



THE ROAD TO NET-ZERO FINANCE

A report prepared by the Advisory Group on Finance
for the UK's Climate Change Committee

Chaired and authored by Nick Robins
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The Advisory Group on Finance and this Report

The Advisory Group on Finance (AGF) was formed by the Climate Change Committee (CCC) as a group of independent external experts, acting in their personal capacities. The AGF was established to support and critically evaluate the development of the CCC's assessment of the role of finance in meeting the 6th Carbon Budget (2033-2037) and the UK's net-zero emissions target. The AGF's core task was to set out the role for finance in delivering the 6th carbon budget and identify how Government can support this at least cost.

The AGF was chaired by **Nick Robins** (Professor in Practice for Sustainable Finance at the LSE Grantham Research Institute) working with **Roberta Pierfederici** (Policy Fellow at the LSE Grantham Research Institute) and comprised the following experts:

- **Ben Caldecott**, Director of the Oxford Sustainable Finance Programme, University of Oxford.
- **Ingrid Holmes**, Head of Policy and Advocacy – International, Federated Hermes.
- **Andy Howard**, Global Head of Sustainable Investment, Schroders.
- **Daniel Klier**, Global Head of Sustainable Finance, HSBC.
- **Rishi Madlani**, Head of Sustainable Finance and Just Transition, NatWest.
- **Rhian-Mari Thomas**, Chief Executive Officer, Green Finance Institute.
- **Steve Waygood**, Chief Responsible Investment Officer, Aviva Investors.

The AGF was set up in March 2020 and held four meetings. Its work involved mapping the current financial landscape in terms of delivering the net-zero target, reviewing the CCC's estimates of financial requirements and exploring the barriers that could impact the efficiency (cost), effectiveness (hitting the target) and equity (fairness) of the financing required. The AGF also examined the implications of the COVID-19 crisis for the financing of UK's net-zero and wider sustainability goals. From this, the AGF derived a set of principles for the successful financing of the transition. Using these, the AGF developed a series of recommendations for government to overcome these barriers and build the financial system needed to achieve the UK's climate goals. The AGF also considered the international context for the delivery of the UK's climate financing goals not least in the context of COP26. Finally, it examined how the UK's progress to net-zero finance could be tracked in the future.

This report has been prepared by Nick Robins with support from Roberta Pierfederici as a chair's summary and draws on inputs from all AGF members. The authors would like to acknowledge the support provided by the Economic and Social Research Council (ESRC) through the Centre for Climate Change Economics and Policy (CCCEP).

The Advisory Group would like to thank the CCC's secretariat for its excellent management of the process, notably Jake Langmead-Jones, Mike Hemsley and Mike Thompson. The AGF would also like to acknowledge the inputs and feedback from other members of the secretariat as well as Committee members themselves.

Executive Summary

Making finance consistent with the delivery of a net-zero and resilient economy is the crucial third goal of the Paris Agreement. As the UK seeks to deliver its target of reaching net-zero emissions by 2050, a more systematic approach to financing is now needed.

Net-zero is not yet embedded into routine financial decisions or policies

Net-zero is increasingly recognised as an important goal by leaders within the UK's financial community, but it is not yet embedded into routine decision-making and policy. Strikingly, COVID-19 has deepened rather than deflected financial sector commitment to climate action. The way the UK exits from COVID will profoundly shape its ability to meet its climate targets and achieve wider economic goals, not least in terms of levelling up prosperity across the country. An ambitious green recovery plan that accelerates investment in a net-zero, resilient and just transition is not just needed, but is also called for by business, finance and citizens.

The net-zero economy of the future will be more capital-intensive, but mobilising the investment required is achievable with effective policies and responsive markets. Specifically:

Mobilising the investment needed for the next decade is achievable with effective policies and responsive markets

- **The next decade is pivotal:** the CCC estimates that extra net-zero investment needs to grow five-fold from c£10bn/year in 2020 to around c£50bn in 2030, before peaking in 2035.
- **Net-zero investment will generate considerable savings:** Additional investment will not only produce emission reductions, but will also generate major financial savings in operating costs.
- **Smart policy could cut the cost of capital by over three-quarters:** Policy risk raises the cost of capital and the CCC estimates that effective policy could cut this from £17bn/year in 2050 to £3bn/year.

The investment needed for net-zero is eminently deliverable once existing obstacles are removed

The depth of the UK's capital markets along with its growing expertise in sustainable finance means that this significant ramp-up in the scale of investment is eminently deliverable. But it will mean being resolutely focused on removing the obstacles that exist. Market, policy and institutional failures continue to undermine the predictable cash flows that are needed to build investment pipelines at scale. Effective demand for net-zero finance remains mixed: growing in the energy sector, almost non-existent in housing. New strategies and mechanisms are also needed to make net-zero the default option for lending and investment. Decision-useful data is improving, but it is still incomplete and inconsistent. Good data also needs to be complemented by enhanced climate expertise amongst the UK's finance professionals so that they can effectively serve and support their customers,

whether households, SMEs, large corporates or the public sector through the transition.

The UK financial system must go beyond managing climate risk and focus on net-zero as a key goal

The increasing expectations of UK regulators are certainly focusing attention of financial institutions on climate risk, but further steps are required to make the overall regulatory regime fit for the net-zero age. The UK's public finance architecture has not yet been updated in light of the net-zero goal, both in terms of existing institutions and filling institutional gaps. In terms of practical delivery, financing net-zero will need to be connected to wider issues of resilience and fairness, enabling local and regional financing solutions. Internationally, the UK's efforts to deliver net-zero finance will have to be closely connected with global regulatory and market initiatives. Finally, the UK lacks a dashboard of metrics that measures how well it is aligning finance with its climate goals.

The AGF has identified five principles to make net-zero finance a reality

Based on these findings, five principles should guide policy and practice to make net-zero finance a reality: first, recognise that the financial requirements for net-zero can be met with good policies and practices; second, shift the mindset from managing climate risks to aligning finance with net-zero as well; third, make real economy policies investable to attract capital; fourth, design financial policy and regulations with net-zero in mind; and fifth, successful net-zero financing in the UK will depend on shaping and developing effective international frameworks. Using these principles, the Advisory Group has made 15 recommendations that can help to overcome the current obstacles, set out on the next page.

Taken together, these recommendations aim to provide an interconnecting set of measures that will make achieving net-zero part of the purpose of the UK's financial system, give clarity and direction to the UK's financial institutions, and thus mobilise the capital required earlier, cheaper and with more co-benefits. Realising net-zero finance is not just a national and global imperative. It offers a strategic opportunity for the UK's financial sector for the next decade and beyond.

A. Strategic



- 1. The UK should commit to be the world's first net-zero financial system**
- 2. Make net-zero projects and plans investable**, by increasing the predictability of cash flows and reducing risks through sector pathways, carbon pricing and de-risking
- 3. Design net-zero policies so that investments are resilient, fair and enable local action**, for example, by introducing a just transition strategy

B. Private finance



- 4. Ensure that market innovation delivers net-zero finance** through sector-specific strategies and system-wide instruments
- 5. Deepen the skills and capacity of the UK's financial professionals** to support their customers and clients in the transition
- 6. Build the literacy, expertise and confidence of the users** of UK financial services to understand and demand climate-aligned product

C. Financial regulation



- 7. Fully integrate climate risk and net-zero** into financial regulation and monetary policy (including assessing legacy rules for alignment)
- 8. Make net-zero targets and plans mandatory for financial institutions**
- 9. Extend investor stewardship** to incorporate the achievement of net-zero
- 10. Set clear metrics** for the net-zero transition at the institutional and product levels

D. Public finance



- 11. Use post-COVID recovery plans** as an opportunity to fast-track climate investment, reset fiscal incentives and connect public debt with climate goals (including through a green sovereign bond programme)
- 12. Set net-zero and sustainability goals** for existing public financial institutions
- 13. Establish a National Investment Bank** with a clear net-zero and sustainability mandate

E. International frameworks



- 14. Build the international frameworks** that can accelerate the financing of net-zero, resilience and a just transition, using 2021 as a key milestone with COP26 and the G7 presidency (for example, through the establishment of an International Platform for Climate Finance).

F. Tracking progress



- 15. Establish a regular assessment of investment needs and financial flows** for climate action in the UK, including net-zero, resilience and a just transition.

1. Introduction

At the heart of the 2015 Paris Agreement is the goal of “making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development” (Article 2.i.c).ⁱ Strategically, climate-aligned finance covers the net-zero, resilience and wider development dimensions; this report focuses on net-zero.

Net-zero momentum is building in the UK financial sector

Five years on, finance is more engaged than ever before behind climate action, with a small but growing number of institutions seeking to align their balance sheets and portfolios with the objective of net-zero emissions by 2050. Over the past year, the UK’s legally binding net-zero target has helped to catalyse new commitments and strategies from leading banks, insurers and investors. The UK has been at the forefront in both designing and implementing better climate reporting through the Task Force on Climate-related Financial Disclosures (TCFD). In addition, the deepening climate expectations of the UK’s financial regulators – notably the Bank of England and the Prudential Regulatory Authority (PRA), the Financial Conduct Authority (FCA) and the Pensions’ Regulator (TPR) - have concentrated the minds of regulated firms in terms of risk, culture and business strategy. And pressure from citizens, civil society and consumers on both government and finance is adding to the momentum for change, symbolised by the recent launch of the Make My Money Matter campaign.

These steps are all welcome in terms of direction. But the UK’s financial system is still far from alignment with the net-zero goal. The 2019 Green Finance Strategy set out a first set of priority actions needed to make financial flows in the UK consistent with its climate goals.ⁱⁱ Yet, the scale and speed of the required transition led the CCC to conclude in its 2020 progress report to Parliament that “there is a clear case for a more comprehensive approach to harnessing finance for climate action.”ⁱⁱⁱ

The severe economic impacts of the COVID-19 pandemic will shape the 2020s, pivotal years for action to achieve net-zero

This need has been powerfully reinforced by the COVID-19 crisis. Beyond the tragic human costs and loss of life, the necessary lockdowns have had severe economic impacts in the UK and internationally, bringing the threat of a major global depression. Just as the Global Financial Crisis and its aftermath profoundly impacted the decade that followed, so the legacy of COVID-19 is set to shape the rest of the 2020s. These are the pivotal years when action to deliver the UK’s green goals not only needs to get on track with existing carbon commitments, but also gain significant ground in terms of net-zero, all the while contributing to levelling-up the economic and social prospects across the country. Doing this will require fresh thinking and action in the terms of the role of finance.

This report summarises the key findings of the CCC’s Advisory Group on Finance (AGF). Our aim has been to identify the changes in financial practice

This report is focussed on “financing green” within the UK

Decarbonisation can no longer be separated from the priorities such as resilience, levelling up and a just transition

that could be taken now that would put the UK on track for achieving the targets in the 6th Carbon Budget (2033-2037) en route to full decarbonisation by 2050. Using the Green Finance Strategy’s terminology, we have focused on what’s needed to ‘finance green’ investments to meet the UK’s domestic targets. With COP26 in mind, however, we have also examined the changes that could help the UK, which has one of the world’s largest financial centres, contribute to mobilising the capital required for the global transition to net-zero.

From the outset, the Advisory Group has sought to develop a joined-up approach that combines a focus on what is needed to create the real economy ‘demand’ for net-zero finance (e.g. carbon prices, policy and regulatory changes, economic incentives) as well as financial system interventions that can scale up the ‘supply’ of net-zero finance (e.g. market innovation, financial regulation, and public finance). The focus of the report is on the UK’s net-zero commitment, but the Advisory Group was clear that decarbonisation can no longer be separated from the accompanying priorities to build a green and resilient economy as well as ensure that the process is fair through implementing a just transition.

The rest of this report:

- Briefly describes the current landscape of UK finance for net-zero and climate (Section 2).
- Reviews the feasibility of the domestic UK financing requirements to deliver net-zero across key sectors of the economy (Section 3).
- Details the main challenges and barriers to the flow of net-zero finance (Section 4).
- Lays out principles to guide policymaking and market practice (Section 5).
- Proposes a set of recommendations for Government, focusing on the domestic UK level, at the same time recognising the international role of the UK financial system (Section 6), and
- Closes with a summary of conclusions for the CCC (Section 7).

2. The Landscape of Net-Zero Finance

2.1 Growing signs of commitment to net-zero finance

Net-zero goals are being adopted by leaders in the financial sector

Net-zero is increasingly recognized as a critical goal by UK and global financial institutions. UK investors (such as Aviva and the Church of England) are among the members of the international Net-Zero Asset Owners Alliance, who have pledged to make their portfolios aligned with a 1.5 Celsius warming target by 2050. Other investors are setting carbon neutrality targets in the 2030s: South Yorkshire Pension Fund (2030); BT Pension Fund (2035), Cambridge University (2038). Investor pressure has also been behind the adoption of net-zero goals by UK-listed oil and gas majors (notably BP and Shell), supported by initiatives such as the Transition Pathway Initiative. In addition, major UK banks have adopted new commitments to aligning their balance sheet with net-zero and scaling up green finance, again in some cases following pressure from their investors (eg Barclays, HSBC, Lloyds, NatWest). The Bank of England has also signaled the transition risks of net-zero by proposing that banks and insurers submit their 'temperature alignment scores' as part of its exploratory climate scenario exercise which will be finalized in 2021.^{iv} The Climate Financial Risk Forum, co-chaired by the PRA and the FCA, is also working to consolidate sector action, with its Innovation Working Group recognizing the need for an asset allocation framework as well as a risk framework to deliver the net-zero goal.^v

Market valuations are responding to the net-zero transition

The significance of these steps in terms of market materiality is also being increasingly recognized in valuations as investors seek to avoid 'stranded assets' and reallocate flows to green investments. Traditional high-carbon sectors are being disrupted, with the combination of long-term transition risks and the COVID-19 shock prompting nearly US\$40bn of impairments at BP and Shell alone. A glimpse of the financial transformation underway can be seen in the recent convergence in the market capitalization of Orsted (formerly Danish Oil and Natural Gas, DONG) and BP. Orsted's steady rise as it divested its fossil fuel assets and reinvested in offshore wind is not just a sign that transformation is possible over a short timeframe. This is also a very British story, with Orsted accounting for nearly two-thirds of UK offshore wind and the UK accounting for about the same proportion of Orsted's installations. This shows that well-designed policy can deliver market restructuring and attract finance for breakthrough businesses.

Net-zero finance is needed in all sectors of the economy

The energy system is clearly at the heart of the net-zero transition. But the challenge is far greater and requires structural change across the whole economy from housing and transport through foundation sectors (such as chemicals and steel) to sectors that could become cornerstones of the green economy (such as hydrogen) as well as a profound rethinking of nature-

based business models in agriculture, carbon management and forestry. In each case, net-zero finance will be a vital enabling agent of change.

2.2 Net-zero is not yet embedded as a structural feature of the financial system

These leading signals are impressive, but they should not deflect attention from the reality that even commitment to net-zero is still not embedded across the £20 trillion in assets within the UK financial system; alignment itself remains far-off.

Net-zero is not yet mainstreamed across the UK's £20 trillion financial system

Physical, transition and litigation risks flowing from the disruption of the climate can create 'stranded assets' at the micro-level and disrupt the stability of the financial system as a whole. However, UK financial institutions and markets are still not factoring climate-related risks into their pricing of assets in a comprehensive way. Financial risk management remains short-term whereas climate factors are both short- and long-term ('the tragedy of the horizon'). For UK financial institutions, this challenge of risk management applies to all assets across the globe and extends far into the future. The structural reasons for this continuing mismatch are tackled in Section 4 below. To take one example, a majority of UK pensions schemes are not yet meeting basic requirements to consider material environmental, social and governance (ESG) and climate risks in their statement of investment principles.^{vi} Recent government proposals to require all large occupational pension schemes to have effective climate management in place are a positive step in the right direction. To be successful, it will be crucial to ensure that these and other regulatory measures drive changes in fundamental behaviour rather than simply narrow compliance.^{vii}

The UK will need to go beyond measuring climate risk and align its financial flows to be consistent with net-zero

More profoundly, work to make UK financial flows consistent with the country's net-zero goal are to at an even earlier stage of evolution. Managing climate risks to financial assets is clearly necessary to deliver net-zero, but it is far from sufficient. Capital also needs to move at scale towards activities and assets that are enabling households, firms and public authorities to make net-zero a reality. Here, the scale of net-zero finance remains unclear. One metric of alignment is the issuance of green bonds, fixed income assets whose proceeds are linked to climate and other environmental goals. The UK remains well outside the Top 10 in terms of countries issuing green bonds, an oddity given the City's leadership on many aspects of the green finance agenda.^{viii}

Green bonds are clearly an important tool at the vanguard of the transition. But the task of financing climate action demands far more. It is vital that the momentum demonstrated so far in the green bond market and other pioneering areas now produces market-wide change. This means generating real additionality in terms of improved market information, better market pricing of climate factors, extra flows of capital for the transition as well as

reduced risks across the UK's financial system. As a result, attention is now extending from green to transition finance, with a focus on speeding the shift in high-carbon sectors.^{ix}

There needs to be a robust assessment of the alignment of both the flows of capital and the stocks of assets with the UK's net-zero target

All of this points to the need for a robust assessment of the alignment of both the UK's annual flows of finance and also its stock of financial assets with the country's net-zero target. This needs to cover both primary investment (e.g. to retrofit a building) as well as secondary markets (e.g. the consistency of a listed equity portfolio with net-zero). To enable the UK to understand the extent to which it is delivering the Article 2.i.c financial consistency test of the Paris Agreement a dashboard of metrics is needed.

One priority for this dashboard is a clear understanding of the level and sufficiency of capital investment flows made by households, firms and public authorities to achieve the UK's climate goals. The Office of National Statistics (ONS) maintains a set of environmental accounts, which includes investment flows, but this does not cover all the sectors needed for net-zero.^x Internationally, the UK is part of an OECD collaborative on tracking climate finance. Other countries are building their financial tracking capabilities. In France, for example, the Institute for Climate Economics conducts an annual assessment of this, and the latest data from 2019 shows climate finance rising from EUR35.8bn to EUR45.7bn from 2011 to 2018; I4CE estimates that there is still a funding gap of EUR15-19bn from the required 2019-2023 trajectory.^{xi} At present, however, the UK lacks a comparable climate finance assessment approach, making it harder to design effective private and public sector interventions.

A second priority for the dashboard is to understand the overall alignment of the UK's stock of financial assets with the Paris Agreement's goals of net-zero and resilience at both a UK and global scale. Individual investors are starting to publish their 'temperature alignment' scores ahead of regulatory requirement. The Bank of England has also estimated that the corporate holdings in its own Asset Purchase Facility had projected emissions of 3.5°C of warming by 2100, marginally below the comparable market benchmark.^{xii} The results of the Bank of England's forthcoming exploratory climate scenario could for the first time provide an estimate for the 'temperature alignment' of the UK financial system as a whole, enabling more targeted action by both financial practitioners and policymakers to close the gap with net-zero.

2.3 Sustainable finance and the COVID-19 shock

The COVID-19 has profoundly changed the context for achieving net-zero

The COVID-19 crisis is profoundly changing the context within which the UK and other countries will deliver their climate goals over the next decade and beyond. Clearly, the full implications are unknown, but some highlights are emerging:

- The UK economy will be far more indebted, both in terms of the public sector and business, with large levels of unsustainable private debt requiring recapitalisation.^{xiii}
- Unemployment levels will be considerably higher and inequalities deepened in terms of region, gender and race.^{xiv}
- The crisis has exposed the vulnerability of some high-carbon business models (e.g. aviation, fossil fuels), for example, bringing a peak in global oil many years earlier than expected.^{xv}
- COVID-19 has also placed a premium on the resilience of the financial system to nature-based threats, not just zoonotic pandemics, but the wider reliance on natural capital.
- The crisis is accelerating the digital economy, bringing forward changes involved in the Fourth Industrial Revolution and disrupting assumptions about asset values (e.g. commercial real estate).
- Finally, the crisis has also led to a number of pro-environmental behaviours and new social norms that could be built upon.

COVID-19 has deepened rather than deflected financial sector commitment to sustainability goals

In terms of the world of finance, COVID-19 has so far deepened rather than deflected financial sector commitment to sustainability goals. One factor has been performance: sustainability, it appears, is being vindicated in financial terms, with ESG investment funds performing less badly than the market in the initial downturn.^{xvi} The crisis has also amplified the case for a strong social dimension to climate action, addressing the inequalities that have been revealed and, in many cases, exacerbated. The importance of fairness as a core principle in the transition has become crystal clear, with increasing financial sector commitment to supporting a just transition, notably in the UK banking sector.^{xvii}

There is a clear desire from business, finance and the public that the government should deliver recovery plans to accelerate progress on net-zero goals

The result is a clear desire from business and finance as well as from UK citizens for the government to deliver COVID recovery plans that not only accelerate progress on net-zero goals, but also create jobs, build skills and support a just transition in high-carbon sectors.^{xviii} For example, a large majority of the members of the UK Climate Assembly (79%) “strongly agreed” or “agreed” that, “steps taken by the government to help the economy recover should be designed to help achieve net zero”.^{xix} Importantly, the government has signalled its desire to ‘build back greener’ and retains the fiscal capacity to drive an ambitious recovery rooted in its

climate commitments.^{xx} This could draw on excess household savings as well as Bank of England liquidity.^{xxi} Benchmarks from other European countries, such as France and Germany, suggest a green stimulus in the order of £30bn is needed both to overcome falling investment spending by business and provide a clear direction to the recovery. The government's July 2020 Plan for Jobs provided a first instalment of a green recovery plan at around £3bn, followed by the £12bn in the November 2020 Ten Point Plan for a Green Industrial Revolution (of which £3bn was new money)^{xxii}.

Against this backdrop, the next section focuses on the UK's investment requirements to deliver net-zero and their achievability.

3. Assessing the Feasibility of Mobilising Finance for the UK's Net-Zero Goal

A range of financial metrics need to be understood when developing cost-efficient, effective and equitable strategies to deliver the UK's climate goals, notably net-zero by 2050. These include:

To build cost-efficient, effective and equitable strategies to achieve net-zero, investment requirements, climate risk, asset alignment and return on investment must be understood

- **Investment Requirements:** this covers the estimated flows of capital investment required to deliver the UK's net-zero in different sectors of the economy. The net-zero economy will tend to be a more capital intensive than the current resource intensive economy.
- **Climate Risk:** this covers the financial implications of physical, transition and litigation risks over the short- and long-terms. Market failures means that climate risks are widely mispriced, pointing to disruptive changes in valuations as policy, technologies and preferences change.
- **Asset Alignment:** this covers the proportion of assets which is aligned with the net-zero goal in terms of bank balance sheets and investor portfolios. This is important to understand the contribution of the financial system as a whole to net-zero and the risks to financial stability from any failure to achieve alignment.
- **Return on Investment:** this has two aspects: first, the expected public return on these investments at a macro-level in terms of avoided climate damage as well as co-benefits such as reduced operating cost (such as energy consumption), improved health, job creation and innovation; and second, the private return on investment for individuals and institutions in terms of risk-adjusted financial returns as well as wider measures of impact.

The rest of this section focuses on the first of these metrics: investment requirements.

3.1 The net-zero economy will require more up-front investment

The CCC has outlined the additional low-carbon investments needed across the UK's economy to achieve net-zero

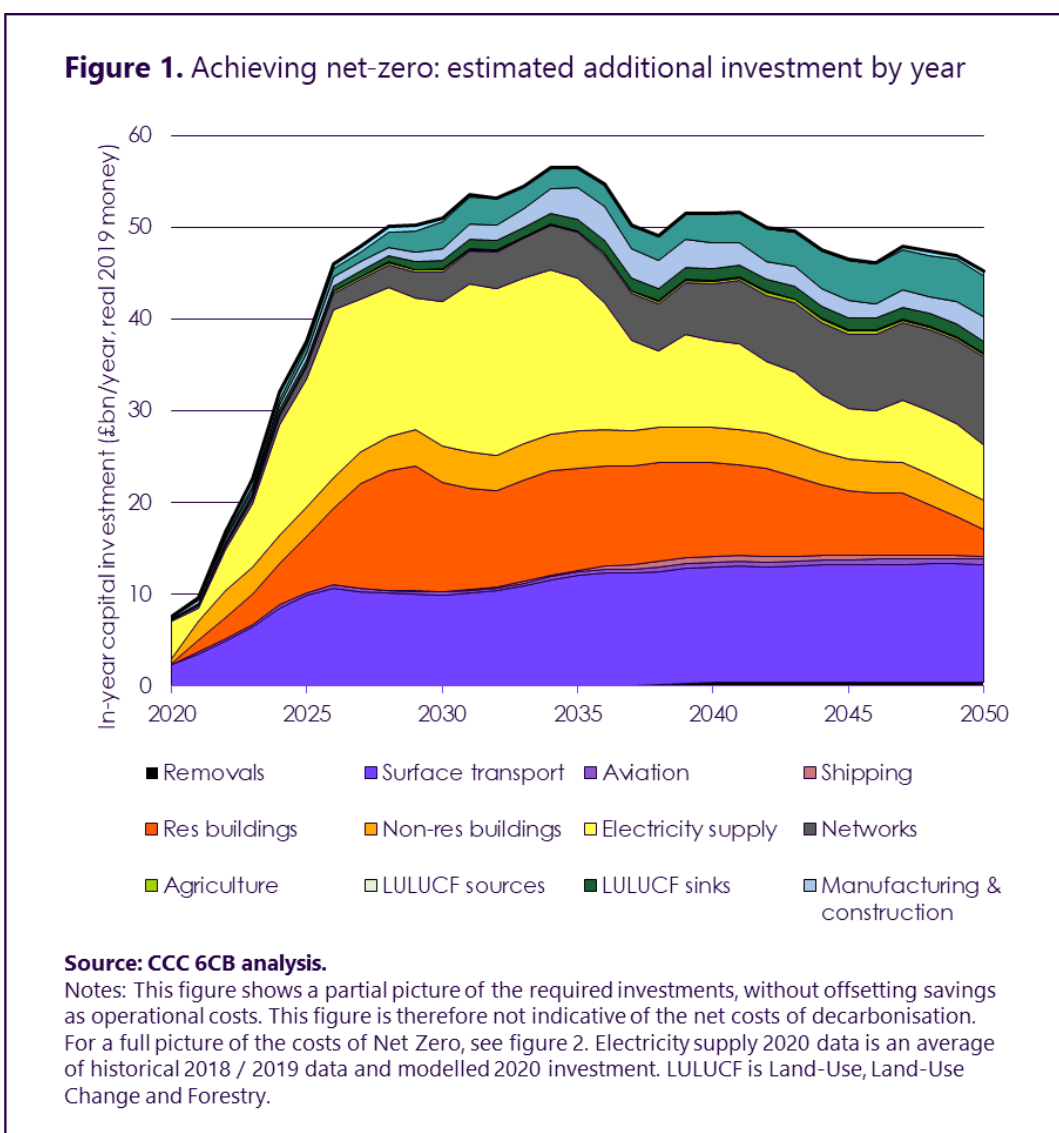
Currently, the UK deploys additional low-carbon investments of around £10bn/year in the electricity sector, plus smaller amounts of investments in heat, energy efficiency and electric vehicles. Looking ahead, the CCC has estimated the additional annual investment requirement by key sectors in order to achieve net-zero. This is the additional in-year capital investment, in real 2019 money of building a low-carbon economy compared to a high carbon economy. The estimates represent the additional cost of purchasing low-carbon technologies and providing the associated infrastructure for a low-carbon system, compared to a high carbon system, but it does not include additional costs associated with supply chain investment that may or may not take place in the UK.

Additional investment is 'money out the door' in a given year, without borrowing costs included

As an example, transport sector costs include the additional cost of purchasing an electric vehicle, compared to a fossil-fuelled vehicle, as well as additional charging infrastructure. It does not, however, include the investment in factories to produce electric vehicles. Costs are 'money out the door' in a given year, recognising that some assets take multiple years to build (e.g. a wind farm), and include spend on materials, and overheads. It does not include the benefits of emissions reduction (e.g. avoided climate damage, improved health, job creation or innovation spill overs). The chart presents in-year investments *without* any borrowing costs included.

Capital investment in net-zero technologies will need to scale up from around £10bn/year to around £50bn/year by 2030, before peaking in 2035 and plateauing towards the 2040s. Over the longer-term, as technology costs continue to fall, and the infrastructure and networks for a low-carbon world become more prominent, the annual additional capital investment costs are likely to fall below £50bn.

Using these CCC estimates, Figure 1 shows that capital investment in net-zero technologies will need to scale up from around £10bn/year to around £50bn/year by 2030, before peaking in 2035 and plateauing towards the 2040s. Over the longer-term, as technology costs continue to fall, and the infrastructure and networks for a low-carbon world become more prominent, the annual additional capital investment costs are likely to fall below £50bn.



These investments deliver 100% emissions reduction in the UK by 2050

These investments are required to scale-up net-zero sectors in the 2020s, which then drive down carbon emissions to 78% below 1990 levels by 2035 and 100% by 2050, achieving the UK's net zero ambition. This investment will deliver a transition to an electro-intensive economy, whereby electricity generation is approximately 2.5 times greater than today's levels. This additional electricity is used to power the UK's vehicles, heat the UK's homes, and act as a low-carbon fuel (e.g. for manufacturing processes), meaning that oil and gas use are reduced by over 80% and 70% respectively.¹

3.2 The importance of early action: extra net-zero investment will need to grow fivefold in the 2020s

Analysis of the CCC's estimates indicates that a rapid scale-up of net-zero capital investment is needed

Analysis of the CCC's estimates points to a fundamental insight: in order to deliver the UK's net-zero goal in 2050, net-zero capital investment will need to ramp up much earlier, with a fivefold expansion required during the 2020s. For example, to ensure capital stock is low-carbon by 2050, 100% of sales of vehicles and household boilers will need to be low-carbon by the early 2030s. A further, but less pronounced expansion of investment would then be required in the 2030s, with the peak in annual investment requirements taking place around 2035.

The early sequencing of investment underscores the urgency to develop effective strategies in the next five years which can mobilise capital to hit the required levels in investment deployment through to 2030 and then sustain this through to 2050. The challenge of doing this is accentuated by the COVID crisis and the fall in private sector investment this has generated. Historically low interest rates as well as availability of liquidity from the Bank of England provide the fiscal space for the government to introduce an ambitious green recovery package that crowds in undeployed private sector assets and savings and sets the direction for growth, investment and employment in the rest of the 2020s. This makes the importance of ensuring that all public finance is aligned with net-zero as soon as possible doubly important.

3.3 Net-zero investments will generate considerable cost savings and other benefits

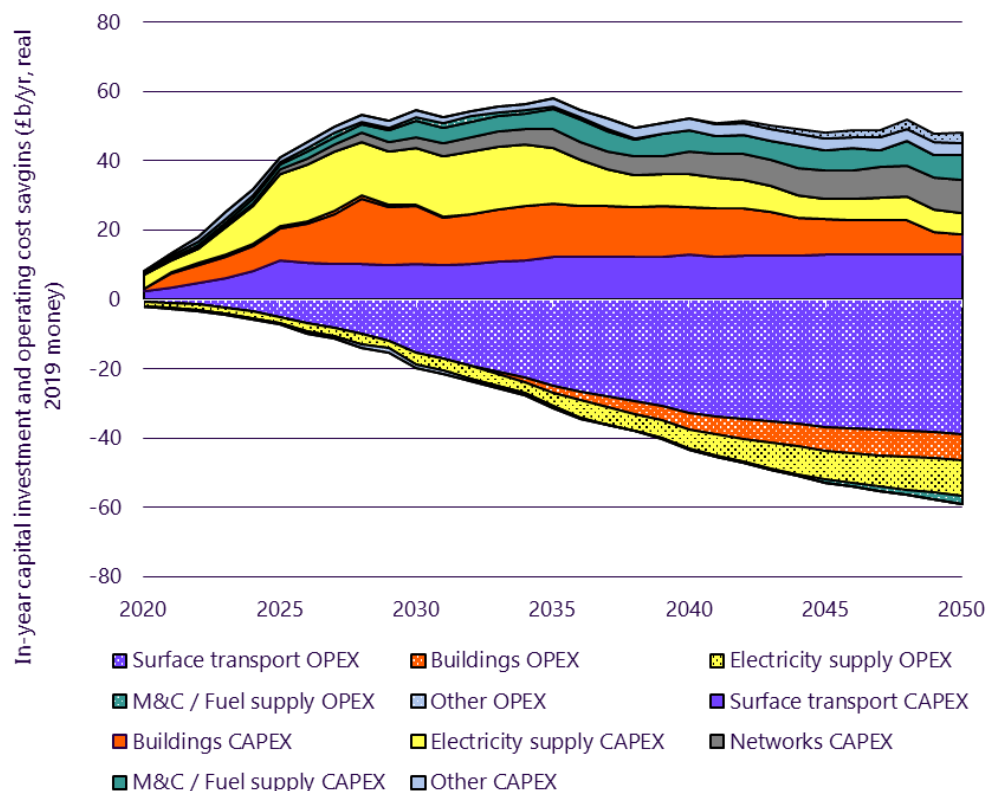
The increased capital investment will achieve significant operational savings, which could substantially offset up-front investment

Reducing fossil fuel use, through both energy efficiency and a switch to low-carbon electricity, is likely to lead to significant operating cost savings in a low-carbon world. These cost savings could substantially offset the increase in capital investment required for net-zero (see Figure 2).

¹ For further detail, see CCC (2020) The Sixth Carbon Budget.

By 2050, annual operational savings could be greater than extra capital investments

Figure 2. Achieving net-zero: estimated additional investment and operating cost savings by year



Source: CCC 6CB analysis.

Notes: LULUCF is Land-Use, Land-Use Change and Forestry. M&C is manufacturing and construction.

The transition will yield significant co-benefits such as improved air quality, health improvements and new jobs

Additionally, a transition to net-zero in the UK is likely to yield significant co-benefits, such as improved air quality (e.g. from burning less fossil fuels, particularly in transport) and health improvements (e.g. due to more efficient homes, improved diets and active travel)², but also jobs resulting from investments in the low-carbon transition.

3.3 Good policy can cut the cost of capital and thus reduce the overall investment requirement

The size of investment is significantly influenced by the cost of capital, which in turn can be determined by policy design

Clearly the size of this investment requirement can be influenced by the learning curves of key technologies and the potential for breakthrough innovations. It can also be influenced by the quality of policy: good policy aligns investor incentives and reduces risk; bad policy (including reneging on environmental commitments) disconnects investor incentives and increases risk. This is important as risk - not least policy risk - has a price in terms of the cost of capital. As climate change is a market failure and requires policy

² For more detail, see the report for the Health Advisory Group, published alongside the 6th Carbon Budget.

reform for resolution, policy risk is one of the major barriers holding back the transition, and one that is most clearly within the Government's control. The capital-intensive nature of the net-zero economy also makes policy as well as financial structures that push down transaction costs as well as the cost of capital particularly valuable. The UK's experience with offshore wind is one positive example. The UK's experience with household retrofit and energy efficiency is an example of decisions that have failed to attract the necessary capital: the Box below compares and contrasts the UK's experience with offshore wind and buildings.

The UK's offshore wind experience shows the potential policy has to reduce cost of capital and deliver net-zero aligned projects

BOX: Offshore wind vs. buildings: learning the lessons for breakthrough financing

The successful story of offshore wind deployment in the UK represents a potentially replicable blueprint for mobilising finance in other technologies and sectors. The critical enabling factors that led to the development of an investable new market included: identification of an untapped high potential technology; specific policy instruments to target bespoke legal or regulatory barriers; reduction of high investment hurdle rates through the creation of the Contracts for Difference (CfD) incentive regime; clear indication of future market demand through competitive bidding rounds for access and construction permissions; the provision of key financial support through the Green Investment Bank (GIB); as well as a sustained focus on regional skill and supply chain development.

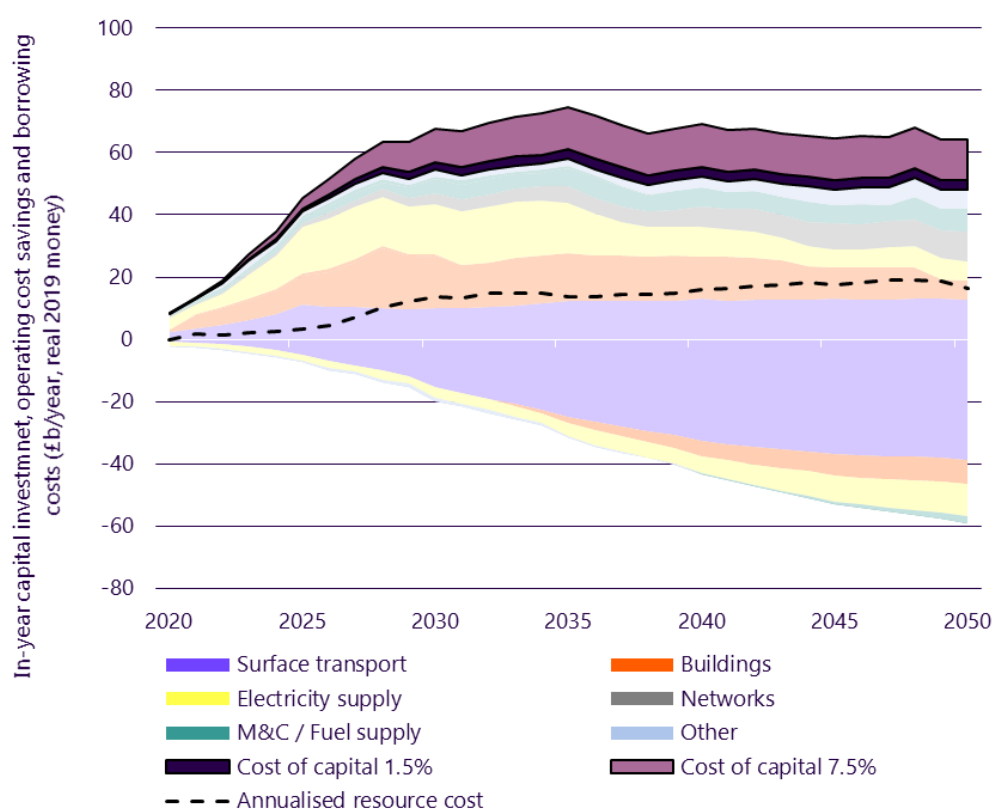
Conversely, the building sector has proved to be one of the hardest sectors for mobilising finance to net zero. Critical bottlenecks have included: lack of integration of climate targets into routine housing finance decisions; negative changes to agreed building regulations and funding programmes; failure of the Green Deal initiative; absence of anchor financial institutions to drive market innovation (such as a National Infrastructure Bank); lack of progress in the UK with deploying financial instruments proven elsewhere (eg Property Assessed Clean Energy (PACE) loans and bonds); no dedicated delivery agency to co-ordinate across government departments; failure to introduce impactful incentives such as an energy efficiency linked Stamp Duty; undeveloped strategies for low-income housing and fuel poverty; insufficient coordination between local and national strategies (including provision of local renovation advice and skills development); and the absence of trusted quality control to build trust and allay household concerns about disruption. New initiatives are underway, such as the Coalition on Energy Efficiency of Buildings (CEEB) and the Green Home Grant programme, which to overcome some of these barriers.

The cost of borrowing to finance the investments in the CCC's scenarios could add £17bn/year in 2050

The estimates presented above have not included the cost of capital (such as the cost of borrowing). The cost of financing these investments could be substantial: as an example the CCC estimated the additional cost of borrowing the money to finance these investments, suggesting it could add up to an additional £17bn/year of borrowing cost on investments of around £50bn/year in 2050 (Figure 3). Reducing risk in these investments, efficient

use of the public balance use and leveraging private sector finance will be critical in reducing the overall cost of the transition. To explore the scale of this variance, the CCC modelled the final investment requirement using two costs of capital. The first, in light grey, presents the cost of capital at 1.5% assuming clear, strong and reliable policy signals: this results in an annual cost of capital of c£3bn. The second, in dark grey, shows the cost of capital at 7.5%, expressing more uncertain policy signals: this adds about £14bn to the cost of capital, results in the total cost of capital being over four times higher and adds an increment of over 30% to overall investment.³ The clear conclusion is that well-designed real economy and financial policy will be crucial for reducing the cost of making the transition more affordable and speedier. Done well, the cost of capital could fall over time.

Figure 3. Borrowing costs can make up a substantial proportion of the costs of meeting net-zero



Source: CCC analysis.

Notes: Costs of electricity are included in the energy supply sector, whereas costs of other low-carbon fuels such as hydrogen and bioenergy are included in the sectors that use these fuels. M&C is manufacturing and construction. Other category includes aviation, shipping, land-use, land-use change and forestry, agriculture, removals, waste and F-gases.

Reducing the cost of capital, through clear policy design, could save up to £14bn per year

³ Note: Capital assumed to be debt, with a payback period of 7.5 years. Costs of capital are attributed to the year the investment is made (e.g. the total cost of capital for an investment made in 2030, paid over seven and a half years, is attributed to 2030).

3.5 Mobilising the required net-zero investment is achievable

The estimates for additional investment presented by the CCC show the need for a significant mobilisation of finance in the next three decades.

The AGF concluded that the CCC's estimates of investment requirements could be delivered

The Advisory Group reviewed the CCC's estimates and concluded that these investment requirements could be delivered, depending on the quality of policy in both the real economy and across the financial system, as well as the responsiveness of financial markets. This makes it critical to understand the obstacles that currently stand in the way of net-zero finance, the focus of the next section.

4. Challenges: Obstacles to Overcome on the Road to Net-Zero Financing

Mobilising the capital required to deliver the UK's net zero goal is achievable, but this will not happen automatically. The Advisory Group identified a set of challenges to overcome, set out below.

Key Challenges	Commentary
The UK's net-zero goal is not yet embedded in the financial system as an objective that shapes behaviour to the same degree as the management of climate risk.	An explicit opportunity-focused net zero policy target is needed for the financial system, which can then be cascaded through to financial institutions and assets.
Market, policy and institutional failures across the economy continue to undermine predictable cash flows for net-zero options.	The 'pull' of real economy signals needs to be clearer, fully comprehensive and more dependable to attract finance at low cost.
COVID-19 could delay climate action, harm confidence and the desire to invest; a green stimulus could be followed by green austerity.	Imperative that early positive signs of green recovery measures (such as the Plan for Jobs) are deepened and sustained.
Development capital is insufficient to build the net-zero infrastructure pipeline. ^{xxiii} Local authorities lack capacity and tools.	The new National Infrastructure Bank could provide development finance. Innovative mechanisms can unlock local financing.
The sequencing of investments can be unclear, notably where fundamental issues of innovation and infrastructure are in play (e.g. EV, CCS, hydrogen)	Sector by sector transition pathways including a policy support framework and dedicated public finance mechanisms to de-risk new technologies and business models are needed.
Net-zero financing needs to be integrated into wider environmental and social policy and management to be resilient over the long-term.	Net-zero investments need to be climate-proofed and support a just transition for workers and communities.
Demand for net-zero financial services is mixed: increasingly high and sophisticated in energy, almost non-existent in housing.	Systematic, sector by sector market innovation strategies are needed, building on examples such as the Coalition on Energy Efficiency of Buildings.

New financing mechanisms and capital structures are needed to connect net-zero opportunities with savings and pensions (notably infrastructure)	It is critical that net-zero becomes the default option for savings and pensions, with more sustainability-linked products providing financial incentives for decarbonisation.
Net-zero has not yet become the norm within financial culture or within external relationships with customers and investments.	Net-zero needs to be linked more clearly to the purpose of financial institutions, their culture and incentives. For investors, this means more active and assertive stewardship.
Decision-useful climate data remains incomplete and inconsistent. Data is often misunderstood – and many users still do not have the skills to respond.	Clear classifications (e.g. taxonomies) as well as trusted data are required for all assets, bolstered by mandatory disclosure and skills development across finance.
Regulatory expectations are intensifying, but legacy rules may not be fit for purpose and the long-term prudential endgame for net-zero is unclear.	Climate risks and net-zero needs to be fully incorporated into risk weights, monetary policy options and financial stability management.
The UK's public finance architecture has not yet been updated in light of the net-zero transition in terms of existing and new institutions.	The mandates of BBB, CDC, UKEF and UKGI need to be updated in line with net-zero. The new National Infrastructure Bank could be pivotal for net-zero investment.
The financial system is global and capital is mobile. Poorly designed policies could deter foreign investment.	The UK needs to shape international regimes governing sustainable finance so that its competitiveness is protected and enhanced.
There is a lack of timely information on the scale of existing net-zero financial flows and future investment requirements.	The UK needs an institution to conduct regular assessments of financial flows and the alignment of assets.

5. Principles for Net-Zero Finance

The scale, complexity and novelty of achieving climate-aligned finance – not least in terms of the UK's net-zero target – means that a set of clear principles are needed to guide both long-term policy and regulation as well as market practice. The AGF has identified the following five principles to drive the shift from current situation towards full alignment over the coming years.

The AGF's principles for net-zero finance

2. The Mindset

The mindset needs to shift from measuring the risks of climate change on finance to the alignment of finance with net-zero, resilience and just-transition.



3. The Economy

Real economy policies need to be investable to attract an increased amount of capital at a low cost.



1. The Prize

The investment requirements to achieve net-zero can be met if effective policies and market frameworks are in place.



4. The System

Financial policy and regulations need to be designed with net-zero in mind and institutional gaps filled to increase the efficiency of capital intermediation.



5. The World

Successful net-zero financing depends on an effective international financial architecture.

The financing challenge is multi-faceted and the investment requirements to achieve net-zero can be met only if effective policies and market frameworks are in place. Policy design, technological change, and the availability of both balance sheet and organisational capacity will determine whether it is cheap or expensive to finance. Hence it is important to ensure policy certainty to reduce the risk premium that investors will pay.

The mindset needs to shift from measuring the risks of climate change on finance to aligning finance with net-zero

In addition, the mindset needs to shift from measuring the risks of climate change (e.g. transition, physical) on finance to the opportunity around alignment of finance with net-zero. We are still facing profound market, institutional and policy failures. Real economy policies need to be investable to attract increased capital at low cost, including technology development and deployment, changing business models, locational dimensions and fairness. Even when the right real economy policies are in place, and climate risk is accounted for, specific financial policies are still required to drive the flow of capital into net-zero assets.

Financial policy and regulations must be designed with net-zero in mind

The UK has been a leader in terms of incorporating climate risk into the rules governing the financial system, for example, by championing greater transparency through the TCFD. But the financial system continues to exhibit a number of features holding back the transition in terms of short-termism, misaligned incentives, incomplete regulation and insufficient expertise. It is crucial that all financial policy and regulations are designed with net-zero in mind and institutional as well as capacity gaps filled to increase the efficiency of capital intermediation.

The UK financial system's role within the international financial system is crucial

Finally, the UK's financial system is one of the most open and global in the world. The UK will want to ensure that its financial frameworks for net-zero are attractive to international investors. In addition, successful net-zero financing depends on an effective international financial architecture in terms of coordinated action by finance ministries, central banks, capital markets and development finance institutions. The UK is recognised as a leader in green and sustainable finance and has considerable potential to shape these frameworks, not least over the short-term as president of COP26 and chair of the G7 group of industrialised economies in 2021.

6. Recommendations for Action

Much needs to be done to mobilise finance for net-zero to deliver the significant expansion in investment in the 2020s and 2030s. This is a national imperative, but also a decades-long growth opportunity for the financial sector. Stronger and more focused real economy policies will be essential to attract capital to help meet the UK's net-zero goal. But on their own, they will be insufficient, due to continuing market inefficiencies as well as missing markets in the financial system itself. To move money at the pace and scale required to deal with climate change, the government will need to reconsider the current architecture of the financial system.

The recovery from COVID-19 provides the moment to restore investment levels across the UK economy by providing directionality to the recovery, steering it towards a net-zero, resilient and just transition. The UK is already developing an explicit climate lens for investor stewardship, prudential regulation and listing rules. A broader focus on the core rules of the game is now required, covering accounting standards, investment standards, valuation conventions, governance expectations, the skills and expertise of financial professionals and the overall pattern of financial innovation. Alongside action focused on private finance, public financial institutions will need to play an anchor role in delivering net-zero. This applies to all existing institutions as well as the new National Infrastructure Bank.

Using the principles listed above in Section 5, the Advisory Group has identified 15 recommendations that would get the UK's financial system on track for net-zero, with 2025 the indicative year when these measures should be in place so that the ramp-up in capital investment is achieved. The recommendations are grouped into six clusters: strategic, private finance, financial regulation, public finance, international frameworks and tracking progress. For each, we have identified the desired impact of each recommendation and the part of government that should take the lead in implementation.

6.1 Strategic

Recommendation 1: The UK should commit to become the world's first net-zero financial system

Key impact: bringing rigour and clarity of focus to the role of finance in delivering net-zero

Government department/body: No10, HM Treasury

The UK's economy-wide net-zero target needs to be supplemented by a specific requirement to make sure that investment flows and assets in the financial system are consistent with national and international commitments at least by 2050. This overall target could then be cascaded through specific programmes of regulation and incentive, with new tracking and data analytics introduced to measure progress (see Recommendations 8 and 15).

Recommendation 2: Make net-zero projects and plans investable, by increasing the predictability of cash flows and reducing risks.

Key impact: reduced financial risks, lower cost of capital and thereby deliver faster deployment.

Government department/body: HM Treasury, BEIS

The real economy 'pull' on finance needs to be strengthened through a credible long-term framework. Key policy levers that can support include:

The real economy 'pull' on finance needs to be strengthened through sector transition pathways, carbon pricing and fiscal reform

a. Sector transition pathways: The government has committed to producing a net-zero strategy in 2021. As part of this, clear pathways are needed for each sector of the economy with transparent expectations about policy, regulation and funding to provide investment clarity for companies and investors. A differentiated sectoral approach will also allow the identification of sector-specific barriers to the mobilisation of capital, which can be overcome through financial innovation and policy. Each of these sector transition pathways should include a financing perspective from the outset to identify a portfolio of measures to support practical action (see Recommendation 4).

b. Carbon pricing: Carbon pricing is a crucial tool for aligning market incentives with net-zero and has delivered important achievements as part of a package of measures (notably the reduction in coal-fired power generation). A strengthened carbon pricing strategy, with a differentiated sectoral approach would fill the gap left by the UK's withdrawal from the EU and the EU ETS.^{xxiv} This would also provide an important source of government revenue in the recovery from COVID-19. To avoid risk of carbon leakage or competitiveness losses, a system of border tax adjustments will be fundamental for those carbon-intensive industries that exposed to international competition. Furthermore, carbon pricing can be designed to ensure a just transition by allocating revenues to support vulnerable communities.^{xxv}

c. De-risking and incentivising net-zero through fiscal reform Beyond carbon pricing, a suite of fiscal and other tools can be used - often on a time-limited basis - to accelerate capital flows into critical technologies and business models that are not yet market competitive. These include direct investment from public financial institutions (see Recommendations 12 and

13), a contract for difference to flatten volatility, risk guarantees and first loss provisions, as well as research and development tax relief for early stage/frontier technologies and differentiated stamp duty for housing according to energy performance. Core financial incentives such as ISAs could also be adjusted so that all savings become ringfenced for net-zero aligned lending and investment.

Recommendation 3: Design net-zero policies so that they are fair, support resilience and enable local financing

Key impact: Ensuring coherence of net-zero delivery with wider government objectives, such as levelling up; building broader public support for net-zero.

Government department/body: HMT, BEIS, DEFRA, DfE, HCLG & others

A national Just Transition Commission could be established at the UK-level

The Treasury is carrying out a Net-Zero Review to examine the distributional implications of the 2050 target. The COVID crisis has amplified the case for a strong social dimension to transition policies so that they are fair and seen to be fair for workers, communities and consumers. A growing number of banks and investors recognise the importance of a just transition as part of their climate strategies, responding to the S of ESG.^{xxvi} To harness this commitment, government needs to supplement classic climate policies with a just transition strategy that shares the benefits of the transition and focuses on the needs of the vulnerable. A national Just Transition Commission - building on the experience in Scotland - could be established at the UK-level to produce focused recommendations for policy and market action, including by financial institutions.

Empowering local, regional and devolved governments is crucial

A crucial part of this is ensuring that local, regional and devolved governments are empowered and enabled not just to deliver national-level objectives, but also accelerate action by tapping into growing citizen and business demand for ambitious place-based measures. Lack of resourcing has constrained the ability of regional authorities to build up investment pipelines tailored to place-based needs in collaboration with business and investors.

Policies for adaptation and mitigation cannot be developed in siloes from each other

Finally, climate policies for decarbonisation and adapting to the impact of climate change resilience cannot operate in siloes from each other: net-zero investments need to be climate-proofed so they are not damaged by the intensification of extreme events (e.g. flooding, heat). Net-zero also needs to be embedded in wider policies for the environment and sustainability (such as the 25 Year Environmental Framework and the reform of agricultural policies). Financial institutions are increasingly connecting net-zero and resilience within an overall framework of the sustainable development goals; joined-up government policy is needed to help make this the norm.

6.2 Private Finance

Recommendation 4: Ensure that market innovation responds to the scale of the net-zero financing challenge through both sector-specific strategies and system-wide instruments

Key impact: reduced cost of capital; increased responsiveness to customer needs

Government department/body: HM Treasury, BEIS, PRA, FCA

Seizing the opportunity of financing net-zero will require the introduction of a new generation of innovative solutions. These will need to be developed at two key levels:

a. Sector by sector: To support the development of sector transition pathways in the real economy (Recommendation 2), the government should collaborate with the financial sector to develop financial innovation strategies that would focus on the specific challenges across the net-zero landscape, notably buildings (residential and non-residential), transport (aviation, shipping, surface), industry (power, CO₂ networks, hydrogen, manufacturing) and nature (agriculture, bioenergy, forestry). These could build on the experience gained in the GFI's Coalition on Energy Efficient Buildings. A particular focus should be placed on reaching small and medium sized enterprises (SMEs) and responding to the need of consumers and communities that could be vulnerable to the transition. Working with business along supply chains offers a promising way for financial institutions to serve companies whose needs are often overlooked in the net-zero transition.

b. System-wide: A set of breakthrough innovations have been identified as requiring a strategic response. These include: green finance innovations such as a green gilt to kickstart a thriving sustainability-themed bond market in the UK; transition financing instruments that support high-carbon companies in transition; new financial vehicles to attract retail investors and pension funds into sustainable infrastructure; and place-based financial mechanisms (such as the new Community Municipal Investments being deployed by local authorities^{xxvii}).

Recommendation 5: Deepen the skills and capacity of the UK's financial professionals to support their customers and clients in the transition

Key impact: Reduced market risk, improved design of financial services, better responsiveness for customer needs.

Government department/body: DfE, PRA, FCA

Market innovation can be spurred through sectoral and system-wide strategies

A number of existing professional education initiatives and qualifications are underway, along with tightening expectations of climate competence from financial regulators. The UK has released the world's first Green Finance Education Charter, with a commitment from 12 professional bodies to integrate green finance and sustainability into their core curricula, introduce new qualifications, and support the continued professional development of their members.^{xxviii}

All of the UK's c1.1 million financial professionals need to have the right net-zero and sustainability expertise

These promising initiatives need to be built upon so that there is a measurable roadmap for making sure that all of the UK's c1.1 million financial professionals (particularly those in board and senior management positions) have the right skills and behaviours. This will enable them to effectively understand climate risks, opportunities and alignment and thereby serve their clients and customers effectively through the transition.

Recommendation 6: Build the literacy, expertise and confidence of the users of UK financial services to understand and demand climate-aligned products

Key impact: Increased flows towards climate-aligned investments.

Government department/body: DfE, PRA, FCA

Demand for sustainable financial services are growing across key markets, but the literacy, expertise and confidence of users must be strengthened

Demand for sustainable financial services is growing across key markets, notably in terms of investment management and pensions. But the literacy, expertise and confidence of many users of UK financial services is insufficient to ensure that their needs are effectively met. In fact, "the UK was ranked joint bottom for adult financial literacy in a league table in 2016 of 17 OECD nations".^{xxix} Looking ahead, financial literacy will need to include the ability of consumers to understand the links between sustainability factors and their financial requirements – and to demand that their expectations are met. One reflection of this was the absence of discussion of savings, pensions and investments in the deliberations of the UK Climate Assembly, pointing to a potential disconnect in the mind of citizens between the need for action on net-zero and their role as consumers of financial services. Key areas where the sustainability literacy of financial users could be strengthened include housing and vehicle financing as well as savings and investments. Here, financial consumers could be aided by the use of public league tables that rank the climate performance of companies in their savings and pension products.

6.3 Financial Regulation

Recommendation 7: Fully integrate climate risk and net-zero into financial regulation and monetary policy (including assessing legacy rules for alignment)

Key impact: reduced cost of capital, better pricing of climate factors, increased flows of capital to net-zero investments

Government department/body: HM Treasury, Bank of England, PRA, FCA, TPR

UK financial authorities have led the way in integrating climate risks into financial practices

Over the past five years, UK financial authorities, notably the Bank of England, have led the way in integrating climate risks into financial practices. Over the next five years, these efforts need to be deepened, with a closer connection with the net-zero target. A first step is for the exploratory biennial scenario on the financial risks of climate change to be completed in 2021 and the conclusions embedded into routine prudential and monetary practices. From the 'temperature alignment scores' submitted by regulated firms, the Bank of England will be able to make a first aggregate estimate of the degree of alignment of the UK's financial system with net-zero; this could then be monitored on a regular basis by the Bank of England. Looking forward, the Bank of England could then set out its role in the achievement of net-zero as part of its core mandate for financial and monetary stability. Forward-looking climate factors will also need to be incorporated into the UK's risk-weighted capital adequacy rules as well as the Bank's monetary policy operations, including collateral frameworks, refinancing mechanisms and asset purchase schemes.^{xxx}

Most of the UK's core financial regulations have not been designed with climate change in mind, and this is making the financial transition more difficult

One important focus is to ensure that the UK's legacy of financial regulations is fit for the net-zero age. As most of our core financial regulations have not been designed with climate change in mind, it is to be expected that some provisions have an unintended consequence of making the financial transition harder. Examples that were presented to the Advisory Group include Solvency II and sustainable infrastructure; Basel III and long-term green finance; the Consumer Credit Act and electric vehicles; mortgage finance rules and retrofitting^{xxxi}; regulations covering Defined Contribution Pension Plans and illiquid assets such as sustainable infrastructure. These and other key provisions need to be reviewed and remedial steps identified where material unintended barriers are discovered.

Recommendation 8: Make net-zero targets and plans mandatory for financial institutions

Key impact: refocusing of financial sector business models around net-zero; stimulus to market innovation and new financial products

Government department/body: HM Treasury, PRA, FCA, TPR

Financial institutions should have net-zero targets and report progress towards them annually

Building on the overall financial system goal outlined in Recommendation 1 and the positive momentum shown by leading financial institutions, the government should introduce a mandatory requirement for all financial institutions to introduce net-zero targets and plans for how these are to be achieved.^{xxxii} These should be delivered through five-yearly interim net-zero goals, matching the UK carbon budgets, with annual reporting of progress. This builds on the proposal by the Climate Financial Risk Forum's Innovation working group for regulated financial institutions to publish 'capital allocation statements' for climate change. An explicit net-zero commitment would help to ensure that financial flows are consistent with the Paris Agreement and would show clear UK leadership. From this, the UK could support an evolution of the TCFD framework to more explicitly include net-zero alignment alongside risk and opportunity.

Recommendation 9: Extend investor stewardship to incorporate the achievement of net-zero

Key impact: more effective capital allocation by UK business; alignment of investment assets with net-zero

Government department/body: HM Treasury, FCA

The exercise of assertive and targeted stewardship is one of the key levers that investors can use to influence the direction of capital towards net-zero aligned projects

Much of the capital in the corporate sector required for net-zero will be held as retained earnings by businesses. The exercise of assertive and targeted stewardship is one of the key levers that investors can use to influence the direction of this capital so that it is consistent with net-zero. The UK's updated Stewardship Code is a positive step in the right direction and sets high expectations of those investing money on behalf of UK savers and pensioners. In particular, the new Code establishes a clear benchmark for stewardship as the responsible allocation, management and oversight of capital to create long-term value for clients and beneficiaries leading to sustainable benefits for the economy, the environment and society. Critical to this will be market frameworks which reward investors who take net-zero seriously and combine this with resilience and just transition, for example, by including stewardship information in fund documentation.

Recommendation 10: Set clear metrics for the net-zero transition

Key impact: enhanced market efficiency, improved pricing of climate factors, increased accountability for climate performance

Government department/body: HM Treasury, PRA, FCA, TPR

Business, financial institutions, policymakers and citizens need to have clear metrics that indicate whether investments and assets are aligned with the net-zero target. The UK is one of the leaders in terms of adoption of the TCFD framework by business and finance and setting the expectation that this will be the market norm by 2022. The Chancellor's intention to mandate climate disclosures by large companies and financial institutions by 2025 makes the UK the first G20 country to do so.

The UK must develop a robust taxonomy of activities aligned with net-zero, track geographically specific financial flows and ensure clear disclosure of alignment with net-zero

To be useful in tracking the alignment and deployment of capital, a number of further steps are needed. A robust taxonomy of activities aligned with net-zero and wider sustainability goals is needed. Here, the Chancellor's announcement that the UK will implement a green taxonomy is welcome, taking the scientific metrics in the EU taxonomy as its basis, with a UK Green Technical Advisory Group to review these metrics to ensure that they are right for the UK market.^{xxxiii}

It will also be important to develop the ability to track geographically specific financial flows related to the delivery of the UK's net-zero goal. Information within TCFD reports is aggregated at the global level by individual institutions; supplementary spatial level data is needed for the UK; third, institution-level reporting through TCFD frameworks also needs to be matched by clear disclosure of alignment at the level of the financial product, such as savings products (e.g. ISAs), loans, mutual funds and pensions.

6.4 Public Finance

Recommendation 11: Use the UK's post-COVID recovery plans as an opportunity to fast-track climate investment, reset fiscal incentives and connect public debt with climate goals

Key impact: stimulating growth in an under-supplied economy; providing strategic direction for a resurgence in private sector investment

Government department/body: HM Treasury

The recovery from COVID-19 must be used to accelerate progress towards net-zero and climate goals

The government needs to use the recovery from COVID-19 both to deliver a short-term stimulus that generates jobs and economic renewal from targeted public investment in climate priorities and also to fundamentally realign market incentives and public spending to accelerate the transition. It is important that stimulus measures are connected with these longer-term policy frameworks, so that green sectors do not go through a 'boom and bust' cycle. This happened with the green stimulus in response to the Global Financial Crisis, which was then followed by policy reversals.

Government COVID-19 recovery plans need to be aligned with the net-zero target to avoid locking-in potentially stranded assets: this can be achieved, for example, through climate conditionality, so that all future COVID-related financing from the government as well as the Bank of England are sustainability-linked. In addition, green sectors offer powerful opportunities for short-term stimulus which is fast and has high job creation potential (eg buildings, nature, renewable energy, transport, resilience). Alongside this, recovery funding can be targeted to build up the longer-term skills base for the net-zero economy as well as support just transition plans in both exposed sectors (such as aviation and oil and gas) and regions (such as the Midlands as well as Yorkshire and the Humber).

To finance this recovery strategy, the UK should introduce a sizeable programme of green sovereign bonds, connecting climate goals with social renewal.^{xxxiv} The Chancellor's announcement that the UK will issue its first Sovereign Green Bond in 2021 will not only help to tackle climate change and create green jobs across the country, but also serve to catalyse additional green bond issuance by corporates and other agencies. It will be important that this issuance continues and diversifies in the years ahead, as a tool to help support the greening of the UK's fiscal framework. As highlighted above in Recommendation 2, this focus on the debt management dimension of UK fiscal policy needs to be complemented by a greater role for well-designed carbon pricing in terms of revenue raising

Recommendation 12: Set net-zero and sustainability goals for existing public financial institutions

Key impact: ensuring consistency of public finance with the net-zero goal; improving access to finance; reducing risks for business.

Government department/body: HM Treasury, BEIS, FCDO

All of the UK's existing public financial institutions should be given a clear mandate and requirement to deliver net-zero, build resilience and support a just transition. This goes beyond existing commitments to publish TCFD reports and focuses on outcomes. This provision includes UK Government

Investments (UKGI) and the British Business Bank (BBB) at the domestic level, along with CDC and UK Export Finance (UKEF) internationally.

Domestically, the BBB could play a particularly important role in improving access to net-zero finance for the crucial SME sector across the country. This could involve tailoring its existing suite of products to net-zero and delivering this on a regional basis. In addition, incorporating net-zero into the governance and performance expectations of UKGI holdings would send important signals into the economy. Internationally, CDC has recently launched a new climate strategy that incorporates the three pillars of net-zero, resilience and just transition.^{xxxv} A similar approach is needed at UKEF.

Beyond these UK level institutions, it will be important that financial institutions and funds managed by devolved nations as well as local and regional governments are also aligned with global climate goals. Here, the new Scottish National Investment Bank provides an example of how the delivery of the low-carbon transition through a just transition can be placed at the heart of the mission of public financial institutions.

Recommendation 13: Establish a National Infrastructure Bank with a clear net-zero and sustainability mandate

Key impact: lowering risk for private sector investment; reducing financing costs; co-creating new investable asset classes.

Government department/body: HM Treasury, BEIS

Measures need to be matched with the establishment of a new public financial institution, a National Infrastructure Bank (NIB) with a clear net-zero and sustainability mandate

These measures need to be matched by the establishment of a new public financial institution, a National Infrastructure Bank (NIB), with a focus on infrastructure and a clear net-zero and sustainability mandate.^{xxxvi} The Treasury's decision to establish the NIB as part of the National Infrastructure Strategy will provide a critical lever to co-invest alongside the private sector.^{xxxvii}

Importantly, the NIB should not be a niche 'green investment bank', but a full-service public development and infrastructure bank (akin to the EIB or the KfW in Germany) that pursues national strategic goals, including net-zero. The NIB will have a key role in improving the functioning of private capital markets and overcoming financial barriers, particularly for early stage and long horizon projects and programmes; these typically face financing challenges, due to the associated high upfront costs and risks. The NIB will therefore play a critical role in providing development finance for the net-zero economy, building up the pipeline of projects and markets which then become attractive to private investors.

The NIB could focus on crowding in private capital by reducing risk and therefore bringing down private sector financing costs. In terms of

additionality, it could also focus on activities that the private sector alone could not manage without excessive cost or risk. This will help to provide certainty, credibility and transparency around finance for sustainable infrastructure. It will also be important to ensure that a NIB would be rooted in the opportunities and needs of the regions and devolved nations of the UK. Design principles for the NIB could be drawn from international best practice as well the lessons of the UK's own Green Investment Bank, notably in terms of the return expectations of the capital it provides as well as how to manage questions of state aid.

6.4 The International Dimension

Recommendation 14: Build the international frameworks that can accelerate the financing of net-zero, resilience and a just transition, using 2021 as a key milestone

Key impact: achievement of global climate goals; putting the UK at forefront of sustainable finance.

Government department/body: No 10, FCDO

The focus of the Advisory Group has been on the steps needed to finance the UK's domestic net-zero target. However, this cannot not happen in isolation from the need to build effective international frameworks that accelerate the financing of net-zero, resilience and a just transition. Here, the UK is already heavily involved in key initiatives such as the Coalition of Finance Ministers for Climate Action and the Network for Greening the Financial System. It is also one of the leading providers of international climate finance to developing countries. In 2021, the UK will have a major opportunity to make a decisive shift on the financial front as president of the UN's COP26 climate summit and chair of the G7 group of industrialised nations. Much is already being done to realise this, not least by Mark Carney, UN Special Envoy on Climate Action and Finance and also the Prime Minister's Finance Adviser for COP26.^{xxxviii} From its work on climate-aligned finance, the AGF would suggest the following three priorities:

The UK's progress towards a net-zero target cannot happen in isolation

Three priorities for the UK are building a coalition of countries committed to net-zero financing strategies, mobilising finance for a global green recovery programme and supporting the establishment of an International Platform for Climate Finance

- First, drawing on the approach set out in this report, the UK could build a coalition of countries committed to net-zero financing strategies, with a focus on the policies, regulations and market practices needed to deliver this in both industrialised and developing countries.
- Second, mobilise finance for a global green recovery programme, with a particular focus on the needs of developing countries hardest hit by COVID-19. The UK already leads the UN's global workstream on ensuring an inclusive and sustainable recovery. One focal area could be a coordinated programme of green and SDG-linked sovereign bond issuance leading up to COP26.
- Third, support the establishment of an International Platform for Climate Finance, tasked with the goal of bridging the global financing gap.^{xxxix} This could be achieved, for example, by providing technical support to countries to develop robust capital raising plans to deliver their Paris commitments, and acting as a matchmaker between governments and private investors.

6.6 Tracking Progress

Recommendation 15: Establish a regular assessment of investment needs and financial flows for climate action in the UK, including net-zero, resilience and a just transition

Key impact: improved information on progress towards financing net-zero; more effective policy and market responses

Government department/body: BEIS

If the UK is to effectively mobilise capital for its net-zero and wider climate goals, then it will need to have robust and reliable analysis of both investment needs and actual financial flows, along with evaluation of the barriers that are keeping the two apart and how these could be overcome. As noted earlier, at present, there is no organisation in the UK that carries out these functions in the UK. A number of organisations could be well-placed to conduct part or all of these functions, including the CCC, the GFI and the ONS.

For the UK to effectively mobilise its capital for net-zero and wider climate goals it needs to have robust and reliable analysis of both investment needs and actual financial flows

7. Conclusions for the CCC

The UK needs a systematic approach to financing climate action that leverages both real economy incentives as well as financial system solutions. Given the time available, the work of the AGF has necessarily focused on strategic considerations and areas where additional action is required from policy and markets.

Our key conclusions for the CCC are as follows:

- Making finance consistent with net-zero and resilience is a key dimension of the Paris Agreement and needs to be translated into action at the national level.
- Net-zero is increasingly recognised as an important goal for the UK's financial community, but it is not yet embedded in routine decision-making and policy.
- COVID-19 will shape the context within which the UK has to scale up net-zero finance, making green and inclusive recovery plans essential.
- Net-zero requires a significant expansion of net-zero investment. Mobilising this is entirely achievable. But doing so at lowest cost will depend on the upgrading the quality of policy and market incentives both in the real economy and financial system.
- The sequencing of net-zero financing is a critical dimension, with a fivefold uplift in annual additional investment needed by 2030, and investment peaking around 2035. Decisive action is needed now to build the required frameworks.
- A range of challenges are holding back net-zero finance, both in terms of real economy rules and incentives as well as blockages within the financial system: among these is the absence of an explicit net-zero target for finance. This is needed to complement the existing focus on climate risk.
- Five principles should now guide policy and practice on net-zero finance, understanding the prize, shifting the mindset, developing investable real economy policies, making net-zero an explicit goal of the financial system and building effective international frameworks.
- Based on these insights, the AGF has identified 15 recommendations that can help to overcome the current obstacles. Taken together, these recommendations aim to provide an interlinking set of measures that will make achieving net-zero part of the purpose of the UK's financial system, give clarity and direction to the UK's financial institutions in terms of opportunity and imperative, and thus mobilise the capital required earlier, cheaper and with more co-benefits.

We hope that the CCC will consider the analysis and recommendations contained in this report in its 6th Carbon Budget report and proposals to government. As well as the 6th Carbon Budget, the planned review of the UK's Green Finance Strategy at the end of 2020 and development of an updated Strategy thereafter provides another opportunity for taking forward the recommendations in this report.

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