uk/-/media/boe/files/speech/2020/the-road-to-glasgow-speech-by-mark-carney.pdf.

⁴⁴ This 7% year-on-year intensity target is associated with achieving <2°C under a series of idealised assumptions. However, the target is calibrated to achieve a reduction in absolute emissions of 75% by 2050 from 2010 levels and therefore individual companies may require significantly larger (or lower) annual reductions depending on where they need to be by 2050, how they have performed since 2010, and their revenue growth.

⁴⁵ Source: Certain information ©2020 MSCI ESG Research LLC reproduced by permission, based on coverage of 90% of the APF corporate portfolio by portfolio weight.

Chart 4.7 Average change in emissions intensity over time, by sector

Sources: Certain information ©2020 MSCI ESG Research LLC reproduced by permission, and Bank calculations.

More complex approaches to assessing portfolio alignment look at previous **and future** emissions and attempt to map them directly to future climate outcomes. These approaches can highlight important insights and trade-offs. For example, a company may belong to a high emitting sector – and so have a high carbon intensity today – but also have ambitious decarbonisation plans that could significantly contribute to the necessary transition in the future. Conversely, a company could have a somewhat lower intensity today but lack developed plans to bring that intensity down to the levels required to meet the Paris goals over the longer term. These sorts of trade-offs are important considerations for investors and policymakers when determining how to respond to climate change.

These forward looking approaches are driven by a range of assumptions about future emissions performance. Consensus has not yet been reached on the appropriateness of alternative methods. One of the work-streams of the COP26 Private Finance Agenda⁴⁶ is considering how to develop a framework for assessing portfolio alignment. In the absence of an industry wide standard, the Bank has engaged with several providers of this type of metric to produce a preliminary assessment of future climate alignment in the APF corporate portfolio. One of those approaches is set out in Box 3 for illustrative purposes, in keeping with the spirit of the TCFD to encourage the development of metrics.

Transition risk

Firms which have business models reliant on the extraction and combustion of fossil fuels are likely to, other things being equal, be more at risk as the economy transitions in line with climate goals.

The **stranded asset risk** for the corporate portfolio can be estimated by looking at the proportion of revenues of companies in the portfolio that come from fossil fuel extraction.⁴⁷ Extraction revenues constitute only 1.9% of the total revenue apportioned to the corporate portfolio (**Chart 4.9**) – although this measure is likely to underestimate the total business level exposure to extractive industries as it does not estimate revenue from downstream activities such as oil refineries (i.e. the processes that convert extracted fossil fuels into more useful products). **Chart 4.9** also shows that apportioned revenues relating to power generation constitute 9.5% of total revenues apportioned to the corporate portfolio, but only 2.2pp of this is from the combustion of fossil fuels.

⁴⁶ 'Launch of COP26 Private Finance Agenda', February 2020: <https://www.bankofengland.co.uk/events/2020/february/cop26-private-finance-agenda-launch>.

⁴⁷ For this analysis revenues are apportioned to corporate holdings based on the percentage of each company's enterprise value financed by the investor. A company's enterprise value is equal to its total debt plus the market value of its equity.

Box 3

Illustrative metric of APF corporate holdings' forward-looking emissions performance against climate goals

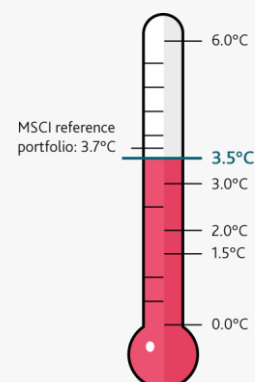
Various methods are under development that attempt to assess an investment portfolio's alignment with international climate targets. One example of these metrics is the 'portfolio warming potential', which attempts to estimate the level of future warming with which a portfolio is currently aligned. Under this approach, each company in the APF corporate portfolio is assigned a 'warming potential'. This is estimated by forecasting emissions intensity for each company out to 2030 and comparing this to the levels of emissions needed to achieve different levels of future warming (eg 3°C, 2°C or 1.5°C). These emissions levels are determined by a company's industry.

This metric suggests that if the projected emissions performance of the APF corporate portfolio was representative of the emissions performance of corporates globally, the world would experience 3.5°C of warming by the end of the century (**Chart 4.8**). That is similar to, but marginally below, the comparable MSCI reference portfolio shown in **Chart 4.5**.

Taken at face value, these results suggest three provisional conclusions;

- First, the sterling corporate bond market as a whole – which the APF holdings closely track – is not currently aligned with the long-term goals of the Paris Agreement. This finding is not surprising given that some estimates suggest the world is on track to experience >3°C of warming by 2100, even if all currently announced climate policies are fully implemented.⁴⁸
- Second, in evaluating appropriate investment holdings it is important to take into account both current and projected future carbon intensity. For instance, the MSCI reference portfolio has a marginally lower carbon footprint today than the APF (**Chart 4.5**), but a marginally higher forward-looking warming potential (**Chart 4.8**).
- Third, all of these evaluations need to take place against the backdrop of a recognition that there are currently significant methodological differences between alternative approaches to estimating the level of warming with which a portfolio is aligned. Other approaches from the data providers lead to a range of estimates from <1.75°C to 4°C for the Bank's corporate bond portfolio.⁴⁹ The differences in results are driven, amongst other things, by choices around the scope of emissions included, and different approaches to forecasting emission reductions and to aggregating from firm to a portfolio level.

Chart 4.8 APF corporate holdings 'portfolio warming potential'



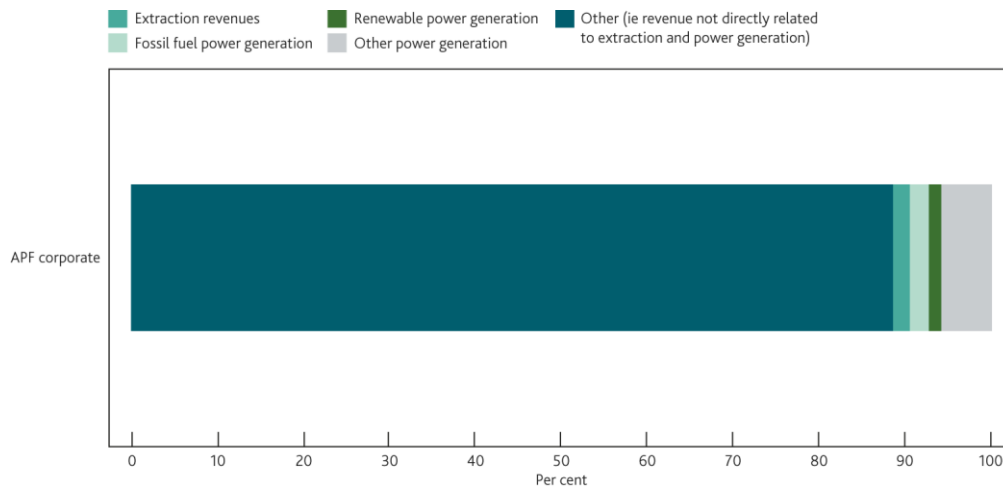
Source: Certain information ©2020 MSCI ESG Research LLC reproduced by permission.

Note: MSCI Reference Portfolio Warming Potential numbers provided by MSCI ESG Research LLC, based on a hypothetical market-value weighted portfolio of sterling-denominated non-financial sector investment grade bonds. See [MSCI.com/disclaimer](https://www.msci.com/disclaimer). This is the same MSCI Reference Portfolio used in **Chart 4.5**.

⁴⁸ 'Emissions gap report 2019', November 2019: <https://www.unenvironment.org/resources/emissions-gap-report-2019>.

⁴⁹ © S&P Trucost Limited 2020 (all rights reserved), certain information ©2020 MSCI ESG Research LLC reproduced by permission.

Chart 4.9 Total revenue apportioned to APF corporate holdings, split by revenue related to extraction and power generation



Sources: © S&P Trucost Limited 2020 (all rights reserved), and Bank calculations.

Notes: (a) This analysis covers only 71% of the portfolio by portfolio weight, given the coverage of the S&P database. Of the corporates not covered, many of these are in the utility sector, so the results may be skewed, however the majority of revenue stemming directly from power generation is covered. (b) 'Other power generation' includes nuclear power, landfill and other electric.

Overall, this partial analysis shows that there is limited direct exposure to fossil fuel related activity, suggesting modest risk to the Bank's corporate asset holdings in the short-term. However, this assessment covers only a very limited range of risks that companies could be exposed to in a transition scenario. As methodologies develop, the Bank will seek to improve its understanding of a fuller range of climate-related risks facing its portfolios.

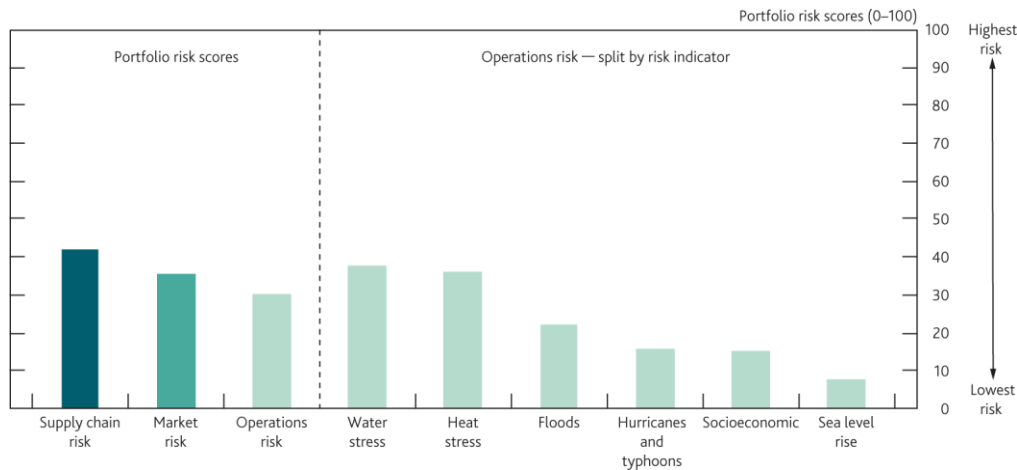
Physical risk

A similar method can be used for assessing physical risks in the corporate portfolio as is used for the sovereign portfolios. For corporates, these scores are a weighted average of three main channels of risk: the geographic location of their direct operations; the location of their supply chains; and the location of their consumer markets.⁵⁰

Using this method, physical risks to the corporate holdings taken as a whole look relatively low, with all relative risk indicators scoring below 50 out of 100 (Chart 4.10). Even at an individual asset level, less than 1% of APF corporate holdings assessed have an overall company climate risk score greater than 50. This result is again driven by the portfolio's UK focus and associated moderate climate conditions.

⁵⁰ Operations risk, supply chain risk and market risk receive weightings of 70%, 15% and 15% respectively in the calculation of company climate risks scores by data provider Four Twenty Seven.

Chart 4.10 APF Corporate holdings physical risk scores



Sources: Four Twenty Seven and Bank Calculations.

Notes: (a) ‘Operations risk’ is the summary score for a company’s owned or operated assets across all climate hazards and for ‘socioeconomic risk’, which is a measure of a company’s broader operating environment at country level. ‘Market risk’ is the summary score for a company’s exposure to physical climate risk within their end markets. ‘Supply chain risk’ is the summary score for a company’s exposure to physical climate risk within their supply chain, upstream of direct operations. (b) APF portfolio coverage, by portfolio weight, is 96% for supply chain and market risk, and 57% for operations risk due to a lack of asset-level location data. Sectors with weaker coverage include the electricity, water and industrial & transport sectors, which could skew some of the portfolio-level results.

Within this aggregate, the companies whose debt is held in the APF corporate portfolio face greater physical risks to their supply chain than from direct threats to their operational locations: 48% of all companies assessed have supply chain risk scores greater than 50. The largest contributors to supply chain risk are the consumer non-cyclical and electricity sectors, as a result of their overseas supply chains and their relatively high dependency on natural resources.

Chart 4.10 also shows that the APF corporate portfolio is estimated to be more exposed to incremental climate change, such as ‘heat stress’ (the increase in frequency and severity of hot days) and ‘water stress’ (drought-like patterns), than through extreme weather events (eg hurricanes and typhoons). The sector most affected by these climate events is consumer non-cyclicals, which includes industries that have a high demand for water (eg food and beverage companies, pharmaceuticals).

Annex 1

Abbreviations

APF – Asset Purchase Facility

Bank – The Bank of England

BEAPFF – Bank of England Asset Purchase Facility Fund

BES – Biennial Exploratory Scenario

CCC – Committee on Climate Change

CFRF – Climate Financial Risk Forum

CO₂ – carbon dioxide

COP26 – the twenty-sixth session of the Conference of the Parties

Court – Court of Directors

Covid-19 – severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

FCA – Financial Conduct Authority

FPC – Financial Policy Committee

FSB – Financial Stability Board

G7 – Group of Seven – Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.

G20 – Group of Twenty – Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom and the United States.

GDP – gross domestic product

GHG – greenhouse gas

IEA – International Energy Agency

IST – Insurance Stress Test

MPC – Monetary Policy Committee

NGFS – Network for Greening the Financial System

pp – percentage point

PRA – Prudential Regulation Authority

PRC – Prudential Regulation Committee

SBT – Science Based Target

SIF – Sustainable Insurance Forum

SM&CR – Senior Managers and Certification Regime

TCFD – Task Force on Climate-related Financial Disclosures

WACI – weighted average carbon intensity

Annex 2

Bank carbon target for 2030

Overview

The Bank has set an ambitious target for cutting its carbon emissions by 2030. To do this it first recalculated the baseline carbon footprint to take account of changes to the Bank's estate, sources of emissions and how it buys energy. This new baseline was then used as a starting point to set a new target, which includes the emissions the Bank can most effectively influence. The Bank will report on its footprint every year in its Annual Report. This annex sets out the changes made to the baseline and details of the new target.

Baseline

The Bank made three changes to how it calculates its baseline carbon footprint to reflect better its operations. It removed Roehampton Sports Centre from the calculations, as it is in the process of being sold. It moved to a market-based emissions factor approach, which means that the Bank's electricity emissions are now calculated on the basis of its energy supplier's carbon emissions, rather than the national average. This allows the Bank to reflect more accurately the emissions associated with the electricity it purchases. And the baseline calculation has also been amended to include the carbon footprint of the paper and polymer used in bank note production; note production will represent an increasing proportion of the Bank's carbon footprint as other sources of emissions are reduced.⁵¹

The Bank will publish an additional metric on carbon emissions per 1000 finished notes. This will reflect the carbon associated with the note substrate manufacture (polymer and paper), but will not include lifecycle emissions. Publishing this additional metric will allow changes to the carbon efficiency of substrate production to be tracked independent from the quantity of banknotes being produced.

The Bank's baseline carbon footprint is calculated with reference to its performance in 2016.⁵² The changes made to the baseline calculation result in the adjustments to the 2016 baseline set out in **Table A2.1** below.

The re-baselined figure is lower than the original, largely due to a reduction in the emissions associated with electricity consumption. This is because the Bank's electricity provider supplied electricity that was below the grid average in terms of carbon emissions. Gas emissions have also dropped slightly, due to the upcoming removal of the Roehampton site and the gas consumption associated with heating that site.

Comparison of the Bank's carbon footprint and carbon target

Not all activities included in the Bank's carbon footprint are included in its carbon target: The Bank's carbon footprint includes the activities which produce the vast majority of its emissions, while the new carbon target focusses only on those emissions it can influence most effectively, around 83% of the Bank's carbon footprint for the baseline year. The Bank can influence these emissions by changing its behaviour, for instance by reducing business travel.

An analysis of the emissions included in the Bank's carbon footprint and carbon target is set out in **Table A2.2** below.

⁵¹ The figures reported refer to the carbon emissions due to the manufacture of the paper and polymer substrate, and do not refer to the lifecycle emissions of finished bank notes.

⁵² This refers to the financial year 2015/16.

Table A2.1 2016 baseline carbon footprint

Type of emissions	Activity	tCO ₂ e	
		Original	Re-baseline
Direct (Scope 1)	Natural gas	3,320	2,890
	Oil - generators	5	5
	Vehicles fleet	97	97
	Refrigerants ⁵³	N/A	53
	Subtotal	3,421	3,045
Direct (Scope 2)	Electricity	16,195	5,562
	Subtotal	16,195	5,562
Indirect (Scope 3)	Electricity transmission and distribution	1,337	1,271
	Air travel	4,334	4,334
	Rail travel	34	34
	Water	83	60
	Office paper	96	96
	Waste	20	32
	Paper (Notes) ⁵⁴	N/A	3,360
Polymer (Notes)	N/A	2,333	
	Subtotal	5,904	11,520
Total gross emissions (tCO₂e)		25,521	20,127

Table A2.2 Analysis of emissions included in the Bank's footprint

Type of emissions	Activity	Included in footprint	Included in target
Direct (Scope 1)	Natural gas	Yes	Yes
	Oil - generators	Yes	Yes
	Vehicles fleet	Yes	Yes
	Refrigerants	Yes	Yes
Direct (Scope 2)	Electricity	Yes	Yes
Indirect (Scope 3)	Electricity transmission and distribution	Yes	Yes
	Air travel	Yes	Yes
	Rail travel	Yes	Yes
	Water	Yes	No
	Office paper	Yes	No
	Waste	Yes	No
	Paper (Notes)	Yes	No
Polymer (Notes)	Yes	No	

There are some areas in which the Bank cannot make a significant emissions reduction. The production of banknotes is a key example of this as the polymer used represents a large proportion of the embodied carbon associated with banknote production. This cannot be reduced significantly within the GHG protocol reporting framework without reducing the number of bank notes printed or moving to recycled polymer. The Bank is unable to reduce the number of bank notes printed, and cannot move to recycled polymer for technical and security reasons. As such the Bank is unable to significantly reduce the carbon emissions associated with banknote production.

⁵³ When calculating the original carbon footprint, this data was not available. The refrigerant figure used in the re-baseline is based on a 3-year average for emissions associated with refrigerants 2016/17 to 2018/19.

⁵⁴ Banknote production was not included in the original carbon footprint (paper and polymer). 2015/16 represented the final year before the Bank started transition to polymer Bank notes, and paper made up 57% of production. As such, this year will not be representative future banknote production rates.

The Bank is taking action to reduce the carbon and environmental impact of banknote printing, including embedding carbon and environmental criteria in the tenders for the provision of new polymer. This has had a positive impact on supplier emissions, for example by encouraging suppliers to invest in carbon offsets to achieve carbon neutrality for polymer production. However the GHG protocol does not allow offsets to be counted when calculating organisational carbon footprint and reduction, and these will therefore not be included in the Bank's calculations.

2030 target

On the basis of the re-baseline noted above, the Bank has set the following target: **The Bank will cut its absolute emissions from Scope 1, Scope 2 and business travel sources by 63% by 2030, compared to its 2016 baseline.**

For the baseline year, the total emissions from these sources are set out in **Table A2.3**. The total carbon footprint, and progress towards targets will be published each year in the Bank's annual report.

Table A2.3 Total emissions for the baseline year

Type of emissions	Activity	tCO ₂ e
Direct (Scope 1)	Natural gas	2,890
	Oil - generators	5
	Vehicles fleet	97
	Refrigerants	53
	Subtotal	3,045
Direct (Scope 2)	Electricity	5,563
	Subtotal	5,563
Indirect (Scope 3)	Air travel	4,334
	Rail travel	34
	Subtotal	4,368
Total gross emissions (tCO₂e)		12,976

To set its 2030 target the Bank used a Science Based Target (SBT) method.⁵⁵ SBT is the best practice methodology for setting an evidence-based emissions reduction trajectory. SBTs are linked to the total volume of carbon that can be emitted into the atmosphere whilst keeping global temperature rises below 1.5°C. This global budget is then broken down by country and sector.

SBTs can be calculated based on the sector of operation, however at the time of developing the Bank's target there was no SBT approach for central banks. Instead the Bank applied the commercial buildings approach, which was considered to be the best fit given the nature of the Bank's operations. The trajectory for emission reduction to 2030 was informed by this methodology.

The full SBT methodology requires detailed investigation of emissions associated with the Bank's supply chain (i.e. emissions linked to products and services the Bank purchases). This is typically time-consuming and, as a result, expensive. The Bank has taken a more pragmatic and cost-effective approach. Its targets are calculated using the SBT methodology, but focus only on those emissions that have the largest impact, and that the Bank can influence. As a result the Bank's targets are informed by the SBT methodology, without official verification from the SBT Institute. The Carbon Trust have however verified the Bank's targets to 2030, reviewed its methodology and the recalculated baseline, and provide third party assurance that it considers the items reviewed to be sound.⁵⁶

⁵⁵ More information on Science Based Targets can be found at <https://sciencebasedtargets.org/methods/>.

⁵⁶ 'Validation letter: Bank of England set Science Based GG emissions target', June 2019: <https://www.bankofengland.co.uk/-/media/boe/files/about/carbon-trust-sbt-validation-letter.pdf>.