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Banking the just transition in the UK

Policy insight

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**PLACE-BASED
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The Banking on a Just Transition project

Launched in July 2019, Banking on a Just Transition is a pilot project that aims to identify how banking can support a just transition towards a net-zero-carbon economy and society across the regions of the UK. The project is a process of research and collaborative dialogue between stakeholders, including banks and other financial institutions, to help achieve this goal. It has a strong focus on place, taking a regional look first at Yorkshire and the Humber.

The project is led by the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science, and the Sustainability Research Institute at the University of Leeds, working in partnership with UK Finance. HSBC is funding the project. For more information see: www.lse.ac.uk/GranthamInstitute/banking-just-transition/

This policy insight is the first output from the Banking on a Just Transition project. It is designed to provide the basis for dialogue at a series of roundtables across the UK through 2019 and into 2020.

The Banking project is part of the broader Financing a Just Transition programme, which has also explored the role of institutional investors. For more information see: www.lse.ac.uk/GranthamInstitute/financing-a-just-transition/

About the authors

This paper was written by Nick Robins (Professor, Sustainable Finance, Grantham Research Institute, LSE), Sophia Tickell (Strategic Adviser, Banking on a Just Transition) and William Irwin (Policy Analyst, Grantham Research Institute, LSE), with inputs from Andy Gouldson (Professor, Environmental Policy, University of Leeds) and Andrew Sudmant (Research Fellow, University of Leeds).

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To provide feedback on this paper, please contact: n.v.robins@lse.ac.uk

This policy insight is intended to inform decision-makers in the public, private and third sectors. It has been reviewed internally and externally before publication. The views expressed in this paper represent those of the authors and do not necessarily represent those of the host institutions or funders.

Contents

2	Summary
3	Introduction
8	Five priority themes
8	1. Renewing purpose through the just transition
9	2. Supporting customers through a just transition
13	3. Responding to place-based priorities
15	4. Shaping the policy and incentive regime
16	5. Exploring wider system innovations
17	Conclusion
18	References

Summary

Making the shift to a sustainable economy in the UK will require the full mobilisation of the country's £20 trillion financial system. The banking sector forms the largest part of the UK's financial system and it will need to increase the quantity of capital flowing to investments that drive emissions down to zero and strengthen resilience to the physical shocks of climate change. The sector will also need to improve the quality of capital to ensure that the shift is fair and inclusive across the country. This is the agenda of the just transition.

The need for the just transition is increasingly recognised by policymakers, trade unions, business, financiers and civil society. The imperative of a just transition is included in the 2015 Paris Agreement on climate change and was part of the decision-making that resulted in the UK's legal commitment to reducing greenhouse gas emissions to net-zero by 2050. Scotland has established a dedicated Just Transition Commission, the Trades Union Congress (TUC) has published a set of just transition principles and the UK's new Green Finance Strategy also highlights its importance.

For the banking sector, the emergence of the just transition comes at a time of increased focus on strategic purpose. Sustainable finance and responsible banking are becoming core to the way that banks are focusing on serving society. As part of the implementation of the new Principles for Responsible Banking, banks could consider making a commitment to supporting a just transition. This would mirror actions being taken on the just transition by over 140 investors worldwide with US\$8 trillion in assets.

The main way that banks can play a role in helping to deliver a just transition is by supporting their customers and clients. Banks and other finance providers will need to address questions around the demand for sustainable financial products. Successfully identifying the opportunities that arise could result in improved customer engagement.

Financing the UK's diverse SME sector through the transition will be crucial. Small and medium enterprises (SMEs) contribute to economic development, employment, innovation and social cohesion, and they are especially important in economically deprived areas. But SMEs can lack time, capital and access to expertise and often have limited market power.

Upgrading the building stock to make it more energy efficient and reduce emissions has intrinsic social implications. About a third of homes with weak energy performance are not in the 'able to pay' category. In addition, workers in the construction and real estate sector will need to upgrade their skills to support the retrofit and new build requirements. Innovations in green mortgages remain early-stage at present.

The transition will play out unevenly across the country, requiring a strong focus on bottom-up initiatives to finance a just transition. Our work reveals an unmet demand for place-based financing that supports the net-zero economy and delivers positive social impact in both rural and urban communities. Locally-rooted banks and financial institutions need to identify how they can play an anchor role in affected regions.

The policies to deliver the transition are still to be formed, whether in terms of climate and industrial strategy, financial regulation or public finance. The dynamic between the banking sector and public finance will be particularly important to get right as Brexit raises questions about successors to European funding and investment.

Wider system innovations could well be needed in terms of developing the right capital mix for the economy as well as how to manage risk in the transition. Banks are currently risk averse at a time when increased risk capital is needed to drive innovation. New models of dialogue and participation will also be needed, such as Citizens' Assemblies.

Introduction

This policy insight looks at the specific contribution that the banking sector can make to ensure that a just transition happens in the UK.

The UK government's commitment to a net-zero-carbon economy by 2050 will have implications across all sectors and industries. It implies a deep economic transformation, which brings with it the opportunity to shift capital to productive new areas of the economy, creating better jobs for workers along with stronger communities, improving health and creating more sustainable lifestyles across the UK in a way that is fair and inclusive. These gains will not be automatic, however, and there is a risk that without an explicit focus on how to make the transition fair and inclusive, it could stall. In other words, the transition must be planned.

This is the agenda of the just transition. A just transition is one that ensures that climate action and efforts to build a sustainable economy are designed and delivered so that they improve social justice, with the interests of workers, communities and consumers particularly in mind (see Figures 1 and 2 below). This positive change will not happen without strategic, collaborative efforts on the part of business, government, trade unions, civil society and finance. Social dialogue is a critical element of any just transition, including honest discussion around costs and benefits and their distribution and compensation.

This paper explores the strategic role that banks could play to support a just transition in the UK. After laying out the key features of the case for action, the paper identifies five priorities for dialogue and action:

1. **Renewing purpose** throughout sustainable finance, with a new focus on the just transition as a bridge between the environmental and social dimensions.
2. **Supporting customers** through a just transition, notably households, small and medium enterprises (SMEs), corporates and public authorities. The paper looks in particular at the challenges faced by SMEs and households with residential mortgages.
3. **Responding to place-based priorities** in terms of the differential impacts of the transition across the country and building 'anchor' financial institutions.
4. **Shaping the policy and incentive regime** in terms of the climate policy architecture (such as carbon pricing), financial regulation and the role of public finance institutions.
5. **Exploring wider system innovations** in terms of the capital mix, risk management, real economy linkages and citizen engagement.

The banking sector cannot make these changes alone. Achieving a just transition will require cooperation and collaboration with many partners in many areas: ensuring the provision of appropriate goods and services, suitable regulation, and market development, for example, all of which will require coordination between banks and other finance providers and stakeholders. It will need new and better information brokerage to help people understand options and improved infrastructure to support cooperation between economic partners.

This policy insight will support a process of consultation in a series of place-based dialogues convened from October 2019 through to March 2020. Based on these meetings and further research, the next output of the project will focus on specific options that banks can take to support a just transition.

Figure 1. The human dimensions of the just transition

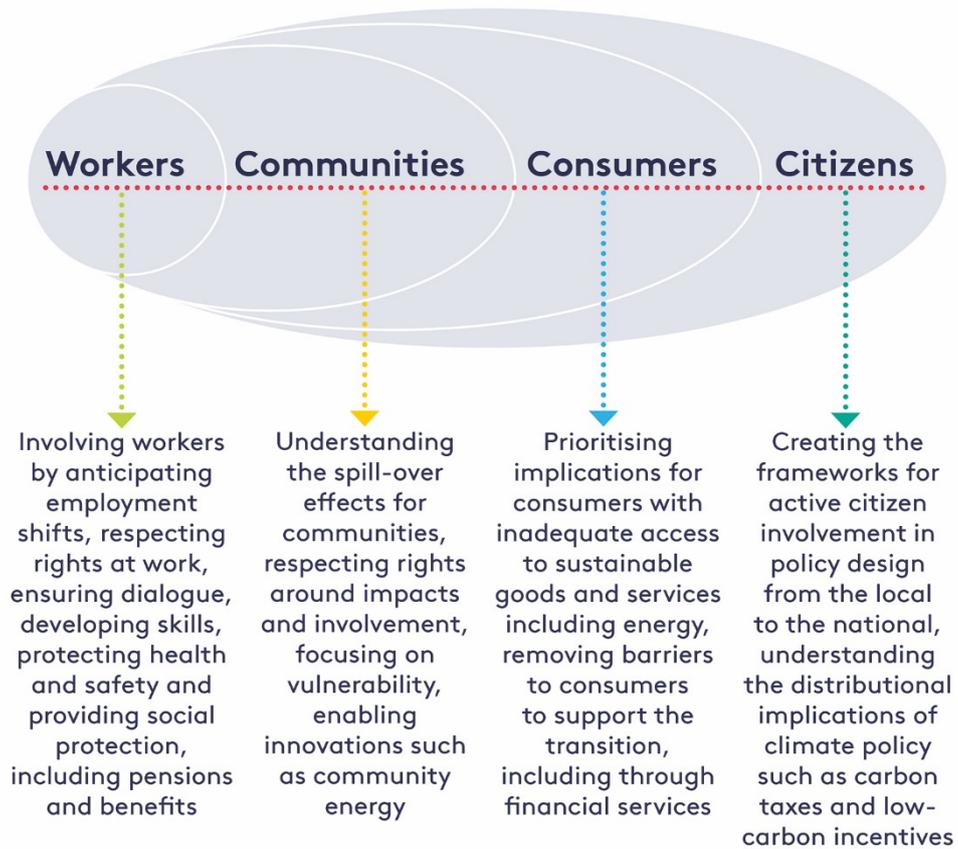
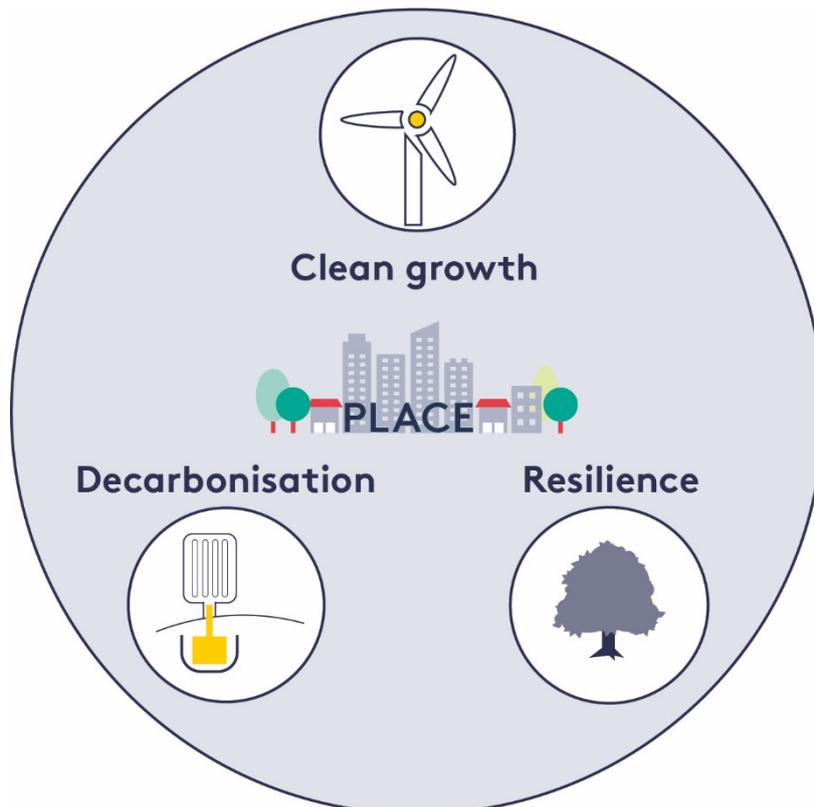


Figure 2. Key components of the just transition



The case for action

The goal: an inclusive and resilient net-zero economy

The UK is the first G7 country to make a legal commitment to achieve a net-zero economy by 2050. It is by far the largest economy to set such an ambitious target and there are signs that the UK's leadership is encouraging other large economies to follow. This target forms part of a wider commitment to adapt to the physical impacts of climate change, build a circular economy and respond to the deepening loss of biodiversity and natural capital.

This shift is increasingly viewed as a driver of economic opportunity, creating new industries and new jobs, improving health, making communities cleaner, and shifting capital to new, highly productive low-carbon industries. According to the Can-do Cities initiative, simply investing in today's cost-effective measures to cut greenhouse gas emissions would save the UK £26.6 billion per year by 2026 through reducing household energy bills on average by £256, and would create 347,500 years of extra employment (PCAN, 2019). These savings amount to 14 per cent of the national total expenditure on energy in 2016.

The UK's net-zero target is a clear response to growing societal concern, most vividly expressed by the school strikes and by the mass protests of Extinction Rebellion, which prompted the UK Parliament to declare an environment and climate emergency. According to a ComRes survey in July 2019, 71 per cent of the UK public agree that climate change will be more important than the country's departure from the EU in the long term, and six in 10 adults said the Government was not doing enough to prioritise the climate crisis (Sherwood, 2019).

Managing a process of disruptive change

Achieving net-zero will affect all individuals, households, companies and organisations – almost the whole economy will be required to decarbonise. This will require proactive management of both risks and opportunities in order to deal with the inevitable trade-offs of change. The country must manage the threat of not only 'stranded assets' and 'stranded enterprises' but also 'stranded workers' and 'stranded communities'.

In its report recommending the net-zero target, the Committee on Climate Change (CCC) concluded that, "If the impact of the move to net-zero on employment and cost of living is not addressed and managed, and if those most affected are not engaged in the debate, there is a significant risk that there will be resistance to change, which could lead the transition to stall" (CCC, 2019). The CCC has recommended that the Government introduce a just transition strategy.

An assessment conducted by the Grantham Research Institute and the University of Leeds has estimated that about one fifth of current jobs in the UK will be affected by the greening of the economy (Robins et al., 2019). Table 1 provides an overview of sectoral decarbonisation targets as laid out by the CCC, current employment levels in each sector, and our estimates of the proportion of jobs that will be affected by greening and the proportion that will require new skills in the transition. The transport, industry, buildings and power sectors are all exposed to significant amounts of change as they green, though the reskilling challenge varies between them: it is high in the construction sector at 30 per cent but lower in industry.

The three regions that are likely to be the most affected are the East Midlands, West Midlands and Yorkshire and the Humber. The UK is already the most regionally imbalanced economy in Europe and it will be important that the transition is designed to reduce rather than increase these divisions (Institute for Public Policy Research, 2018). The transition will have consequences beyond work, too, for communities, consumers and citizens.

Table 1. Sizing the challenge: UK emissions targets, employment and skills alignment

Sector	Emissions targets	Employment levels	% of jobs affected by greening of the sector	% of jobs that will require new skills in the transition
Surface transport	98% reduction in emissions by 2050	1.6m employed in transport and storage; 4m in retail and repair of vehicles	46% ¹	26% ¹
Industry	90% reduction in emissions by 2050	3m employed in manufacturing	50% ²	17% ²
Buildings	All new heating systems low carbon from 2035	2.4m jobs in construction; 0.5m jobs in real estate	60% ³	30% ³
Power	99–100% low-carbon generation by 2050	90,000 employed in electricity production, transmission and distribution; 544,000 employed in UK energy industry	43% ⁴	26% ⁴
Agriculture	30–50,000ha afforested every year to 2050; 20% cut in consumption of beef, lamb and dairy	426,000 employed in agriculture; 4m jobs in agri-food sector overall	11% ⁵	6% ⁵
<p><i>Notes: 1. Transport and storage. 2. Manufacturing sector only. 3. Construction sector only. 4. Mining, quarrying and utilities. 5. Agriculture, forestry and fishing.</i></p> <p><i>Sources: Key sectors for decarbonisation and long-term emissions targets from CCC (2019b); Skills profile of sectors from Robins et al. (2019); Numbers employed in each sector from Rhodes (2018), Defra et al. (2019), ONS (2017) and Energy UK (2018).</i></p>				

The success of the economic transformation that is required will be measured not only in terms of meeting the country’s emissions targets and how well resilience to climate impacts is built in, but also in the degree to which it delivers fairness, social justice and greater wellbeing. For this to happen, fresh thinking on the design and delivery of vital policy tools (such as carbon pricing) as well as business and financial practices will be necessary. The Scottish government has already established a multi-stakeholder Just Transition Commission to provide advice on how the country can develop a “carbon-neutral economy that is fair for all” (Scottish Government, 2018). New approaches to dialogue (such as Citizens’ Assemblies¹) will also be required. In its 2019 statement on the just transition, for example, the Trades Union Congress (TUC) concluded that “the opportunities will not be realised unless the workers most affected have a seat at the table where key decisions are made” (TUC, 2019).

¹ In June 2019, six select committees of the House of Commons announced plans to hold a Citizens’ Assembly on combating climate change and achieving the pathway to net-zero carbon emissions. See UK Parliament (2019).

Mobilising the UK's financial system

Making this shift will require the UK's £20 trillion financial system to effectively manage climate risks and channel capital towards sustainable activities. According to an open letter co-written by Bank of England Governor Mark Carney, the transition will require "a massive reallocation of capital", and "if some companies and industries fail to adjust to this new world, they will fail to exist" (Carney et al., 2019).

The net-zero economy could involve extra investments of 1–2 per cent of UK GDP per year in 2050, according to the CCC (CCC, 2019c). At a national level, this is manageable, as overall investment has fluctuated at between 15 and 24 per cent of GDP over the last 30 years. The costs of key technologies have been steadily falling and are expected to fall further. Nonetheless, financial innovation will be needed to help reduce the upfront capital costs in the transition.

This imperative comes at a time of considerable uncertainty for the financial system and the country more generally. More than a decade on from the financial crisis, restructuring and regulation remain driving forces, along with historically low interest rates. Deep uncertainties exist over the macroeconomic and financial system implications of Brexit, contributing to slowing economic activity and demand for financial services. Accelerating digital disruption is providing new ways to channel finance at lower costs (including to solve climate and societal challenges), but this is also set to bring further structural changes that are yet to be fully understood for financial sector institutions, their employees and customers (Leaders' Quest, 2017).

The UK is in the international vanguard in terms of its financial sector and policy response to climate change: there are already policy expectations that climate disclosure will become mandatory and new regulatory expectations for how banks manage the financial risks of climate change, and in 2021 the first system-wide climate stress test will be introduced (HM Government, 2019a; Carney, 2018; Bank of England, 2019). In terms of how banks are responding to climate change, the Prudential Regulatory Authority estimated in 2018 that about 30 per cent of banks are being 'responsible' (e.g. driven by Corporate Social Responsibility and focusing on reputational risks), about 60 per cent are being 'responsive' (e.g. viewing climate change as a financial risk from a relatively narrow perspective) and about 10 per cent are being 'strategic' (e.g. taking a long-term view of the financial risks and supporting an orderly transition) (Bank of England, 2018).

The Government has announced a number of measures aiming at mobilising the additional capital required for a sustainable economy, as part of its new Green Finance Strategy. One of the most important tasks is to work out how to scale up flows of equity and debt finance for climate action across the UK. To take one indicator, according to the Climate Bond Initiative, the UK ranks 12th in terms of green bond issuance at the country level (Climate Bond Initiative, 2019). Two new institutions are aiming to close this and other gaps: the Green Finance Institute and the related Impact Investing Institute, which is focused on combining social purpose with financial returns (Green Finance Initiative, 2019; Impact Investing Institute, 2019).

The challenge of the just transition lies in many ways at the intersection of green finance and social impact investing. This is recognised in the Green Finance Strategy, which identifies delivering a just transition as a key next step: "...as our economy changes it is vital we make sure that this growth in inclusive, benefitting people across the UK, supporting workers as industries transform and ensuring the costs as well as the benefits are shared fairly, protecting consumers, workers and businesses" (HM Government, 2019a).

Banks now need to define the pivotal role they can play. The following sections explore five priority themes for further discussion.

Five priority themes

1. Renewing purpose through the just transition

The growing importance of purpose for banking

In 2017, a consortium of banks based in Britain working with investors and other stakeholders reaffirmed the importance of their core purpose: to serve the real economy over the long term (Leaders' Quest, 2017). This renewal of the importance of strategic purpose is now being linked to sustainable finance and responsible banking. The EU has led the way through its Sustainable Finance Action Plan, stimulating a broad spectrum of market and regulatory measures to make environmental and social priorities central within the financial system.

This question of purpose is also reflected in the new Principles for Responsible Banking (PRB), which the UNEP Finance Initiative launched in September 2019 (UNEP FI, 2019). These set out six principles for banks to implement in terms of the alignment of their business strategy, impact management, working with clients, engaging with stakeholders, governance and culture, and accountability. More than 100 institutions have signed or supported the Principles; UK Finance is one of its endorsers.

The prologue to the Principles gives a clear sense of its ambition:

Our success and ability to remain profitable and relevant is intrinsically dependent on the long-term prosperity of the societies we serve. We believe that only in an inclusive society founded on human dignity, equality and the sustainable use of natural resources, can our clients and customers and, in turn, our businesses thrive. We therefore want to take a leadership role and use our products, services and relationships to support and accelerate the fundamental changes in our economies and lifestyles necessary to achieve shared prosperity for both current and future generations.

To date, the environmental and social dimensions of sustainable finance and responsible banking have been managed in siloes. Climate change is clearly an environmental issue, but the transition is a process of structural economic change with obvious social consequences. What the just transition does is help decision-makers in banks and elsewhere to see how the climate agenda fits with the social dimension. The just transition is explicitly included within the Paris Agreement on climate change and it unites many of the individual Sustainable Development Goals.

Translating the just transition into a digestible framework

Financing the actions behind the net-zero target is a task in itself; doing it in a way that contributes positively to a just transition is an additional challenge. The just transition remains embryonic and needs to be translated into a digestible framework for banks, their clients and communities. Business as usual with climate add-ons does not reflect a strategic approach to the risks and opportunities the just transition offers the sector. Instead, the core question for banks to ask as part of their just transition strategy development is: *How can banks and the banking system best respond to the social opportunities and risks that flow from the transition to a resilient, net-zero economy?*

Adopting a strategic, collaborative and consultative approach that has innovation of new products, approaches, values and client relationship models at its heart will enable banks not only to address climate change but also to reaffirm their core purpose to serve society. Thus, a just transition could help bolster and support their social licence to operate. Banks will also need to work with policymakers to ensure that effective incentives and regulatory frameworks are put in place to mobilise the banking sector more broadly to design solutions that reward inclusive outcomes.

To bring strategic focus, banks could therefore consider, as part of their support for the global Principles for Responsible Banking or within their own strategies, making a specific commitment to support a just transition. This would mirror the commitments made by more than 140 institutions in the investor community to the just transition, many of whom are major shareowners and bondholders of banks (UN PRI, 2019).

2. Supporting customers through a just transition

Understanding the granular needs of different groups

The main way that banks can play a role in helping to deliver a just transition is in supporting their customers and clients. A growing number of banks have already announced public commitments to withdraw financing from high-carbon sectors (such as coal and tar sands) as well as to scale up flows to green economy sectors. Overlaying the just transition dimension means fully understanding the needs of different groups in society, the risks and costs they might face, the opportunities for business or lifestyle improvement and the innovations that could be needed to respond at the required scale and speed. Banks and other finance providers will need to address questions around the demand for sustainable financial products. This means understanding the requirements of different customer segments (particularly under-served segments), the barriers they face, and the financial solutions that could enable them to succeed in the transition. Successfully identifying the opportunities that arise from the just transition could result in improved customer engagement, stronger linkage to the real economy and renewed confidence of local communities. Doing so will involve considerable market development, necessitating coordination between banks and other finance providers, information brokerage to help consumers understand options, improved infrastructure to support cooperation between economic partners, blended finance and appropriate regulation. This will require trusted intermediaries and blended finance, the 'patient capital' of the public sector alongside impact investors (Mazzacuto, 2016).

Banking innovations on the just transition are starting to emerge. In April 2019, for example, Spanish bank BBVA coordinated for Iberdrola the first sustainable credit facility aligned with the just transition principles, totalling €1.5 billion. The facility was explicitly aimed at delivering environmental and social objectives simultaneously, in this case the expansion of renewable energy and increased access to energy (BBVA, 2019). Sustainable improvement loans offer another mechanism for incentivising environmental and social performance (Thomä et al., 2019).

It is already possible to start identifying possible implications for customer groups along with the products and services to help high- and low-carbon business clients transition to the new economy, as well as individual customers who will need green mortgages to retrofit their houses, and savings customers who want to avoid 'stranded deposits'.

Table 2 below sets out questions for different customer groups to stimulate discussion. The rest of this section focuses on the needs of SMEs and household mortgages as important examples.

Table 2. Banking and the just transition: questions across customer groups

<p>Individuals and households</p> <ul style="list-style-type: none"> - How can lending and mortgage products be aligned with a net-zero future and better incorporate issues of social inclusion (e.g. fuel poverty)? - What regulatory and market changes are needed to support banks to transition to the point that all lending and mortgages are green? When will this be achieved? - How can savings product models respond better to the needs of Generations X and Y? - How can banking institutions be transparent about the contribution of savings products to the just transition (including place-based programmes)? 	<p>Small and medium enterprises (SMEs)</p> <ul style="list-style-type: none"> - How can SMEs, government and finance providers best quantify SME demand for just transition financing (e.g. to avoid stranding risks and support long-term development)? - What financial products and what advisory services are likely to be needed by SMEs, and under what terms? - What institutional mix is required to respond to these needs in terms of shareholder banks, mutuals, community development finance institutions (CDFIs) and public finance? - How can capacity on climate finance be built in the SME sector? - What is the role of technology such as cloud-based accounting in supporting SMEs to transition to net-zero?
<p>Corporate finance</p> <ul style="list-style-type: none"> - How can the environmental and social dimensions of the transition be incorporated into capital raising for large corporates (e.g. bonds, credit facilities)? - How can the social dimension be included in banking finance for sustainable infrastructure? - What new public finance mechanisms are needed to support investment for net-zero and inclusive infrastructure? - How can the just transition agenda be incorporated into international trade finance? 	<p>Public authorities and partnerships</p> <ul style="list-style-type: none"> - What innovative models exist for financing local projects that support a just transition (e.g. revolving funds, crowdfunding municipal bonds, use of digital technology)? - How can local authorities and enterprise partnerships work with banks to support net-zero industrial clusters? - What fresh thinking is required to best connect banks with public finance institutions to deliver a just transition? - How can banks support national-level action for the just transition (e.g. through sovereign bond issuance)?

Financing SMEs through a just transition

SMEs are the backbone of the UK economy, accounting for 90 per cent of UK businesses and 60 per cent of private sector jobs. There are roughly 5.6 million SMEs in the UK with a total annual turnover of £2 trillion; 96 per cent of these are self-employed or companies with fewer than 10 employees (Ward and Rhodes, 2014). SMEs contribute to economic development, employment, innovation and social cohesion, and they are especially important in economically deprived areas (see, for example, Lerner, 2010).

SMEs are hugely diverse in terms of economic contribution, environmental performance and social impact. From users of high-carbon capital stock (such as diesel haulage) to suppliers to high-carbon sectors (such as automotive, aviation, energy and industry), and on to pioneers in clean tech innovation and firms dedicated to sustainability, all SMEs in the UK will need to be net-zero by 2050, and many well before then (Owen et al., 2018). However, SMEs lack time, capital and access to expertise and often have limited market power.

It is essential that SMEs are consulted, supported and effectively financed to make the necessary changes in ways that are manageable and sustainable. This means understanding potential risks,

upgrading their businesses, and adapting to new markets for net-zero products and services. There is a window of opportunity right now for banks to work with SMEs to enable them to prepare for the transition.

This will not be easy, particularly as SMEs can struggle to access finance and advice. Banks account for 80 per cent of SME loans but many are turned down on grounds of being too risky. A quarter of all SME applications are rejected (BVA BDRC, 2019). This is partly the result of risk-averse regulation following the financial crisis and partly because SMEs often have little or no collateral and no track record for the bank to assess the risks and opportunities an SME poses.

SMEs with business models based on intellectual property, and those seeking finance for new business models or technology where innovation is often key to their development, have particular problems in securing loans (see, for example, Cowling et al., 2018). About 7 per cent of SMEs are reluctant to seek external finance (British Business Bank, 2018), citing time and hassle as key reasons. These challenges extend to the transition as well. A first task is to raise awareness of what needs to be done, and then work with SMEs to understand what it will take to embrace the transition. The Government has set out some policies to support SMEs, notably the Boosting Access for SMEs to Energy Efficiency (BASEE) competition, announced in March 2019, with £6m of funding for new innovative models that reduce costs, simplify processes and encourage take-up (Thomä et al., 2019; HM Government 2019a, b).

Access to finance alone may not always be the stumbling block. For example, funds for energy efficiency upgrades lie unused by many SMEs because of time pressures and perceived risks. Ways must be found to address the apparent lack of SME demand for loans to finance economically attractive carbon reduction opportunities. Innovations in data and technology are likely to play a central role too, especially those designed to access, communicate and assess companies' needs and potential for using finance. An institution providing advice to SMEs, whose remit could include green finance and the just transition, is one option, linked to the potential establishment of a new national infrastructure bank (see Priority 4 below). Lessons can be learnt from other jurisdictions such as in Germany, where its national development bank, KfW, has been a crucial contributor to the *Energiewende* ('energy transition'), especially through energy efficiency loans to SMEs.

In Box 1 we provide examples of two SMEs working in the energy efficiency field and how they have been financed.

Box 1. SME transition pioneers: Q-Bot and Switchee

The Ashden Awards is an annual competition for sustainable energy trailblazers globally. A handful of winners each year gain funding and support to help their expansion. More widely, Ashden works to advocate for the sector and support the growth of new sustainable solutions.

Q-Bot (Ashden winner, 2018). Up to 25 per cent of heat loss can occur through floors, making this an important area for improvement in the nation's housing stock. Q-bot has developed a robot that can apply a layer of insulation beneath suspended floors, without the need to pull up carpets – thus it is a less costly and disruptive way to insulate homes and thus reduce heating need and emissions. The company received €2.13 million in grant funding from the EU's Horizon 2020 programme, as well as from other public and philanthropic bodies including Innovate UK and Climate-KIC, and equity funding from six London-based 'Angel' funders (Q-Bot, 2019).

Switchee (Ashden winner, 2017). Smart thermostats make it easier for households to optimise their heating use, saving money and reducing emissions. However, they are often not suitable for social housing, as they usually require wifi to work, which not all tenants have. Switchee has designed a smart thermostat for social housing that works without wifi or mobile phone apps. Energy use can be cut by up to 15 per cent and data is fed back to housing associations and local authorities. The company has received equity funding from Evergreen Energy and other, smaller investors (Evergreen Energy, 2016).

Financing household mortgages through the just transition

More than 10 years since the Climate Change Act was passed, the CCC has concluded that “there is still no serious plan for decarbonising UK heating systems”, notably in the housing sector (CCC, 2019c). To meet the new net-zero target, all new housing must be built to meet zero-carbon standards, and all buildings, commercial and residential, will have to be retrofitted in the coming decades. This means ensuring that all new housing meets zero-carbon standards and all buildings, commercial and residential, are retrofitted to net-zero standards in the coming decades. To be on track, for example, 545,000 lofts need to be insulated each year; in 2018, only 43,000 were actually insulated (CCC, 2019b).

The Government has set targets to halve the energy use of new buildings by 2030, and to improve all housing stock to Energy Performance Certificate (EPC) band C by 2035, which will cost an estimated £35bn–£65bn (House of Commons Business, Energy and Industrial Strategy Committee, 2019). Households and businesses will be required, for example, to replace all existing oil and gas appliances (used for heating and cooking) and introduce energy efficiency measures such as insulation.

Upgrading the building stock in this way has intrinsic social implications at a time of fundamental concerns about both the amount and affordability of housing in the UK. For example, about one-third of all homes below EPC band C are not in the ‘able-to-pay’ category (CCC, 2019b) and about 13 per cent of UK households today live in fuel poverty, rising to over 40 per cent in some locations such as Northern Ireland (HM Government, 2017). In addition, workers in the construction sector are also the most exposed to both the opportunities and the risks from the transition, with 60 per cent estimated to be affected: 30 per cent of construction workers have skills that will be in more demand during the transition, while 30 per cent have skills that could face falling demand (Robins et al., 2019). This points to questions about how the upgrading can also generate decent work with good pay and conditions.

The banking sector will play a crucial role in connecting finance with environmental and social outcomes in the housing sector during the transition. Bank credit remains concentrated in loans to households, the largest share of which is mortgage lending. In 2018, banks provided finance for 800,000 home purchases. Total new lending for mortgages in the UK in the year to April 2019 was £147bn (including £75.6bn for purchases in London) (UK Finance, 2019).

Loans tailored to encourage energy efficiency and decentralised renewable energy development will be crucial. To date, a few ‘green mortgages’ have come onto the market. Barclays offers lower rates on fixed rate products for homes with EPC ratings A and B (Barclays, 2019). Ecology Building Society also offers lower rates for homes with EPC rating A or B, as well as more specialist products for energy retrofits, energy-efficient self-builds, and energy-efficient buy-to-let purchases (Ecology Building Society, 2019). It will be important to ensure that this potential to reduce energy bills can be made available to vulnerable customers and reduce fuel poverty.

Banks are also starting to work internally to connect data on their mortgage portfolios with information on energy performance. More broadly, digital technology and data availability could play a big role in product tailoring and in facilitating the viability of new decentralised structures. For example, banks could play a role in facilitating peer-to-peer trading networks for local solar energy generators.

The Government has signalled a willingness to help: in its Green Finance Strategy, it announced a new Green Home Finance Fund of £5m to help the private sector pilot these types of products. It will be publishing a consultation later in 2019 on setting requirements for lenders to help improve the energy performance of the homes they lend to (HM Government, 2019a). A mix of incentives and requirements are likely to be needed, with social justice considerations built in.

3. Responding to place-based priorities

The transition will not be geographically neutral

Many of the factors that will determine the transition are determined at the national level or indeed internationally. Yet, these impacts will be felt very differently across the country, in rural communities as well as urban centres. This spatial dimension is particularly important for the UK given the entrenched regional imbalances that exist. Deindustrialisation continues to have negative effects in many parts of the country and there are concerns that the drive to net-zero could again negatively affect important industrial areas. Ambitious place-based strategies are needed to ensure that the transition is undertaken in ways that do not leave workers or communities in these regions behind. Equally, a just transition requires that already vulnerable communities do not pay higher energy bills as a result of policy reform.

On the upside, the transition can be shaped to drive a process of regional revitalisation. This could be linked to the commitment by more than 220 local authorities that have declared a climate emergency (Declare a Climate Emergency, 2019). The clearest example is the offshore wind sector and a number of regions are already seizing this opportunity. For example, the economy along the Humber estuary emits more carbon dioxide than any other industrial cluster in the UK, but the Local Enterprise Partnership has set an ambitious target of achieving net-zero in the area by 2040, a decade ahead of the country as a whole (Humber LEP, 2019).

Rural areas and market towns

The just transition will also need specifically to address the needs of rural areas and market towns if it is to avoid exacerbating inequalities. Food and farming will need to be central to the debates as the impact of extreme and changing climate patterns is already affecting food supply and farming communities. It will need to understand the needs of the UK's 149,000 farms, 90 per cent of which are sole traders or family businesses (Countryside, 2019). Decarbonisation of transport will also need to be sensitive to the needs of rural communities and accompanied by investment in public transport provision if it is to avoid worsening existing problems in accessing employment and social isolation. Some rural councils and market towns have already seized the initiative. For example, Cornwall Council declared a climate emergency in January 2019 and has approved an ambitious plan to become carbon-neutral by 2030.

Generating priorities from the bottom up

Place is one of the key cross-cutting components of the just transition, not least because of the decentralised nature of the net-zero economy. Our work has revealed an unmet demand for place-based financing that supports the net-zero economy and delivers positive social impact. Closing this gap will require innovation in many areas. Local authorities and enterprise partnerships must incorporate the just transition in Local Industrial Strategies and City Deals, including the development of net-zero industrial clusters and support for community-based business models. Our research has also identified the importance of anchor institutions, organisations whose scale, rootedness and community links are such that they are acknowledged to play a key role in local development (Morris et al., 2010). Development finance is also vital to help new companies, technologies and business models that are aligned with the transition to develop in locations that need economic uplift. Citu, a low-carbon housing company in Leeds, provides an example of this (see Box 2).

Box 2. Financing net-zero innovation – Citu

Citu is a privately owned, low-carbon housing development company based in Leeds. Its buildings have a carbon footprint seven to 10 times lower than the average UK house and its districts are designed to encourage behaviour shifts and community engagement to reap further environmental benefits. Citu’s expansion has required patient financial backing. Such developments are high risk, facing technological risk and policy risk, as well as risk from financial and housing markets. Citu has been supported by flexible public finance from the Government’s housing accelerator Homes England, Leeds City Council’s Revolving Investment Fund, and Innovate UK.

Anchor institutions such as leading businesses and local authorities, along with trade unions, universities, hospitals and major charities, can often play a critical role in place-based climate action. Responding to place-based priorities will also require leadership from locally-rooted banks and financial institutions: these institutions need to identify how they can play this anchor role. In an era when the physical presence of banks is declining due to branch closures, innovative approaches will be needed to identify the long-term role that national as well as region-specific institutions can play in specific places. It will be important for banks to ensure that their regional and local knowledge is retained and shared with others when designing strategies to address the just transition. They will also need to tailor their products to different economic realities.

The Banking on a Just Transition project will be working on this with the new Place-based Climate Action Network (PCAN).² PCAN brings together the LSE’s Grantham Research Institute, the University of Leeds, the University of Edinburgh and Queen’s University Belfast. The network will support three city-based climate commissions, in Belfast, Edinburgh and Leeds, and will seek to stimulate the flow of green finance into cities across the UK. PCAN will also explore how to ensure that there is a just transition so that nobody and nowhere is left behind (Grantham Research Institute on Climate Change and the Environment, 2019). The Leeds Climate Commission is already established; one of its priorities is to mobilise finance (see Box 3).

Box 3. Leeds Climate Commission – how to finance an inclusive carbon finance

The Leeds Climate Commission is an independent, cross-sectoral, multi-stakeholder group that has brought together relevant organisations and actors to identify and stimulate investment in the opportunities associated with the low-carbon transition. In March 2019, Leeds City Council passed a motion to declare a climate emergency, based on the preparation of a science-based Carbon Roadmap produced by the Commission. This concluded that “technically and to a large extent also economically it is entirely possible for Leeds to become a carbon neutral city” and set a number of targets for the city to reduce its emissions: a 70 per cent cut by 2025, 85 per cent by 2030, 95 per cent by 2035, 97 per cent by 2040, 99 per cent by 2045 and 100 per cent by 2050 (Leeds Climate Commission, 2019).

Importantly, the Commission highlighted in its analysis of the city’s next steps that “a key challenge is to ensure that the transition is a just and inclusive one – with steps being taken to ensure that people and places are not left behind and that all social groups and economic sectors participate in and benefit from the transition”. The Commission is also working on innovative ways to mobilise finance for this pathway. For example, to help bridge the gap between the demand and supply of capital, the Commission is hosting peer-to-peer learning programmes.

² See <https://pcancities.org.uk/>

Questions for place-based dialogues

- What are the critical financing needs to deliver a just transition in the city/region over the coming decades in each sector?
- What is the mix of public and private finance that will be needed, including banks, investors and other financial institutions?
- What are the key barriers to flows of sufficient, affordable, place-based finance – and what steps could be taken to overcome them?
- Are there iconic projects that could help to build confidence, capacity and momentum at the local level?
- What role would the city/region like to see banks playing to support regional just transition plans?
- Who are the main actors that need to be involved?
- What new partnerships or institutions are needed to deliver these flows?
- What forms of institutionalised social dialogues are needed?
- What needs to change nationally to enable place-based financing to take-off?

4. Shaping the policy and incentive regime

Developing a just transition policy framework

Building a net-zero economy will involve “a major ramp-up” of policy effort across government at all levels, according to the Committee on Climate Change (CCC, 2019a). In its 2019 *Progress Report to Parliament*, the Committee identified that only seven out of 24 indicators of progress were on track and in terms of 25 headline policy actions set in 2018, only one had been delivered in full (CCC, 2019b). This policy framework is still to be formed, and a dimension of it will have to aid better direction of financial flows in the banking system; the banking sector and its stakeholders could help to shape it so that funding flows to the right activities with far greater urgency.

While there is growing awareness of the need for urgency in climate action, and for this to be inclusive, policy and market incentives still do not reward finance to flow in this direction. A strategic policy framework for the just transition is needed that covers the key policy dimensions (e.g. macroeconomic, industrial, regional, labour market and wider environmental policies) as well as the public finance required. Tools such as carbon pricing will need to be designed and delivered with the just transition in mind.

The just transition policy framework will need specifically to address the question of how a risk-averse banking sector can be incentivised to invest in the just transition, not least to encourage flows of sufficient, affordable finance across UK regions. Such a framework would need to recognise the importance of decentralisation and devolved decision-making, and the need to engage all stakeholders in its design. Getting the just transition into national and local Industrial Strategies, and the new Shared Prosperity Fund, are immediate priorities.

Aligning financial regulation

The UK’s central bank and financial regulators have made it clear that climate change is a financial stability risk (Bank of England, 2019). They have yet to address the social and the spatial dimensions of the transition, however. Banks already face a broad ‘fairness’ agenda (e.g. in terms of access to cash, customers in financial difficulties, fraud) but as yet this is not linked to the imperatives surrounding climate change. A more tailored approach could be needed that differentiates between what needs to be centralised and what can be regionally determined as a way of stimulating secondary markets. Banks and other finance providers could also disclose the geographical allocation of finance to enhance understanding of inflows to the local and national

economy. Furthermore, there remains a continuing concern that some existing regulation could hinder the actions that need to be taken by financial institutions to support a just transition, including by acting as a barrier to entry or constraining longer-term capital.

The crucial role of public and blended finance

Delivering a just transition is also likely to involve a new mix of financing mechanisms and institutions. This agenda comes at a time of profound change for public financing as Brexit will lead to the end of long-standing European regional and investment bank flows. This has led to the call by many for the establishment of a national infrastructure bank, with a dedicated sustainability, climate and just transition mandate (Rydge et al., 2018). Existing public finance organisations, such as the British Business Bank, could also take on a strategic role in supporting SMEs through the transition, acting through their financial services partners.

Policy is also needed to help create the ecosystem of financial institutions that can take a leadership role in the just transition. This can take the form of institutional innovation, such as setting up financial institutions with a social mission (for example, Big Society Capital). Fiscal incentives can also be deployed, such as the social investment tax credits. Take-up rates have been low in this particular example, something that subsequent initiatives must address. When operational, the new Impact Investing Institute could work to identify policies that might close the finance gap for the just transition. Further work is also needed to explore the potential for public sector bond issuance for a just transition, both by local authorities and centrally, for example, through a sovereign bond.

5. Exploring wider system innovations

The scale of the challenge linking climate action with social inclusion and economic prosperity points to the question of how transformational innovations across the banking sector and wider financial system can be developed. Our research points to several areas of potential innovation that could have a major impact.

- **Rebooting the capital mix:** Just as the UK needs to think about the optimal energy mix for a zero-carbon economy, we also need to explore what the right capital mix looks like to finance this transition in an efficient and inclusive way. Traditionally, banks have been built to provide 'baseload' finance and have found it hard to adapt to more decentralised and responsive forms of capital creation and allocation. Fresh thinking is required to understand how this 'baseload' role can be rethought in terms of the transition (for example to support local financing that is currently being developed by crowdfunding platforms, though volumes are still low).
- **Managing financial risk in the transition:** Risk is a key factor not just in the cost of capital but also in the way that financial institutions address the transition and wider sustainability issues. In one sense, the progress that banks have made in terms of managing climate risks is a sign of success. More broadly, however, banks are now regulated to be risk-averse at a time when the transition actually requires an increase in the proportion of risk capital to drive the innovations that are needed.
- **Serving the real economy:** The just transition is a challenge for the real economy rather than about the creation of a separate 'green economy'. The task for banking and finance is how to support the structural and systematic transformation of the whole economy through financial intermediation and expertise. Since the financial crisis, progress has been made to relink banking with the real economy. The climate emergency and the need for a just transition reemphasise the importance for banking to demonstrate the value it is creating for the UK, particularly to play a critical connective role between large-scale financial flows and practical project financing at the household, enterprise and local levels.
- **Refreshing models of dialogue and participation:** The scale and urgency of the climate emergency is prompting new thinking about how to involve citizens and stakeholders in

decision-making. The Scottish Government's Just Transition Commission provides a model for the UK as a whole. Citizens' Assemblies are another example of new ways of encouraging and facilitating public participation. To date, these assemblies have not been used to explore how financing could be better deployed for the transition: this is an area that the Banking on a Just Transition project will be exploring further.

Conclusion

The shift to a zero-carbon economy in the UK will require the mobilisation of significant capital from the UK's £20 trillion financial system. The success of the economic transformation needed will be measured not only by decarbonisation but also by the degree to which it delivers fairness and social justice.

The banking sector has a unique role to play in support of a just transition because of the sector's role in the economy and the goods and services it provides to households, businesses and organisations across the country. Banks need to ask themselves how they can best respond to the social opportunities and risks that flow from the transition to a resilient, net-zero-carbon economy, including making a specific commitment to support a just transition. The most important way banks can do this is by supporting their customers and clients. They need to help customers understand the benefits of carbon reduction in a way that is socially inclusive, and to consider how to move to the most appropriate mix of short-term credit and longer-term, asset-backed finance.

It is particularly important that SMEs, rural and urban, are able to participate in the zero-carbon transition and that upgrading building stock is done in a socially inclusive way. The transition will play out unequally across the country and there is an unmet demand for place-based financing that supports the net-zero economy and delivers positive social impact. Locally-rooted banks and financial institutions need to identify how they can play an anchor role in affected regions. For the banks to successfully support a just transition will also require a ramped-up policy framework and wider systems innovation.

Success with the just transition is by no means guaranteed and raises a series of tough issues. The social dimension of climate change touches on power, distribution and participation, all against the troubled backdrop of Brexit. At times, genuine dialogue could also be marked by disagreement and conflicting perspectives, hence the importance of building in and acknowledging the need for mediation and conflict management processes as part of the process. A revolution in data and digitisation is underway, with double-edged implications; the cross-over between the climate and technology transitions will ultimately need to be managed as a whole. Yet the reality that the transition is often going to be hard and that making it inclusive will be challenging should not deflect attention, especially not from the finance and banking sectors. Achieving these goals is entirely manageable. The time to start is now.

References

- Bank of England (2018) *Transition in thinking: The impact of climate change on the UK banking sector*. <https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/report/transition-in-thinking-the-impact-of-climate-change-on-the-uk-banking-sector.pdf?la=en&hash=A0C99529978C94AC8E1C6B4CE1EECD8C05CBF40D>
- Bank of England (2019) *Enhancing banks' and insurers' approaches to managing the financial risks from climate change*. Bank of England Policy Statement 11/19. <https://www.bankofengland.co.uk/prudential-regulation/publication/2018/enhancing-banks-and-insurers-approaches-to-managing-the-financial-risks-from-climate-change>
- Barclays (2019) 'Barclays Green Home Mortgages.' Web page. <https://www.barclays.co.uk/mortgages/green-home-mortgage/>
- BBVA (2019) BBVA coordinates Iberdrola's first sustainable credit facility aligned with the just transition principles, totalling €1.5 billion. Press release. <https://www.bbva.com/en/bbva-coordinates-iberdrolas-first-sustainable-credit-facility-aligned-with-the-just-transition-principles-totalling-e1-5-billion/>
- British Business Bank (2018) *Small Business Finance Markets 2017/18 Report*. <https://www.british-business-bank.co.uk/wp-content/uploads/2018/02/Small-Business-Finance-Markets-2018-Report-web.pdf>
- BVA BDRC (2019) *SME Finance Monitor*. http://www.bva-bdrc.com/wp-content/uploads/2019/03/BVABDRC_SME_Finance_Monitor_Q4_2018_FINAL.pdf
- Carney M (2018) 'New Economy, New Finance, New Bank.' Speech given by Mark Carney, Governor of the Bank of England. <https://www.bankofengland.co.uk/speech/2018/mark-carney-speech-at-the-lord-mayors-bankers-and-merchants-dinner-mansion-house>
- Carney M, Villeroy de Galhau F, Elderson F (2019) Open letter on climate-related financial risks from the Governor of Bank of England Mark Carney, Governor of Banque de France François Villeroy de Galhau and Chair of the Network for Greening the Financial Services Frank Elderson. <https://www.bankofengland.co.uk/news/2019/april/open-letter-on-climate-related-financial-risks>
- Climate Bonds Initiative (2019) *Green Bonds – State of the Market 2018*. <https://www.climatebonds.net/resources/reports/green-bonds-state-market-2018>
- Committee on Climate Change [CCC] (2019a) *Phase out greenhouse gas emissions by 2050 to end UK contribution to global warming*. <https://www.theccc.org.uk/2019/05/02/phase-out-greenhouse-gas-emissions-by-2050-to-end-uk-contribution-to-global-warming/>
- Committee on Climate Change [CCC] (2019b) *Reducing UK emissions: 2019 Progress Report to Parliament*. <https://www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament/>
- Committee on Climate Change [CCC] (2019c) *Net Zero – the UK's contribution to stopping global warming*. <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>
- Countryside (2019) 'Membership Category of the National Farmers Union (NFU).' Webpage. <https://www.countrysideonline.co.uk/food-and-farming/contributing-to-the-economy/>
- Cowling M, Ughetto E, Lee N (2018) The innovation debt penalty: Cost of debt, loan default, and the effects of a public loan guarantee on high-tech firms. *Technological Forecasting and Social Change* (127): 166-176
- Declare a Climate Emergency (2019) 'List of Councils who have declared a Climate Emergency.' Web page. <https://www.climateemergency.uk/blog/list-of-councils/>
- Department for Environment, Food and Rural Affairs [Defra], Department of Agriculture, Environment and Rural Affairs (Northern Ireland), Welsh Government, Knowledge and Analytical Services, The Scottish Government, Rural and Environment Science and Analytical Services (2019) *Agriculture in the United Kingdom 2018*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815303/AUK_2018_09jul19.pdf
- Ecology Building Society (2019) 'Residential Mortgages.' Web page. <https://www.ecology.co.uk/mortgages/residential-mortgages/>
- Energy UK (2018) *Energy in the UK*. https://www.energy-uk.org.uk/files/docs/Research%20and%20reports/Energy_in_the_UK/EnergyintheUK2018finalweb.pdf
- Evergreen Energy (2016) *Evergreen Invests in Switchee*. <https://evergreen-group.co.uk/evergreen-investments-articles-switchee/>

- Grantham Research Institute on Climate Change and the Environment (2019) New £3.5m research network to support UK transition to a low-carbon economy. Press release. <http://www.lse.ac.uk/GranthamInstitute/news/new-3-5m-research-network-to-support-uk-transition-to-a-low-carbon-economy/>
- Green Finance Initiative (2019) 'Green Finance Institute.' Web page. <http://greenfinanceinitiative.org/green-finance-institute/>
- HM Government (2017) *Fuel Poverty Statistics*. <https://www.gov.uk/government/collections/fuel-poverty-statistics>
- HM Government (2019a) *Green Finance Strategy*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820284/190716_BEIS_Green_Finance_Strategy_Accessible_Final.pdf
- HM Government (2019b) *Boosting access for SMEs to energy efficiency (BASEE): competition*. <https://www.gov.uk/government/publications/boosting-access-for-smes-to-energy-efficiency-basee-competition>
- House of Commons Business, Energy and Industrial Strategy Committee (2019) *Energy efficiency: building towards net zero*. <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/1730/1730.pdf>
- Humber Local Enterprise Partnership [LEP] (2019) *Humber Industrial Strategy Prospectus*. <https://www.humberlep.org/wp-content/uploads/2019/06/Humber-LIS-Prospectus-June-2019-1.pdf>
- Impacting Investing Institute (2019) 'Welcome'. Web page. <https://www.impact-investinginstitute.org/>
- Institute for Public Policy Research [IPPR] (2018) *Prosperity and Justice: a plan for the new economy*. <https://www.ippr.org/research/publications/prosperity-and-justice>
- Leeds Climate Commission (2019) *A Science-based Carbon Budget, Carbon Targets and Carbon Roadmap for Leeds*. <http://leeds.candocities.org/news/leeds-can-become-carbon-neutral-city-according-new-roadmap-report>
- Lerner J (2010) The future of public efforts to boost entrepreneurship and venture capital. *Small Business Economics* (25)3: 255-264
- Mazzacuto M (2016) Innovation, the State and Patient Capital. *The Political Quarterly* 86 (S1). <https://onlinelibrary.wiley.com/doi/full/10.1111/1467-923X.12235>
- Leaders' Quest (2017) *Banking Futures: Building a healthy, resilient and inclusive banking sector*. <https://leadersquest.org/banking-futures>
- Morris K, Jones A, Wright J (2010) *Anchoring Growth: the role of 'anchor institutions' in the regeneration of UK cities*. Research Paper 2. The Work Foundation.
- Office for National Statistics [ONS] (2017) Industry (2, 3 and 5 – digit SIC) – Business Register and Employment Survey (BRES): Table 2. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/industry235digitsicbusinessregisterandemploymentsurveybrestable2>
- Owen R, Lyon F, Brennan G (2018) Enabling investment for the transition to a low carbon economy: Government policy to finance early stage green innovation. *Current Opinion in Environmental Sustainability Special Issue for the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Cycle and Special Report on Global Warming* 31: 137-145.
- Place-Based Climate Action Network [PCAN] 'Find your place.' Web page. www.pcancities.org.uk/find-your-place
- Q-Bot (2019) Homepage. <https://www.q-bot.co/about.html>
- Rhodes C (2018) *The construction industry: statistics and policy*. House of Commons Library Briefing Paper No. 01432. <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN01432#fullreport>
- Robins N, Gouldson A, Irwin W, Sudmant A (2019) *Investing in a Just Transition in the UK: How investors can integrate social impact and place-based financing into climate strategies*. London: Grantham Research Institute on Climate Change and the Environment. <http://www.lse.ac.uk/GranthamInstitute/publication/investing-in-a-just-transition-in-the-uk/>
- Rydge J, Martin R, Valero A (2018) *Sustainable growth in the UK: Seizing opportunities from technological change and the transition to a low-carbon economy. Special report for the LSE Growth Commission*. <http://www.lse.ac.uk/GranthamInstitute/publication/sustainablegrowth/>

- Scottish Government (2018) *Just Transition Commission – Terms of Reference*.
<https://www.gov.scot/binaries/content/documents/govscot/publications/factsheet/2019/03/just-transition-commission-governance/documents/just-transition-commission-terms-of-reference/just-transition-commission-terms-of-reference/govscot%3Adocument>
- Sherwood H (2019) Climate more pressing than Brexit, say 71% of Britons – poll. *The Guardian*, 26 July.
<https://www.theguardian.com/environment/2019/jul/26/climate-more-pressing-than-brexit-say-71-of-britons-poll>
- Thomä J, Caldecott B, Ralite S (2019) *Sustainability Improvement Loans: a risk-based approach to changing capital requirements in favour of sustainability outcomes*.
<https://www.smithschool.ox.ac.uk/research/sustainable-finance/publications/Thomae-et-al-2019-Sustainability-Improvement-Loans.pdf>
- Trades Union Congress [TUC] (2019) *A Just Transition to a greener, fairer economy*.
<https://www.tuc.org.uk/research-analysis/reports/just-transition-greener-fairer-economy>
- UK Finance (2019) *Mortgage Trends*. <https://www.ukfinance.org.uk/data-and-research/data/mortgages/lending-trends>
- UK Parliament (2019) *Select Committees announce plans for Citizens' Assembly*.
<https://www.parliament.uk/business/committees/committees-a-z/commons-select/business-energy-industrial-strategy/news-parliament-2017/climate-change-and-net-zero-chairs-comments-17-19/>
- United Nations Principles for Responsible Investment [UN PRI] (2019) *Statement of Investor Commitment to Support a Just Transition on Climate Change*. <https://www.tfaforms.com/4694571>
- United Nations Environment Finance Initiative [UNEP FI] (2019) *Principles for Responsible Banking Signature Document*. <https://www.unepfi.org/wordpress/wp-content/uploads/2019/07/FINAL-PRB-Signature-Documents-2-Interactive-22-07-19.pdf>
- Ward M, Rhodes C (2014) *Small Businesses and the UK Economy*. House of Commons Standard Note: SN/EP/6078. <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN06078#fullreport>