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REBUILDING TO LAST: HOW TO DESIGN AN INCLUSIVE, RESILIENT AND SUSTAINABLE GROWTH STRATEGY AFTER COVID-19

REPORT FOR THE ALDERSGATE GROUP

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FOREWORD

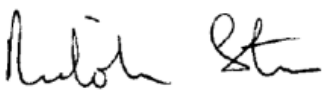
The COVID-19 crisis is a profound structural dislocation for the UK and the world. And it comes at a challenging time for the UK, with multiple other forces of change reshaping the economy, including globalisation, technology, the net zero transition, and the UK's exit from the European Union.

We are in a dangerous situation with a real risk of mass unemployment, severe social stress and economic depression; national GDP declined by 20% in April and a rapid recovery is far from guaranteed. In this context it would be a very serious mistake to try to return to the dangerous economic model of the past; that model did not deliver strong, inclusive, sustainable and resilient growth and was failing to manage the forces of change.

Strong and decisive action is needed to build a better economy and society after COVID-19. For the immediate recovery period, the UK needs investments – supported by sound institutions and policies - that are fast, labour intensive, have high multipliers, and can be targeted at the places that need them most. These same investments, institutions and policies can lay the foundations for the transition to net zero and the inclusive, resilient and sustainable growth we must pursue from now on for our own well-being and that of generations to come.

This report, commissioned by the Aldersgate Group, sets out the vision, strategy, investments, institutions, and policies we need to rebuild after COVID-19. Central will be strong UK institutions that can bring forward the necessary investments. Establishing a new National Investment Bank to reduce risk and unlock private finance should be an immediate priority for the UK government. It could play its part in the necessary financing and liquidity which will be crucial to recovery. With strong leadership it could be up and running by late 2020.

This is a pivotal moment in UK history. Our actions now will have profound implications for the future of Britain. A strong and sustainable recovery package will require new and innovative thinking and leadership. Now is the time to be ambitious in our vision and determined in our responses, guided by the sensible, clear, and evidence-based analysis this report carefully sets out. We know what to do. We need to act with a sense of purpose and urgency, and on the necessary scale, to deliver an inclusive, resilient and sustainable recovery. Our actions now will shape the prospects for the UK far into the future. And if we get it right in the UK our leadership, including through the presidency of both the G7 and UNFCCC COP26 next year, could help shape the world. That is "Global Britain".



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1. EXECUTIVE SUMMARY

COVID-19 represents a dramatic shock to the UK and global economy. We are in unchartered territory and a fast bounce-back is far from certain. It could take several years to recover from this crisis, with long-lasting effects. Reducing the risk of protracted recession and rebuilding on a path of inclusive, resilient and sustainable growth will depend significantly on policy choices in the coming months.

A clear macroeconomic vision is required to restore confidence, create quality jobs and grow the UK economy out of post-COVID recession and debt by supporting activity in the short term and expanding productive capacity in the medium term. There will be a need to ensure fiscal and monetary policy work together to guide liquidity and savings towards the growth of productive sectors. A focus will be necessary in dealing with the immediate impacts of jobs losses, but also managing the structural challenges ahead that will see a rapid shift in skills and labour markets.

A recovery package based on sustainability and resource efficiency can generate a sustained economic recovery, with strong job creation and ultimately, public sector debt sustainability. Properly managed and implemented, it can simultaneously reduce existing welfare inequalities that will be exacerbated by the pandemic and improve economic and social resilience to future shocks. It can also act to decouple economic growth from materials use and greenhouse gas emissions. The right choices now could drive a long-term downward trend in greenhouse gas emissions while boosting the productive efficiency and long-term competitiveness of the economy. This will provide better jobs across the country.

There is however a real risk that recovery packages try to return the UK economy to the old model that has proved so unproductive and has not delivered better living standards for all. This would make achieving the government's economic, social and environmental objectives much more challenging in the years and decades ahead and harm the UK's international reputation at a time when it is trying to forge a new role in the world. There can be no going back to the old normal.

There is mounting evidence that green investments have better prospects for generating jobs, productivity and levelling up than traditional stimuli. There are many examples of green investments that can start quickly across a range of capital. The package can target investment in productive, sustainable and resilient physical, human, social, intangible and natural capital in regions that need it most. Human capital investment (skills and training compatible with low-carbon resource efficient production) and intangible capital investment (the ideas, knowledge, management and technical processes, and institutions that must accompany a low-carbon transition) need to be prioritised. Building social capital by restoring trust in institutions is necessary to enable citizens to hold policymakers accountable for making decisions in their long-term interests. Natural capital, the resources and services provided by nature, will need to be better measured, monitored and nurtured to avert environmental stress.

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Central to the recovery and meeting the government's objectives – levelling up, net zero, productivity, infrastructure, Global Britain – will be guiding expectations through credible policy while securing institutional flexibility to respond to rapid and accelerating technological and structural change. This report outlines the specific institutions and policy priorities necessary to bring about a clean, resilient and inclusive recovery and meet longer term economic, social and environmental objectives. The policy mix must be broad, comprehensive and coherent, if it is to guide investment and rapidly scale up financial flows. Most importantly, it must be clear, credible and enduring. This is the most effective way to generate investor confidence and to accelerate green innovation. By contrast, mixed and muddled signals delay action, and raise the policy risk premium attached to green investments.

Policymakers and business expectations are aligning around the view that investments and policies directed at addressing the UK's persistent economic, societal and environmental challenges may be precisely the post-COVID-19 medicine the economy needs. Surveys suggest that they see investments and policies with the highest impact and highest growth multipliers being the cleanest and most sustainable. The future is ours to design and to build, and now is the perfect time to put unemployed resources to good use.

The costs of failing to tackle the government's long term objectives, especially net zero, means there is no place for complacency or delay, for example by waiting for new technologies to emerge. Many cost-effective technologies are available that can be deployed now in the recovery to boost resource productivity and clean growth. In addition, technological dynamics suggest that the pace of cost-effective decarbonisation is likely to accelerate. Strong inertia and high switching costs often make it difficult at first to shift the innovation system from dirty to clean technologies and networks, even where the latter are more productive and efficient. But strong and supportive policies can influence both the direction and pace of change and steer a comparative advantage in green markets. This can stimulate spending and create enduring, future-proofed, jobs in the short run and put the economy at a competitive advantage in the medium term.

There is an opportunity today for the UK recovery package to lay the foundations for the future by leading the world in the development, manufacture and use of new low-carbon technologies, systems and services that cost less than high-carbon alternatives. The UK should build on existing comparative advantages: it is easier for the UK to become competitive in new green products that require similar production capabilities and know-how to existing sectors. The UK is well placed here in several industries including chemicals and EVs. There is no reason in principle why a decarbonised UK economy would not be cleaner, quieter, more efficient, innovative, and productive, in the face of changing global markets, than any alternative.

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Managing such change confers great opportunity but it will not be without challenges. Our actions today can ensure a strong recovery and help level up, boost productivity, deliver infrastructure to where it is most needed over the medium to long run, and help deliver the Global Britain agenda on the ground. But the adjustment to a low-carbon economy in the UK will inevitably be uncertain and complex. There will be winners and losers. Many of the behaviours, technologies and infrastructural networks of the last century look set to be devalued or stranded. Ensuring a just transition will be crucial for maintaining social cohesion and economic justice. This puts investment in adaptive and flexible human capital at the fore, including the training and re-training of current workers and the provision of continuing education.

The European Union has also made a strong start in its recovery packages, but future success will require continued coordination among key economic actors and sectors including member states, the ECB and the UK. It must continue to follow many of the same principles set out in this report, including the need to boost short and long run growth multipliers while focussing on 'levelling up', innovation, regulation, bailouts and competition. This will require learning-by-doing and feedback drawing on the best technical and economic knowledge and local expertise, wherever it is located.

There is a unique window for the UK and Europe to rebuild to last after COVID-19 and generate employment and activity that locks in a more inclusive, resilient and sustainable, growth path. Missing it means a legacy of the COVID-19 pandemic which could lead to a series of damaging social, environmental and economic emergencies. The consequences of a prolonged UK depression could be profoundly damaging, the consequences of environmental degradation and unmanaged climate change could be catastrophic.

The recommendations in this report can deliver a sustainable, resilient and inclusive recovery that helps governments rebuild to last after COVID-19. They do not form an exhaustive list, but should be priorities to deliver a strong, sustainable and fair recovery, while also being consistent with a resilient and just transition to net zero over the next few decades. A full set of recommendations (see Section 7) accompany the headline recommendations presented directly below.

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RECOMMENDATIONS: STRATEGY AND INVESTMENT

The strategy underpinning the UK recovery package should be based on ambitious fiscal policy to restore supply and demand in the short term, boost confidence and deliver a strong, sustainable, resilient and inclusive recovery. **Aiming to balance budgets in a recession, as a means to achieve debt sustainability, is self-defeating and counterproductive.**

The strategy should also directly advance the government's long-term objectives and be assessed against these:

- 'Levelling up' opportunities and tackling regional inequalities;
- Low-carbon and environmentally resilient infrastructure and investment;
- Increased productivity;
- A just transition to net-zero;
- Delivering the Global Britain agenda on the ground, by growing trade in low-carbon goods and services; and strengthening the UK's diplomatic status as a leader in the field.

The government should make a clear long-term commitment to the net zero transition and the environmental agenda. This would involve a credible policy plan to put the UK on track for net zero, completing the Environment Bill and Agriculture Bill, and putting in place comprehensive natural improvement targets under the Environment Bill.

There must be a focus on the strength of growth multipliers in the short and long run, including co-benefits which enhance efficiency, health and wellbeing, and the aim to level-up across the country. The speed of implementation, the location of investment, and labour intensity in the short run will be important to absorb unemployed labour in the wake of COVID-19. Based on these criteria, the government should prioritise investment in:

- **Broadband and *smart connectivity*** to enable virtualisation and facilitate home working as well as expand connected healthcare, education and security platforms.[1]
- **Accessible EV charging networks** will be critical to increase incentives for buying electric cars. The UK and EU should bring forward investments in EV infrastructure that could create demand and jobs while also enabling the faster take-up of EVs with positive impact on carbon as well as local air quality.

1 BT Digital impact & sustainability

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- **Upgrading and retrofitting homes and buildings** through building efficiency spending for *renovations and retrofits* including improved insulation, heating, and domestic energy storage systems.
- **Energy and heat networks and the circular economy** (reducing recycling and reusing material inputs) to create new skills and new jobs.
- **Expanding rail and bus transport** to better connect low-income regions.
- **Natural improvement projects such as planting trees, restoring wetlands, greening cities and improving biodiversity,** employing the sharp rise in available young workers previously employed in the retail, entertainment, food and catering sectors.

RECOMMENDATIONS: SUPPORTING INSTITUTIONS AND POLICIES

INSTITUTIONS AND INDUSTRIAL STRATEGY

- **Establish a new National Investment Bank (NIB)** with £20 billion paid in capital – £5 billion per year for 4 years – that can help the government deliver investment for a strong, sustainable, inclusive and resilient recovery to net-zero in 2050.
- **The NIB should work with the National Infrastructure Commission,** using its National Infrastructure Assessment and the new National Infrastructure and Construction Procurement Pipeline for 2020–21 as a guide, to develop and publish an updated pipeline of clean and sustainable infrastructure investments consistent with recovery objectives, meeting the UK's 2050 decarbonisation target and future environmental targets established by the forthcoming Environment Bill – this can be reflected in the government's National Infrastructure Strategy.
- **Deliver greater policy and fiscal autonomy to cities and regions,** building on the Cities and Local Government Devolution Act 2016. This can ensure stimulus investments are aligned with local recovery plans, are suited to local characteristics, and are targeted where they are needed most.
- **Bring together the existing *Industrial Strategy* and Clean Growth Strategy** to create a single forward-looking and coherent plan for strengthening the UK's human capital for the recovery and the low-carbon transition.[2] There is also a need to reassess and better integrate climate adaptation in this plan.
- **Develop research missions based on a** *range of metrics*, including positive technology spill-overs, as part of a forward-looking Industrial Strategy to retain comparative advantage in future markets.[3] Push new innovation while supporting *large scale trials* of new technologies and business models.

2 UK Industrial Strategy
3 LSE Growth Commission Report (December 2018) ***Sustainable growth in the UK: Seizing opportunities from technological change and the transition to a low-carbon economy***

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- **Extend and integrate the focus of the UK Industrial Strategy on securing strong domestic supply chains** to support the full spectrum of decarbonisation activities.
- **Aim to support intrinsically low-carbon industries across the regions.** This should include sectors such as education and financial services, and not just industries in the environmental goods and services sector, which is important but a relatively small part of the economy. For example, developing further incentives to encourage the take-up and UK production of electric vehicles while supporting zero vehicle manufacturing and supply chains across the regions to secure competitive advantage could create 80,000 regional jobs by 2030 and an *additional 150,000 jobs* by 2040.

CARBON PRICING, STANDARDS AND INNOVATION POLICIES

- **Reinforce the UK's carbon pricing regime to ensure prices are consistent with net zero.** This suggests a politically feasible carbon price starting at around £40 per tCO_2 in 2020 and rising to £100 per tCO_2, or more, in 2050. The government should move forward with plans to replace participation in the EU-ETS with a UK ETS. This should be aligned with net zero, contain a price floor, and the initial cap should be set at a level consistent with future advice from the Committee on Climate Change.
- **Adopt standards and regulations where market failures reduce responsiveness to prices to promote efficiency and drive innovation.** For example, introducing minimum energy efficiency standards to bring new and existing buildings to EPC band C by 2035 (2025 for low-income households) would drive investment in energy efficiency retrofits.
- **All public expenditure, including procurement, should be aligned with net zero,** to create incentives at scale for products and technologies that meet both financial and environmental needs.
- **Scale up innovation policy, research, development and deployment,** to achieve the government target of 2.4% of GDP early, prior to 2027, and ensure a greater share for the regions. Strengthen the UK's research and development capabilities as part of the revised Industrial Strategy. This will require a mix of increased funding and further incentives for business innovation, including enhanced incentives for clean innovation.
- **Accelerate the establishment of a clean innovation mission,** in a revised Industrial Strategy, which can accelerate learning-by-doing at scale, and honour the election commitment for £800 million to fund an equivalent institution to the *US Defense Advanced Research Projects Agency.*[4]

4 Defence Advanced Research Projects Agency

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JOBS, SKILLS AND LEVELLING UP POLICIES

- **Adopt "just transition" employment measures to avoid workers falling into long-run unemployment after the crisis,** including: job guarantees; retraining and reskilling for the future; incentives for employers via human capital tax credits; and boost training for workers, including apprentices, in new and emerging sectors.
- **Develop a national low-carbon skill strategy** to give the existing and future workforce the skills they need to prosper in a competitive low carbon economy. This requires investment in further education and lifelong learning, and could include embedding sustainability across the educational curriculum. This could start with a review of apprenticeship standards and T levels and the setting up of sustainability standards, metrics and labels for tertiary level education courses.
- **Where workers become unemployed, adopt Active Labour Market Policies (ALMP) and target these policies in areas that need it most.** For example, focus employment policies in regions severely disrupted by COVID-19 and other forces of change, such as Northwest and Northeast England and South Wales. Target these policies at vulnerable and disadvantaged groups, including youth, women, disadvantaged students, apprentices and those at high risk of long-term unemployment.
- **Coordinate labour market policies with regionally targeted stimulus investments** that create short term demand for labour and support local SMEs. National and local government and businesses should work together to seek to attract low carbon investment towards regions in need of economic regeneration and where transferrable skills and infrastructure exist. Such an approach was successfully adopted to attract the Siemens / ABP / Ørsted investments in the Humber and the MHI Vestas investments on the Isle of Wight where BEIS, Local Enterprise Partnerships, manufacturers, project developers and higher education institutions all worked together.
- **Ensure adequate funding for education institutions and skills/training providers, especially in the regions hard hit by COVID-19,** including for universities, colleges and schools, to effectively reskill and retool workers for the jobs of the future (all low-carbon jobs, not just green jobs).

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BEHAVIOUR CHANGE AND BAILOUT POLICIES

- **Explore policies to embed climate- and productivity-positive behaviours that were brought on by the response to COVID-19,** for example investing in changes to travel routines, virtual learning and healthcare, the use of urban space and investment in the circular economy to reduce reliance on fragile supply chains.
- **Bailouts should be conditional on improvements against climate-positive criteria,** including requirements to embrace newer, yet proven, standards, technologies and business models. They should further include commitment to mandatory disclosure and stress testing under TCFD by COP26, and commitment to collaborate through global R&D partnerships, e.g. in aviation and shipping.

RECOMMENDATIONS: GLOBAL BRITAIN

- **Empower and give credibility to the UK COP26 Presidency and the G7 Presidency through a strong green recovery programme at home.** Identify key areas of mutual interest with the EU on economic recovery and net zero transition and prioritise key areas of future collaboration.
- **Ensure Official Development Assistance (ODA) is effective and Paris aligned.** The merger of the Department for International Development (DfID) and the Foreign and Commonwealth Office (FCO) presents an opportunity to ensure UK ODA is more effective and better coordinated, including being aligned with the Paris Agreement goals.

RECOMMENDATIONS: EUROPEAN RECOVERY

- **The EU is also designing large recovery packages that will need to follow many of the same principles set out in this report.** Working with the EU to ensure strong coordination in areas of mutual interest will raise the benefits of stimulus investments in the short and long term, and boost growth multipliers. Clearly setting out the arguments for strong, sustainable growth lessens the likelihood that vested corporate and national interests will push back on ambitious decarbonisation programmes and/or seek support for fossil fuel sectors.

2. INTRODUCTION

The UK has been transformed by the COVID-19 crisis. Beyond its tragic human costs and loss of life, the pandemic and the necessary lockdowns have resulted in a sharp contraction of aggregate demand, supply disruptions, loss of revenues for many service sector businesses, and unprecedented increases in under- and unemployment. Structural changes already underway are being accelerated by the crisis, including digitisation of the workplace. Some behaviour changes induced by the crisis, such as the shift to cycling and working from home, are expected to persist long after the crisis. While some sectors are proving resilient to the crisis, e.g. technology firms, most firms, especially high-carbon firms, have been hit hard. The economy is in unchartered territory and a fast bounce-back across all sectors cannot be guaranteed. It could take several years to recover from this crisis, with long-lasting effects.

Even before the pandemic, the UK economy was performing unsatisfactorily. The decade after the financial crash of 2008 was characterised by low wage growth, stretched public services, stagnant productivity and rising inequality. Although employment held up remarkably well, an increasing number of jobs were insecure, part-time and poorly paid. Trust in institutions *declined sharply*.[5]

At the same time, the global climate crisis has not gone away and requires urgent action. Global emissions are already rebounding from their temporary reduction and this dip is unlikely to have much impact on concentrations of greenhouse gases in the atmosphere, the key factor driving climate change. The importance of protecting nature has also become much clearer in the COVID-19 context; failure to protect nature has increased the risks of infectious disease emergence and led to immense social and economic damage. Meanwhile, the global technology revolution towards resource efficient low-carbon production remains unstoppable.

As the UK emerges from the crisis phase of the pandemic, the UK government will need to rapidly introduce a comprehensive stimulus package to promote recovery, restore jobs, and *Rebuild to Last* on a path of strong, sustainable, resilient and inclusive growth. Risk and resilience will need to be centre stage, as will a recognition of the growing opportunities from building the economy of the twenty-first century.

Pulling the UK and the world out of recession means framing a much better vision of the future. A key objective of any recovery package is to stabilise expectations, restore confidence, and to channel surplus desired saving into productive investment. Restoring confidence requires harnessing the growth potential of an inclusive, resilient and resource-efficient economy. *Previous studies* have highlighted opportunities associated with sustainable growth in the UK and the world, but COVID-19 increases the urgency of shifting to a better growth model.[6] Laying the foundations for a more resilient, cleaner and inclusive economy can generate increased resource efficiency, innovation and productivity in the long term; this can lead to a more competitive, durable and prosperous economy. This report will examine the degree to which UK resilience and

5 MORI Social Research Institute (2003) ***Exploring Trust in Public Institutions, Report for the Audit Commission***

6 New Climate Economy (August 2018) ***Unlocking the inclusive growth story of the 21st century: accelerating climate action in urgent times***; Grantham Research Institute on Climate Change and the Environment (August 2016) *Building 21st century sustainable infrastructure: Time to invest*; Grantham Research Institute on Climate Change and the Environment (August 2016) *Building 21st century sustainable infrastructure: Institutional Reform*; LSE Growth Commission (December 2018) *Sustainable growth in the UK. Seizing opportunities from technological change and the transition to a low-carbon economy*

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competitiveness can be enhanced by staying ahead of major trends in global markets as the world decarbonises, cleans up urban and rural environments and seeks to use resources more cleverly.

This report sets out a clear strategy for such a stimulus plan, one that can help the UK grow out of the present crisis and build resilience to future crises, creating well-paid resilient jobs in the short and long term. The UK did not seize the opportunity to lay strong foundations for a sustainable and resilient recovery and long-term transformation in response to the 2008 Global Financial Crisis. This time there is a real opportunity to avoid returning the UK economy to the unproductive 'cut spending' policies of the past that led to more inequality, historically low productivity growth, and failed to support the UK's climate and long-term net zero objectives, with high levels of public sector debt to GDP remaining a decade on. There can be *no going back* to the old normal. The only sensible option going forward is growth-oriented stimulus measures that promote investment and create jobs in sectors that are sustainable and resilient[7] and contribute to budget deficit reduction over the medium to long term.

THE INVESTMENTS WE NEED AFTER COVID-19

Stimulus investments need to have several key characteristics to rebuild to last after COVID-19: they should be fast (quick to implement); labour intensive (to soak up the excess supply of labour, particularly in vulnerable and disadvantaged groups and regions); have strong multipliers in the short and long term (each £ invested needs to maximise the impact on GDP now and drive productivity in the long run), and deliver strong co-benefits in terms of local pollution, health, congestion, efficiency, innovation and resilience in its broadest sense, including adaptation and levelling up opportunity across the country. It is worth noting that biodiversity loss increases the likelihood that diseases like COVID-19 emerge and infect humans. In addition, the UK and other countries failed to prepare for the pandemic despite numerous credible warnings, including the UK's Exercise Cygnus programme. COVID-19 then proceeded to *expose inequality*, including the poor treatment of essential workers and air pollution.[8]

There is mounting evidence that sustainable, resilient and inclusive investments have some of the highest short- and long-run multipliers in a recession, meeting the most important criteria for a strong and sustainable recovery. In the short run, green investments perform substantially better on jobs than traditional stimulus investments, e.g. clean energy infrastructure is particularly labour intensive, creating twice as many jobs per dollar spent than fossil fuel investments. Construction projects like *insulation retrofits* and building wind turbines (or installing broadband networks, planting trees and restoring wetlands) are less import intensive than many traditional stimulus measures and lead to higher multipliers. Some projects like building new roads have high multiplier effects, but risk higher emissions and local pollution, and threaten to lock in resource-hungry and inefficient forms of urban development.

7 E3G (April 2020) ***Briefing Summary- Recovering Better: A Green, Equitable and Resilient Recovery from Coronavirus;*** Grantham Research Institute on Climate Change and the Environment (April 2020) *From rescue to recovery, to transformation and growth: building a better world after COVID-19*; LSE Business Review (May 2020) *Covid and climate – building a strong and sustainable recovery*

8 Quigley, E. (2020) Uni***versal Ownership in the Age of COVID-19: Social Norms, Feedback Loops, and the Double Hermeneutic***

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Evidence also suggests that sustainable and productive investments are available across a range of complementary assets, including in skills and human capital, natural capital, social capital, and physical capital. These range from wetland restoration, offshore wind projects, energy efficiency retrofits, and low-carbon industrial clusters, to investment in low-carbon skills and embedding sustainable behaviour. In this way recovery packages can go far beyond physical infrastructure, although this is essential.

Sustainable investments can also boost UK competitiveness in the new markets of the future. They offer a sound basis for levelling up national wealth and delivering higher and more resilient living standards for all at a time when the UK is facing a range of challenges from structural change, and not just from the climate transition but also across several secular trends including automation, digitisation, big data, AI and changing demographics.

THE VISION AND STRATEGY WE NEED AFTER COVID-19

A clear macroeconomic vision is needed to restore confidence, drive investment, create jobs and grow the economy out of post-COVID-19 recession and debt by supporting activity in the short term and expanding productive capacity in the medium term. The macro-fiscal vision will be crucial. The government will need to come to a clear understanding that an ambitious recovery package is both affordable – concerns around debt sustainability can be managed – and can deliver on the need to boost jobs, restore confidence, innovate to drive productivity and well-being, build capacity, manage risk and grow the economy out of the depressed state that it is in. Fiscal and monetary policy will also need to work together to guide liquidity and savings towards the growth of productive sectors. Coordinated macroeconomic policy is required not only to restore productivity growth but to simultaneously address global surplus saving, raise real and nominal interest rates above zero, stabilise public debt (with current public budgets approaching balance over the economic cycle) and maintain stable inflation.

A coherent strategy for Building to Last after COVID-19 involves long-term commitments from which policies and institutions will flow. Such a strategy sets the direction for the necessary recovery investments, and policy and institutional frameworks, sends clear signals to private markets and aligns expectations which lowers the risk associated with targeted investment.

This will include a credible and coherent clean industrial strategy in the COVID-19 context, where the state has assumed a larger role in the economy, to ensure that all targeted recovery investments are consistent with restoring demand and supply and achieving net-zero. The current Clean Growth Strategy, focussed on the relatively small "low-carbon goods and services sector", around 1% of GDP, is too narrow and outdated.[9]

9 LSE Growth Commission Report (December 2018) *Sustainable growth in the UK: Seizing opportunities from technological change and the transition to a low-carbon economy*

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It must also include a credible plan to put the UK on track for net zero emissions. Among other things, this will involve the completion of ambitious Environment and Agriculture Bills. They would all set a clear direction for current and future policy making. Such measures could generate strong returns to investment in nature, as long as the Environment Bill is underpinned by a set of comprehensive and ambitious environmental improvement targets and the Agriculture Bill genuinely delivers a step change from the EU's CAP and puts in place a "public money for public goods" subsidy regime.

THE INSTITUTIONS AND POLICIES WE NEED AFTER COVID-19

A new institutional structure and policies will be needed to tackle market failures and barriers that prevent the scaling up of private finance sources. These will effectively mobilise private finance and channel it into the right investments. Supportive public finance foundations will be essential, but the dominant role will come from private finance given the scale of the investment challenge. There is no shortage of private finance, even in the crisis – investors are actively seeking investments while private saving is on the rise, but generating competitive real risk-adjusted returns requires sharing and containing perceived policy risk.

A National Investment Bank (NIB) is well placed to directly tackle these market failures and barriers, largely related to risk, and offers great value for money to taxpayers. There is anecdotal evidence that viable "shovel ready" projects can provide jobs but are struggling to raise finance due to the absence of such an institution. A NIB can play an important part in the necessary financing and liquidity which will be crucial to recovery and it will be particularly helpful as the UK withdraws from the European Investment Bank.

Policy reform is also needed to maximise the benefits of green investments. A stronger carbon pricing framework will be central, but also maintaining and strengthening standards and complementary, ambitious, and well enforced regulations. The UK has an established carbon pricing framework, but reforms could enhance its effectiveness, efficiency and fairness. Disruption from COVID-19 and leaving the EU has created an opportunity to adjust UK carbon price levels and integrate existing policies with the development of a new UK ETS. Carbon prices can be an important part of wider fiscal reforms that help boost public finances now and set clear expectations on the long-term direction of structural change in the economy.

Policies to address other market failures can also be tackled head on, including to induce innovation, to re-skill, and to protect nature and biodiversity; there is a particularly strong "bang for your policy buck" from policies to invest in nature. All policy will need to contribute to levelling up, enhancing well-being and be consistent with a just transition to net zero. The report examines how UK policies can be amended now to better achieve these objectives.

A recovery package that is quick, inclusive, and labour intensive in the short run, can also build wealth across the regions over the longer term. As well as investing in a more productive and resilient economy long term, the recovery package can help the UK to overcome deep-seated inequalities across regions, which are manifest not just in income but in wealth, health and access to public and private services. Everyone will need to benefit from the opportunities from change

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through coordinated reskilling and retooling policies. Spending on infrastructure projects such as broadband, green technology, transport and housing could deliver *an additional 1¼ million resilient jobs* over the next two years, replacing those destroyed by COVID-19.[10]

Building to Last after COVID-19 will not be easy and will require a radical change in thinking across all arms of policy and government that is not yet evident. National government – with HM Treasury taking on a coordinating leadership role – local government, regional mayors, the private sector, including investors and civil society, will all need to work together to innovate and move quickly. There is a widespread desire not to return to an economic model that was deficient. But a muddled and poorly coordinated response with no clear strategy could leave the UK in a far weaker position than before the crisis. The summer statement is a first step in the right direction. The quality, content and strength of the next stimulus package will determine economic, social and environmental outcomes for decades to come.

GLOBAL BRITAIN AND EUROPEAN RECOVERY

A strong, inclusive, sustainable and resilient UK recovery package will set an important foundation for international engagement and resetting Britain's role in the world. It can secure credibility to the UK COP26 Presidency and provide a focus for the UK's G7 Presidency in 2021. "Global Britain" means actions now that can help shape the world.

Many if not most of the recommendations and analysis in this paper will also be applicable, in principle, to other countries, including across the EU. Following the European Commission's stated ambition to align its €750bn recovery package with the objectives of its Green Deal, this report can provide guidance for that work and form the basis for discussions around possible areas of collaboration. The UK and the EU should maintain a good working relationship with one another, sharing and collaborating around recovery plans. Cooperation can increase the effectiveness of stimulus investments and help all EU countries 'rebuild to last' after COVID-19.

The report is structured in three sections. The next section will set out the background to the present crisis and what can be learnt from past recovery plans. Section 4 examines the importance and benefits of green public investment to build a more resilient, sustainable and productive economy, along with options for maximising returns. Sections 5 and 6 discuss the macro-economic framework, investments, institutions and policies to put decarbonisation, resource efficiency and well-being at the heart of the recovery package. They also cover policy to drive investment and mobilise the private sources of finance that will be needed. While there is a focus on the UK economic and policy environment, many of the issues discussed are important internationally, especially in EU countries. A full set of recommendations are presented in section 7.

10 Transition Economics (2020) *Can an infrastructure stimulus replace UK jobs wiped out by COVID19 crisis?*

3. COVID-19 AND THE ECONOMIC LESSONS FROM PAST RECOVERY PLANS

Recovery plans following the global financial crisis (GFC) in 2008 failed to deliver. Fiscal policy was used little at the global level after the first two years following the 2008 crisis: the burden of supporting aggregate demand fell largely on monetary policy. Quantitative easing was employed in most countries, including the UK, and official interest rates were reduced progressively, in due course almost reaching the zero bound.

For more than a decade, too much global saving was chasing *too little productive investment* in the UK:[11] or, putting the matter the other way around, and perhaps more tellingly, desired investment globally was modest relative to the level of desired saving. The result was that productivity growth languished and aggregate demand was weak. The UK economy grew only slowly, but global emissions kept rising. Sector borrowing, both corporate and personal, expanded on the back of cheap credit, while growing debt leverage inflated asset prices. As the rich grew wealthier, real earnings growth for the majority stagnated. Inequality and failure to invest in public services, which further exacerbated inequality *undermined the social contract*, spawned popular discontent and contributed to the rise in saving.[12]

For many companies, high leverage on the back of cheap credit has been a deliberate strategy over the past decade, aimed at maximising returns through share buybacks and large dividends. Others blame moral hazard associated with GFC bailouts followed by ultra-loose monetary policy. Either way, the current crisis has had a significant impact. A 20% global slump in share prices in the first quarter of 2020 hit corporate balance sheets hard (see Options below). According to the *Institute of International Finance*, the ratio of global debt to GDP reached an all-time high of 322% towards the end of 2019 (with more than two thirds of the debt in private hands).[13] The global stock of non-financial corporate debt was at *record levels* of $74n in Q3 2019.[14] The quality of corporate bonds is *also lower* – credit ratings are lower and maturities are longer – so the possibility of contagion to the banking system cannot be discounted.[15] This debt leverage almost certainly makes the global economy even more vulnerable than it was in 2008.

Recovery Packages after the GFC in 2008 failed to embody sustainability in most countries, including the UK. According to a *leading study*, globally only around 16% of stimulus could be classified as 'green'; 15% in the UK.[16] The other 84% led to a spike in emissions and air pollution in many countries, including China. It was an opportunity lost to protect human health, build resilience and respond to climate risk. In other countries, green investments failed through poorly

11 Bank of England (December 2015) ***Secular drivers of the global real interest rate***
12 OECD (2020) ***Coronavirus (COVID-19): Joint actions to win the war***
13 Institute of International Finance (January 2020) ***Global Debt Monitor – Sustainability Matters***
14 Institute of International Finance (January 2020) ***Global Debt Monitor – Sustainability Matters***
15 OECD (February 2020) ***Corporate bond debt continues to pile up***
16 Cited in: The Energy and Climate Change Committee (March 2010) ***Energy and Climate Change – Fourth Report: Low carbon technologies in a green economy.*** Original HSBC source not available online.

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targeted investments. For example, the US government's investment in the solar manufacturer Solyndra, in the form of loan guarantees, turned bad. The lesson here was that *green technologies* are subject to significant ***ex ante*** uncertainty, e.g. in technology, price, market and commercial trends. This means it is better to provide financial support policies across a wide group of projects/firms, which increases the probability that some are viable ***ex post***, enabling the programme to provide net benefits overall.[17]

Avoiding a return to this model that produced unsatisfactorily slow and dirty growth – or worse, avoiding a downward spiral into depression – will require careful management. *Office for National Statistics data* showed that between February and April, the UK economy shrunk by a quarter, a contraction three-and-a-half times as big as the 6.8 % decline (peak-to-trough) in the Great Financial Crash of 2008.[18] The *Bank of England Monetary Policy Report* expects the unemployment to rise to 9 percent by the end of the 2nd quarter.[19] Even with a sharp recovery, the IMF in its April ***Economic Outlook*** predicts in that, in 2021, advanced economies' GDP will be *6.1% lower* than it would have been in the absence of the pandemic.[20] And such a recovery is far from guaranteed in the near term.

The clear risk, as seen in other recessions, is that the combination of uncertainty and reluctance to spend, particularly on investment, proves self-fulfilling, delivering a weaker economy through classic 'multiplier' and 'accelerator' effects. Workers lose their jobs, businesses cut back on investment, which then triggers more job losses, consumption falls and savings rise, and so on. This causes expectations to align around low growth and a cycle is entrenched.

But a bit like Tolstoy's unhappy families, downturns differ in their own way: no two economic crises are the same and demand different responses. The financial crash of 2008–09 required particular measures to extend liquidity and restore the health of the banking system. The COVID-19 crisis and the post-pandemic environment too are likely to prove unique and require responses tailored to the characteristics of the crisis. The banking system and corresponding financial plumbing remains functional, but business activity and physical supply lines will need rebuilding. Increased corporate indebtedness will exacerbate the strains. The 2008 reason for bailing out the banks was their central, but not directly visible, role in the intermediation process between savers and lenders. By contrast, the impact of the pandemic is being felt directly, right across the economy, by households, businesses, and consumers alike. Some of this impact may be delayed by the UK government's furlough scheme, which will be felt as the scheme winds down. It will also be felt across government, as it takes on higher debt liabilities. Job losses and unemployment will undermine health and wellbeing, stretch public services and spending, and damage skill levels – some of which will be *lost irretrievably*[21]. Moving from rescue to recovery will therefore require action, simultaneously both to restore ***demand*** and bolster ***supply***.

17 Dani Rodrik (2014) ***Green Industrial Policy***
18 ***Office for National Statistics, GDP monthly estimate, UK: April 2020***
19 Bank of England (May 2020) ***Monetary Policy Report***
20 IMF (April 2020) ***World Economic Outlook, April 2020: The Great Lockdown***; see also accompanying blog IMFBlog (April 2020) *The Great Lockdown: Worst Economic Downturn Since the Great Depression*
21 Brookings (2012) ***Fiscal Policy in a Depressed Economy***

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3.1 DEMAND AND SUPPLY AFTER LOCKDOWN: AN AMBITIOUS TWO-PRONGED RECOVERY PLAN

A distinction is often made between the rescue and recovery plan. Rescue policy seeks to put the economy on life support until the pandemic is under control, so as to minimise damage to economic capacity. It seeks to protect incomes and jobs, particularly for the most vulnerable and the poorest. Economic rescue packages implemented around the world already total *more than GBP 5 trillion*.[22]

Rescue plans keep the economy on life support for later resuscitation. The UK, like all G20 nations, has *imposed restrictions*[23] on travel such as *'self-isolation' and 'social-distancing'*.[24] These restrictions have *been effective*[25] in *slowing the spread of the virus*[26] but, together with voluntary changes in spending behaviour, have generated severe economic consequences. The cost of lockdown alone – the deliberate action taken to limit contagion from the pandemic – is *£2½ billion per day*.[27] A recent study identified over *300 implemented policies* of significant magnitude.[28] The vast majority of these policies are of the rescue rather recovery typology, including significant

22 Oxford Smith School of Enterprise and the Environment (May 2020) ***A net-zero emissions economic recovery from COVID-19***
23 IMF (2020) ***Policy Responses to COVID-19***
24 Wilder-Smith and Freedman (March 2020) ***Isolation, Quarantine, Social Distancing and Community Containment: Pivotal Role for Old-Style Public Health Measures in the Novel Coronavirus (2019-nCoV) Outbreak***
25 Can Hou et al. (April 2020) ***The effectiveness of quarantine of Wuhan city against the Corona Virus Disease 2019 (COVID-19): A well-mixed SEIR model analysis***
26 Joel Koo et al. (March 2020) ***Interventions to mitigate early spread of SARS-CoV-2 in Singapore: a modelling study***
27 Centre for Economics and Business (April 2020) ***As the UK remains in lockdown, Government may need to target more support at manufacturing sector***
28 Cameron Hepburn et al. (May 2020) ***Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?***

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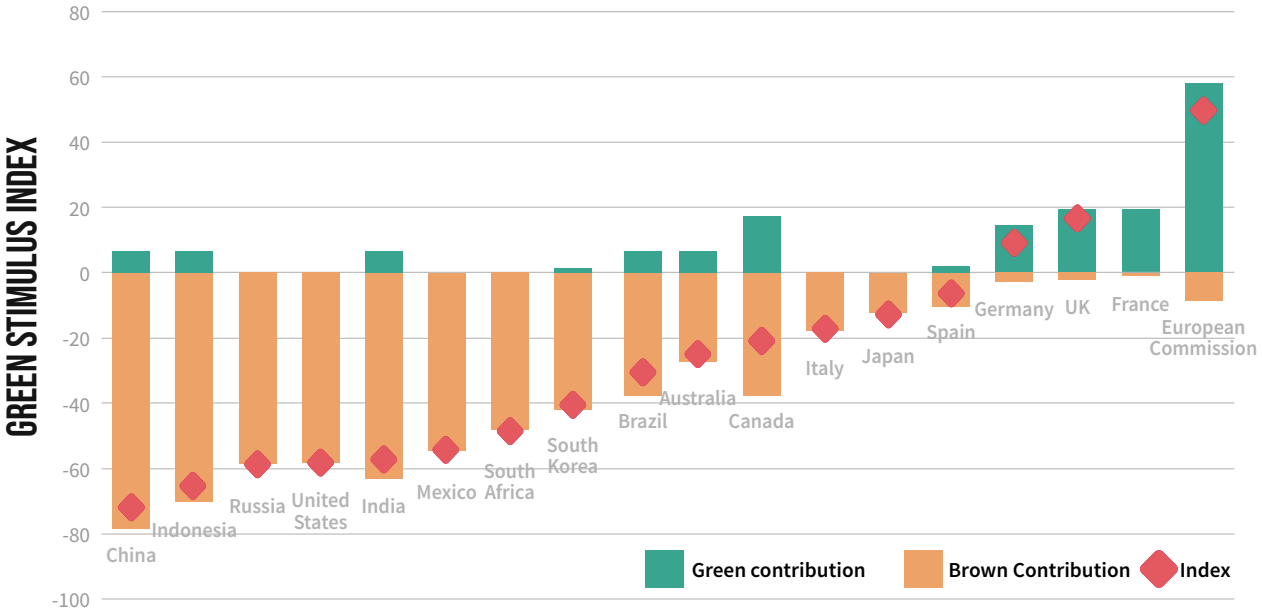
worker and business compensation schemes which defend livelihoods. An example is the UK's Coronavirus Job Retention Scheme (UK Coronavirus Act, 2020) which allows firms to apply for government assistance to cover up to 80% of furloughed workers' wages, capped at £2,500 monthly, at a cost of *over £10bn a month*.[29] These policies have not paid much attention to sustainability, but the UK is doing *better than many other countries*, presumably reflecting that much of the support goes to its lower-emissions service-oriented economy.[30]

FIGURE 1: VIVID ECONOMICS GREEN STIMULUS INDEX



Source: *Vivid Economics, 2020*[31]

The focus of this paper is on strategy and policies for recovery, but careful account is taken of the transition from the rescue phase – which we are now in – to recovery. Although the boundary between rescue and recovery is blurry – waves of disease and response may impact society and the economy until a vaccine or treatment is found. By the time the pandemic has been deemed to be largely under control and contained, both demand and supply capacity will have taken a knock. And even after businesses have been allowed to reopen, uncertainty and lack of confidence in the economic outlook will likely persist. Consumers will likely hold back on spending,

29 Institute for Fiscal Studies (May 2020) ***Extending the Coronavirus Job Retention Scheme: trade-offs and balancing acts***
30 Vivid Economics (April 2020) ***Green Stimulus Index***
31 The Green Stimulus Index (July 2020 version) examines 17 major economies and the European Commission to assess the green vs. brown orientation of their stimulus funding based on: the scale of funds flowing into environmentally relevant sectors; the existing green orientation of those sectors, and the efforts to steer stimulus toward (or away from) sustainability. What is being captured in the index to date is a flow of rescue funding into existing sectors, which, for many countries, reinforces a status quo that is significantly tilted toward brown.

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businesses may be cautious about investing, and maybe even shed labour, while banks could become even more cautious in extending credit. All this will almost certainly lead to a visible need for policy action to restore economic activity and get people back in sufficient numbers to paid work. There will, naturally, be significant variation within this aggregate picture: the duration of lockdowns will almost certainly vary from sector to sector, and region to region, with some already struggling regions hit particularly hard.

Recovery packages seek to rebuild the economy to last and prosper. As with the rescue phase, recovery packages seek to protect incomes and jobs, particularly for the most vulnerable and the poorest, but there is an opportunity to go much further to avoid returning the UK economy to the unproductive model of the past that was not resilient and delivering better living standards for all. **There is also an opportunity to ensure that rescue packages do not worsen a bigger and longer-lasting crisis – climate change.** The challenge is to restore demand and supply in a way that builds a strong, inclusive, sustainable and resilient recovery from the COVID-19 crisis. This is going to require radical change and thinking across all arms of policy. A recovery package is needed that is ambitious, coherent productive and jobs rich. This report outlines the key elements of such a package.

3.2 CONFIDENCE, EXPECTATIONS AND FISCAL SPACE TO SUPPORT RECOVERY

Viable businesses will go bust, while human and knowledge capital will depreciate as a result of lockdown. Unlike in conflict/war, few real assets will have been physically destroyed. But skills will have atrophied, and optimism may be thin. Fear of economic depression, or of continued recession, can all too easily become a self-fulfilling prophecy as banks cut lending, businesses trim jobs, and investment and individuals curtail spending. Quite possibly therefore the greatest need will be to rebuild confidence, noting that the *impact on expectations* may be shaped as much by emerging health risks as by financial responses.[32]

In the short run, the world faces a classic Keynesian paradox of thrift. This is when fear of downturn leads business to cut investment and shed labour, banks to retrench credit and consumers to claw back spending. When everyone responds in this way, expectations become self-fulfilling in generating the very downturn that was feared. Expansionary fiscal policy in a slump can arrest these negative reinforcing feedbacks. The primary macroeconomic task is to offset this and stimulate private spending/lending/hiring in the short run and this requires restoring confidence.

32 Roosevelt Institute (April 2020) *Four Priorities for Pandemic Relief Efforts*

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Photo credit: Jasmin Sessler Unsplash

Concerns about repaying enlarged public debt and limited 'fiscal space' must be addressed head on. UK public borrowing in 2020–2021 is likely to exceed £200bn with public debt *approaching 100% of GDP*. In the long term, it is important to recognise that increases in government spending are likely to crowd out private spending, especially if *financed by distortionary taxes* or if policy encourages rent-seeking by vested interests.[33] Moreover, if lenders begin to fear that the government may renege on repaying public-sector debt in full, default risk premia and inflation premia on government bonds may rise sharply, exacerbating the tightening of credit conditions and increasing the cost of public investment.

It is important to set out clearly the macroeconomic arguments and the options for fiscal and monetary policy in these unprecedented circumstances. The point of departure has to be that real bond rates in high per capita income economies remain close to zero. This reflects continued low private sector desire to invest, and its counterpart is an abundant investor appetite for public debt. Despite the rise in government borrowing and the prospect of extended public borrowing-based support for economies across the world, the markets continue to buy up government paper at prices which keep real risk free interest rates close to zero. The UK sold ***negative-yielding government bonds***[34] **for first time in May and the markets expect real bond rates to *remain below zero***[35] **for the rest of the decade.**

33 Marianne Baxter and Robert King (June 1993) *Fiscal Policy in General Equilibrium*
34 Bloomberg (May 2020) *U.K.'s First Negative-Yielding Bond Sale Sharpens Focus on BOE*
35 Bank of England (2020) *Yield curves*

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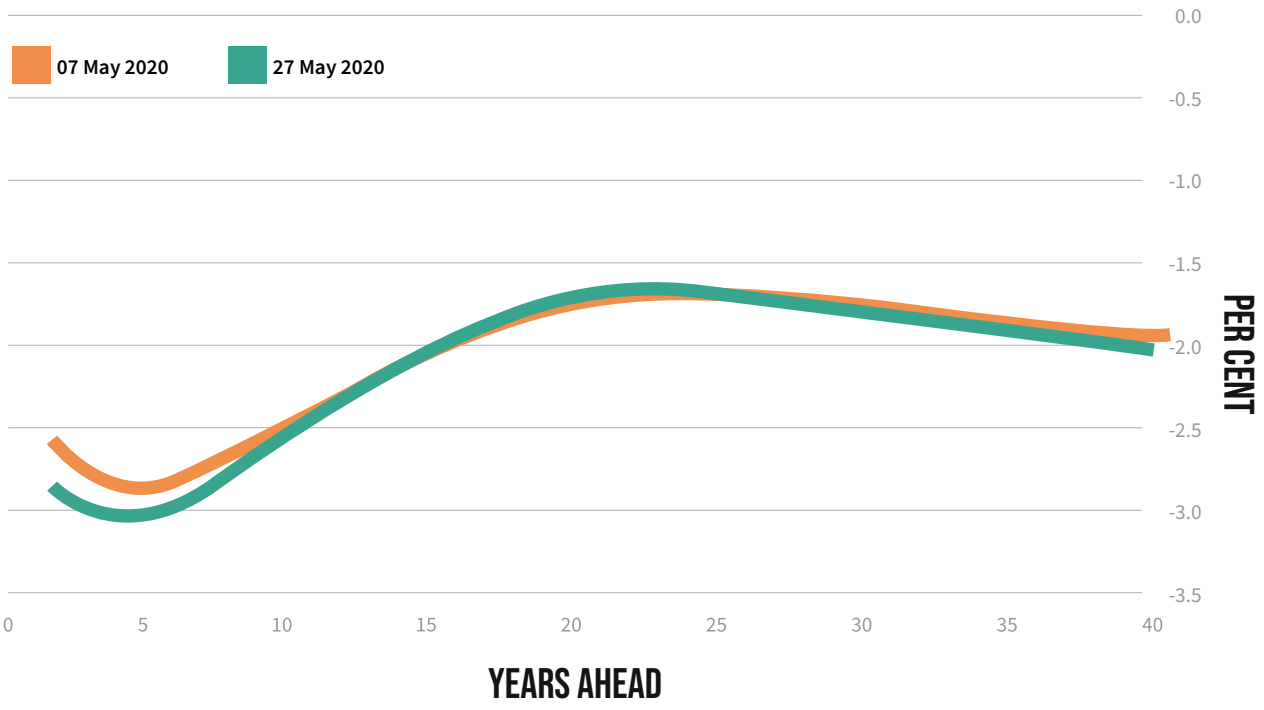
FIGURE 2: UK INSTANTANEOUS IMPLIED REAL FORWARD CURVE (GILTS)



Source: *Bank of England*

Figure 2 show that futures markets expect real risk-free rates to remain below zero for decades to come. The bond market isn't just pricing in a recession as a result of the coronavirus, it also expects the policy rates to be near zero for the long term – marking a prolonged era of *'secular stagnation'* where productivity growth and inflation remain subdued and interests stay on the floor.[36] Deleveraging, aging populations, inequality, corporate short-termism and growing monopoly power and the build-up of foreign exchange reserves are *among the reasons* cited for driving a trend towards greater desired saving and lower productivity.[37] Greater precautionary saving in the event of a global pandemic and recession is likely to exacerbate the downward pressure in rates.

Into the medium term, provided recovery plans avoid depression, debt remains historically affordable. A premature tightening public budgets is likely to undermine debt sustainability in the long run.

36 Larry Summers (2020) *Secular Stagnation*
37 Grantham Research Institute on Climate Change and the Environment (August 2016) *Building 21st century sustainable infrastructure: Time to invest*

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BOX 1: MIND THE FISCAL GAP: PUBLIC DEBT SUSTAINABILITY DYNAMICS

Debt dynamics are currently very favourable as the standard equation for debt dynamics illustrates:

$$\text{Change in } d = -p + (r - g)^{*} d(-1)$$

Where ***d*** = debt/GDP, ***p*** is the primary balance (public borrowing after interest payments), ***r*** is the rate of interest and ***g*** the rate of nominal GDP growth. This basically says that, all else equal, if an economy grows faster than the rate of interest charged on its stock of debt, its debt to GDP ratio will fall. This is because the numerator (debt) grows more slowly than the denominator (GDP).

Growth lowers debt/GDP by swelling the denominator. If the recovery plan can restore *g* to its trend rate of around 4% and *r* is around 2% suggesting the UK can run a primary deficit of the order of 2% of GDP while keeping debt/GDP unchanged. This can be spent on growth boosting *public investment in green infrastructure*, R&D, skills and education which can further support growth.[38] Once one adds back interest payments, the medium-term sustainable deficit in the UK is of the order or 4–5% GDP.

But growth also drives the debt/GDP numerator. For example, if targeted investment generates a multiplier of 3, then 1% of GDP in extra borrowing can be expected to raise GDP by 3% thereby generating public revenues sufficient to reduce the public deficit by around 1% of GDP. This combined effect on both the numerator and denominator of the debt/GDP ratio explains why, **under the right conditions, borrowing to invest can be so much more sustainable in terms of public debt management than seeking to directly target balanced budgets.** From a political economy perspective, not to mention that of good governance, growing out of debt has the additional merit of generating more jobs, boosting productivity and wages and bestowing a more content electorate.

38 Grantham Research Institute on Climate Change and the Environment (August 2016) ***Building 21st century sustainable infrastructure: Time to invest***

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Financial assets however are not national net wealth. Every debtor/liability has corresponding lender/asset. In circumstances such as the present, governments are not borrowing from the future and the rise in public borrowing is matched by an almost equal and opposite rise in private saving. With many wealthier households being 'forced to save' (as spending options such as travel, restaurants, entertainment and holidays are closed to them), *economists* expect the household saving ratio to rise from its normal post war range of 5–10% to 20%.[39] Total global debt is only relevant in that it reflects underlying challenges, such as growing inequality, or in so far as increased leverage creates financial and public sector vulnerabilities. So far, as noted above, the markets are not unduly concerned. **By contrast, offices, factories, people as well as ideas and natural capital are real assets. The preservation, and building up, of these assets should be the priority in order to safeguard future prosperity and ensure that there are valuable assets in people's savings and pensions.**

Concerns around the supply of private capital drying up also need careful consideration. The shutdown of the economy, driven by government, has been accompanied by a huge boost in liquidity to keep the economy on ice. There is significant uncertainty over the future viability of most industries, with the crisis accelerating structural changes that were already underway (see below). **What is important is that capital is available for businesses that survive and have good prospects, particularly SMEs, so they can innovate, restructure, and improve their productivity. There is ample private capital around with investment funds buying up billions in new corporate debt**; these funds are looking for productive investments. High forced savings during the crisis will add to the domestic savings investors have to invest. The government has also stepped in to *provide capital* for high-growth and innovative companies that will drive the productivity and living standards of the future.[40]

39 Cambridge econometrics (May 2020) ***Support for consumer spending is needed to lift UK economy out of recession***
40 HM Treasury (May 2020) ***Future Fund launches today***

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BOX 2: MIND OVER MATTER: THE IMPORTANCE OF EXPECTATIONS

Carbon from fossil sources has powered most of the world's economic activity for more than 200 years, since the use of coal to fire steam engines first gave birth to the industrial revolution. It is estimated that between two thirds and four fifths of global proven and possible fossil fuel reserves will need to *remain in the ground* if the world is to have a 50–80% probability of keeping global warming below 2°C (or, if they are combusted, the greenhouse gases must be captured and stored).[41] ***Almost all new fossil fuel related infrastructure*** **built now will need to be prematurely scrapped or subject to costly retrofit.**[42]

Nevertheless, a net zero transition is inevitable. It is inevitable because the extent of global warming depends on the ***stock*** of greenhouse gasses in the atmosphere – not the ***rate*** of emissions. Greenhouse gases (GHGs) stay in the atmosphere for years, decades, or centuries (depending on the gas), so the stock will keep growing for so long as the flow of GHG emissions exceeds the earth's capacity to absorb them, and temperatures will keep rising. This means that to halt continual temperature increase requires transitioning to a net zero emissions world that allows concentrations of greenhouse gases to stabilise.[43] The alternative is that nature does this for us by creating such a hostile climate it causes vast movements of people[44] and then rapidly depopulates the earth. This inevitability can guide investor actions and help overcome *strategic complementarity* [45] problems and *inferior Nash equilibria*.[46]

They occur when the pay-off to a particular action depends on what others do. Even if a superior outcome is attainable when all act together, individuals may hold back if they fear they will be acting alone. Expectations regarding the transition, and its inevitability, are therefore crucially important. A mayor, politician or businessperson who believes that no one will invest in clean technologies is unlikely to take the risk of being the first to invest. However, if they believe others are investing at scale then they will expect the cost of the new technologies to fall, the finance to move from niche to mainstream, and

41 Christophe McGlade and Paul Ekins (January 2015) *The geographical distribution of fossil fuels unused when limiting global warming to 2 °C*
42 Alexander Pfeiffer et al. (May 2018) *Committed emissions from existing and planned power plants and asset stranding required to meet the Paris Agreement*
43 COVID-19 is unlikely to have a significant impact on concentrations of greenhouse gases in the atmosphere, despite temporary falls in flows of emissions.
44 Recent research, assuming a scenario of unmanaged climate change, finds mean temperature rise experienced by human populations by 2070 could be as high as 7.5 °C compared to the pre-industrial, about 2.3 times the mean global temperature rise by this time. Up to 3 billion people (roughly 30% of the projected global population) would have to move. Chi Xu et al. (May 2020) *Future of the human climate niche*
45 Bennett Institute for Public Policy (2019) *Mind over matter – how expectations generate wealth*
46 Lombard Odier (February 2020) Can we be green and grow?

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substantial new market opportunities to emerge. Therefore, they will invest. But the very act of investing, if everyone does the same, means the costs of new technologies fall quickly and so forth – making the expectations become a self-fulfilling prophecy.

Social psychologists have long understood that solving coordination problems like this requires building expectations into models and generating *'common knowledge'*.[47] The big innovation of the *Paris Agreement* is that it dropped the language of 'burden-sharing' and focussed instead on nationally determined voluntary contributions.[48] This reflects the reality that self-interest, not shared sacrifice for the greater good, breeds cooperation. This in turn builds on a *growing appreciation of the opportunities associated with a low-carbon transition*.[49] Policy makers must proactively act to identify potential co-benefits during the policy design stage and shape implementation criteria to maximise impact. **The role of credible and durable policy in driving a cost-effective and productive low carbon transition cannot be over-emphasised.**

47 Kyle Thomas et al. (October 2014) *The Psychology of Coordination and Common Knowledge*
48 United Nations (2020) *The Paris Agreement*
49 The Grantham Research Institute on Climate Change and the Environment and The Centre for Climate Change Economics and Policy (December 2014) ***Taming the beasts of 'burden-sharing': an analysis of equitable mitigation actions and approaches to 2030 mitigation pledges***

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3.3 MULTIPLIERS: LEVERAGING PRIVATE ACTIVITY AND MAXIMISING INVESTMENT RETURNS

What matters at this juncture is to invest the borrowing wisely, to generate resilient output and sustainable capacity. This task is made easier by the fact that, in present conditions, the multipliers that attach to public spending – i.e. the ultimate increases in both income and capacity that result from high-quality government investment – are far larger than in more normal times, when economies are running at or near full capacity.[50]

Multipliers matter. Short run expenditure multipliers are generated by offsetting deficient aggregate demand. Long run multipliers apply to, and derive from, *structural investment* in key assets (physical, human, intangible, natural and social capital) to increase their resilience to future shocks and to expand capacity to generate a more productive growth path.[51]

The size of short run 'expenditure multipliers' depends on several factors, including the stance of monetary policy (the multiplier is likely to be higher in the current accommodative environment); the degree of spare capacity in the economy; and the speed and extent to which the initial expenditure spills over into other domestic sectors rather than into imports. The global reach of the pandemic has meant a synchronised global slowdown the likes of which has not been seen in recent history. Multipliers will therefore be stronger if there is a concerted stimulus effort across countries, given the UK economy's reliance on exports and global supply chains. The *most-connected general-purpose suppliers* in production across the economy, which are susceptible to bottlenecks, are refineries, energy suppliers, and core manufacturers.[52] The currently low elasticity of substitution among those reliant on these sectors means that, when they are stimulated by a boost in investment, the effects are propagated across GDP even though they account for a modest fraction of gross value added.

There are two important features to investment funded by public borrowing in a downturn. The initial investment gives rise to successive (multiplied) rounds of expenditure throughout the economy. The ultimate increase in total spending is thereby greater than the initial, first-round, effect. However, the increase in investment expenditure also adds to capacity generating what John Hicks called **a super multiplier** (see Figure 3).

50 The multiplier measures the ratio of a change in national income to the change in debt financed government spending. For example, a multiplier of 2 means that each percentage point of GDP of debt financed investment, if sustained, can be expected to increase UK GDP by around 2 percent in the long run.
51 IMF (October 2014) ***World Economic Outlook: Legacies, Clouds, Uncertainties***
52 Vasco Carvalho and Alireza Tahbaz-Salehi (May 2019) ***Production Networks: A Primer;*** Daron Acemoglu for the Royal Economic Society (April 2020) ***Economic approaches for analysing the short, medium term and long run impact of the COVID-19 crisis***

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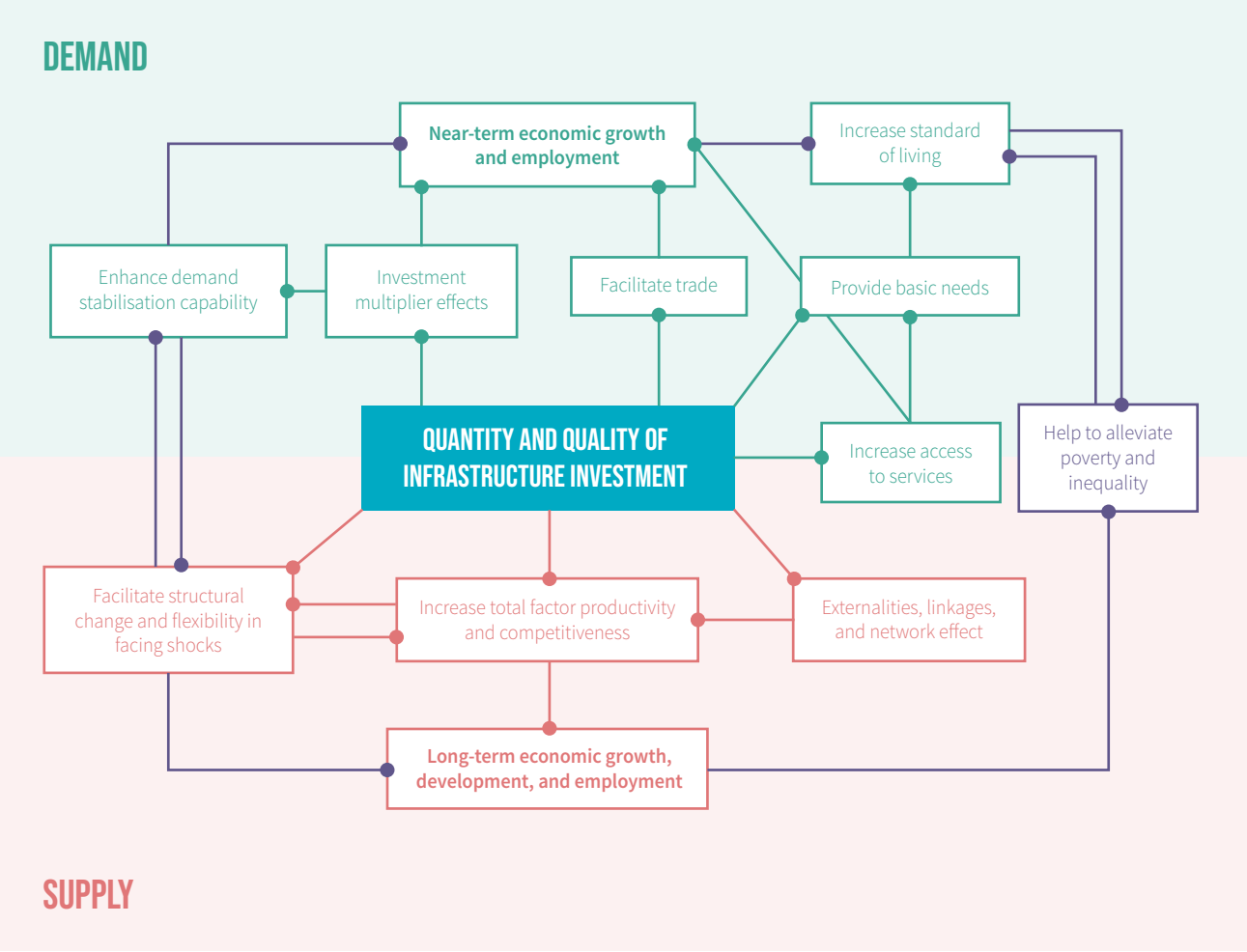
FIGURE 3: THE 'SUPER MULTIPLIER': INVESTMENT CAN EXPAND AGGREGATE DEMAND AND AGGREGATE SUPPLY.



Source: Llewellyn Consulting *Webinar brief for RES*, May 2020

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Empirical estimates show that, particularly during a severe downturn, each dollar of public borrowing is likely to raise output by £2–£3, the result of a short-term income/expenditure effect and a longer-term capacity-increasing effect. Thus studies from NBER[53] and the IMF[54] suggest that fiscal multipliers[55] associated with government spending range from near zero, when the economy is operating close to capacity, to about 2.5 during recessions. Government spending in a slump not only generates positive benefits, it also prevents negative hysteresis[56] effects on future supply, whereby capital is scrapped and labour skills are lost as a result of protracted under-utilisation. Llewellyn Consulting conclude, on the basis of three quite different models for the UK that under current circumstances debt-financed **fiscal injections probably have UK multiplier effects in a (narrow) range of *2.5 to 3.0*.**[57] Another IMF study found that in the medium run (three years), the average multiplier for the EU is about 1 in normal times, but between 1.6 and 2.8 when interest rates are close to the zero bound, as they presently are.[58] The OECD estimates a similar range.[59]

EU output losses in the context of the COVID-19 shock could turn out to be permanent without strong fiscal action. A recent study concludes that a 1 percentage point loss in actual output is associated with a loss in potential output of about 0.6 percentage points (which is to say most the lost output will never be recovered).[60] They argue that focussing on balancing budgets without recognising the impact of fiscal policy on expanding potential output, risks pro-cyclical fiscal tightening with damaging long-term impact.

Government consumption matters too. It can help to buffer current distress and pay for health education and social services, which expand capacity. Like government investment, it can also raise the longer-term growth potential and boost resilience to future pandemics. Furthermore, it boosts aggregate demand through the expenditure multiplier. It also adds to capacity, directly and, given the complementary nature of broad assets, crowds in further private investment.

53 Alan Auerbach and Yuriy Gorodnichenko (2012) ***Fiscal Multipliers in Recession and Expansion***
54 Olivier Blanchard and Daniel Leigh (2013) ***Growth Forecast Errors and Fiscal Multipliers*** IMF WP1301 IMF (January)
55 Lawrence Christiano et al. (May 2009) ***When is the Government Spending Multiplier Large?***
56 Brookings (2012) ***Fiscal Policy in a Depressed Economy***
57 Llewellyn focuses only on model results in which spending was additional and funded by new borrowing. The OECD, averaging across three different model estimates, has estimated that a sustained increase in public investment in the UK of ½ percentage point of GDP leads to a long-term output gain (potential GDP) of around 1½ % of GDP (i.e. a 3% increase for a 1% increase in investment). See OECD (November 2016) ***Can an increase in public investment sustainably lift economic growth?***, paragraphs 26 – 31., and Figure 8.
The IMF has estimated similar figures, with the caveat that underlying economic conditions affect the value importantly: "The macroeconomic effects of public investment shocks are very different across economic regimes (Figure 3.6, panels 1 through 4). During periods of low growth, a public investment spending shock increases the level of output by about 1½ percent in the same year and by 3 percent in the medium term, but during periods of high growth the long-term effect is not statistically significantly different from zero." See IMF (2014). *World Economic Outlook October 2014. Chapter 3. Is it time for an infrastructure push? The macroeconomic effects of public investment*
Elsewhere the IMF has found statistical evidence for a value of 2.5: see IMF (May 2015) *The Macroeconomic Effects of Public Investment: Evidence from Advanced Economies*, especially p. 19.
58 ***Amendola, A., di Serio, M., Fragetta, M. and Melina, G. 2019 The Euro-Area Government Spending Multiplier at the Effective Lower Bound. IMF***
59 Mourougane, A., Botev, J., Fournier, J-M., Pain, N., and Rusticelli, E., 2016. ***Can an increase in public investment sustainably lift economic growth?*** OECD Economics Department Working paper, 24 November, paragraphs 26 – 31, and Figure 8.
60 ***Heimberger, P. Potential (2020) Output, EU Fiscal Surveillance and the COVID-19 Shock. Intereconomics 55, 167–174.***

3. COVID-19 AND THE ECONOMIC LESSONS FROM PAST RECOVERY PLANS

Governments must provide companies with the clarity and confidence they need to unlock low carbon investments. This generates the *ambition loop* – a positive feedback mechanism in which string government policies and private sector leadership reinforce each other. The size of the multipliers will be a function of the degree to which credible and stable policy guides expectations and lowers perceived risk by signalling direction of travel (see Box 2 and Section 6). Credible policy plays a vital coordination role in generating such reinforcing feedbacks whereby the government sends the right signals to industry and businesses. It is important to recognise that the key objective is not to chuck public money at investment, but to build a policy framework that generates private activity and attracts private capital.

If policy is successful in generating growth, interest rates and debt servicing costs can be expected to rise. But this would be a symptom of success. Policymakers can tighten the fiscal screws as global private sector activity normalises to raise revenues and balance demand.

3.4 HANDLING SHOCK AND DISRUPTION AND PROVIDING LIQUIDITY

Boosting demand will be particularly challenging in the current environment. As noted above, the slowdown comes at the end of a long period of *slow productivity growth* and real policy interest rates close to zero.[61] With rates already so low, and savings pushing rates even lower, the limitations of monetary policy are prompting ever more unorthodox approaches, while also putting an emphasis on fiscal support (see above), with the prospect in some countries of at least some direct monetisation of public debt.

Like many central banks, the Bank of England has been buying up new issues of government bonds by issuing reserves. As the Bank's balances sheet swells, the Bank can cancel the debt or keep interest rates low to assist debt sustainability even if that causes inflation, which erodes the real value of nominal public debt. Yield curve control is also being considered, whereby the Bank buys up longer-term bonds to lower long-term interest rates. All options including negative interest rates are on the table.

61 Bank of England (December 2015) ***Secular drivers of the global real interest rate***

3. COVID-19 AND THE ECONOMIC LESSONS FROM PAST RECOVERY PLANS

However, fears of debt monetisation *may be overstated*.[62] What matters for inflation and credibility is operational independence of the Bank of England, rather than the instrument in use. Provided an operationally independent central bank can modify its stance in accordance with its objectives, in the form of a transparent reaction function, there is no reason why anti-inflationary credibility should be undermined. With inflation undershooting, radical measures are justified provided they are temporary. There remains the need to account for biases in the Central Bank's asset purchase programmes which may *favour carbon intensive sectors*.[63] By buying securities and debt issued by big companies, they disproportionately invest in the incumbent sectors of yesterday to the exclusion of smaller low carbon sectors that will define the economy of tomorrow. It is important that addressing such biases is not confused with attempts at a green quantitative easing programme. **It is actually about keeping the playing field level and not biasing it in favour of carbon intensive sectors loaded with climate transition risks**.

The importance of monetary policy is heightened. It is important to recognise that broad money is endogenous. Consider for example the famous question put by Professor Nicholas Kaldor on observing the annual surge in money supply each Christmas: does the money supply cause Christmas; or does Christmas cause the money supply? Thus, in a confidence crisis, and when interest rates are already near their zero bound, both the fiscal and the monetary authorities need to act to sustain spending and ensure that liquidity goes into new productive investment – rather than inflating the price of existing assets held by the wealthy. To sum up, the need to address the climate challenge and build a resilient and inclusive economy, properly pursued, might prove to be the very macroeconomic medicine the post-COVID-19 economy requires.

62 Blanchard and Pisani-Ferry (April 2020), Vox CEPR Policy Portal (April 2020) ***Monetisation: Do not panic***
63 Grantham Research Institute, LSE (May 2017) ***The climate impact of quantitative easing***

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

4.1 INVESTING IN COMPLEMENTARY PRODUCTIVE ASSETS

In the short run the key aim of macroeconomic policy is to restore confidence, stimulate spending and reanimate the economy; however generating Hicks's super-multiplier and setting the economy on a rapid, sustainable, inclusive and resilient path, require framing a vision of the benefits of government action. In the UK that vision needs to be linked to the carbon budgets, environmental targets and the net zero goal.

DEFINITION OF SUSTAINABILITY

FOUR TYPES OF CAPITAL THAT ARE ESSENTIAL TO HUMAN WELL-BEING AND WALTH

The short-term stimulus should be consistent with the strategic goals.

In the long run, inclusive sustainable growth means investing savings in an array of complementary assets which 'crowd in' capacity. This includes:

- **Physical capital**: Locking into future-proofed productive and resilient infrastructure, described by *Carbon Tracker*,[64] and for example not spending public money propping up fossil-fuel intensive assets with limited productivity potential.
- **Human capital**: To secure the *skills and jobs* necessary for 21st century economy,[65] and retooling and, reskilling workers to enable those affected by change to participate in the new economy – 'levelling up' opportunities and regions.

64 Carbon Tracker (April 2020) ***COVID-19 and the energy transition: crisis as midwife to the new***
65 Grantham Research Institute on Climate Change and the Environment (October 2019) ***Financing inclusive climate action in the UK – An investor roadmap for the just transition***

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

- ***Natural capital***[66]**,** COVID-19 shows the interaction between our environment, economy and the urgent need to strengthen the *quality and resilience of natural assets*[67] noting that biodiversity and habitat loss *increase the likelihood*[68] of diseases. Economic activity that leads to unsustainable use of natural capital thereby contributes to pandemics.

- **Knowledge and intangible capital** noting the economy of the 21st century will be shaped by knowledge and innovation. Ideas are the key driver of the growth in total factor productivity (TFP, see section 4.4).

Dematerialisation is going to play an increasing role in reducing carbon emissions and resource intensity. John Stuart Mill was among the first to recognise that even if the material economy attained a stationary state, our *intellectual development* would increase indefinitely.[69] Marty Weitzman showed how bringing existing ideas together generates a potentially *limitless supply of new ideas*.[70] This is reflected in the increasing importance to national income of intangible, knowledge-products – software, new media, databases and libraries, creative copywrite and online services. Intangibles also make up an increasing part of the capital base necessary for production.

The valuation of the world's largest firms is now based mostly on their intangible capital and not the value of their people, buildings or capital equipment. In 1975, around 20% of the value of listed companies was intangible – the ideas, processes and networks the company has nurtured. By 2015, that level had risen to *around 80%*.[71] the World Bank measures the *'True Wealth of Nations'*[72] and *estimates*[73] that intangible capital may make up between 60% and 80% of total wealth in most developed countries. Today, *about four out of five dollars spent in the leading OECD economies* purchase services or intangible goods.[74]

66 Bennett Institute for Public Policy (2020) ***Valuing Wealth, Building Prosperity: The Wealth Economy Project on Natural and Social Capital***
67 IPBES (April 2020) ***COVID-19 Stimulus Measures Must Save Lives, Protect Livelihoods, and Safeguard Nature to Reduce the Risk of Future Pandemics***
68 Settele, J., Díaz, S. and Brondizio, E., and Daszak, P., (2020) COVID-19 Stimulus Measures Must Save Lives, Protect Livelihoods, and Safeguard Nature to Reduce the Risk of Future Pandemics. IPBES, 27 April. Available at: https://ipbes.net/covid19stimulus
69 Alex Bowen and Cameron Hepburn (October 2012) ***Prosperity with Growth: Economic Growth, Climate Change and Environmental Limits***
70 Martin Weitzman (1998) ***Recombinant Growth***
71 Ocean Tomo 300® Patent Index
72 World Bank (2020) ***The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium***
73 World Bank (2020) ***The Changing Wealth of Nations 2018: Building a Sustainable Future***
74 OECD (2020) ***Value added by activity***

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

BOX 3: BUILDING RESILIENCE

A key feature of the recovery plan is to secure resilience. The recovery phase affords an opportunity for policies to create jobs as soon as lockdown is lifted and expand the productive capacity of the economy. However, the lessons of COVID-19 also highlight the importance of an economy which is capable of responding flexibly to unexpected shocks, with a degree of redundancy, available 'just in case' the worst happens.

A prerequisite for resilience is investment in the capacity of state institutions. Hyper deregulation and drives for efficiency have left some institutions threadbare with limited capacity for surprises. The lack of protective equipment in the NHS provides perhaps the most graphic example but others abound. For example, the overwhelming dependence of London's entire transport infrastructure on TFL's funding model, which is based on packing in commuters to generate revenues.

Green investments will also create resilience as they reduce risks of climate impacts in the long-term and strengthen adaptation to climate impacts we are already experiencing today. Backed by strong employment laws, they can create attractive jobs and skills in the recovery that are more likely to persist over time as the economy transitions to net zero. Adaption also creates a broader range of benefits, for example water retention, preserving biodiversity and improving health (see 6.9 *investing in nature*).

Increased localisation and self-sufficiency as well as reducing reliance on fragile supply chains are ways to improved resilience, but it is important not to mistake independence for security. Global connectivity and collaboration *enhance resilience*, whether it be collective action to tackle global pandemics or limit the scope and impact of climate change.[75] Asymmetric shocks affecting countries, for example from pandemics, droughts or restricted energy supplies, also require cross-border collaboration to supply food, energy and emergency supplies. The UK is connected to the world economy and reliant upon it, so building resilience requires building collaboration internationally (see section 6.15 Global Britain).

75 IPCC (2014) *International Cooperation: Agreements and Instruments*

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

Measuring wealth provides a more comprehensive understanding of the modern economy. By supplementing GDP with complementary measures of natural, social, and human capital, our work provides a deeper assessment of the underlying wealth of nations. Many of the challenges we face today, including climate change, the 'productivity paradox' plaguing many advanced economies, and even political upheaval, can be traced to an erosion of natural, human, social and institutional capital. But these trends are not reflected in standard official statistics.

Assessing the wealth that will drive the UK's productive capacity in a sustainable manner **requires additional support for the ONS** to better measure the stock of broad assets, against which to assess sustainability and prosperity, alongside flows of GDP, something a group of us have been *working on in Cambridge*.[76]

4.2 CLEAN SECTORS HAVE RELATIVELY HIGH MULTIPLIERS

Against this framing, sustainable, resilient and inclusive investments have some very appealing short- and long-run characteristics in a recession. In the short run, clean energy infrastructure is particularly *labour intensive*,[77] creating *twice as many jobs* per dollar spent than fossil fuel investments.[78] Construction projects like *insulation retrofits* and building wind turbines (or installing broadband networks, planting trees and restoring wetlands) are less import intensive than many traditional stimulus measures and lead to *higher multipliers*.[79]

For example, wind turbine blades are made in Siemens' Hull manufacturing plants, one of the most deprived regions of the country, rather than being imported. Ørsted and Siemens Gamesa have also invested in local education and training facilities. Across the economy as a whole, the switch to EVs is estimated to create between *7,000 to 19,000 jobs*, depending on the levels of domestic production and imports.[80] A circular economy, focused on reducing, repairing, reusing and refurbishing could create *205,000 jobs* in the UK.[81] **With unemployment expected to more than double from its level at the end of last year, there is likely to be limited displacement or pressure in wages: gross jobs will approximate net jobs.** Meeting the net zero target on the housing construction sector could see the creation of 108,000 *net new jobs* by the end of this decade.[82]

76 Bennett Institute for Public Policy (2020) ***Valuing Wealth, Building Prosperity: The Wealth Economy Project on Natural and Social Capital***
77 UK Energy Research Centre (November 2014) Low Carbon Jobs: The Evidence for Net Job Creation from Policy Support for Energy Efficiency and Renewable Energy
78 Political Economy Research Institute (September 2008) ***Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy***
79 World Resources Institute (February 2009) ***A Green Global Recovery? Assessing US Economic Stimulus and the Prospects for International Coordination;*** Grantham Research Institute on Climate Change and the Environment (October 2012) *Green Growth: Economic Theory and Political Discourse*
80 Transport and Environment (September 2017) ***How will electric vehicle transition impact EU jobs?***
81 WRAP (September 2015) ***Economic Growth Potential of More Circular Economies***
82 Cambridge Econometrics & Verco for Customer Focus (October 2012) ***Jobs, growth and warmer homes: evaluating the economic stimulus of investing in energy efficiency measures in fuel poor homes***

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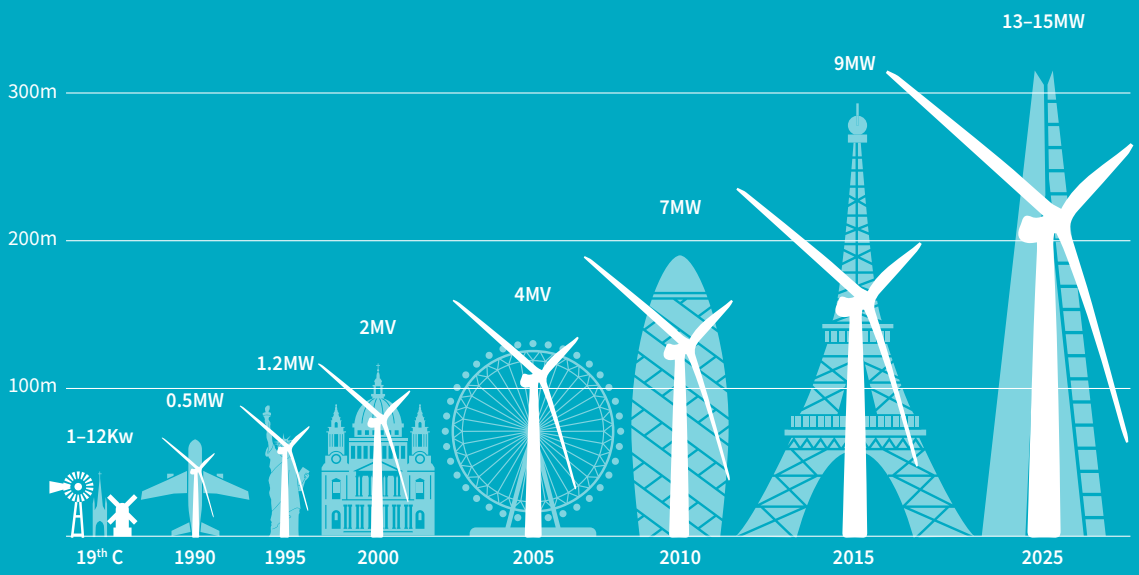
BOX 4: WINDS OF CHANGE: INNOVATION IN WIND TECHNOLOGY

The following *example* illustrates the pace at which technology has improved productivity. Mesa Wind project near Palm Springs in the US was installed in 1983 and was one of the first in the country. It has 460 turbines and a 30 megawatt capacity. They are about to be replaced with a new 30 megawatt installation.

While large in the early 1980s, today the Mesa Wind project is less than 3% the size of the largest US wind farm project currently under construction. What is really striking though is that to create the same 30 megawatts today, those 460 old turbines will give way to, at most, 11 new ones. The new turbines will also have the same peak generating capacity as the old, 30 MW, but on non-peak days, they will almost certainly outperform their predecessors thanks to vastly improved hardware, software, and adaptability to different wind conditions. Even though the new turbines will be bigger in size, there will be so few of them that the entire configuration will shrink by 10 acres.

WIND TURBINES CAN GENERATE 100 TIMES THE POWER OF 30 YEARS AGO



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In the long term, the economic multipliers are high, as the operation and maintenance of more productive renewable technologies makes them less labour-intensive, while *energy cost savings* are passed on to the wider economy.[83] By generating growth, public debt becomes sustainable and *easily repayable*.[84] Over the coming years the distinction between 'green' jobs and other jobs will disappear – *all jobs that survive will in some sense be 'green'*, but during the period of transition the concept remains helpful.[85] Investment in small, modular renewable technologies provide numerous co-benefits and their small sizes imply shorter project lead times and *larger job creation potential*.[86]

Criteria for ranking recovery plan investments is important. Within the broader category of infrastructure investment, it is necessary to understand whether the stimulus properties of low-carbon and high-carbon investment significantly different. If they are, this would suggest either one or the other category should be prioritised for stimulus reasons. If they are broadly similar, the decision on infrastructure investment would be based on their long-term structural properties. We explore the question based on the stimulus framework introduced above (targeted, timely, temporary), but suggest refinements where appropriate (for example where short run and long *job creation* objectives differ). **Not all high multiplier investments are unambiguously clean, and where they are not, they need to be considered on their merits in terms of whether they fit into the country's long term economic strategy** (see Box 5 on roads). Some sectors such as aviation are of strategic importance to the UK, but conditional support can accelerate the process of decarbonisation (See section 6.12 below).

BOX 5: GIVE WAY: THE CARBON STATUS OF ROADS

The UK's stated long-term aim is to decarbonise road transport, largely through take-up of electric vehicles, with *bans on the sale of new hybrid and petrol cars* planned from 2035.[87] Once vehicles are 'clean', road investments should in principle be carbon neutral. However, during the transition phase over the next 15 years, **there are complex links between road investments and emissions.**

Some projects like building new roads have high multiplier effects, but they may not be best suited for large scale investment. On the one hand, the construction of new roads relieves the pressure on congested roads. Since vehicles on congested roads consume more fuel than free flowing vehicles as users are forced to drive in lower

83 Committee on Climate Change (May 2020) ***Building a resilient recovery from the COVID-19 crisis***
84 Cameron Hepburn et al. (May 2020) ***Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?***
85 Grantham Research Institute on Climate Change and the Environment (October 2019) ***Financing inclusive climate action in the UK – An investor roadmap for the just transition***
86 Wilson, C. Grubler, A., Bento, N., Healey, S., Stercke, S. D., and Zimm, C., (2020) ***Granular technologies to accelerate decarbonization. Science. 368, 36–39***
87 Reuters (February 2020) ***Electric dream: Britain to ban new petrol and hybrid cars from 2035***

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gears, it might be assumed that road building can lower transport emissions. On the other hand, new roads are complementary goods to cars making cars and the usage of cars more appealing. New car purchases resulting from a larger road network will not occur immediately but will be spread over time. Increasingly, the car fleet will be low carbon and electric. Consequently, evaluating the likely impact of road building even in qualitative terms is a difficult task.

A purely theoretical cost-benefit analysis by *Affuso, Masson, and Newbery (2003)* suggested building new roads had a relatively small effect on the increase in demand for vehicle use: building a new road in their model only results in an increase in demand of 1.3 to 1.6 per cent from rail switching, while for a carriageway widening, the statistic is 3.2 per cent.[88] However, this does not include the possibility of, for instance, individuals changing their place of geographic residence in response to the new level of road access. The relevant short- and long-run elasticities may be very different. Moreover, locking in to car-based sprawling urban development increases the *carbon and resource intensity of cities* in general by requiring more extensive connections to utilities such as electricity, water and broadband.[89]

More generally, it could be the case that road building does not keep pace with the growth in vehicles. *Historic transport trends* for the period 1960–2000 reveal that in the UK, the length of road grew at a rate of 0.5 per cent per annum, while traffic increased by 3.1 per cent over the period 1980–2000 (Affuso, Masson, & Newbery, 2005), resulting in a net decrease in the average amount of road space available per car.[90]

Economic analysis usually suggests that congestion can be tackled most efficiently through demand management in the form of road pricing and road tolls. However, these are currently relatively uncommon in the UK.

88 Institute for Fiscal Studies (September 2003) ***Comparing Investments in New Transport Infrastructure: Roads versus Railways?***
89 Coalition for Urban Transitions (2018) ***Integrating National Policies to Deliver Compact, Connected Cities: An Overview of Transport and Housing***
90 Institute for Fiscal Studies (September 2003) ***Comparing Investments in New Transport Infrastructure: Roads versus Railways?***

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4.3 CLEAN SECTORS GENERATE LARGE CO-BENEFITS

Many and perhaps most of the policies required to decarbonise the global economy generate co-benefits. Much of this boost stands to come from addressing multiple market failures – situations where a pure market outcome misallocates resources, for example, because polluters escape paying for the damage they cause (see Section 6). *Co-benefits of climate policies*[91] often include reduced waste and inefficiency (see box 6), including *food waste*,[92] reduced *urban congestion*,[93] and improved *health outcomes*,[94] *biodiversity*[95] and *ecosystem sustainability*[96]. They include commercial opportunities associated with deploying (and fabricating and exporting) cheap and increasingly competitive new clean technologies.

The benefits of reducing air pollution alone are eye-opening. In the UK, congested, polluted cities, with leaky buildings, using outmoded energy technologies, and ill-served by public transport, are inefficient and wasteful. Urban air pollution is a major cause of respiratory illness, cardiovascular disease, and early mortality. The Committee on the Medical Effects of Air Pollutants (COMEAP) estimates that, in the UK, premature deaths resulting from a single particulate pollutant, $PM_{2.5}$, currently total around *29,000 per year*.[97] The *European Environment Agency*, using data from its Air Quality e-reporting database, puts the figure at approximately 37,800 premature deaths a year in the UK and 432,000 in 2012 in Europe, with an additional 75,000 people dying each year from exposure to NO_2 air pollution.[98/99] Global welfare losses due to pollution are estimated by one study to amount to *6.2 percent* of global economic output.[100] A recent study by the London School of Economics even draws a link between *increases in crime*[101] with London's growing air pollution and recent links suggest that pollution increases *vulnerability to COVID-19*.[102]

A number of authoritative studies have shown that policies to decarbonise the global economy boost economic growth, not reduce it. A recent *World Bank study* found that, compared with business-as-usual, green growth would produce immediate positive effects on the economy, when taking proper account of co-benefits (e.g. reduced local pollution); growth in new 'green' sectors; and reduced energy price volatility via reduced dependence on fossil fuel imports.[103] The *Global Commission on the Economy and Climate* found that more than half, and perhaps as much as 90%, of the global emissions reductions required to meet an ambitious

91 Mikael Karlsson et al. (February 2020) ***Climate policy co-benefits: a review***
92 Yosuke Munesue et al. (2015) ***The effects of reducing food losses and food waste on global food insecurity, natural resources, and greenhouse gas emissions***
93 Portugal-Pereira et al. (2013) ***The Sustainable Mobility-Congestion Nexus: A Co-Benefits Approach to Finding Win-Win Solutions***
94 Eric Chivian and Aaron Bernstein (2008) Sustaining Life: How Human Health Depends on Biodiversity; Mikael Skou Andersen (August 2017) *Co-benefits of climate mitigation: Counting statistical lives or life-years?*; Vivian Quam et al. (April 2017) *Assessing Greenhouse Gas Emissions and Health Co-Benefits: A Structured Review of Lifestyle-Related Climate Change Mitigation Strategies*
95 Brett Bryan et al. (2016) ***Designer policy for carbon and biodiversity co-benefits under global change***; Henry Wüstemann et al. (April 2017) *Synergies and trade-offs between nature conservation and climate policy: Insights from the "Natural Capital Germany – TEEB DE" study*
96 Cheryl Palm et al. (April 2014) Conservation agriculture and ecosystem services: An overview
97 Committee on the Medical Effects of Air Pollutants (August 2018) ***Mortality effects of long-term exposure to air pollution in the UK***; European Environment Agency (April 2016) *Premature deaths attributable to air pollution*
98 European Environment Agency (April 2016) ***Premature deaths attributable to air pollution***
99 Another recent study by the World Resources Institute (WRI), based on fairly standard approaches to the statistical value of a life, estimates the health impacts of PM2.5 exposure (including premature deaths) in China at 10–13 percent of annual GDP. See New Climate Economy (2014) *Better Growth, Better Climate*
100 Philip Landrigan et al. (February 2018) ***The Lancet Commission on Pollution and Health***
101 Malvina Bondy et al. (April 2018) ***Crime is in the air: the contemporaneous relationship between air pollution and crime***
102 Xiao Wu et al. (April 2020) ***Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study***
103 Stéphane Hallegatte et al. (February 2012) ***From growth to green growth—a framework***

climate target could generate net benefits to the economy.[104] These include health benefits from reductions in urban pollution; falls in traffic congestion; increases in efficiency; improvements in energy security and supply. The *OECD argues* similarly:

"… bringing together the growth and climate agendas, rather than treating climate as a separate issue, could add 1% to average economic output in G20 countries by 2021 and lift 2050 output by up to 2.8%. If the economic benefits of avoiding climate change impacts such as coastal flooding or storm damage are factored in, the net increase to 2050 GDP would be nearly 5%."[105]

In June, the International Energy Agency (IEA) published its *Sustainable Recovery Plan*. Working with the IMF, it outlined the on policies governments should implement in the next three years to simultaneously spur economic growth, create millions of jobs and put emissions into structural decline. The focus was on accelerating global structural change to a low-carbon energy and transport system while boosting energy efficiency. It estimates that the plan would add 1.1% to GDP, create 9 million jobs, eliminate 4.5 metric gigatons of greenhouse gas emissions and make 2019 the peak year for global emissions.

4.4 DRIVING PRODUCTIVITY THROUGH CLEAN INNOVATION

The economy of the 21st century will be shaped by knowledge and innovation. It is the key driver of the growth of total factor productivity (TFP). It will determine the ability to get more out of the resources we have (resource efficiency) by directing the 'weightless' economy to foster dematerialisation and decarbonisation. **The scale of the low-carbon transition means *network effects and economies of scale in production and discovery*, are so large that we invariably underpredict the scope for productivity-augmenting clean innovation.**[106] Over the past decade, there has been *a near tenfold* decline in the cost of both *solar photovoltaic generation* and battery storage, necessary to address intermittency of supply.[107/108] Both sectors benefitted *from substantial support* in the form of publicly funded R&D and direct deployment support (such as the renewables obligation in the UK and feed-in tariffs in Germany).[109] There is also evidence of significantly greater *spill-overs* into other parts of the economy, compared with more mature fossil fuels investments.[110] A *study* of OECD patent data shows that both wind and solar technologies create knowledge spillovers at the national level.[111] This dynamic technological change also delivers lower energy costs in the long term after the upfront costs are paid (Figure 4).

104 New Climate Economy (2014) ***Better Growth, Better Climate***
105 OECD (May 2017) ***Investing in Climate, Investing in Growth***
106 Gerard van der Meijden and Sjak Smulders (November 2017) ***Carbon Lock-In: The Role of Expectations***
107 Bloomberg New Energy Finance (2019) ***New Energy Outlook 2019***
108 Vox (October 2015) ***The International Energy Agency consistently underestimates wind and solar power. Why?*** https://www.vox.com/2015/10/12/9510879/iea-underestimate-renewables
109 IRENA 2018, Renewable Energy Policies in a Time of Transition
110 Philippe Aghion et al. (February 2016) ***Carbon Taxes, Path Dependency and Directed Technical Change: Evidence from the Auto Industry***; Grantham Research Institute on Climate Change and the Environment (October 2017) *Knowledge spillovers from clean and dirty technologies*
111 Frauke Braun et al. (June 2010) ***Innovative Activity in Wind and Solar Technology: Empirical Evidence on Knowledge Spillovers Using Patent Data***

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FIGURE 4: FACTORS INCLUDING CHANGE IN BRITAIN'S POWER SYSTEM OVER THE LAST DECADE, EMISSIONS INTENSITY OF THE GRID, AND WHOLESALE ELECTRICITY PRICES.

Note: Cap. = Capacity

Source: *Drax Electric Insights*[112]

112 Drax Electric Insights (December 2019)

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

As a result, clean technologies are rapidly outcompeting fossil fuels. In many parts of the world, renewable energy is now *cheaper than fossil fuel-based energy*.[113] Within the coming decade, it will be cheaper almost everywhere. Regardless of whether policymakers care about carbon or not, the world will now have cheaper energy; and this is the result largely of policy initiatives to steer investment in renewables. The markets alone would not have delivered this. Applying policy early to overcome such dynamic market failures has the potential to change the global economy. This understanding, first outlined by the Nobel prize winning economist Romer and others when they postulated the theory of *endogenous technological change*, is central to the task of efficiently managing a low-carbon transition.[114]

Investment in renewable generation, excluding nuclear and hydroelectricity, is already *outstripping investment in coal, gas, and oil power* the world over, with renewables now on track to power the bulk of global electricity in the second half of the century.[115] There is even some evidence that COVID-19 is accelerating the energy transition in the UK, with the grid *coal free for a record 68 days* during lockdown. Something similar happened to the *European electricity sector over the 2008 recession*.[116] Demand for fossil fuel powered electricity collapsed, and never again recovered to 2007 levels. This is because by the time electricity demand bounced back, renewables were able to supply all the growth. A similar story is likely this time. While the use of coal, oil and gas fell precipitously in Q1 2020, the share of renewables in global electricity generation *jumped to nearly 28%* in from 26% in Q1 2019 (see Figure 5).[117] Transformative cost reductions are also occurring in other key technologies, such as fuel cells, electric vehicles, and even electric aviation.

113 Business Green (May 2019) ***Cheaper than fossil fuels: Global renewables costs hit record low***
114 Paul Romer (1990) ***Endogenous technological change***
115 Bloomberg New Energy Finance (2019) ***New Energy Outlook 2019***
116 Carbon Tracker (April 2020) ***COVID-19 and the energy transition: crisis as midwife to the new***
117 ***International Energy Agency 2020 Global Energy Review 2020: The impacts of the Covid-19 crisis on global energy demand and CO2 emissions***

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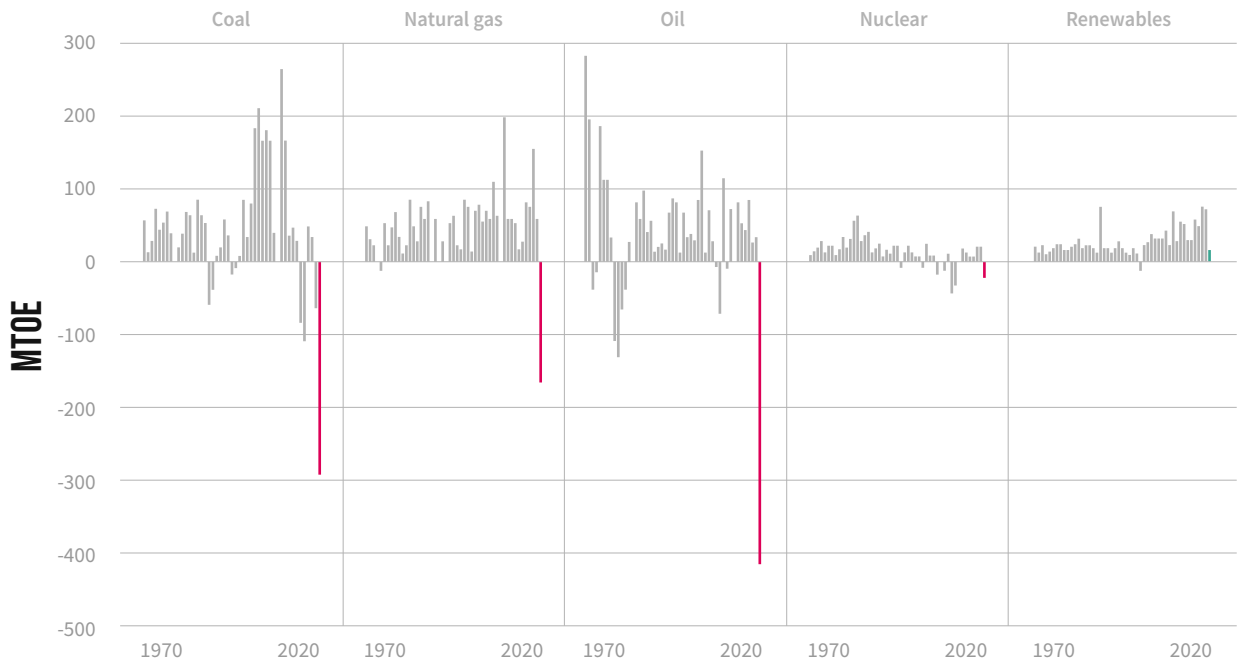
FIGURE 5: CHANGE IN GLOBAL ENERGY DEMAND BY FUEL, 1970–2020



Coal is set for the largest decline since World War II, alongside sharp reductions in gas and oil. Nuclear power is less affected by lockdown measures, while renewables are the only energy source on the rise of 2020.

Source: IEA, 2020

The productivity potential of the low-carbon transition is immense, but it is also just one of many 21st century secular megatrends that are already starting to reshape our lives. AI, automation, machine learning, big data, the internet of things, nanotech and biotech revolutions have already delivered significant disruption. Some, such as automation, could be accelerated by COVID-19 as firms invest in new technology to boost their resilience and respond to a rise in the relative cost of labour. This is likely in manufacturing automation, the shift from traditional to online retailing, automation of distribution, remote working and robotic process automation, and horticulture automation.

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

Strong inertia and high switching costs often make it difficult at first to shift the innovation system from dirty to clean technologies. Innovation is highly *path dependent in three ways*.[118] Firms and scientists *tend to direct innovation* toward what they are already good at.[119]

- First, scientists work in areas that are well funded, where other good scientists work, leading to geographical clustering of research and knowledge production.
- Second, deployment, whereby innovations leverage existing infrastructure and ideas, rather than risk investment in potential new sectors.[120]
- Third, incentives for technology adoption, whereby the net benefits of unilaterally switching to an alternative network, rise with the number of others using it.

However, once they reach a tipping point where *expectations change rapidly*, technologies can switch quickly from one network to another when supported by credible policy intervention.[121]

A key feature of network dynamics is that it is easier for countries to become competitive in new green products that require *similar production capabilities and know-how to existing sectors*.[122] A firm's choice whether to innovate 'clean' or 'dirty' is influenced by the practice of the countries where its researchers/inventors are located. Moreover, **firms tend to *direct innovation* toward what they are already good at.**[123] **As a result, *green transitions are highly path-dependent:* countries that successfully invest early in green capabilities have greater success in diversifying into future green product markets.**[124] Mealy and Teytelboym (2017) show that the "green complexity" of the economy, that is, the sophistication of the production capabilities of green products is highly path-dependent. They show how research and knowledge production are also geographically clustered. Mealy and Teytelboym (2017) suggest that it is possible to identify "nearby" opportunity for *expanding the green industrial base*.[125] Therefore, policymakers might consider targeting stimulus towards industries that are "green adjacent possible" where the UK already has comparative advantages, for example in pharmaceuticals, *chemicals*,[126] and *electric vehicles* (EV).[127]

118 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (November 2014) *Path dependence, innovation and the economics of climate change*
119 Philippe Aghion et al. (February 2016) *Carbon Taxes, Path Dependency and Directed Technical Change: Evidence from the Auto Industry*
120 For example, conventional cars have historically been easier to sell than electric vehicles because the existing network of petrol stations is far larger than that of charging stations.
121 Paul Krugman (May 1991) *History Versus Expectations*
122 Cesar Hidalgo et al. (July 2007) *The product space conditions the development of nations*
123 Philippe Aghion et al. (February 2016) *Carbon Taxes, Path Dependency and Directed Technical Change: Evidence from the Auto Industry* https://dash.harvard.edu/handle/1/27759048
124 Penny Mealy and Cameron Hepburn (October 2017) *Transformational Change: Parallels for addressing climate and development goals*
125 Penny Mealy and Alexander Teytelboym (December 2017) *Economic Complexity and the Green Economy*
126 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (September 2012) *Who will win the green race? In search of environmental competitiveness and innovation*
127 LSE Growth Commission (February 2020) *Seizing sustainable growth opportunities from zero emission passenger vehicles in the UK*

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

The UK's comparative advantage on EV innovation is greater in connected and autonomous vehicle technologies, than in EV powertrain technologies (e.g. batteries). *Recent research* reveals that development and commercialisation activity for these technologies (e.g. firms like Oxbotica) is concentrated in the South East of England, created via spin-offs from UK's university-related R&D activities around Oxford and Cambridge; this is an example of directing innovation towards things we're already good at.[128] The Midlands are also home to significant EV innovation activity, both as a share of total car innovation and also clean and autonomous technologies. For example, firms like Jaguar Land-Rover base their R&D there. There are also clusters of government, industry and research bodies working together, e.g. the *Advanced Propulsion Centre*, which includes the University of Warwick, Department for Business, Energy and Industrial Strategy (BEIS) and others.[129] A strong sense of regional identity is formed around these automotive activities.

Productive clusters are emerging. Teesside, which accounts for 58% of the UK's chemicals industry and is responsible for 20,000 jobs and £4bn of exports per year, is developing a cluster of leading energy intensive industries to create the *'Teesside low emissions industrial zone'*, through the development of shared emission reduction infrastructure.[130] By sharing infrastructure, logistics, energy and utilities, and by exchanging raw materials, products and residual and waste materials, companies in the cluster can operate more efficiently. This enables them to reduce their costs and strengthen their competitive position. The UK chemicals sector is also well placed to respond to increasing demand for EV batteries. It is estimated that chemicals for batteries could represent a *£2.7 billion per year opportunity* for the UK chemical industry, just for UK-built cars.[131]

A third feature is that, because innovation is *path-dependent*[132] and prone to *tipping points and reinforcing feedbacks*[133], conventional models systematically overstate the costs of decarbonisation. This means that rather than predict the future, our efforts are better spent trying to *manage and steer the transition*.[134] Investments in enabling assets can spur technology tipping points and generate network externalities.[135]

The UK has lagged behind other major economies in investment in R&D over the past 25 years:

- On total investment (GFCF), the UK's performance is even worse, averaging 17.1% of GDP over 1995–2018, compared with 20.8% and 21.6% in Germany and France, respectively, and 23.6% for OECD countries as a whole.
- Gross R&D expenditure (GERD) averaged 1.6% of GDP over the period 1995–2017, compared with 2.6% and 2.2% in Germany and France, respectively, and 2.2% for OECD countries as a whole.

128 LSE Growth Commission (February 2020) ***Seizing sustainable growth opportunities from zero emission passenger vehicles in the UK***
129 Advanced Propulsion Centre UK
130 Institute of Civil Engineers (October 2017) ***Teesside: creating one of Europe's first clean industrial zones with carbon capture and storage***
131 E4tech (June 2018) ***The UK chemicals and process supply chain for battery manufacture***
132 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (November 2014) ***Path dependence, innovation and the economics of climate change***
133 Daron Acemoglu et al. (February 2012) ***The environment and directed technical change***
134 World Resources Institute (2018) ***The Role of Modelling and Scenario Development in Long-Term Strategies***
135 For example, once electric vehicle infrastructure is rolled out, the incentives to conduct research and development on electric cars increase relative to combustion engine, or fuel cell, vehicles. Volvo will stop producing combustion engine cars from 2019 and start focusing its R&D on electric vehicles; others are sure to follow.

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

This suggests that harnessing opportunities of the sustainable economy can 'kick start a productive innovation machine' and keep the UK competitive in a rapidly transitioning world. The UK is a relatively small player and has to take the pace of the global transition as mostly given and exogenous (although the economy is big enough to influence technology costs through innovation and deployment). However, the fact that the dynamics outlined above are playing out at the global level, as big players like China invest in decarbonisation, means that the UK must be aware of the risks and opportunities associated with a fast transition and plan for this strategically.

4.5 INVESTING IN SOCIAL CAPITAL, FAIRNESS AND 'LEVELLING UP'

A key part of intangible capital is social and institutional capital, which is required to deliver effective and functional governments and *rebuild trust in the social contract*.[136] There is a strong geographical/income dimension to social capital in the UK, and the sector has generated up to £200 billion of value to the UK economy, or around *10 per cent GDP* in recent years.[137] To ensure this vital service continues, it will be necessary to reinvigorate the cash-starved social sector (e.g. charities and enterprises with social objectives).

Governments need to work with institutional investors through dialogue and experimentation to produce social impact metrics that can help channel investment to areas that need more social capital. Building social capital also means **tackling inequalities** (not just in income but in wealth and in 'access' to goods and services such as health, housing, transport, education and justice – inequalities exacerbated by COVID-19). It is noteworthy that pre-existing inequalities made the COVID-19 crisis worse with BAME people more likely to be affected. This was due to poorer socioeconomic circumstances and a deficient social care system which meant many care homes were not prepared to deal with this pandemic, with huge social consequences (see Box 3).[138] *Measuring broad asset stocks*, including social capital, requires additional support for the ONS to provide accurate metrics against which to assess sustainability and prosperity.[139]

136 OECD (2020) ***Coronavirus (COVID-19): Joint actions to win the war***
137 Andy Haldane (May 2019) ***The Third Pillar and the Fourth Industrial Revolution***
138 It is noteworthy that pre-existing inequalities made the COVID-19 crisis worse with BAME people affected more severely due to poorer socioeconomic circumstances and a deficient social care system which meant many care homes were not prepared to deal with something like this pandemic, with huge social consequences (see box 3)
139 Bennett Institute for Public Policy (2020) ***Valuing Wealth, Building Prosperity: The Wealth Economy Project on Natural and Social Capital***

4. WHY BRITAIN NEEDS INVESTMENT IN SUSTAINABLE, RESILIENT AND PRODUCTIVE ASSETS

The crisis will impact inequality in the UK, exacerbating existing trends and further setting back the government's efforts to level up across the regions. Recovery packages will need to keep the levelling up agenda at the forefront. They will need to pay particular attention to low-skilled, low-income and socially deprived areas – not only in the regions, but also in greater London. Particularly impacted will be *women*, youth and BAME.[140] These groups are likely to not only be hit harder by the virus, they are more likely to be in jobs that cannot be digitally converted, e.g. cleaners, waiters, and security guards. Consequently, while those in relatively unaffected industries or firms work from home and build wealth through forced savings, these other groups of workers are far more likely to become furloughed, under- or unemployed. After the crisis, not all will return to their jobs. Some liquidity constrained firms will not be able to afford to reinstate or rehire (the productivity of labour will go down and its relative cost rise due to social distancing) and others will respond to structural change. **Structural change could be exacerbated by customers' behaviour changes or an accelerated shift to automation and digitisation, as discussed earlier. The social and individual costs of these workers becoming long-term unemployed is high. Policies to tackle this problem are discussed in Section 6.8.**

As noted above, some sustainable investment projects can help as they can be job intensive in the short run – relatively small scale and quick to get operational, targeted at the most impacted regions. Many can utilise relatively low-skilled workers, young and agile workers, (particularly from hard hit sectors such as retail, entertainment and aviation who are also nimble and able to adapt and learn new skills more easily) and only require minimal pre-job training (e.g. landscaping, nature restoration, upgrading parks with better exercise facilities, and widening footpaths). Where training is needed, it will be important to make this available on-the-job and to address skills mismatch. To help make the projects operational quickly and get the jobs to the regions where they are needed most, further devolution of responsibility to local government may be needed to ensure investment goes to local projects that suit the types of labour on offer, for example a region with more low-skilled youth could more easily be matched to landscape and cycleway construction type projects. This will then require stronger governance structures around local government to ensure sensible financial management in recovery.[141]

140 Centre for Economic Performance (May 2020) ***Work, care and gender during the Covid-19 crisis***

141 Some small local authorities are using subsidised loans that are available from the Public Works Loan Board (a body attached to the Treasury that funds councils' infrastructure spending) to invest in infrastructure including commercial property and renewable energy. See: Financial Times (April 2017) *UK public finance: councils build a credit bubble* and Financial Times (May 2020) *Revealed: an Essex council's £1bn borrowing spree to fund investment in solar power*

5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

5.1 MACROECONOMIC STRATEGY

A priority for governments in the wake of the pandemic is to adopt a clear strategic framework for the recovery package. This needs to be set in the current macro-fiscal context, provide a clear vision to restore confidence, boost demand, create competitive and productive jobs and grow a more resilient economy. The aim is to grow the economy out of post-COVID-19 debt by supporting activity in the short term and expanding productive capacity in the medium term. Fiscal and monetary policy must work together to channel liquidity and savings to grow productive sectors.

A recovery based on fiscal austerity driven by spending cuts and weak links to sustainability and resilience failed post 2008 and further locked in the unproductive fossil fuel economy. It led to increased inequality, historically low productivity growth, and failed to achieve its objectives, with high levels of public sector debt to GDP remaining a decade on. This time, there is an urgent need to prevent hysteresis and lost capacity and meet the government's overarching objectives. This will require a clear strategy on stimulus and public policy signals to guide the private sector confidence and expectations in order to get private capital flowing, including clarity that the best way out of this crisis is growth, clear regulations, strong institutions, and roadmaps for decarbonising industries, as described in this section of the report.

A thought experiment can help reinforce the notion of debt affordability. Assume a macroeconomic policymaker does not know the level of public debt. They have to decide on an appropriate fiscal stance for an economy on the brink of recession and conclude that a fiscal contraction would be economic suicide. They are then told public debt is relatively high. To what extent would that materially change their view on the appropriate fiscal stance? The answer is it should not, except in so far as higher debt impacts affordability by pushing up risk premiums on public borrowing rates. Section 3.2 described scant evidence for this thus far. Indeed, if public debt leverage is high, the risks from prematurely crashing the economy by failing to support private sector activity could be even higher than if public debt is low.

The evidence suggests growing out of this slump is a far superior policy (see Section 3 above). The key is creating fiscal space to fund the best growth and job enhancing investments and leverage private finance where possible. In this context, the crisis has revealed structural weaknesses in the UK tax system and opportunities for fiscal reform to increase fiscal sustainability, which can help repair budget deficits in the longer term. This will involve carbon price reform and may involve higher taxes for a period on the forced savings of those lucky enough to be benefiting from the crisis. Carbon pricing reform, including through the proposed UK ETS, may be a good way to increase tax revenues as this can be done in a way that increases economic efficiency, including by reducing distortionary taxes.

5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

The macroeconomic difficulties in the EU are no less challenging. The eurozone has no centralised fiscal capacity or co-ordination to offset asymmetric shocks through automatic stabilisers or discretionary transfers. The banking and capital market unions remain work in progress. The uneven distribution of perceived sovereign debt risk reflects an *incomplete euro area banking union* (with *ECB commitments* to act as lender of last resort proxying for an EU-wide deposit insurance scheme) and near absence of automatic and discretionary stabilisers derived through cross-border fiscal flows under a single currency. The systemic risk to those countries with high public debt (which in the case of Italy and Spain have also been hit hard by COVID-19) highlights the importance of targeted policies to boost growth and retain solvency.

European policymakers have made a strong start in delivering a strong and sustainable recovery. The EU was one of the earliest and hardest hit regions affected by COVID-19. Yet EU governments, the ECB and the European Commission have put in place strong measures to sustain income and employment, ease financial risks and maintain the flow of credit. The *European Commission Recovery Strategy* is likely to inject EUR 2.4trn over the period 2021 to 2027.[142] The plans prioritise *low carbon sectors*[143] and digital spending, where multiplier effects can be expected to be highest. These plans must be made robust to lobbying by vested interests or member states seeking to slow ambition (see Section 6.15).

The European package is aimed disproportionately at higher debt and lower income southern European economies, and is thereby promoting resilience and 'levelling up'. This is already having a *positive effect on business and consumer confidence*. In addition, Llewelyn Consulting estimate that individual member states' fiscal stimulus plans range from around 3% of GDP in Romania, to a notable 50% of GDP in Germany. In support of these measures, the ECB has recently expanded its asset purchase programme by around €1.4 trillion.

142 This includes figure includes SURE, the ESM Pandemic Crisis Support Scheme, and the EIB Guarantee Fund, the Next Generation EU Recovery Plan and the reinforced Multiannual Financial Framework according to Llewellyn Consulting. See Recovery Plan for Europe, 2020. European Commission

143 European Green Deal, 2020. European Commission

5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

5.2 TARGETED INVESTMENT

The next step for the UK government is to design investments that contribute to both its short-run and long-run objectives. The short-term macroeconomic merit of an investment can be judged based on established criteria of what constitutes a good economic stimulus. This has been outlined in *similar research* before and includes whether an investment is:[144]

- **timely** (anti-cyclical and executed before the economy recovers);
- **temporary** (is there an exit strategy on spending, bearing in mind the longer-term pressure for fiscal consolidation and the desire not to 'crowd out' alternative productive investment when the economy is operating close to capacity);[145]
- **targeted** at areas where the investment will have maximum benefits;
- **measured** in terms of its multiplier effect as a measure of economic stimulus, its ability to leverage private investment, and the extent to which it effectively complements the broader green policy framework and general social benefits generated;
- **Cost-effective and resource efficient,** given political pressure to maximise productivity of public spending will be high.

During the 2008/09 GFC, governments embarked on *recovery packages* that were not well aligned with a low-carbon transition, were not always cost-effective, and took too long to implement.[146] The main problem was a lack of 'shovel-ready' climate-related investments. Low-carbon projects had to first be found, new green supply chains created, and by the time the projects were implemented, the multiplier had decreased. Other well-intentioned green policies were not well designed, some were rushed without proper planning, and as such they had *mixed cost-effectiveness*, e.g. cash for clunkers and some home insulation schemes.[147] To have maximum effect, fiscal measures need to be *timely and targeted*,[148] *but also cost-effective*. This will only be possible with proactive planning, clear policies and strong institutions.

144 Grantham Research Institute on Climate Change and the Environment (February 2009) ***An outline of the case for a 'green' stimulus***
145 Policymakers would, in fact, want to actively crowd out some non-green investment, even in the long run.
146 HSBC Global Research (February 2009) ***A Climate for recovery: The Colour of Stimulus Goes Green***
147 Agrawala et al (May 2020), ***What policies for greening the crisis response and economic recovery?: Lessons learned from past green stimulus measures and implications for the COVID-19 crisis***
148 Center on Budget and Policy Priorities (January 2008) *Principles for Fiscal Stimulus Economic Policy in a Weakening Economy*; Mercatus Research (January 2015) *Timely, Targeted, and Temporary?" An Analysis of Government Expansions over the Past Century*

5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

A forthcoming study of international COVID-19 crisis support schemes shows that only a fraction of the economic stimuli currently proposed would be more than sufficient to stimulate both global economic recovery and a Paris-compatible low carbon transformation.[149] They show that the average annual cost of a low-carbon energy and efficiency investment pathway to meet the Paris agreement *is estimated* at about *$1.3 trillion per year* over the next five years.[150] This amounts to about 15% of the total pledged post-COVID-19 stimulus to date.

This time around, the UK government can be more ambitious as available green options are cheaper and some projects are 'shovel ready'. In 2008 there was spare capacity for years following the crisis as time was wasted fretting about "shovel ready". The government needs to act urgently, so the best time to start is now and recognise the different green investment options across a range of assets that are available over different time horizons. It can quickly restart projects that were already underway prior to the crisis and bring others forward. Smaller scale regional projects, for example energy efficiency, reskilling, rooftop solar, nature restoration, local park and other environmental upgrades, can be put in place rapidly and use existing knowledge and innovations. Planning for medium- to long-term high productivity assets that will deliver capital stock and a labour force suited to future challenges, will also need to start now.

The government's net zero target, consistent with meeting the UK's carbon budgets, offers several investment-focused options. The government can act to bring these forward, often without direct public funding, as part of a targeted and timely package. A number of measures were reiterated in a recent *letter to the Prime Minister* from the chair of the Committee on Climate Change, which included among other things investment in low-carbon and climate-resilient infrastructure, and the reskilling, training and research for a net-zero economy.[151]

149 Andrijevic et al. Forthcoming. Post-COVID-19 recovery stimulus dwarfs near-term climate change investment needs. Science.

150 D. L. McCollum, W. Zhou, C. Bertram, H.-S. de Boer, V. Bosetti, S. Busch, J. Després, L. Drouet, J. Emmerling, M. Fay, O. Fricko, S. Fujimori, M. Gidden, M. Harmsen, D. Huppmann, G. Iyer, V. Krey, E. Kriegler, C. Nicolas, S. Pachauri, S. Parkinson, M. Poblete-Cazenave, P. Rafaj, N. Rao, J. Rozenberg, A. Schmitz, W. Schoepp, D. van Vuuren, K. Riahi, Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals. Nature Energy. 3, 589–599 (2018) and J. Rogelj, D. Shindell, K. Jiang, S. Fifita, P. Forster, V. Ginzburg, C. Handa, H. Kheshgi, S. Kobayashi, E. Kriegler, L. Mundaca, R. Séférian, M. V. Vilariño, in Global Warming of 1.5 °C: an IPCC special report on the impacts of global warming of 1.5 °C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, G. Flato, J. Fuglestvedt, R. Mrabet, R. Schaeffer, Eds. (IPCC/WMO, Geneva, Switzerland, 2018; http://www.ipcc.ch/report/sr15/), pp. 93–174.

151 Committee on Climate Change (May 2020) ***Letter: Building a resilient recovery from the COVID-19 crisis to Prime Minister Boris Johnson***

5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

An example of such investment priorities can be found in public transport, where investment has helped reduce emissions and bring prosperity to the regions. A 10% increase in accessibility[152] of a region could lead to a *3% increase* in employment.[153] Recent *research*[154] found that *transport appraisal methodology in the UK*[155] favours high productivity regions and this locks low productivity regions into poverty traps. Investment in rail infrastructure, water and waste have potentially high multipliers and climate and resource-friendly impacts.

National Grid estimate that investment in a clean energy transition can create 400,000 jobs across the country, with a significant portion in the North of England and the Midlands. In order to meet the governments net zero target, *National Grid estimates* that low carbon electricity generation has to increase by around 50% with 2.8 million homes needing low carbon heating retrofits and an additional 60,000 charging points to power around 11 million electric vehicles.[156]

A *recent survey* of leading economists and policymakers identified policies perceived to perform well on their timeliness, multipliers and climate impact.[157] Respondents included 231 central bank officials, finance ministry officials, and other economic experts from G20 countries, and the survey compared the relative performance of 25 major fiscal recovery archetypes across four dimensions: speed of implementation, economic multiplier, climate impact potential, and overall desirability.

Ultimately it found that climate-positive policies were perceived by respondents to have high overall desirability while most climate-negative policies had relatively low desirability. This was true even for climate-positive policies that took more time to implement. Long-run multipliers of climate-positive policies were found to be high, reflecting strong returns on investment for government spending in promoting innovation and expanding capacity (see Figure 6).

152 The UKRI accessibility index captures the amount of employment that can be reached from a given location, per unit of travel time along the road network.
153 UKRI (December 2013) ***Road networks and local employment***
154 Diane Coyle and Marianne Sensier (2020) ***The imperial treasury: appraisal methodology and regional economic performance in the UK***
155 HM Treasury (April 2020) ***The Green Book: appraisal and evaluation in central government***
156 National Grid (January 2020) ***Building the net zero energy workforce***
157 Cameron Hepburn et al. (May 2020) ***Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?***

5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

Investment and policy priorities stemming from this survey include:[158]

1. **Investment in sustainable smart infrastructure,** including EV infrastructure; renewable electricity generation; storage; grid modernisation to expand electrification of road and rail combined with digitisation to better smooth supply and demand; urban planning and smart cities; broadband connectivity; nature and land; waste and recycling.
2. **Building efficiency spending for renovations and retrofits,** including improved insulation, heating, and domestic energy storage systems. This will lower household bills, help tackle fuel poverty, and provide local jobs that cannot be offshored. *Efficiency programmes*[159] could *support over 150,000 jobs* across all regions of the UK.[160] The government can also support the market for heat pumps by bringing forward the two-year £100 million Clean Heat Grant scheme currently being consulted on to start on March 2021, a year ahead of plan.
3. **Investment in human capital, education, training and skills;** to address immediate unemployment from COVID-19 and structural shifts from decarbonisation.
4. **Natural capital investment** for ecosystem resilience and regeneration, including restoration of carbon-rich habitats and climate-friendly agriculture.
5. **Developing and adopting climate-smart technologies** and clean R&D spending: such as renewables; resource efficiency; batteries and storage (including hydrogen); carbon capture and storage (CCS) technology; geoengineering; laboratory produced meat.
6. **Supporting adaptation and resilience:** including water management; flood protection; heat and the preservation of non-renewable natural capital.
7. **Bailouts** conditional on improvements against climate-positive criteria (see Section 6.12).

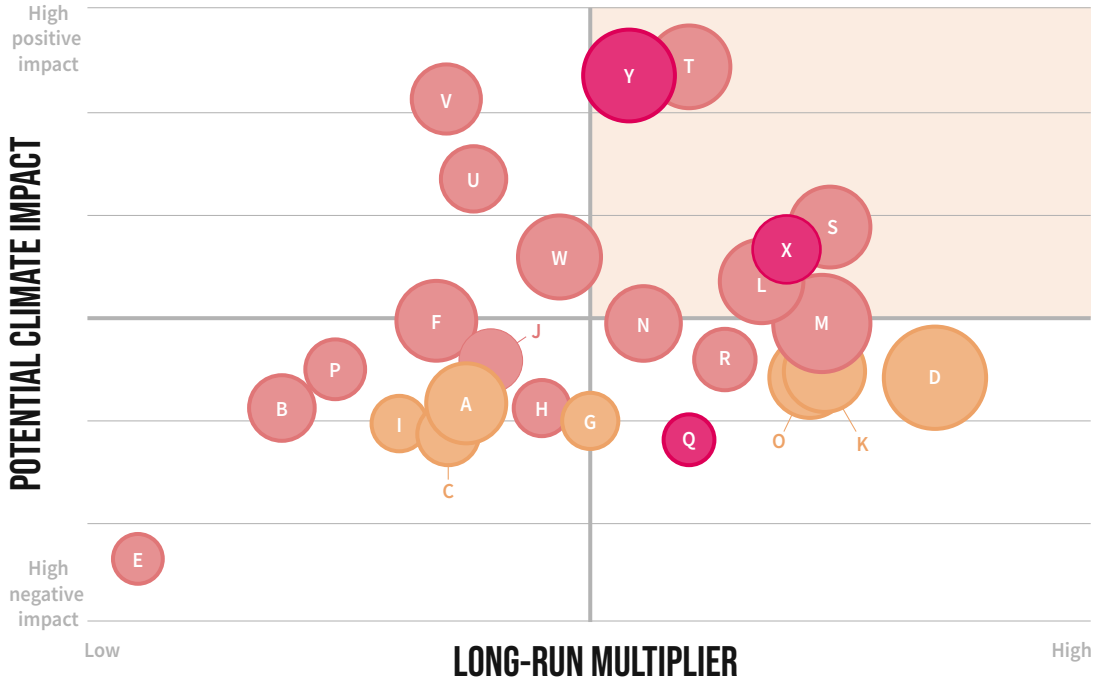
158 Recent *Aldersgate Group research* examines arrange of low-carbon and environmental projects that could address some of the key economic and social challenges facing the UK following the COVID-19 crisis. At a global level, the *IEA* has set out 30 immediate energy policy measures and investments that can boost economic growth, create jobs and build more resilient and cleaner energy systems.

159 Green Finance Institute 2020. ***Financing energy efficient buildings – the path to retrofit at scale***. This outlines the urgent need to increase the pace and scale of investment into UK residential buildings' energy efficiency and resilience, setting out a range of policy options to boost a sustainable and inclusive economic recovery.

160 Energy Efficiency Infrastructure Group (June 2020) ***Energy efficiency's offer for a net zero compatible stimulus and recover***

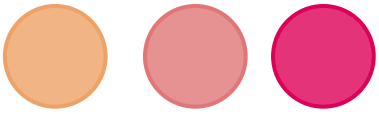
5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

FIGURE 6: SURVEY OF 231 FINANCE MINISTRY/CENTRAL BANK OFFICIALS/ SENIOR ECONOMISTS APRIL 2020



NUMBER OF EXPERT RATING POLICY IN TOP 10

SPEED



ALPHABETIC LABELS REFERENCE POLICY IDS

A Temporary waiver of interest payments
B Assisted bankruptcy (super Chapter 11)
C Liquidity support for larger corporations
D Liquidity support for households, start-ups and SME's
E Airline bailouts
F Not for profits, education, research, health inst. bailouts
G Reduction in VAT and other goods and services taxes
H Income tax cuts
I Business tax deferrals
J Business tax relief for strategic and structural adj.
K Direct provision of basic needs
L Education investment
M Healthcare investment
N Worker retraining
O Targeted direct cash transfers or temporary wage increases
P Rural support policies
Q Traditional transport infrastructure investment
R Project-based local intrastructure grants
S Connectivity intrastructure investment
T Clean energy infrastructure investment
U Buildings upgrades (energy efficiency)
V Green spaces and natural infrastructure investment
W Disaster preparedness, capacity building
X General R&D spending
Y Clean R&D spending

Source: Hepburn et al. 2020

5. MACROECONOMIC STRATEGY AND INVESTMENTS FOR BUILDING TO LAST AFTER COVID-19

Recent modelling evidence suggests that investing just £11 billion in a package of these types of green measures, including investments in building energy efficiency and subsidies for new wind and solar power installations, combined with a reduction in VAT from 20% to 15%, could lead to *GDP growth of 0.8% by as early as next year*.[161]

BOX 6: ENERGY EFFICIENCY AT THE END OF A SHOVEL

Buildings account for almost 40% of global energy-related greenhouse gas emissions and are a source of energy waste *exacerbating fuel poverty*. The *Energy Efficiency Infrastructure Group* (EEIG) estimate that investment in home renovation for net zero can support over 150,000 skilled and semi-skilled jobs to 2030. This will help to 'level up' infrastructure, spread opportunities across the UK, reduce household energy bills by £7.5 billion per year at today's prices, and benefit regions most affected by unemployment, under-investment and fuel poverty.

The government can start to deliver these benefits now through a £2.8 billion two-year stimulus package that builds on schemes already running – the Energy Company Obligation and devolved nation programmes. The stimulus programme would generate over 40,000 full-time equivalent jobs across the supply chain over the two year period, leverage a further £3.4 billion from households, social housing providers and the public sector estate, and deliver energy cost saving to one million households across the country.

A *leaked document on the EU's* planned 1 trillion-euro stimulus package includes €91 billion to fund building retrofits, intending to trigger a total of €350 billion including private finance over the next seven-year budget cycle 2021 to 2027.

Digitisation and electrification also increase the scope for efficiency improvements through real time monitoring od smart connected systems. Tech giants like IBM, Cisco and Huawei have been pushing new systems for decades, but digital innovation by companies like Smartwires, Octopus, Ohme and BNEF Pioneers Enbala and Limejump enable *smart management of existing electrical infrastructure.*

161 Cambridge Econometrics (May 2020) ***Green stimulus package together with a VAT rate cut could lead the UK out of recession in 2021***

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These fiscal policies can drive investments not only to improve productivity in a narrow sense, but also improve health and wellbeing, including strengthening social cohesion. Consideration of this long-run outlook, combined with the proper valuation of different forms of capital – particularly human, social and natural – can inform policies to crowd in investments in innovation, infrastructure and skills, garnering popular support at the national and local levels.

A note of caution on overusing the term 'shovel ready'. There are a range of investments that are timely, labour intensive, and boost productivity and green in the long term across physical but also natural, social, knowledge, and other capitals. Not all of these involve a shovel, and often when a shovel is physically involved, they take a long time to prepare given barriers and market failures that slow down infrastructure investments. For example, the *Mersey Gateway Bridge* was proposed in 1994 and opened in October 2017; London's Crossrail was proposed in 1974 and will possibly open in 2021. Projects without a shovel can be quick, labour intensive, and not involve construction of anything.

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6.1 KEY CONSIDERATIONS: CLEAR AND CREDIBLE POLICY SIGNALS AND INSTITUTIONS

The UK government will need to act now to implement strong and supportive policies, backed by enabled and well-funded institutions. This will deliver a green recovery package that maximises multipliers and the other short and long run benefits of green investments. It is essential that these policy and institutional frameworks align expectations, build confidence and help to overcome the challenges of preparing and financing investments.

Effective action requires strong institutions and the use of an array of policy tools and instruments, each designed to tackle particular market failures, which are listed below. Tackling hard to crack sectors such as aviation, shipping, heavy industry and agriculture requires a clear sense of the direction of long-term policy. One *influential study*[162] makes a powerful case that policy to support clean innovation needs to be strong but temporary. Once the "clean innovation machine" has been "switched on and is running," it can be more innovative and productive than the conventional alternative, with a positive impact on GDP levels and growth. Once low carbon is the norm, policy pressure can be eased.

Confidence and expectations are key and this means policy signals must be clear, credible and durable. Credibility is essential if the UK is to guide expectations and build a strong, inclusive, sustainable and resilient recovery from the COVID-19 crisis. In particular, the credibility of markets driven or heavily regulated by the public sector, such as those relating to energy infrastructure, transport, buildings and the environment, is predominately within policy makers' control. Consequently, mixed or muddled signals on policy intent and the design of policy frameworks will deter investment and raise risk premia charged.

The challenge is to develop credible, long run policy commitment, in which public institutions take on some of the policy risk which investors cannot control. Doing that is likely to increase the effectiveness and lower the cost of any single private investment project. Thus a coherent policy-set enhances the effectiveness of all related infrastructural investment: the sum of a *credible and stable long term policy framework* will be greater than the parts.[163] To quote a leading *economic historian:*[164]

"What matters is the state['s…] ability to and willingness to pursue policies of structural change. And hence, what matters is whether or not the state is in possession of sufficient political consensus and social cohesion for political elites to be able to go against powerful vested interests resisting change."

162 Daron Acemoglu et al. (February 2012) ***The environment and directed technical change***
163 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (June 2011) ***The Basic Economics of Low-Carbon Growth in the UK***
164 Espen Moe (2007) ***Governance, Growth and Global Leadership: The Role of the State in Technological Progress***

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Any policy intervention needs to be carefully designed in order to avoid replacing market failure *with policy failure*.[165] Greater coordination and public sector bailouts mean more government, but more government does not always mean better government. *Lessons on policy failure* after the 2008–09 GFC can help governments do better this time on green stimulus. Where explicit choices are required, they should be limited to sectors and technologies, not firms. Policy should otherwise aim to be non-discriminatory, competitive and guard against rent-seeking by powerful vested interests. Policy must be sufficiently stringent to change behaviour, predictable in order to contain policy risk, yet *simple and flexible* in evolving to changing circumstances while limiting compliance costs.[166] The *incentive and opportunity for vested interests* to seek favours from the political system are greater than usual in an economic recession, and it will be important to take into account competition-distorting effects of state aid.[167]

The EU has a strong institutional framework and the European Commission and individual EU countries, e.g. Germany, have already announced their recovery plans. The EU, for example, has the European Investment Bank (EIB) and several national development banks and agencies including KfW in Germany. All play a unique role in financing EU green investments of different types and scales. The UK has no such equivalent, the closest being the Commonwealth Development Corporation, but this does not invest in the UK. The UK could maintain ties with the EIB after it leaves the EU and collaborate on establishing a new UK investment banking institution (see below). The UK and EU could also cooperate on design and implementation of recovery packages to ensure best practice, cost-effectiveness, and take advantage of gains from cooperation, e.g. reduce costs by linking the new UK-ETS with the EU-ETS, and boost multipliers by coordinating stimulus investments.

165 Cameron Hepburn (2010) *Environmental policy, government, and the market*
166 Dieter Helm (July 2010) *Government failure, rent-seeking, and capture: the design of climate change policy*
167 John Vickers (December 2008) *The Financial Crisis and Competition Policy: Some Economics*

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6.2 KEY CONSIDERATIONS: BUILDING CAPACITY AND MANAGING LONG RUN RISK

Recovery packages will rightly focus on the immediate task of restoring demand and supply, boosting jobs, and preventing economic and social damage. But at the same time these packages are also about investing now to reduce future risks. In this way, all policies need to consider the long term and send clear long run signals.

The shifting balance of risk and uncertainty means that industrial sectors and households are confronted with a growing array of climate related risks. These manifest in at least three ways:[168]

1. **Physical risk,** which includes preventing and addressing potential distress such as floods, droughts, natural disasters as well as ecosystem collapse and the costs of restoring depleted natural capital.
2. **Litigation liability risks,** whereby people take to the courts to seek recompense and justice against private and public organisations who knowingly undertook activities which have undermined their livelihoods.
3. **Transition risk,** which focusses on disruption and valuation losses across the economy resulting from attempts to reduce emissions at an accelerated pace.

Physical risk: *Recent weather events* have been linked to human-driven climate change including extreme rainfall and flooding here in the UK.[169] Climate change will continue to make extreme weather events such as floods and drought more likely in future years, with around 5 million UK properties at *risk of flooding*.[170] These 'physical risks' impact society and the economy. Failure to manage climate change opens up significant risks of vast numbers of people having to move, which would likely create a "climate refuge" crisis in the UK. Recent research, assuming a scenario of unmanaged climate change, finds mean temperature rise experienced by human populations by 2070 could be as high as 7.5°C compared to the pre-industrial, about 2.3 times the mean global temperature rise by this time. Up to *3 billion people* (roughly 30% of the projected global population) would have to move.[171]

Litigation liability risk: At the same time, people are turning to the courts to ensure governments fulfil their climate commitments. The recent appeal court decision *to rule a third runway at Heathrow illegal* because it did not match the government's commitments to tackle the climate crisis, or the previous litigation against the Netherlands forcing accelerated emissions cuts, mark the start of a growing trend.[172] Companies and governments found to have knowingly supported activities which undermine livelihoods will be held to account. There are currently *25 climate-related lawsuits* brought against governments or their representatives.[173]

168 This is consistent with early slow progress in deployment of decarbonisation technologies.
169 Bank of England (2020) Climate change: what are the risks to financial stability?
170 National Infrastructure Commission (June 2018) ***Building resilience in the face of the effects of climate change***
171 Chi Xu et al. (May 2020) *Future of the human climate niche*
172 Courts and Tribunals Judiciary (February 2020) ***R (Friends of the Earth) v Secretary of State for Transport and Others***
173 Grantham Research Institute on Climate Change and the Environment and the Centre for Climate Change Economics and Policy (July 2019) ***Global trends in climate change litigation: 2019 snapshot***

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Businesses are being sued too. In October 2019, Massachusetts joined New York in suing Exxon Mobile for allegedly hiding its knowledge of climate change and misleading investors on its financial impact. Cities and counties in New York, California, Colorado, Washington and Maine have filed civil lawsuits against oil and gas companies. The recent cases of *PG&E*[174] and *Bayer/Monsanto*[175] provide early examples of the power of litigation to undermine equity valuations. Finally, the *threat of litigation* will increasingly undermine the future viability of companies and their shareholder value.[176]

Transition risk: Climate damages will eventually transfigure markets, but the more immediate threat for UK manufacturing comes from liability and transition risks. That is, the risks associated with keeping up with rapidly changing technologies, markets, policies and social norms. These risks can render physical, human and intangible assets devalued or stranded, and this can happen rapidly.

In addition to these three risks, it is important to also note that **technology risk is already high.** New technologies and processes are likely to undercut old ones and render them redundant. This has the potential to transform the competitiveness of goods and service markets, especially as significant R&D and deployment shifts to low-carbon sectors. At the same time, increasingly ambitious policy action (including regulation and more stringent carbon pricing) increases the costs of high-carbon activities.

The perception of risk is also changing. Where once green technologies were seen as exotic and risky, investors increasingly worry about the risk of holding assets which may become devalued or redundant on account of hostile policies, cost competitive alternatives and risk of litigation (what the FSB and TFCD call transition risk). Reflecting diminishing prospects, stock prices in fossil fuels have been *underperforming for a decade*, with the oil and gas sector dropping from 15% of the US stock market to under 5% while coal companies have sought bankruptcy.[177] This suggests there are benefits of investing in flexible and diversified assets to boost innovation and prevent lock into high carbon infrastructure, behaviour and institutions.

Markets increasingly recognise the strong economic and commercial case for early mitigation action by *divesting from risky, high-carbon sectors*.[178] There is a growing risk that *failing to keep up with changing technologies and policies* will render assets ill-suited to the economy of the 21st century. The risk that they lose future value or perhaps becoming stranded is reflected in share prices for renewable goods and services outperforming those of carbon-intensive sectors.[179] Royal Dutch Shell and BP recently cut the value of their assets by $22 billion and $17.5 billion respectively. Both cited coronavirus as a source of lower future demand for energy products, however, awareness of likely policy and regulatory changes and competition from new

174 Barron's (October 2019) ***A California Wildfire Has Thrown a Wrench Into PG&E's Bankruptcy Process***
175 Spiegel International (January 2019) ***Monsanto Merger Migraine: Safe Or Not, Roundup Is Toxic for Bayer***
176 Grantham Research Institute on Climate Change and the Environment and the Centre for Climate Change Economics and Policy (July 2019) ***Global trends in climate change litigation: 2019 snapshot***
177 Carbon Tracker (April 2020) ***COVID-19 and the energy transition: crisis as midwife to the new***
178 Financial Times (January 2018) ***Insurers go cold on coal industry***
179 BNP Paribas (August 2019) ***Wells, Wires, and Wheels – EROCI and the Tough Road Ahead for Oil***

technologies likely played a key role in that assessment. Big oil and gas players are increasingly recognising that that tens of billions of dollars worth of investment are likely to be rendered unviable as the world decarbonises to meet the Paris climate goals.[180/181]

The UK is well placed not only to adjust to, but also to benefit from, a low-carbon transition. To realise the benefits, however, it will be essential that recovery plans and policies clearly and consistently support appropriate innovation and investment. The evidence for this is set out in the *Report of the Advisory Group on Costs and Benefits of Net Zero* for the Committee on Climate Change (CCC).[182] The report concluded that the costs of transitioning the UK economy to low-carbon forms of production are a function of the decisions taken by policymakers and investors today. The more coordinated the UK's response to managing a low-carbon transition, the more cost-effective it will be.[183] The COVID-19 recovery package presents an opportunity to put in place a coordinated and strong response that accelerates the low-carbon transition and maximises the net benefits. The key institutions and policy elements of such a package are examined in the following sections.

6.3 INSTITUTIONS: A NEW NATIONAL INVESTMENT BANK

The LSE Growth Commission has long argued that a new institutional architecture is needed to drive infrastructure investment across the UK. Sound institutions can boost confidence and reduce the cost of capital, by *sharing and reducing risk*.[184] The UK should look to recognised institutional success stories – such as the *Climate Change Act*[185] and *the Committee on Climate Change*[186] independently holding UK government to account – and replicate them in areas in need of better data, measurement and evaluation.

A strong institutional architecture is even more important today in order to bring major sustainable infrastructure projects to market. Reform consists of three pillars: a new development bank, an infrastructure commission, which the government has already created, and government reform. This section discusses the benefits of a *new development bank and accompanying government reforms*.[187] The pace of change and the need for extensive public intervention to recover from the pandemic and promote the low carbon transition underlines the importance of transparent regulatory institutions to limit rent-seeking, protect consumers and promote competition.

180 Christophe McGlade and Paul Ekins (January 2015) *The geographical distribution of fossil fuels unused when limiting global warming to 2 °C*
181 Alexander Pfeiffer et al. (May 2018) *Committed emissions from existing and planned power plants and asset stranding required to meet the Paris Agreement*
182 Committee on Climate Change (2019) ***Report to the Committee on Climate Change of the Advisory Group on Costs and Benefits of Net Zero***
183 For example, policy can generate cost reductions and new economic benefits by avoiding locking into high-carbon infrastructure, behaviours and institutions which will be expensive to subsequently retrofit or scrap, while at the same time, inducing resource-efficient innovation.
184 Scott Baker et al. (October 2015) ***Measuring Economic Policy Uncertainty***
185 HM Government (2008) ***Climate Change Act 2008***
186 Grantham Research Institute on Climate Change and the Environment and the Centre for Climate Change Economics and Policy (April 2018) ***10 years of the UK Climate Change Act***
187 LSE Growth Commission (2013) ***Investing in Prosperity: Skills, Infrastructure and Innovation***

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The right institutional framework recognises the centrality of political risk, can create long term commitments across electoral cycles, and can bring financing costs down. These three factors are crucial when considering investment in a context of long-term strategy around inclusive, sustainable and resilient growth, which is aligned with the net zero target and technological change. They also combine to create and clarify revenue streams, which can *support investment* by capturing (in part) spillovers and externalities (public co-benefits) flowing from infrastructure, including for the long term.[188]

Publicly funded institutions **can also overcome market failures around investment.** They can promote risk sharing and risk reduction through guarantees, publicly backed equity stakes, feed in tariffs and carbon price floors.[189] They can also run pilot projects where knowledge is low and barriers to entry, regulations or network effects are high. Public sector investment or "skin in the game" can be crucial as it reduces private perception of policy risk, lowering the cost of capital. Legislated frameworks such as *the UK Climate Change Act* can enshrine a process for emissions reductions into law to the same effect.[190]

However, there remains a *lack of confidence in the duration and credibility of public institutions* to support decarbonisation investments.[191] The previous Green Investment Bank (GIB) was in a position to act as a *'first mover' in the UK market*, but it has since been privatised as the Green Investment Group and so may lack the mandate to support UK-only investments.[192] Other existing institutions may not have the capacity or the expertise to raise the significant amount of financial resources required for future zero-carbon infrastructure in the UK.

A new institution in the form of a UK National Investment Bank (NIB) can help the government to deliver a strong, sustainable, inclusive, and resilient recovery and beyond to net zero in 2050. A NIB can do this by:

- Leveraging both domestic and international sources of private finance, providing liquidity for the recovery;
- Reducing and managing risk through innovation, and helping to overcome other finance barriers for investments in comprehensive assets (physical, human, intangible and natural) consistent with a transformation to more resilient, inclusive and sustainable form of growth;
- Helping to bring forward and prepare *sound projects at scale*, from large complex projects to aggregation models;[193]
- Creating platforms for going to scale in new green technologies such as hydrogen – the NIB would set new examples of scaling investment and others can then duplicate their efforts.

188 Royal Economic Society (May 2020) ***Finance for a strong and sustainable recovery***
189 Institute of Energy and Sustainable Development (October 2009) ***Energy Services and ESCos – their benefits and implications for regulation and the consumer***
190 Committee on Climate Change (May 2018) ***The CCC's new Chief Executive relishes the challenges ahead***
191 FEU-US (November 2019) ***The Truth Behind the Climate Pledges***
192 Grantham Research Institute on Climate Change and the Environment (September 2019) ***Decarbonisation of the UK economy and green finance***
193 National Infrastructure Commission (May 2019) ***Letter: Sir John Armitt to Chancellor of the Exchequer***

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A NIB can also build partnerships to overcome capital market failures, particularly for early stage risk where they can provide more risky capital at the start of major projects using a range of instruments. Capital markets are often weak in managing large and complex projects/programmes, with large perceived risks, long term horizons, and government induced policy risk and other political risks. By overcoming many of these market failures a NIB can make a major difference in unleashing private finance. There are many examples from around the world including the EBRD, IFC, EIB, and many national investment banks like KfW in Germany. A list of their strengths and benefits is provided in Box 7.

As an example of the type of scale it could generate, with £20 billion paid in capital and £80 billion callable; total capitalisation could be £100 billion total. Paid in capital could be, for example, paid in over 5 years at £4bn p.a. With a 1.5–1 gearing ratio and turnover of portfolio on average 5 years, it could lend around £30 billion per year.

Utilising these strengths, the mandate of the NIB would be to foster sustainable investment and take it to scale. Initially, there should be a targeted focus on managing and reducing risk in fast, labour intensive, and high multiplier projects that can contribute directly to a strong, sustainable, inclusive and resilient recovery. Thus it could play a central part in the necessary financing and liquidity which will be crucial to recovery. However, the Bank's mandate could be carefully broadened over time. Project origination and appraisal processes should be rooted in regional development plans and infrastructure needs. It could lend to the private sector, national government and local governments as they take a greater role in recovery and levelling up investments. The Bank should use its strength to innovate and help push the frontiers of investment as many of its counterparts in other countries already do; sharing and taking an interest in what others are doing globally will be key.

The effectives of a new NIB in delivering on the governments objectives will need complementary government reforms that ensure a system-wide financial response from national to local level. There is a clear need for:

- **A strong governance structure for infrastructure that joins up and empowers local authorities,** enabling coordination of infrastructure investments across regions and cities, in particular across housing and related infrastructure investments. This will involve strengthening the capacity of local, regional and devolved governments to attract and deploy capital; there is real concern around local government debt management given high risk *commercial and other property investments*.[194] Much of the emerging, sustainable economy is inherently decentralised (transport, renewables, land use) and requires granular, ground-up solutions, particularly for SMEs.

194 National Audit Office (February 2020) ***Local authority investment in commercial property***; Financial Times (February 2020) *Audit office warns over councils £6.6bn commercial property spree*

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BOX 7: THE STRENGTHS OF A NATIONAL INVESTMENT BANK (NIB)

Political economy strengths

- Strong governance and high transparency of public investments and financing facilities by being a public entity.
- A board established by government and accountable to Parliament.
- Decisions involving finance and investment are taken out of the innards of ministries and this reduces political interference.
- Can include a private sector shareholding.
- Potential to be profitable without subsidy if set in the context of good policy.

Investment strengths

- Able to invest across a range of assets with high public returns, e.g. energy systems, transport, digital communication infrastructure.
- Can shift investment strategy depending on the economic cycle.
- A trusted convener and syndicator; and it can build sector and other skills.
- It can run pilot projects.
- A sustainability mandate enables a focus on achieving UK long term climate objectives, as well as levelling up.
- Can work closely with private retail banks to scale up private investment in areas with market failures and barriers, e.g. mass replacement of gas boilers, building retrofits, wetland regeneration, and so on.
- Can work alongside the British Business Bank, which is oriented towards SMEs, but would also need a sustainability mandate to leverage complementarities.
- Builds sustainable investment and finance skills.

Policy strengths and risk instruments

- Looks long term and reduces policy risk (often just by its presence).
- Has a range of instruments to manage risk (such as equity, long term loans, mezzanines, and political risk guarantees).
- Reinforces the policy regime by working closely with government on supportive policies and regulations and overcoming barriers to investments.

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- **Priorities for investment in regions** where productivity and wellbeing would be most responsive to higher capital intensity, and where network and agglomeration effects can be exploited to support low-carbon innovation hubs. This should connect local priorities with national objectives including net zero-aligned investment, levelling up, building skills and ensuring a just transition.
- **Delivering greater policy and fiscal autonomy to cities and regions,** building on the Cities and Local Government Devolution Act 2016, and other recent moves to empower cities, with particular focus on *climate-smart cities*.[195] Strengthening governance structures at the local and city level will be crucial to avoid poor financial management and/or corruption.

6.4 INSTITUTIONS: A REVISED INDUSTRIAL STRATEGY

The impact of COVID-19 has increased the role of the UK government in the economy through the process of rescue with loans to or shares in many companies. That puts it in a position to be active on industrial policy. As the rescue-loans are unwound, extended or converted to equity, in which case the state becomes a significant shareholder, the state could tilt its influence in these firms towards a sustainable, resilient and inclusive recovery, utilising supportive public policies. See also Section 6.12 on bailouts, where the government intervenes to provide liquidity to strategically important firms and industries.

The UK has lacked scale, consistency and longevity in its industrial strategy, caused by a lack of institutional underpinning. As the role of policy is to set expectations on the future path and break us out of a negative feedback loop, and the government is in a unique position given the impact of the crisis, there is a strong case for a radical rethink of the UK's industrial strategy. The challenges of implementing an effective industrial strategy are considerable. The UK should learn from past experience to reduce the risk of policy failure. The *LSE Growth Commission (2017)* and *Mazzucato (2017)* discuss principles of industrial strategy, lessons from past successes and failures, and the current UK Industrial Strategy.[196]

Crucial for a more effective Industrial Strategy is greater coherence with the Clean Growth Strategy and stronger ambition if economic growth is to be sustainable over the long term. It is not sensible to focus *the Clean Growth Strategy* on promoting a narrowly defined 'low-carbon sector' that contributes around 1 per cent to UK GDP, while the rest of the economy gets on with a business-as-usual high-carbon path.[197] To target longer-term green investment, the government will need to bring together the existing Industrial Strategy and Clean Growth Strategy to create a single forward-looking and coherent plan for strengthening the UK's human capital for the recovery and the low-carbon transition. As part of this, it also needs to reassess and better integrate adaptation.

195 LSE Growth Commission (2018) ***Sustainable growth in the UK. Seizing opportunities from technological change and the transition to a low-carbon economy***
196 LSE Growth Commission (2017) ***UK Growth A New Chapter, A Blueprint for Growth in 2017 and Beyond***; Mariana Mazzucato (2017) ***Response to the Green Paper "Building our Industrial Strategy"***
197 LSE Growth Commission (2018) ***Sustainable growth in the UK. Seizing opportunities from technological change and the transition to a low-carbon economy***

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Such a revised strategy needs to set a clear long-term commitment to net zero and adaptation and will need to map out how it plans to get there. Net zero and adaptation must be positioned at the heart of this new strategy and should link to local industrial strategies setting out plans to help businesses recover from COVID-19 by aligning with the provision of zero carbon goods and services. It will also need to involve a plan for adaptation and the natural environment. This will need to be accompanied by efforts to finalise the ambitious Environment Bill and Agriculture Bill – by subsiding projects that deliver environmental improvements, putting in place a comprehensive set of improvement targets under the Environment Bill, and developing a trade policy and future trade agreements that support the delivery of the UK's climate and environmental goals (see Box 10).

Technical advances and policy innovations are opening up opportunities for improvements to labour and resource productivity, and sustainable growth, everywhere across the economy. A revised Industrial Strategy is not only about developing breakthrough innovation, as important as this will be longer term. It is also about recognising the wide array of existing cost-efficient low-carbon technologies that can be adopted across different sectors and the intrinsically low-carbon activities that companies can expand with the right incentives. For example, there is vast potential in the UK for implementing existing innovations in aviation, including more efficient flight paths and other aircraft operations. There is also potential for green growth via supporting and expanding intrinsically low-carbon industries across the regions, such as in education and financial services, areas where the UK already has a comparative advantage. It is not just about expanding the narrowly defined environmental goods and services sector in isolation, which is important but a relatively tiny part of the economy. The *industrial strategy, with a commitment to not only net zero, but also levelling up*, should also focus on resilience and the crucial role of the social third sector.[198] The idea of research missions, as discussed above in the innovation section, can bring the strategy together.

A particular mission may be around zero emissions vehicles. Recent research identifies a *significant manufacturing and employment opportunity* in this sector. Nearly 80,000 jobs could be created by 2030 in the production of electric vehicle powertrain components, charge points, fuel cell powertrain components and autonomous vehicle hardware and software. This requires incentives to support production in regions across the UK, policies to boost demand for zero emission vehicles and regulations that are closely aligned with the European Single Market and EU emissions regulations.[199] A *particular strength* for the UK is automation and control systems.[200] Developing further incentives to encourage the take-up and UK production of electric vehicles could create an *additional 150,000 jobs* by 2040.

198 Royal Economic Society (May 2020) ***Policy for a strong and sustainable recovery***
199 LSE Growth Commission (February 2020) ***Seizing sustainable growth opportunities from zero emission passenger vehicles in the UK***
200 LSE Growth Commission (February 2020) ***Seizing sustainable growth opportunities from zero emission passenger vehicles in the UK***

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Failure to get the institutional and policy structures right, including Industrial Strategy, risks continued under-investment across national assets and loss of international competitiveness. This will weaken the UK's foundations for a sustainable recovery and more inclusive growth. It would leave the UK with ongoing structural weaknesses, muddled expectations on the direction of change, including policy uncertainty, and less flexibility to adapt to future external shocks. The UK would be less well prepared for the challenging transition ahead – diffusion of new productivity-enhancing technologies would be slow, and growth, living standards and the levelling up agenda would suffer.

Sound institutions, including the NIB and a net-zero aligned industrial policy, will need to be supported by strong policies for key market failures and guard against the negative impacts of COVID-19, by having a strong competition policy in times of high firm bankruptcy and liquidity constraints, and bailout conditionality.

6.5 POLICIES FOR CARBON PRICING

Carbon *pricing is* a foundation for recovery policy that will help drive innovation and investment.[201] Without it, overconsumption and overproduction of damaging activities is all but guaranteed. It will also be very hard to achieve the UK's climate commitments, including to net-zero emissions, without a strong and effective carbon price.

Greenhouse gas emissions are often described by economists as an *externality* of market transactions[202] or a market failure. As greenhouse gas emissions rise, warming generates damages measured using the *'social cost of carbon'*.[203] A standard economic approach is to internalise this cost by *pricing carbon* to offset the market failure.[204] This takes the form of a market-based policy instrument such as carbon tax or establishing emissions trading schemes.

Prices send a transparent and non-discriminatory signal to all consumers and producers to guide the most efficient short-term emissions reductions. Because the market drives investment, pricing reduces the scope for rent-seeking by powerful lobbies to secure lucrative public contracts. Pricing is also necessary to reduce the *'rebound effect'* whereby the savings generated through more efficient use of resource are ploughed back into even greater consumption of those resources (for example heating, flights or car journeys).[205] Pricing helps steer those savings towards less damaging consumption. Global policies must be expected to tighten further in anticipation of this effect.

201 Centre for Climate Change Economics and Policy and Grantham Research Institute in Climate Change and the Environment (December 2011) *The case for carbon pricing*
202 Economics Online
203 Carbon Brief (February 2017) *Q&A: The social cost of carbon*
204 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (May 2019) *How to price carbon to reach net-zero emissions in the UK*
205 UKRI (2020) *The rebound effect*

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The UK already has a comprehensive carbon pricing regime in place. It has several different carbon prices across the economy due to overlapping policies and implicit and explicit price signals. There have been calls for its reform over many years. Two types of *reforms* are often advocated: bring it more in line with economic theory by having one uniform price across the economy, and ensure price levels are in line with the UK's climate commitments, including net zero.[206]

New research suggests the current regime may not necessarily be a problem if the price levels are designed correctly, with the *appropriate complementary policies*.[207] The research focusses on price levels that can deliver additional revenue to government in the short term and are consistent with the net-zero commitment in the long-term, including complementary policies that will be needed given non-price sensitive sectors. It discusses a sector approach to setting price levels. Reform of carbon price levels will need to consider important factors such as distributional incidence, competitiveness concerns, design of revenue recycling, and deadweight losses and gains. The LSE Growth Commission reports, and others, examine these factors.[208]

Now is a good opportunity to adjust carbon price levels. With the UK planning a *new UK ETS* as it leaves the EU-ETS, and given the disruption from the crisis, there is an opportunity, temporarily, to adopt a *strong carbon price* across the economy that can guide recovery decisions and redirect economic systems in a zero-carbon direction.[209] The UK would not be alone in taking advantage of this opportunity; Switzerland for example recently reformed its carbon prices. More optimal carbon prices across policies can also improve the efficiency of the tax system overall, without hurting net jobs, and raise new sources of revenue for government, which can help to create fiscal space for job enhancing recovery investments, which will, in turn, generate higher tax revenues that can help bring down the budget deficit in the long term.

UK carbon prices, including shadow prices, have been too low to date, stalling the development of low-carbon solutions, particularly in sectors that are more difficult to decarbonise. In terms of investment programmes and projects in the UK recovery package, the government will need to ensure the shadow price of carbon – the price it uses internally to guide public-sector decisions – is consistent with net-zero. Such a price could *start at £50 (with a range of £40–100) per tonne of carbon dioxide (tCO2) in 2020, reaching £75 (£60–140) in 2030 and £160 (£125–300) per tCO2 in 2050*, which reflects the likely cost of negative emissions technology.[210]

206 LSE Growth Commission (December 2018) ***Sustainable growth in the UK. Seizing opportunities from technological change and the transition to a low-carbon economy***; Dieter Helm (October 2017) *Cost of Energy Review*; Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (May 2019) *How to price carbon to reach net-zero emissions in the UK; OECD (August 2011) Climate-Change policy in the United Kingdom*

207 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy and Vivid Economics (March 2020) ***Distributional impacts of a carbon tax in the UK: Report 2 – Analysis by income decile***

208 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy and Vivid Economics (March 2020) ***Distributional impacts of a carbon tax in the UK: Report 2 – Analysis by income decile***

209 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (May 2020) ***Pricing carbon during the economic recovery from the COVID-19 pandemic***

210 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (May 2019) ***How to price carbon to reach net-zero emissions in the UK***

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To be politically feasible and allow for the politically sensitive management of distributional consequences, the carbon price imposed on emitters may have to be lower than the shadow price and must be responsive to the sector context.[211] Revised carbon prices can be differentiated by sector; an approach that could have a *lower impact on household bills* compared to other options.[212] A politically feasible carbon price could start at around £40 per tCO_2 in 2020 across most sectors, except for aviation and shipping and energy intensive industries where it would be £50, rising to £100 per tCO_2, or more, in 2050 (see Figure 7). The government's plan to establish a UK ETS also provides a sensible opportunity to reform the carbon pricing policy patchwork in this way; reforms can raise and equalise carbon prices across policies, and extend the UK ETS to more sectors, including waste. Equalising prices across policies can realise large efficiency gains. Complementary policies will also be needed to ensure full decarbonisation in line with net-zero, including regulations (also see next section), technology support and incentives for negative emissions to remove any remaining emissions from the atmosphere.[213]

If these sector-based carbon prices were imposed through an explicit carbon tax or the auctioning of emissions allowances, the proposed price levels would raise public revenue of around £15–20 billion a year until the early 2030s, before falling gradually as emissions reduce to net-zero. **This is equivalent to about two-thirds of the total revenue raised through fuel duty.** Carbon pricing can therefore play a part in wider fiscal reform that may be needed in recovery, reducing any rise is distortionary taxes, such as income taxes or wealth taxes.

211 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (May 2019) ***How to price carbon to reach net-zero emissions in the UK***. The numbers presented that are sourced from this report are a static representation of cost and must be revised over time, allowing for behaviour change and technological and process innovation.

212 Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy and Vivid Economics (March 2020) ***Distributional impacts of a carbon tax in the UK: Report 2 – Analysis by income decile***

213 A complementary price mechanism could also be set up to encourage the development and use of negative emissions technology. This could take the form of a public procurement scheme, through which the Government would purchase negative emissions in proportion to the residual carbon output that its policies have not succeeded in avoiding. A second possible mechanism is a private but regulated offset market, in which market participants would buy negative emissions in place of paying the carbon price. See: Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (May 2019) ***How to price carbon to reach net-zero emissions in the UK***

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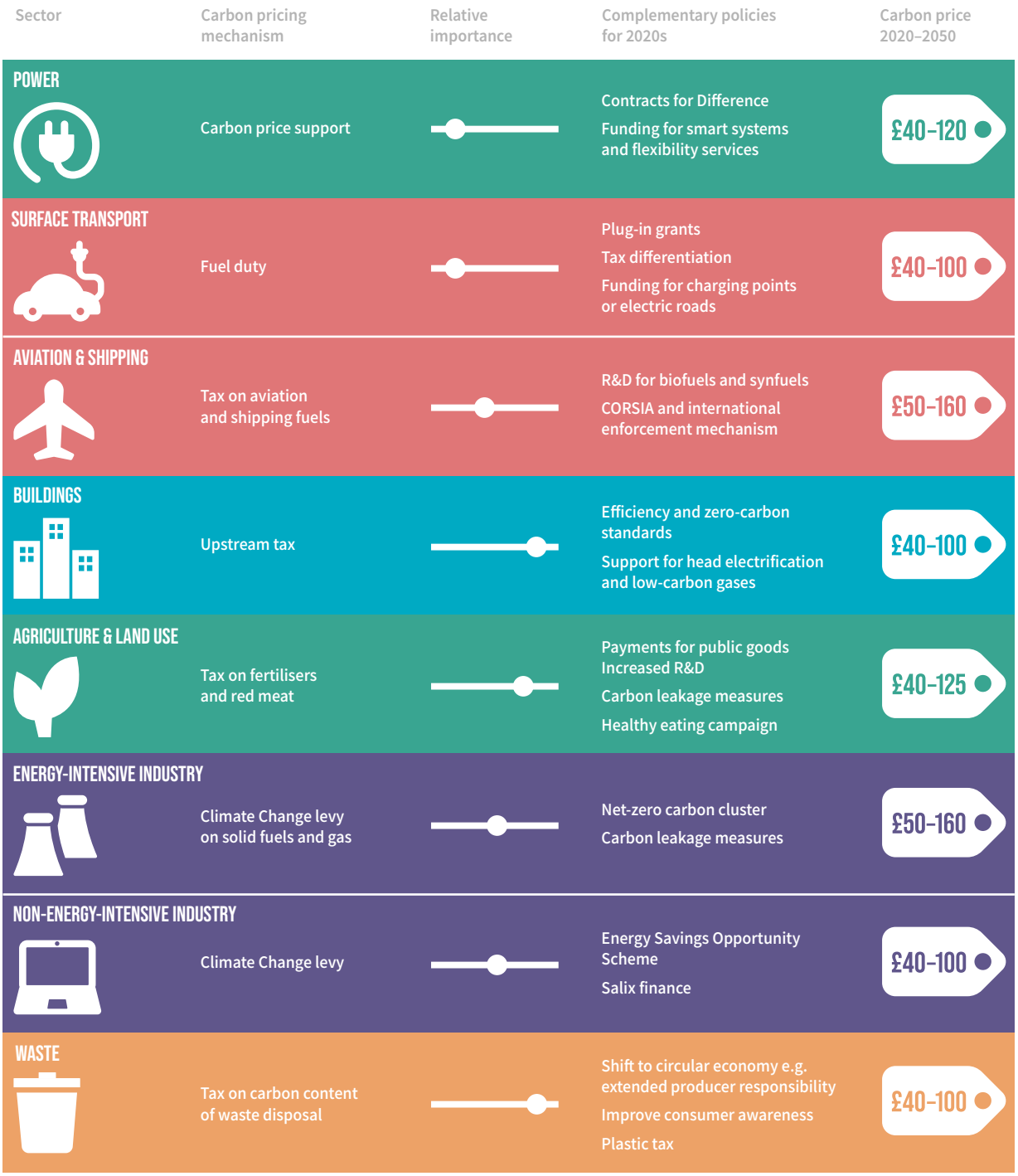
FIGURE 7: DIFFERENTIATED CARBON PRICES AND THE RELATIVE IMPORTANCE OF CARBON COMPLEMENTARY POLICIES BY SECTOR TO REACH NET-ZERO BY 2050



Source: Burke, J., et al. (2019).

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6.6 STANDARDS, REGULATIONS, AND PUBLIC PROCUREMENT

The damages caused by carbon are not the only market failure that needs to be overcome and the pricing of greenhouse gas emissions is a necessary, but not a sufficient requirement for efficient decarbonisation. Standards and regulations are needed to tackle a range of additional market failures and have a key role to play as a complement to carbon pricing, helping to drive the investments that are urgently required. During a crisis, regulations can be helpful policy tools in three ways.

First, existing regulations can ensure that the UK does not go backwards. For example, if standards are suspended or weakened, firms may be tempted to relax pollution controls or worker protection to save costs in the short run. Such temporary gains would impose much higher long-term costs, e.g. higher lifetime capital costs for those investing in long-term assets. Examples include efforts in EU to weaken automotive fuel efficiency standards even though economic analysis shows negative impacts on jobs, innovation, air pollution, health outcomes and carbon emissions. Not to mention that efforts to relax regulations are often ineffective and backfire, reducing innovation and competitiveness in global markets (see 6.11 below).

- **Regulations can promote competition and tackle concentration to support structural change.** With the state taking on a bigger role in the private sector, regulations can promote competition to protect the consumer, limit discriminatory policies and avoid rent seeking. There is also a big risk that firm failures enhance concentration. Large firms with access to liquidity can snap up start-ups, building dominant market shares and limiting competition. This is especially prevalent in the tech sector where it undermines structural adjustment and diminishes innovation. The government can assess its £500 million Future Fund with this in mind.

Second, using regulations and new standards as complements to carbon pricing can help to accelerate innovation in growth sectors, create efficient markets and induce new technologies, thereby lowering the level of public stimulus expenditures required to bring an economy back to full activity. Consistent with the analysis on carbon pricing in the previous section, it is often more effective to blend price signals with regulations, such as for energy efficiency or pollution control, than to rely on price signals alone.

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- Progressive regulations and standards can provide signals and policy certainty (and they align expectations) for the private sector that guide investments over the medium term, e.g. as they have done for renewable energy. Standards like efficiency standards on buildings, cars and domestic appliances, can also provide clear signals and policy certainty, and have been shown to cut costs and drive innovation. *Recent research* examines several case studies across waste, buildings and transport and finds that well-designed environmental regulations can increase business investment in innovation and skills, better quality products and infrastructure, and can lead to greater business competitiveness and job creation.[214]
- Pre-announced regulation in key decarbonisation areas provide clear direction from government (e.g. banning sales of internal combustion engines after a certain date) to direct innovation and investment.
- Regulations can be more politically acceptable than carbon prices (see Box 8). Tough EU fuel efficiency and fleet average emissions targets for passenger cars induced a series of technological improvements which helped make European cars globally competitive. They can influence the design of new products and R&D strategies, as seen in the car industry. They have also been found to positively affect consumer preferences and social norms.
- Regulations could be introduced to accompany national level financing of local government investments, as occurs under the *Public Works Loan Board*.[215] For example, HM Treasury could apply regulations to maximise the impact of these fiscal outlays for recovery and long-term transformation.

214 Aldersgate Group, Burohappold Engineering (2017) ***Help or Hindrance? Environmental regulations and competitiveness.***
215 UK Debt Management Office (2020) ***PWLB lending facility***

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BOX 8: STANDARD ISSUE: THE POLITICAL ACCEPTABILITY OF STANDARDS[216]

Performance standards may have greater political acceptability compared with policies such as carbon pricing for a variety of reasons, and can be used as to complement carbon prices:

1. In most sectors, standards do not immediately affect existing industries and equipment, only new investments – so incumbents are less likely to object to their introduction.
2. The UK already has performance standards in several sectors, and these may only need strengthening and better enforcement to reduce emissions further. Thus the government can avoid the trouble of creating entirely new policy tools.
3. Performance standards achieve measurable results more rapidly than carbon prices, and their benefits can thus be observed over shorter timescales.
4. Performance standards convey a positive message and focus on achievements and progress. For example, it can contribute to regional development goals such as moving domestic manufacturing toward higher value-added products, rather than focus on limits and constraints.

Many examples exist that confirm these reasons. The *EU's eco-design regulations* have resulted in energy related products covered by the regulations consuming 18% less energy by 2020 than would otherwise have been the case.[217] The regulations have been so successful that the EU in its latest *Circular Economy Action Plan* has now committed to broaden their scope to more products and to cover resource efficiency criteria. This received *strong business support*.

216 New Climate Economy (2014) ***Better Growth, Better Climate***
217 The Economist (October 2016) ***The EU is Reviewing the Policy that makes its appliances so Efficient***.

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A further set of market failures defines non-price sensitive sectors prone to waste and inefficiency. In some cases, lack of information can be overcome by creating awareness of the different carbon contents of energy sources, and the options available for emission reductions, for example energy ratings on domestic appliances. In other cases, incentives to invest in efficiency improvements are absent. For example, tenants in leaky buildings will not want to pay for investment in buildings they do not own, but neither will landlords as they do not shoulder the higher bills which are paid by the tenant. Such cases may benefit from the creation of or a *range of instruments*[218] such as *energy service companies (ESCOs)*.[219] These companies sell energy services to consumers, which include implementing energy-efficiency projects and refurbishing buildings to generate savings which are then shared with consumers in the form of lower bills.

Third, public consumption accounts for a quarter of UK spending. The government can use public procurement to create incentives at scale for products and technologies that meet both financial and environmental needs.[220] Implementing green public purchasing approaches – whether for low-emitting light bulbs, sustainable energy or building materials – can help shift markets and bring down costs of clean alternatives through economies of scale in a way that can become permanent after the crisis. *For example*, the Dutch ministry of infrastructure and the environment, partnered with the councils of Rotterdam, Amsterdam and Utrecht to run two pilots investigating ways procurement processes could support more efficient use of raw materials. The ministry's "multi-water works project" required the replacement of 50 locks and dams, needing large amount of concrete, and they identified new processes to embed in procurement including assessment criteria, evaluating bids, proof and monitoring. The potential savings from a single lock could be 36% of CO_2 and 21% of materials. Meanwhile the city councils held a workshop to encourage the concrete industry to consider their total environmental impact, from extraction to production, transport, use and end of life disposal. Rotterdam council's subsequent tender for concrete tiles delivered tiles that had halved their environmental cost.[221]

6.7 POLICIES TO INDUCE INNOVATION

A crucial market failure outlined in Section 4.4 is associated with the need to innovate to drive decarbonisation. *Supporting innovation* can take the form of grants and tax breaks for research, development and deployment (R,D&D) as well as subsidies, obligations and other mechanisms (such as feed-in tariffs for clean energy generation) to support deployment.[222] Strong and consistent policies are required to tip energy and industrial systems towards newer, cleaner, and ultimately cheaper modes of production that become impossible to outcompete. **Early policy intervention can *direct technical change*.**[223] Government finance for early stage

218 Green Finance Institute 2020. ***Financing energy efficient buildings – the path to retrofit at scale***.
219 Institute of Energy and Sustainable Development (October 2009) ***Energy Services and ESCos – their benefits and implications for regulation and the consumer***
220 Amar Bhattacharya et al. (May 2020) ***Better Recovery, Better World: Resetting climate action in the aftermath of the COVID-19 pandemic. Forthcoming***. The authors have drawn on material in this paper in writing this section of the report.
221 Aldersgate Group (January 2019). ***Beyond the 2019 Elections, Maintaining Momentum on resource Efficiency.***
222 Committee on Climate Change (2019) ***Report to the Committee on Climate Change of the Advisory Group on Costs and Benefits of Net Zero***
223 Daron Acemoglu et al. (2012) ***The Environment and Directed Technical Change***

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R&D has been the source of many *significant post-war innovations*.[224] The technologies that have gone into the iPhone are probably the most high profile example. Touchscreen display, GPS and voice-activation were all initially government-funded. Some of these successes are by-products of a wider research 'mission', which focuses on solving specific societal challenges through the interaction of many different sectors and government. A key example is the Internet, the origins of which trace back to the US government's efforts to build more reliable communication networks in the 1960s. The concept of *research missions* is gaining in popularity across the world as a basis for industrial strategies that try to achieve important economic and social objectives, such as low-carbon innovation across all sectors.[225] This highlights the importance of not just promoting deployment or facilitating private sector R&D spending, as important as this is, but also *direct public investment in early stage riskier technologies*.[226]

Where innovation policies have been tried in green technologies, the world is already witnessing *the power of this early intervention effect*.[227] Examples include the 100 billion dollar German Energiwender, which drove the game-changing solar photovoltaic revolution, and the UK's support for offshore wind farms, which in a matter of years drove innovations that pushed contract prices down to the level of wholesale electricity. Targeted innovation and deployment policies have helped make the UK a world leader in offshore wind. The sector is a UK success story, generating almost a tenth of the UK's electricity in just a decade, and falling costs. The sector *employs 7,200*,[228] and the sector expects to grow its skilled workforce to *27,000 by 2030* as capacity increases.[229] The IEA forecasts global offshore wind capacity to increase fifteen-fold to 2040, becoming a $1 trillion industry over the next two decades.

Whether or not one cares about carbon, past policy mechanisms such as subsidies for renewables and support for R,D&D on batteries *are delivering cheaper electricity* and better cars than fossil fuel based alternatives.[230] The market alone would not have provided it and economists could never have predicted it. Most importantly, once given the push, innovation is driven by the desire to *profit from growing new markets*.[231]

Some industrial sectors are *innately carbon- and energy-intensive* but even they have scope to dematerialise and reduce emissions.[232] These include aviation, haulage, shipping, metals, ceramics, chemicals cement, plastics and agriculture. Demand for these sectors is unlikely to shift to ready substitutes in the near term (the world will continue to need steel, cement and plastics) but production process, technologies and the efficient use and re-use of materials will allow some firms to outcompete less efficient rivals. Policy must focus on accelerating innovation to cut emissions in such *hard to crack sectors* by supporting R&D and demonstration of critical technologies and new business models (for example in fuel cells, hydrogen and ammonia

224 *Philippe Aghion* et al. (July 2019) *Path dependence, innovation and the economics of climate change*
225 LSE Growth Commission (December 2018) ***Sustainable growth in the UK: Seizing opportunities from technological change and the transition to a low-carbon economy***
226 Mariana Mazzucato (June 2011) ***The Entrepreneurial State***
227 Bloomberg NEF (December 2019) ***Liebreich: Peak Emissions Are Closer Than You Think – and Here's Why***
228 Department for Business, Energy and Industrial Strategy (March 2020) ***Offshore wind Sector Deal***
229 Department for Business, Energy and Industrial Strategy (March 2019) ***Offshore Wind Sector Deal: Written statement – HCWS1382***
230 Lombard Odier (April 2019) ***What happens when complacent economists meet a dynamic planet?***
231 Dimitri Zenghelis (July 2016) ***10. Decarbonisation: Innovation and the Economics of Climate Change***
232 The Energy Transitions Commission (November 2018) ***Reaching net zero emissions: mission possible***

technologies, carbon capture and storage and biomass). The public sector must invest in risky innovation noting that the appropriate allocation of risk capital means that not all new innovation will be scalable or profitable. Plans for a suitably funded and autonomous *UK ARPA* are welcome in this regarded.[233]

Innovation funding could be framed as a mission around low-carbon technologies and embedded in a revised industrial strategy (see below). The missions could include international collaboration, university-industry interaction, and a regional hub focus building on the *University of Sheffield Advanced Manufacturing Research Centre – AMRC* success.[234] And it could be supported by strong carbon prices. The government's £500 million Future Fund, which provides helpful support for start-ups and innovative new firms, and the new *Clean Growth Fund*, part of the Green Growth Strategy, is a step in the right direction, but should be coordinated with the mission to ensure that policy ensures a culture of creating winners is established.[235]

Targeted deployment support is also required in a portfolio of innovation policies. Renewable energy policy needs to be dynamic, since the technologies are new, and the costs are likely to come down through time as a function of deployment. The example of US investment in the failed Solyndra project highlights the dangers of seeking to favour a particular business.

A recovery package aligned with the net zero emissions target could provide a significant industrial opportunity for UK businesses as long as it is accompanied by a bold innovation policy. These policies should seek to accelerate the innovation at scale of critical technologies such as hydrogen, and rapidly grow the demand for ultra-low carbon infrastructure, products and services, including battery storage and synthetic fuels. This highlights the importance of *large-scale trials of new technologies* in place of UK innovation policy which has in the past been too fragmented, too small scale and often subject to change. This has been due to policy makers' fear of failure.[236]

Policy needs to go beyond carbon pricing and support for R&D to deliver efficient decarbonisation. In the early stages of R&D, it is fair to support a wide range of technologies through a uniform and slowly rising carbon price, designed to pick off the most cost-effective emissions reductions at the margin. However, for many network investments, there comes a time when *choices need to be made* about rolling out and scaling technology infrastructure[237] (for example, do governments support EV or hydrogen vehicle networks? Should decarbonising domestic heating focus on fuel pumps and electricity grid upgrades or hydrogen using upgrades of the existing gas network? Investing in both in one location would be wastefully duplicative).

233 Policy Exchange (2020) *Visions of ARPA*
234 AMRC (March 2019) *AMRC is an 'enormous success' but more to be done*
235 Department for Business, Energy and Industrial Strategy (March 2020) *Clean growth fund*
236 *Accelerating innovation towards net zero*, from Vivid Economics and the UK Energy Research Centre (UKERC) commissioned by the Aldersgate Group, and *Zeroing in: capturing the opportunities from a UK net zero emission target*, from the Aldersgate Group
237 *Gross, R., Stern, J., Charles, C., Nicholls, J., Candelise, C., Heptonstall, P. and Greenacre, P. 2012 On picking winners: The need for targeted support for renewable energy, Imperial College London*

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Where network choices must be made, picking winners still beats picking losers. The mantra on not picking winners delayed policy makers in acknowledging the evidence that renewable technologies were the most competitive. Policies such as the renewables obligation and Contracts for Difference (CfDs) in the UK, as well as the feed-in tariffs in Germany, require choices being made on deployment eligibility.

Strong early intervention is key to drive innovation. The *'slow carbon price ramp'*[238] approach has since been *challenged by economists*[239] who argue that carbon abatement costs are shaped by innovation, so that once a technology becomes sufficiently competitive, it starts to change the *entire environment in which it operates*.[240] For many advanced technologies, it makes better sense to *start with the most expensive options* to bring their costs down.[241] *Early policy intervention*[242] can *direct technical change*.[243] In place of a slow price ramp, these authors argue for a clear and credible early policy shock, including a high carbon price, to *kick start the green innovation machine* and definitively shift investment.[244]

6.8 POLICIES TO RE-SKILL AND LEVEL-UP

A key role for government in the recovery package is to create a *strong institutional framework and sound policies* for flexible labour markets enabling workers to thrive in the new economy.[245] If the policy is socially disruptive, it could meet resistance which sets back policy progress (as recent events in *France*[246] and *elsewhere*[247] testify). Around one-fifth of jobs in the UK today use skills that are likely to be affected by the green transition. Approximately half of these involve skills that are likely to be needed in the low carbon economy. For example, over one-third of marine engineers formerly employed in the oil and gas sector now work in the offshore renewables sector. Yet, around one in 10 use skills that are *likely to be less in demand*.[248]

The risks of resistance to new policy today could be higher given the impact of the COVID-19 shock on society and the economy. *Understanding* where the policy impact will be felt is becoming a central pillar of any climate strategy.[249] It explains why much of the recent focus has been on a *'just transition'*.[250] **Ensuring a 'just transition' means enabling and insuring**

238 *Nordhaus, W. 2007 The Challenge of Global Warming: Economic Models and Environmental Policy, Yale University*
239 *Grubb, M. and Wieners, C. 2020 Modeling Myths: On the Need for Dynamic Realism in DICE and other Equilibrium Models of Global Climate Mitigation INET Working Paper No. 112 January*
240 *Zenghelis, D., 2019. What happens when complacent economists meet a dynamic planet? Lombard Odier.*
241 *Vogt-Schilb, Adrien & Meunier, Guy & Hallegatte, Stéphane, 2018. "When starting with the most expensive option makes sense: Optimal timing, cost and sectoral allocation of abatement investment," Journal of Environmental Economics and Management, Elsevier, vol. 88(C), pages 210–233.*
242 *Chapter 4: Aghion, P., Hepburn, C., Teytelboym, A., and Zenghelis, D. 2019 Path dependence, innovation and the economics of climate change in Handbook on Green Growth, Fouquet, R. (Ed).*
243 *Daron Acemoglu et al. (2012) The Environment and Directed Technical Change*
244 Philippe Aghion et al. (November 2009) *Cold Start for the Green Innovation Machine*
245 LSE Growth Commission (December 2018) *Sustainable growth in the UK: Seizing opportunities from technological change and the transition to a low-carbon economy*
246 The Guardian (December 2018) *Who are the gilets jaunes and what do they want?*
247 BBC News (September 2000) *Countdown to crisis: Eight days that shook Britain*
248 Grantham Research Institute on Climate Change and the Environment (October 2019) *Financing inclusive climate action in the UK – An investor roadmap for the just transition*
249 LSE Business Review (January 2019) *The discredited economic vision at the root of France's 'gilets jaunes' problem*
250 Grantham Research Institute on Climate Change and the Environment (December 2018) *Climate change and the just transition: A guide for investor action*

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potential losers through institutions that reskill and retool workers, offer clean substitutes, and provide social insurance. This is not just politically expedient; it is practically necessary if climate policies are to be enacted at sufficient scale and speed. To deliver this, *some have proposed* a multi-stakeholder Net Zero and Just Transition Delivery Body that would develop and deliver a plan for a just transition to net zero.[251] The OECD broadens the concept of just transition and considers climate policy through a *wellbeing lens*, a perspective which analyses synergies and trade-offs between climate change mitigation and broader goals such as health, education, jobs, as well as wider environmental quality and the resources needed to sustain our livelihoods through time.[252] A well-being and just transition lens should be applied across all aspects of the recovery plan and the transition to net zero.

Accounting for political realities is distinct from succumbing to lobbying from powerful industrial sectors liable to lose from change. Awareness of distributional impacts recognises that the biggest barriers to adjustment are not economic or technological but political, institutional and cultural. However, structural and regional reform require transparent and efficient institutions which promote competition and innovation while limiting rent-seeking from vested interests and powerful lobbies.

Rapid transformative change needs to be managed carefully, whether it is from a crisis like COVID-19, decarbonisation, artificial intelligence, automation, or digitisation. The gains must be, and be seen to be, equitably distributed, and the losers supported. This requires:

- *'Enabling institutions'* to reskill, retool, and compensate affected workers; [253]
- Policies designed to compensate those who lose out;[254] and
- Targeted *'place-based' employment transition policies* in areas at high risk of disruption.[255]

Equipping people with the right skills and resilience so they are flexible in the face of changing labour markets can limit the harm to people's lives and livelihoods from potential and actual job displacement. **Economic history shows that economies that embrace change are better able to *manage structural adjustment*, as they do not inhibit the flow of resources from declining, low-productivity sectors to new, more productive sectors.**[256]

251 IPPR Environmental Justice Commission (May 2020) ***Faster, Further, Fairer: Putting People at the Heart of Tackling the Climate and Nature Emergency***
252 OECD (September 2019) ***Accelerating Climate Action: Refocusing Policies through a Well-being Lens***
253 Bank of England (May 2018) ***Ideas and Institutions – A Growth Story***
254 Examples include proposals for the US Democratic Green New Deal to return carbon tax revenues to households, or former London Mayor Ken Livingstone's popular use of congestion charge revenues to fund extra capacity on London's bus networks.
255 Benjamin Austin et al. (April 2018) ***Jobs for the Heartland: Place-Based Policies in 21st Century America***
256 Dimitri Zenghelis et al. (2018) ***Stranded assets: then and now***; Llewellyn Consulting (October 2014) *Tough Love*

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The UK should put in place a national low carbon skill strategy to support the existing and *future workforce* in the long-term with the provision of necessary skills as the economy decarbonises. This could include embedding sustainability across the educational curriculum, including a review of apprenticeship standards and T-levels, and the setting up of sustainability standards, metrics and labels for tertiary level education courses. Central and local government can work collaboratively with businesses and educational institutions to direct investment to parts of the country in need of economic regeneration. This was done successfully with the Siemens / Ørsted / ABP investments near Hull and the MHI Vestas on the Isle of White, where BEIS, Local Enterprise Partnerships, manufacturers, project developers and higher education institutions all worked together.

Ørsted and Siemens Gamesa have been pivotal in growing the Humber offshore wind cluster. This includes education and training facilities and easy transfer between roles, for example through developing the 'Offshore Energy Passport' that enables offshore workers to transfer between the renewable and extraction industries.[257] Likewise, Teesside hosts 58% of the UK's chemicals industry and is responsible for 20,000 jobs and £4bn of exports per year. There is a cluster of leading energy intensive industries in Teesside working together to create the 'Teesside low emissions industrial zone', through the development of shared emission reduction infrastructure. By sharing infrastructure, logistics, energy and utilities, and by exchanging raw materials, products and residual and waste materials, companies in the cluster can operate more efficiently, enabling them to reduce their costs and boost their competitiveness.

The government should consider adopting a standardised grading or standard mark system for tertiary training and education courses to mark compatibility with a low carbon economy (based on the same principles as TCFD disclosure). It would demonstrate the resilience of skills to climate risk, litigation risk and transition risk, which encompasses the risk of policies hostile to emissions and new technologies that undercut convention fossil-fuel based systems.

It is unknown exactly how long social distancing measures will be in place, how consumers will behave out of the crisis and what the structural change might look like in the long term. Large numbers of workers have been displaced and may have no job to go back to after lockdowns are lifted, at huge social and personal cost, and it is the more deprived areas and groups that will suffer most. Policies need to be carefully thought through to ensure COVID-19 does not lead to permanent increase in inequality and set back the levelling up agenda. A number of measures are needed in the UK's recovery package, including:

- Job guarantees, which are less costly than long-run unemployment, but should allow sufficient flexibility to allow workers and employers to respond to a changing jobs market.
- Retraining and reskilling for the future, which has a huge return but needs much better coordinated government support.

257 Aldersgate group (April, 2019). Zeroing in: capturing the opportunities from a UK net zero emission target

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- Policy should support firms to overcome barriers to in-house training through human capital tax credits and *partnerships with education providers*[258]
- Active Labour Market Policies (ALMPs) that help people who have become recently unemployed to find alternative employment or remain in the active workforce.

These policies can be targeted to protect the livelihoods of people in areas highly disrupted by COVID-19 and the forces of change, such as Northeast England and South Wales. They can also be coordinated with place-based stimulus investments that create short term demand for labour and support local SMEs.

Employment policies in recovery will also need to create new job opportunities for youth, women, disadvantaged students, apprentices and those who have been out of the labour market for some time. It will be important for policy to go beyond protecting existing jobs, important as that has been in the crisis. **A crucial part of this will be ensuring that education institutions are responsive to the changing labour market and are flexible as the green recovery accelerates the low-carbon transition and the demand for skills shifts.** Universities, colleges, schools and employers all have key roles to play in equipping workers to deal with and embrace the changes from COVID-19 and those that will emerge in the years to come. To achieve this, education institutions need to work closely with other economic, environmental, technological and social institutions. Fortunately, many areas in the mid- and north of England have strong education institutions, established during the heyday of the enlightenment and industrial revolution. These institutions remain strong but going forward they will need adequate funding to ensure they can play their crucial role in skilling and reskilling as part of a coherent levelling up and net-zero agenda. *New technologies* can also help disadvantages students access university.[259]

Policies also need to protect viable firms in the regions that will offer the new jobs of the future. Multinational corporations, with high productivity and greater resilience, will probably need less support but may need incentives to remain or locate in the regions. Small, start-up, innovative firms will need support (as already announced by the government) as these firms will be a source of new more resilient jobs in the future; this support can be targeted to small, innovate regional firms. SMEs, who employ most of the UK's workers across the regions, will need strong support to adopt new technologies, new management techniques and to access new markets to grow and expand high productivity employment opportunities. SMEs account for most of the "long tail" of UK companies who have failed to invest sufficiently in processes, products and digital infrastructure, and which have dragged productivity. The government needs to find a way of raising productivity in those tail firms. Local Mayors, who have local knowledge and are more in touch with local economic and social conditions and sentiment, can join the central government in designing any stimulus and support measures for the regions. The 38 ***Local Enterprise Partnerships*** (LEP) across England can also help determine local economic priorities and undertake activities to drive economic growth and job creation, improve infrastructure, and raise

258 LSE Growth Commission (December 2018) *Sustainable growth in the UK: Seizing opportunities from technological change and the transition to a low-carbon economy*
259 The Times (May 2020) *App gives poor pupils a mentor to guide them into top universities*

workforce skills within their local area. *Regional leaders* are already moving forward with their own green recovery plans and these need to be well-coordinated with plans at the national level.

The private sector can also take a leading role in the regions. Fund managers, local authority pension funds and foundations are starting to integrate just transition principles into their climate plans. Banks also have a role to play as a just transition offers them a way of bridging their climate response with their primary purpose of serving the real economy across the UK. A *Just Transition Investment Fund* could be designed to channel institutional capital and private savings into green investments with positive social impact in left behind regions.[260]

6.9 POLICIES TO PROTECT NATURE AND BIODIVERSITY

Climate action and investing in the quality and resilience of nature can reduce the risks of pandemics and boost jobs in the short run. The underlying cause of disease emergence is the huge negative impact *human activities* are having on ecosystems and their ability to function.[261] The world and the UK needs to *reconcile human development within the biophysical environment*.[262] Investing in nature and biodiversity should play a central role in the recovery package. *Environmental policies* that promote sustainable land-use planning, reduced land clearing and deforestation, biodiversity protection and biosecurity, provide ancillary benefits and reduce disease emergence.[263] In the UK, there are ongoing issues that mainly come from biosecurity issues in the farming sector, such as TB in badgers.

The UK has one of the most depleted natural environments in the world. This partly reflects the fact that the country was the first in the world to industrialise, but the trend is ongoing. A key *index of species' indicator*, based on species abundance, has fallen by 16% since 1970; between 2002 and 2013, the index fell by 3%.[264]

UK natural capital investments that boost ecosystem resilience and regeneration can deliver large economic multipliers quickly. Investments in restoration of carbon-rich habitats and climate-friendly agriculture – such as afforestation, expanding parkland, and enhancing rural ecosystems – require to low worker training requirements and minimal planning and procurement requirements.[265] These investments should perform well against criteria of short run multipliers. Things like tree planting, restoring wetlands, greening UK cities, and improving biodiversity, ought to be labour-intensive with limited importing or off-shoring. In the near term, it might be good to match opportunities with those who may have lost their jobs in the retail and entertainment sector (who tend to be young, flexible, energetic, and geographically mobile).

260 Grantham Research Institute on Climate Change and the Environment (December 2019) ***Uniting the nation through climate action: Why the just transition could be the next big thing for Britain***
261 Johanna Lindahl and Delia Grace (November 2015) ***The consequences of human actions on risks for infectious diseases: a review***
262 UNEP (2016) ***UNEP Frontiers 2016 Report: Emerging Issues of Environmental Concern***
263 IPBES (April 2020) ***COVID-19 Stimulus Measures Must Save Lives, Protect Livelihoods, and Safeguard Nature to Reduce the Risk of Future Pandemics***; Toph Allen et al. (October 2017) *Global hotspots and correlates of emerging zoonotic diseases*; Kate Jones et al. (February 2008) *Global trends in emerging infectious diseases*
264 RSPB (2016) ***State of Nature 2016***
265 Cameron Hepburn, et al. (2020), ***Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?*** Oxford Review of Economic Policy 36(S1), forthcoming.

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Natural capital can combine with adaptation measures to generate multiple co-benefits. For example, improving and extending green spaces to absorb carbon and particulates, retain water, and address heat island effects benefit human physical and mental health. They also restore biodiversity and strengthen ecosystems. To maximise on these benefits, it requires the extension of the natural capital accounts to cover all interrelated sectors. London's groundbreaking natural capital accounts showed how learning and relaxing alongside nature *promote children's healthy development* and nurture positive environmental attitudes and values.[266] Disadvantaged areas have the least access to green landscapes. Better green spaces, starting with social housing estates, would have a positive impact on health and well-being as well as *social inclusion and economic opportunity*.[267]

BOX 9: NATURAL CHOICE: NATURE PROJECTS AND JOBS

A group of nature CEO's have presented proposals for investment in nature that were delayed by the pandemic or could be started rapidly. For an investment of around £300 million, these large-scale habitat investment programmes could deliver skilled and low-skilled jobs across urban and rural areas – 5,000 skilled and 5,000 low-skilled jobs in construction, agriculture and delivery – and 200,000 of the 500,000 hectare priority habitat commitment set out in the 25 Year Plan. The projects also have several attractive co-benefits. They can build resilience against climate impacts, reverse declines in biodiversity, provides local and regional economic benefits that can help to level up and provide better access to nature. The government should prioritise investments in critical assets that are not fungible with other habitats or forms of capital, for example wetland restoration.

Project types, examples and delivery organisations include:

- *Habitat conservation and management*. For example, restart seagrass restoration (WWF, Project Seagrass, Sky Ocean Rescue) and projects to halt deterioration of rare wildflower meadows (Wildlife Trusts).
- *Endangered species and rare breeds*. For example, reintroduction programmes and population monitoring of endangered species (Wildlife Trusts, Buglife).
- *Habitat creation and restoration.* For example, resume peatland restoration in Scotland (Buglife) and restart marine habitat restoration projects (Marine Conservation Society).

266 GLA 2017 Natural Capital; Accounts for Public Green Sspace in London.
267 Campaign for Better Transport , CPRE , Friends of the Earth , Green Alliance , Greenpeace , London Wildlife Trust , National Trust , RSPB , WWF., 2106 Greener London: what the next mayor can do to improve our capital

- *Water quality and flooding.* For example, restart projects to protect habitats, improve water quality and quantity, and reduce flood risk (Rivers Trust, Westcountry Rivers Trust)

  The RSPB England's strategic pipeline of projects also provides immediate investment opportunities which are cost-effective, create new jobs and generate significant co-benefits. They identify five priority projects requiring around £80 million in investment: the Haweswater Change Project, the Completing the Ouse Washes Habitat Creation Project; the Oxford-Cambridge (OxCam) Arc Programme; the East Coast Wetlands Programme; and the Curlew Project.

  Combined delivery of these projects would potentially meet the green space standard and provide visits for over 1 million people each year, store 200,000 tonnes of additional carbon, with an economic value of £70 million, protect over 50 homes in East Anglia and the North-West from flooding, safeguard at least 50 priority species, including nationally significant populations of endangered curlew and godwit, restore 5,700 hectares of priority habitat, support a wide range of businesses including engineers, developers and farming businesses, create over 3,000 days of volunteer effort each year and 45 direct conservation jobs, and guarantee the water quality at Haweswater Reservoir, which provides 25% of the entire supply for the North-West of England.

  Source: RSPB England

The Treasury should continue to bring forward its plans to support natural capital in the UK and implement the recommendations of the forthcoming *Dasgupta Review* on the Economics of Biodiversity. For example, the March 2020 Budget announced the creation of a forest "the size of Birmingham" across England over the next five years, contributing to the wider UK target to plant 30,000 new hectares every year, as advised by the CCC. Some of the £640 million for the Nature for Climate scheme, also announced in the 2020 Budget, could be used to leverage private investment, enabling the government to reach its tree planting targets faster, or even exceed them. Bringing forward these investments, as well as investments in peatland restoration, will require the creation of new investment models for natural capital, for example, multi-investor funds with matched funding from government. The investors might be carbon investors seeking offtake of carbon credits to insurance companies interested in flood prevention.[268]

268 Committee on Climate Change, Cost and Benefit Advisory Group forthcoming.

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It is important that climate change and biodiversity are addressed together as they interact closely.[269] For example, *protecting intact forest landscapes* can benefit biodiversity conservation and global carbon storage, while at the same time preventing the risk of disease transmission to humans.[270] Intact ecosystems may play an important *disease regulation role* by maintaining natural disease dynamics in wildlife communities and reducing the probability of contact and pathogen transmission among humans, livestock, and wildlife.[271/272]

The UK has vast potential to plant trees, restore degraded lands and wetlands. Plans are well specified in the *25-Year Environment Plan*.[273] These projects would be particularly beneficial in recovery as they have high short run multipliers – they are labour intensive but cannot be offshored. Such capital spending would be fast-acting because worker training requirements are low, many projects have minimal planning and procurement requirements, and most facets of the work meet social distancing norms. They also have the potential to generate high returns in the long run. Such investments could strengthen solidarity and engagement between communities around the UK.

BOX 10: UK REGULATION FOR NATURAL CAPITAL INVESTMENT

Strong regulation can align expectations around the government's nature strategy and provide the certainty businesses need to invest in natural capital, helping to deliver jobs and other co-benefits. The government should prioritise its existing ambitious programme of regulatory change. Regulatory uncertainty or roll-back would be a mistake, transferring costs from the loss of natural capital and biodiversity to the public and hurting business resilience long term. One recent example is evidence that air pollution exacerbates the pandemic; countries that have cut air quality regulations have been hit harder. Three Bills should be reformed, strengthened and/or adopted with urgency.

The Agriculture Bill – The Agriculture Bill sets up an essential framework for investment in public goods and future-proofing the farming sector by investing in the natural resources which underpin it. Policy development and consultation on an Environmental Land Management scheme should not be delayed, nor should

269 Robert Watson on the BBC Radio 4 Today Programme 17/04/2020
270 James Watson et al. (February 2018) ***The exceptional value of intact forest ecosystems***
271 Felicia Keesing et al. (December 2010) ***Impacts of biodiversity on the emergence and transmission of infectious diseases***
272 The authors thank Charlotte Taylor for this contribution.
273 HM Government (2018) ***A Green Future: Our 25 Year Plan to Improve the Environment***

development of parallel schemes to enhance animal welfare and farm productivity. A one-off scheme of grants should also be considered, supporting transition of farms to be able to meet the higher environmental standards required under the UK's future agriculture regime. This package of reform will improve cost-effectiveness of public investments and form part of a green recovery. Gaps in the Bill need to be addressed around long-term funding and budget-setting processes, regulatory standards and enforcement, and legislative assurances that domestic standards will not be undercut by future Free Trade Agreements.

The Fisheries Bill – Fish stocks are a textbook example of the interdependence of ecology and the economy. Fisheries have a theoretically infinite economic value as a low-carbon, renewable resource, but a value that could fall to zero through over-exploitation. As part of a wider programme of ocean recovery, the Fisheries Bill should be strengthened to ensure that fisheries are climate-smart and that catch limits are set at sustainable levels, with effective monitoring and enforcement.

The Environment Bill – The Environment Bill can play a key role in business and public confidence in the Government's plans to restore nature and make our use of natural resources more sustainable. The targets in the Bill can help drive improvements in the long term and provide businesses with certainty. The timetable for the Bill and its important provisions should therefore not be delayed further. Resuming the work can demonstrate domestic leadership as the world seeks to agree a new global deal for nature at next year's Convention on Biological Diversity conference. The Bill should be strengthened in two ways in light of the coronavirus crisis. First, the government should set clear long-term targets and credible interim targets to drive public and private sector action. Secondly, the Bill should include interdependent targets that reflect the complexity of the issues at hand. For example, it should include targets to reverse species loss and improve the extent and condition of habitats, with long-term goals for the recovery of nature; and a goal to reduce the UK's global environmental footprint should be a priority. This should stand alongside regulatory requirements for reporting and due diligence in supply chains for commodities that risk causing deforestation and conversion, as proposed by the Global Resource Initiative.

Source: *Wildlife and Countryside LINK* and Aldersgate Group

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6.10 POLICIES FOR SCALING UP PRIVATE FINANCE

Significant challenges around finance must be overcome. The UK government will need policies to unlock all pools of finance and utilise them more effectively to support recovery packages and beyond. The focus here is on scaling up private sources of finance to help fund the investments needed for recovery and long-term transformation.

Asset managers and investment banks are increasingly interested in sustainable investments, recognising the growing risks associated with stranded or devalued high carbon assets. This is supported by investor requests, the need for portfolio diversification and pipeline origination, social responsibility and in some countries' regulatory requirements. Fortunately, the financial sector commitment to net zero has deepened through the crisis as *ESG funds have outperformed* in the crisis in ways few expected;[274] and *risk adjusted returns from investment in green assets* are now demonstrably higher than carbon intensive alternatives. They have also fared better through the crisis with growing opportunities, given the large falls in green technology prices in recent years.[275]

Despite this interest, in 2016, only *1.2% of the £8 trillion in assets under management* (AUM) in the UK were invested in ESG funds.[276] At the end of the rescue phase, despite ample private savings and growing interest in green investments, mobilising more of these sources of private finance may be impeded by high risk premia and other long-standing market failures and barriers. Confidence in the consistency and credibility of a durable and supportive policy environment is essential to create demand for a pipeline of projects, while simultaneously lowering investors' perception of policy risks. This is vital in sectors such as energy, transport and buildings which are heavily regulated and policy driven. For example, a big part of the cost reductions of the last 10 years have been due to a reduction in the cost of finance brought about by implicit risk guarantees associated with the Contract for Difference (CfD) model. A *recent study* found that every 1% reduction in the cost of finance, the levelised cost of energy (which captures capital and operating costs over the lifetime of the investment) of offshore wind projects goes down by 6%.[277]

New institutional structures will be crucial to tackle these market failures and barriers and bring the cost of capital down. Reforms to create the necessary institutional structures were examined in section 6.3. Here we examine some of the key market failures and barriers, and ways to tackle these, that are needed to align all financial flows and stocks (portfolios) with net zero and shift the financial system. The government needs to prepare now for ways to unlock private finance.

274 Bloomberg Green (May 2020) ***Blackrock Joins Allianz, Invesco Saying ESG Funds Outperformed***
275 Financial Times (April 2018) ***Green investing generates returns, not just a warm glow***
276 Department for International Trade (May 2018) ***The UK – a natural home for green asset management***
277 Energy UK, 2018, Offshore Wind Market Development and Cost Reduction Background, February:

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MOBILISING PRIVATE FINANCE

The UK can build on its success in key areas such as offshore wind by innovating new financial approaches for scaling up investment, including: exploring greening central bank asset purchase programmes; issuing green sovereign and municipal bonds; harnessing pension fund interest in real assets and utilising the UK's strength in investment trusts; and improving project pipeline development. There are also innovations in fintech that can help to mobilise retail investors.

Quantitative Easing (QE) programmes after the GFC did not consider climate change, and evidence suggests they leaned towards *assets from carbon-intensive companies*.[278] The Bank of England's first *climate-related financial disclosure* in June 2020 shows their sterling investment grade corporate bond holdings, although only around 2% of their total Asset Purchase Facility investments, are consistent with 3.5°C of global warming. Central banks now have ample *tools to balance the multiple objectives of QE*, including ensuring it supports strong green recovery packages and is more in line with *net zero*.[279] At a minimum, the Bank of England's QE programmes can more selectively purchase corporate debt from companies on a "do no harm" basis, implying companies that are misaligned with net zero goals would not be able to participate. These companies are not well positioned to deal with the major secular trends and the long-term net zero transformation and could instead, where they are large employers, participate in government bailouts with sensible green conditions.

Much of the funding for a sustainable recovery could come from increased government borrowing in the form of additional *sovereign bonds*, as well as other public issuance.[280] In the Green Finance Strategy, the UK Government indicated that it does not plan to issue a sovereign green bond at present. The experience from other countries indicates that sovereign bonds can have an important demonstration effect both across the financial system and within government, given the need to identify qualifying areas of public spending. In addition, sovereign bonds (along with issuance from other public bodies) can also help to channel private savings to priorities that tend to be undersupplied by the market (such as research and development, SME finance as well as the just transition activities at the regional level).

The Government and the new Green Finance Institute could work with others to develop a strong strategy for a green and sustainable bond market in the UK, at the national, corporate and local level. This could identify the barriers facing this market and highlight practical options to scale up issuance of community, corporate and public sector bonds, which accelerate flows of green and sustainable finance in a cost-effective manner. Better local financial solutions could be particularly useful for funding effective local investments in the regions and innovations are emerging. For example, Box 11 examines the emergence of community bonds for funding local authority renewable energy investments. In addition, transition finance instruments like sustainability-linked loans and transition bonds can provide solutions for high-carbon sectors

278 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (May 2017) *The climate impact of quantitative easing*
279 INSPIRE (June 2020). *A Toolbox for Sustainable Crisis Response Measures for Central Banks and Supervisors.*
280 Nick Robins et al. (October 2019) *Financing inclusive climate action in the UK: An investor roadmap for the just transition*

where there is a need to undertake complex low-carbon transformations and which are often ineligible for sustainable finance products with strict use-of-proceeds rules, generally for green projects.

BOX 11: WISDOM OF CROWDFUNDING: MUNICIPAL BONDS FOR THE TRANSITION

The UK lacks the thriving municipal 'green bond' market that can be found in other European countries, such as Sweden.[281] Crowdfunding models could offer investors an interest rate with higher rewards than holding cash, but low enough to provide finance that is sufficiently cheap for councils to meet institutional requirements. Local UK authorities must, for example, seek the cheapest source of finance possible, and the Public Works Loan Board currently offers funds at concessionary public sector interest rates.

The first 'Community Municipal Bond' model was issued by Abundance and Swindon Council in 2016, raising £1.8 million at 6 per cent over 20 years through local and national investors. This model is now being trialled for renewable energy by the University of Leeds and Leeds City Council. The pilot is aiming to install solar arrays on council buildings, funded by a crowdfunded municipal bond through the Abundance platform, and has been supported by the Department for Digital, Culture, Media and Sport, and Local Partnerships. The project will launch bonds open to citizen investors in Leeds.

To harness pension fund interest in real assets, a range of challenges will need to be overcome to mobilise private capital. These are many of the challenges that the NIB can tackle, as described above, including: project pipeline development, reducing transaction costs (such as around project origination and preparation), and reducing the perceived high risks of green investments through de-risking instruments, such as guarantees.

281 Nick Robins et al. (October 2019) *Financing inclusive climate action in the UK: An investor roadmap for the just transition*

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A crucial task for the new NIB will be to work with the National Infrastructure Commission to step up *project pipeline development that is net zero aligned*.[282] A common complaint among investors is that there is no shortage of money looking for returns, but there is a lack of scaled up opportunity. The government, through the NIB, can provide what is necessary. It can provide: ***leadership***, through championing the development of a robust project pipeline; ***transparency***, by developing net zero sectoral investment plans that take account of the factors discussed above on local UK considerations, by sourcing projects and using data effectively; ***priorities***, through expediting strategically valuable projects; ***project support***, including through the investment-enabling environments that affect the risk-return profiles of projects such as policy incentives, the supply of public funds and institutional support; and provide ***eligibility criteria*** to align projects with long-term climate objectives – combined with dynamic adaptability to keep project pipelines aligned with policy objectives over time. This would prevent the current situation where the National Infrastructure and Construction Procurement Pipeline for 2020–21, published June 2020, shows over £8 billion worth of planned spending on high carbon transport.

Figure 8 shows the composition of the major pipeline categories in terms of funding source following the 2008 financial crash. The three classifications are: public, private, or a mixture of both (that is, private-public partnerships). Across all categories, 72 per cent or £207 billion of the total expenditure from 2011/12 to 2019/20 was planned from private sources (with energy accounting for the bulk of this). Public/private partnerships accounted for 20 per cent or £56 billion and public spending for 9 per cent or £25 billion.

282 OECD (November 2018) *Developing Robust Project Pipelines for Low-Carbon Infrastructure: Policy Highlights*

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FIGURE 8: PUBLIC AND PRIVATE SOURCES OF INVESTMENT FINANCE

Notes: 'London' refers to infrastructure spending within the capital, e.g. Crossrail and the Thameslink upgrade
Source: Vivid Economics, HM Treasury (2012)

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BOX 12: UNLOCKING PRIVATE DEBT FINANCE FOR NEW ENERGY INFRASTRUCTURE: ZENOBĒ ENERGY

Zenobē Energy is an independent UK operator of battery storage assets. A recent £25 million in debt funding from Santander will support its ambitious UK growth plans. The debt will finance a range of investments, including: the construction and purchase of additional battery storage projects; 'behind the meter' services to improve power supply resilience and reduce energy costs for commercial and industrial customers; and provide services to the fleet vehicle sector including the design, operation and financing of batteries and associated charging infrastructure.

Gary Roscoe, partner at TLT, the legal advisor for Santander on the project, commented that "energy storage is becoming an increasingly attractive proposition for equity investors and debt funders alike, given its significant role in the energy system. Santander have taken an innovative approach to the traditional project finance structure to offer debt funding for this project, and we expect to see increasing interest in investment opportunities of this kind over the coming year."

TLT also commented more broadly on debt funding for renewable energy and complementary investments such as battery technology. "Traditional renewable generation assets with subsidy support are a proven, secure proposition for project finance. However, with the curtailment of subsidies and the emergence of new technologies and opportunities (such as energy storage), funders have needed to revisit the established approach to debt structuring. There is no one-size-fits-all approach for new renewable generation projects and developing an understanding of the wider lifecycle and associated revenue streams – particularly in the context of multi-technology projects – will be key to opening up the funding market. In some cases, a credit decision informed by more traditional leveraged debt considerations (as opposed to strict project finance criteria) has enabled a viable debt solution to be configured. But, as the market develops, we'd expect to see an increasing number of more tailored, flexible debt deals come to market."

Source: *TLT*

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Innovations in fintech can also leverage retail investor capital. For example, digital crowdfunding platforms can bring in retail investors directly to labour intensive clean technology investments, including energy efficiency. It can help to tackle market failures and scale up finance, which is especially useful at a time when sources of finance are stressed. This is in an early stage but has huge potential. Fintech, e.g. blockchain, can drive down transaction costs and make risk evaluation easier. There is nonetheless a need for regulatory, governance and policy clarity, as well as education and awareness around the digital tools/platforms that are available.

ALIGNING FINANCIAL FLOWS AND TRANSFORMING THE FINANCIAL SYSTEM

All finance needs to be aligned with the Paris Agreement goals. It will be crucial to reduce information asymmetry, which involves improving and possibly standardising metrics for the classification of assets as 'green', 'brown' or in transition to green, to provide investors and markets with a clearer indication of which activities are considered sustainable and to mitigate 'greenwashing'. The *EU Taxonomy* provides such a tool. It can help investors understand whether an economic activity is environmentally sustainable, and to manage the transition to a net zero. While a good first step, the EU Taxonomy will need to overcome limitations in its methodology. For example, the taxonomy specifies static metrics and thresholds against which a project is assessed as compliant or not (green or brown). This does not recognise the "50 shades of green" on the transition to green. The taxonomy is also limited to sectors that are covered by NACE codes and it artificially separates mitigation and adaptation projects when they are often interwoven (e.g. a low-carbon, climate resilient project). The UK has proposed developing its own taxonomy.

While metrics are important, they are part of a much wider programme of action to transform the financial system and ensure all financial decisions take climate change into account. To mitigate the risks of financial instability due to climate change, governments, central banks, regulators and the financial industry need to: improve the information and disclosure of climate risk (reporting); transform risk management (risk); and enable investors to make informed decisions on the climate readiness of their portfolios (returns). Mark Carney, in his role as the Prime Minister's finance advisor for COP26, is taking forward work to align and transform the financial system through this three 'R' framework: reporting, risk management and returns.[283]

283 Most recently in his remarks at the Petersberg Climate Dialogue, April 29, 2020. To inform climate risk management of financial regulators and industry practitioners (including investors and insurers), the OECD is launching a series of workshops in 2020–22 on Climate Science, Policy, Regulation and Practice.

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- **Refine reporting methods and develop pathways to make them *mandatory*:** What is measured gets managed.[284] Policymakers *increasingly recognise* that investments must be resilient to a resource constrained low-carbon world, preventing locking in to a range of assets (physical, but also human, intangible and natural) that may be rendered devalued or stranded.[285] The Task Force on Climate-related Financial Disclosures (TCFD) goes beyond backward-looking emissions disclosure to encourage companies to report their *strategic forward look*, or risk management and hedging strategy, to decarbonise activities and supply chains to safeguard shareholder value against transition risks.[286] There has already been huge progress on the largely voluntary, private sector led, TCFD with around $120 trillion of balance sheet capital behind it. There is now a need to refine the TCFD standards, including improving metrics and taxonomies, and develop pathways to make them mandatory in the UK and across the globe. Canada has pushed the envelope and introduced *mandatory reporting for employers accessing liquidity assistance* during the crisis.[287] The UK could consider TCFD as a bailout condition. Revised TCFD standards should become mandatory for all large UK businesses, including all listed companies on the London Stock Exchange, by COP26 in November 2021.

- **Rapidly accelerate the development of better data and analytic tools to improve climate risk management:** A step change in risk management is needed to ensure firms and investors can manage and measure the risks in the transition to a net-zero world. The purpose is to stretch horizons so that firms can manage the risks better and take different decisions today in the light of otherwise opaque future financial risks. A key part of this is better supervision and climate stress testing and scenario analysis. The Network of Central Banks and Supervisors for Greening the Financial System (NGFS) will soon publish guidance on climate-related scenario analysis and a collection of reference scenarios for use by all interested central banks and financial regulators. The IMF is also stepping up its work on *climate stress testing* in the context of the Financial Sector Assessment Program (joint with the World Bank).[288] The Bank of England should set a timeline to resume its stress testing work, suspended in the crisis, and work with the NGFS to build a coalition of central banks and supervisors that commit to climate stress testing.

- **Ensure all financial firms and companies are focused on the opportunities and returns from the transition to net zero:** around 120 countries so far have committed to reducing emissions to net zero. The United Nations-convened Net-Zero Owner Alliance represents a group of institutional investors with over $4.6 trillion in assets under management which have united to *align their portfolios with a 1.5oC scenario*.[289] Every company in every UK sector – insurer, pension fund and so forth – should commit to develop and disclose a net-zero plan, including the opportunities and returns they expect, by COP26. Against a similar timeline, all UK providers of capital, banks, investors' pensions funds and insurers should commit to disclose where they are on the path to net zero, including what their overall portfolio looks like compared to Paris objectives.

284 Aldersgate Group (October 2019) ***Using TCFDs to manage climate risk: next steps for UK government, investors and businesses***
285 The Task Force on Climate-related Financial Disclosures (June 2019) ***TCFD: 2019 Status Report***
286 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (July 2016) ***The importance of looking forward to manage risks: submission to the Task Force on Climate-Related Financial Disclosures***
287 Canadian Government *Large Employer Emergency Financing Facility Factsheet*
288 IMF Blog (February 2020) ***Assessing Climate-Change Risk by Stress Testing for Financial Resilience***
289 Responsible Investor (April 2020) ***Post-Covid recovery packages must quicken the pace to net-zero carbon emissions***

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These steps will lay the basis for a more sustainable financial system that helps drive and smooth the transition to a zero-carbon and climate-resilient economy. Financial instruments to achieve these goals – including green bonds discussed above – need to be developed and supported further. This will require nationally agreed taxonomies and standards that utilise improved classification metrics. For example, the proposed EU Green Bond Standard will be based on the EU Taxonomy and so will inherit its limitations. The relative performance of these instruments though the economic downturn should be monitored to determine their resilience to shocks. As stated, initial evidence suggests that *ESG-based instruments have fared better*, although heightened risk aversion has affected all new issuance, including for green bonds.[290]

6.11 UK COMPETITIVENESS

As business spending and confidence has taken a hit from COVID-19, it may be tempting to argue that climate policies at this time would also create an unwanted hit to competitiveness. Even in times of a strong economy, incumbents often claim that ambitious climate policy will put UK firms at a competitive disadvantage, or even cause them to relocate elsewhere outsourcing emissions to less strongly regulated economies. With very few exceptions, the evidence does not support these fears:

- Recent studies of European climate policy, particularly of the EU emissions trading system, suggest that the *impacts have thus far been small*, whether in terms of carbon offshoring, economic growth, employment or consumer prices. Only a few energy-intensive sectors (such as steel and cement) are at risk of significant adverse effects if policy is strengthened.[291]

- Even those who perceive themselves as losers may in fact be acting against their own interests by delaying transition. Policies and regulations which firms complain will damage them can turn out to *incentivise innovation* once implemented and boost productivity and competitiveness.[292] For example, in 2009 the EU introduced a fleet average efficiency target of 130 g/km by 2015. This was widely opposed by the motor industry, but it was met two years early. In the US, by contrast, consumer and industry car lobbies kept gasoline taxation low and improvements in fuel efficiency were slower. As a consequence, the US car industry was much less prepared for higher oil prices and the global financial crisis, an important factor in the *bankruptcies of Chrysler and General Motors in 2009*.[293]

290 the International Network of Financial Centres for Sustainability (FC4S)
291 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (July 2014) *Burden or opportunity? How UK emissions reductions policies affect the competitiveness of businesses*
292 Llewellyn Consulting (October 2014) *Tough Love*
293 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (July 2014) *Burden or opportunity? How UK emissions reductions policies affect the competitiveness of businesses*

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New technologies and processes are likely to undercut the old and render them redundant. This has the potential to *transform the competitiveness* of goods and service markets.[294] Indeed, it underlies one of the key elements of transition risk. Sectors, companies and countries that are slow to adapt to the new economy are likely to lose (see Section 4.4). They will miss out on growing opportunities associated with new markets and risk being saddled with unproductive assets including workers, management and ideas. At a time of large dislocation and change like COVID-19, it is more important than ever to put in place incentives for firms to reset their business models and adopt and embrace both existing technologies (move to the technology frontier) and also innovate (move the frontier out) so they can compete in the recovery and the new sustainable economy we build (see Box 8 for examples of how regulations can achieve this with high levels of business support).

6.12 BAILOUT CONDITIONALITIES

Recovery policies can be designed to have positive climate outcomes by attaching appropriate conditions for government support on hard hit firms and sectors. Polluting firms and sectors are being hard hit by the COVID-19 pandemic and they employ thousands across the UK, with many fossil-fuel extraction and usage sectors are already asking for government bailouts. **Governments can protect jobs and prevent locking in emissions by attaching conditions; there does not have to be a trade-off between climate and jobs. Propping up these companies will help to not only save jobs but also maintain a stronger foundation for economic recovery.** To do this governments could offer loans, guarantees, capital injections, and wage subsidies. With time, burdensome debt can be traded for public equity stakes provided conditions are met.

Conditions can include requirements to embrace newer (yet proven) standards and business models and commit to climate targets, making them much more likely to survive and compete in a transformation to low-carbon markets. Experience shows that attaching efficiency and emissions targets to financial support can give corporations an edge to compete in a changing marketplace. One example is the success of the fuel efficiency standards attached to *US car industry bailouts* in the American Recovery and Reinvestment Act of 2009. This successfully fostered a range of new technologies. Therefore, it can be extremely beneficial to include more stringent emissions targets to guide the bailout of airlines, hotels, carmakers, and many other industries that can invest in new business models, energy efficiency and/or rely more on renewable energy sources. Most of the knowledge and technologies are already available and cost-effective; this is not about imposing rapid structural changes on industries. For example, conditional *bailouts for airlines* could require achievement of net-zero emissions by 2050 with intermediate targets set at 5- or 10-year intervals, starting now with the adoption of a range of existing cost-effective technologies.[295] If airlines are unable to meet these targets, bailout funding would be converted to equity at today's very low stock market spot prices.[296] Accompanying a

294 Aldersgate Group (May 2020) ***COP26 delay must be used to maximise summit success***
295 The Conversation (May 2020) ***Why airline bailouts are so unpopular with economists***. See also the work of the *Solar Impulse Foundation*.
296 O'Callaghan, B., and C. Hepburn (2020), 'How to make airline bailouts green', The Conversation.

short term focus on implementing existing technologies, airlines should also work with the UKs universities, aviation, avionics and aero engine manufacturing expertise to develop sustainable aviation fuels industry. This is a priority area for helping to tackle this sector's emissions and strengthen UK capabilities and competitiveness in new technologies. In this context, it is welcome that the Department for Transport recently announced the *'Jet Zero Council'* to decarbonise aviation.[297]

This is starting to happen in other countries. For example, *conditions were attached* to the recent Air France-KLM Group and Australian Airlines bailouts, including emissions reductions targets, sustainable fuel use targets, and cuts in domestic flights where rail alternatives less than 2.5 hours in travel time exist.[298]

6.13 COMPETITION POLICY

As large liquid firms snap up small start-ups *suffering financial difficulty* under lockdown, careful policy will be required to prevent excessive market concentration which can undermine competition and innovation.[299] It is also important to consider perverse effects of support for high emissions firms, and explore the potential for attaching *conditionality related to lowering emissions* or, beyond the crisis, offering extended support for businesses transitioning their production to net zero.[300] Flexibility in state aid rules are required during the crisis (as reflected by *the EU's temporary framework*).[301]

Transactions are justified on the grounds that bankruptcy would be more damaging to competition than acquisition. While the Competition and Markets Authority (CMA) has indicated that it *will not relax the standards* by which it judges these types of transactions as a result of COVID-19, substantial uncertainties as to the state of future markets make informed judgements challenging for the CMA.[302] This could have a long term impact upon competition by enabling firms with sufficient access to financing to annex firms facing bankruptcy; as evidenced by *Amazon successfully making a minority investment in Deliveroo* via the failing firm defence.[303]

297 Edie, 2020 – *Jet Zero Council: Government unveils new collaborative initiative to decarbonise aviation*
298 World of Aviation (May 2020) *Air France Bailout Tied to Green Conditions*
299 GCR (April 2020) *CMA will not relax failing-firm analysis during covid-19 pandemic*
300 The Guardian (March 2020) *The Covid-19 crisis is a chance to do capitalism differently*
301 European Commission (March 2020) *State aid: Commission adopts Temporary Framework to enable Member States to further support the economy in the COVID-19 outbreak*
302 HM Government (April 2020) *Summary of CMA's position on mergers involving 'failing firms'*
303 Linkedin (April 2020) *The 'failing firm' defence in merger control and the impact of Covid-19*

6. INSTITUTIONS AND POLICIES FOR BUILDING TO LAST AFTER COVID-19

6.14 POLICIES TO LOCK IN BEHAVIOURAL CHANGE

The reaction to the crisis has shown the possibility of rapid changes in ways of doing things. It offers an opportunity to *embed climate- and productivity positive behaviours*.[304] This includes changes to travel routines, virtual learning and healthcare, the use of urban space and investment in the *circular economy* to reduce reliance on fragile supply lines, noting that independence does not equate to security. For essentials such as medical supplies or food or energy, *global connectivity and collaboration enhances resilience*.[305]

However, some post-COVID-19 behavioural change may be incompatible with emissions reductions. There is anecdotal evidence from China, for example, of people shifting from public transport to cars. This testifies to the need to invest in public transport capacity, even as revenues fall, to offer an attractive substitute to the car and avoid sprawl and the hollowing out of cities.

Behavioural innovation can also accelerate the pace of transition. As better ways of consuming, producing, and living are found, *complementary changes in behaviour, institutions, and social norms* will evolve.[306] The presence of low-cost alternatives to emitting greenhouse gases has enabled anti-fossil-fuel campaigns to point to *superior energy alternatives*.[307]

Anti-fossil-fuel norms **are already concentrating moral pressure on the largest culprits of climate change.**[308] A *spate of lawsuits* have been filed against fossil fuel companies and governments for deceiving shareholders and citizens by knowingly undertaking or supporting unsustainable and damaging activities.[309] These factors are driving global climate policies at an accelerating pace: more than 1,500 climate laws and policies worldwide; and 106 since the Paris Agreement was reached. At the same time, new business lobbies in fast-growing sectors are starting to *challenge the influence of incumbents* on policymakers.[310] In moving towards a low carbon economy, policy is likely to both respond to and accelerate inevitable changes in social norms.

Social feedbacks help make norms self-reinforcing and therefore stable. Formal institutions struggle to enforce collectively desirable outcomes without popular support. Acceptable *standards of behaviour and social norms* are the sources of law and ultimate drivers of legislative change.[311] Social norms are the sources of law and recognising the appropriateness or immorality of behaviour is a driver of legislative change.

304 BCG Henderson Institute (April 2020) ***Sensing and Shaping the Post-COVID Era***
305 IPCC (2014) ***International Cooperation: Agreements & Instruments***
306 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (August 2015) ***The road to Paris and beyond***
307 Elizabeth Bradshaw (August 2015) ***Blockadia Rising: Rowdy Greens, Direct Action and the Keystone XL Pipeline***; Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (May 2014) *Closing coal: economic and moral incentives*
308 Fergus Green (February 2018) ***Anti-Fossil Fuel Norms***
309 Cities and counties in California, New York, Colorado, Washington and Maine have filed civil lawsuits against oil and gas companies. The Grantham Research Institute on Climate Change and the Environment (May 2018) *Global trends in climate change legislation and litigation* survey identifies 25 climate-related lawsuits brought against governments or their representatives.
310 Matthew Lockwood (October 2013) ***The political sustainability of climate policy: the case of the UK Climate Change Act***
311 Eric Posner (1997) ***Standards, Rules, and Social Norms***

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However, social norms are also prone to tipping points. Studies show that when a committed minority of individuals reach a critical mass of as little as *25% of the total*, they were consistently able to overturn the established behaviour and initiate social change.[312] Policy can modify prevalent self-reinforcing feedbacks by giving people reasons to change their expectations. Social psychologists have long understood that solving coordination problems requires building expectations into models. Tipping dynamics can apply to social norms opinion dynamics and *cascades of belief updating*.[313] 2019 saw the examples of Greta Thunberg and Extinction Rebellion on climate and Sir David Attenborough on plastic pollution. Social feedbacks then help reinforce policies which help induce new technologies and grow new industrial lobbies, self-reinforcing and accelerating broader structural change.

6.15 GLOBAL BRITAIN IN A POST-PANDEMIC WORLD

UK action matters. While the UK is only directly responsible for only 1% of global emissions of greenhouse gases by production – and only 2% even accounting for indirect effects (arising from net imports of greenhouse-gas-intensive goods to meet UK consumption) – there are many reasons why the UK should take a global leadership role.

A Global Britain can help ensure a more coordinated international response to avoid a global depression and build a better future. Isolationism, in terms of limiting trade and investment flows, cutting technological cooperation (including international collaboration to find a vaccine) and starving global institutions of support, will make the UK and the world less resilient.

A strong, inclusive, sustainable and resilient UK recovery package will provide an important foundation for international engagement and resetting Britain's role in the world. It could help strengthen the UK's Nationally Determined Contribution (NDC) that it will take to COP26 in November 2021, build solidarity with the EU through sharing and collaborating around the proposed €750 billion recovery plan, which will be aligned with the EU Green Deal and the EU Taxonomy – collaboration could increase investment multipliers across the UK and EU countries – and it could provide a focus for the UK's G7 Presidency in 2021. Our actions now could help shape the world. That is "Global Britain".

The postponement of the COP26 climate change negotiations until November 2021 offers an opportunity for the UK COP26 Presidency to sharpen its strategy, particularly around finance. The UK COP26 Presidency strategy will need to carefully assess the stressors that COVID-19 places on the international financial system, which could hinder its capacity to meet international climate finance commitments and in mobilising private sources of finance, particularly in emerging and developing countries. It will need to revise its strategy over the coming year and show strong leadership to make progress on its COP26 objectives.

312 Damon Centola et al. (June 2018) ***Experimental evidence for tipping points in social convention***

313 Cass Sunstein writes about how opinion cascades are caused when private beliefs which are not expressed are authenticated when someone significant expresses them in public causing a cascade of 'belief updating'. See Timur Kuran and Cass Sunstein (January 2007) ***Availability Cascades and Risk Regulation.***

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Concessional finance will be particularly important in the current context. One crucial consideration for the UK COP26 Presidency is around the developed country commitment to the $100 billion climate finance target for 2020 and how it will seek to get countries to maintain commitment ahead of COP26, including setting a new 2025 target. Progress will be a slow, delicate and iterative process, to which the UK's soft influencing skills are particularly suited. The UK can also directly support the MDBs to help them build capacity around a green recovery. International institutions can only be successful if they receive the support of member countries/shareholders, and the UK could play an enhanced role in the face of the current US government's weak support of multilateralism.

The UK can also play a stronger role in international collaborations, including the Coalition of Finance Ministers for Climate Action. It can lead by example through a green recovery package and share knowledge and best practice through these existing platforms. Finance ministries are catching up with other ministries on climate change and need to take a central coordinating and leadership role across governments. The authors have provided analytical work and guidance to the Coalition, detailing key aspects of green recovery package design with a focus on strategy, investments, policies and finance. This is being shared across countries and complements this report.

The merger of DFID and the FCO is another opportunity to ensure all of the UK's international work is better coordinated, including ensuring the quality, effectiveness, Paris alignment, and non-politicisation of ODA is strengthened. The UK can maintain a Global Britain focus by not only raising the quality of ODA, but also by maintaining its high levels in times where it will be needed most by poor countries. The amount of UK aid is based by law on 0.7% of GNI, which has been achieved. As COVID-19 will cut the denominator in this ratio, this should not be allowed to flow through to lower absolute ODA levels – meaning the ratio may increase above 0.7% temporarily. The UK can also encourage EU countries to maintain their ODA. The UK needs a clear strategy that prevents back peddling.

A future focus for direct UK ODA could be protecting nature given high pandemic emergence risk in developing countries. The UK can also help to foster *global collaboration* to strengthen the mandate and financing of global decision-making bodies, which will be essential to ensure an effective response to the pandemic and facilitate international collaboration on nature and climate action.[314]

The UK's trade policy post-Brexit must ensure future trade agreements are consistent with the delivery of its environmental and climate goals as well as increasing the competitiveness of its businesses in the low-carbon transition. In so doing, the UK can set a positive example to other countries and reinforce its global standing as a leader.

314 Steele, W., T. Alizadeh, L. Eslami-Andargoli, and S. Serrao-Neumann (2014), Planning Across Borders in a Climate of Change, Routledge, London, United Kingdom.

7. RECOMMENDATIONS

The recommendations in this report set out a sensible, clear, and evidence-based framework for Building to Last after COVID-19 on a path of strong, sustainable, resilient and inclusive growth. They are not an exhaustive list, but priorities that will ensure a strong and green recovery. They will also form the foundations for a just transition to net zero over the next few decades.

7.1 RECOVERY STRATEGY

There is wide support for a recovery strategy that lays strong foundations for advancing both short term recovery objectives and the UK's climate and long-term transformation objectives. The government can take these immediate steps to lock in such a recovery:

Design a recovery package strategy that aims to both restore supply and demand in the short term and advance long-term objectives, such as: levelling up and tackling regional inequalities; investing in low-carbon, resilient infrastructure; improved productivity; a just transition to net-zero; and delivering the Global Britain agenda on the ground. The package should be assessed against these overarching criteria.

Concerns around fiscal space and the affordability of such a package need to be tackled head on. Austerity-based policies have been shown to hamper long-term growth. Stabilising debt/GDP requires growth to boost the denominator and raise net revenues to slow the growth of debt, the numerator. Only by generating growth does public debt become sustainable and easily repayable. The alternative is depression and instability. A recovery based on fiscal austerity driven by spending cuts and weak links to sustainability and resilience failed after 2008 and further locked in the unproductive fossil fuel economy.

Use ambitious fiscal policy to deliver a strong, sustainable, resilient and inclusive recovery. Aiming to balance budgets in a recession to achieve debt sustainability, is self-defeating.

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The strategy must make clear, long-term commitments on the low-carbon transition and reversing environmental degradation. To do this it should:

- Include a credible plan to put the UK on the beginning of a pathway to reach its net zero target,
- Complete the Environment Bill and the Agriculture Bill, with the latter making a clear commitment to direct public money towards public goods, including subsidies towards farmers that deliver high levels of environmental improvements;
- Put in place a set of comprehensive improvement targets under the Environment Bill;
- Ensure the UK's trade policy and its future trade agreements are consistent with the delivery of its environmental and climate goals and increasing the competitiveness of its businesses in the low-carbon transition.

7.2 TARGETED INVESTMENT

Targeted direct investment expenditures with short- and long-term gains will deliver on the recovery strategy. Sustainable, resilient and inclusive investments have some very appealing short- and long-run characteristics in a recession. This is because they boost demand and create jobs in the short run and expand capacity in the long run.

To ensure investments deliver and maximise the multiple benefits this report sets out, recovery investment programmes and projects will need to be assessed along the following set of dimensions:

Recovery investment programmes and projects can be assessed against a range of criteria with a focus on the strength of growth multipliers in the short- and long-run and the extent of co-benefits in contributing to climate/net-zero, resilience, and levelling-up across the country. It will be especially important to consider speed of implementation, the location of investment, and labour intensity in the short run so as to absorb unemployed labour in the wake of COVID-19. Investments aligned with the UK's climate and environmental targets can deliver many of the social, economic and co-benefit criteria mentioned above.

7. RECOMMENDATIONS

Drawing on the latest evidence, the government should prioritise investment in:

- **Broadband and *smart connectivity*** to enable virtualisation and facilitate home working across all parts of the country, as well as expand connected healthcare, education and security platforms.[315]
- **EV charging networks** to increase incentives to buying electric cars. The government's *vision for an EV rapid charge point network* for England announced on May 14 sets the direction.[316]
- **Upgrading and retrofitting homes and buildings** through building efficiency spending for renovations including improved insulation, heating and cooling, and domestic energy storage systems. Coupled with supportive fiscal and non-fiscal *policies* such as rebates, tax deductions and mechanisms share efficiency gains between landlords and tenants).
- **Energy and heat networks and the circular economy** (reducing recycling and reusing material inputs) to create new skills and new jobs.
- **Expanding rail and bus transport** to better connect low-income regions with major centres providing better access to better jobs.
- **Planting trees, restoring wetlands, greening cities and improving biodiversity.** Investment in nature ought to perform well against criteria of short run multipliers. They are likely to be labour-intensive with limited importing or off-shoring. In the near term, some may provide good matching opportunities following the sharp rise in available young, flexible and geographically mobile workers, previously employed in the retail, entertainment, food and catering sectors.
- **Bring forward private sector investment in offshore wind** which has high long and short run multipliers.[317] The Contracts-for-Difference (CfD) framework has been effective at reducing risk and leveraging in private investment. It will need to be amended to make auctions more regular and appropriately sized, in order to frontload the 2019 Conservative Manifesto commitment for 40GW of new offshore wind by 2030 and put UK supply chains in good stead to continue to deliver in the 2030s and beyond.
- **Supporting adaptation and resilience:** including water management; flood protection; and the preservation of non-renewable natural capital. In many instances, preserving natural capital generates multiple co-benefits including decarbonisation and adaptation to a more volatile climate (see section 6.9).

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315 BT Digital impact & sustainability.
316 *HMG 2020, Government vision for the rapid charge-point network in England. May*
317 *Committee on Climate Change Cost and Benefit Advisory Group forthcoming.*

7.3 INSTITUTIONAL REFORM TO SUPPORT INVESTMENT

New and strengthened institutional structures will be crucial to tackle market failures and barriers and bring the cost of capital down. The government should increase efforts to achieve cross-party consensus on institutional and regulatory frameworks, to lower perceived political risk and provide clear signals for private investors. Consensus and reform are needed across three pillars:

1. **Establish a new National Investment Bank** (NIB) with £20 billion paid in capital that can help the government to deliver a strong, sustainable, inclusive and resilient recovery to net-zero in 2050. Prioritise investment in regions that need it most. Direct public support for new infrastructure must be matched by regulation to maintain investment and protect consumers from rent-seeking.
2. **Deliver greater policy and fiscal autonomy to cities and regions,** building on the Cities and Local Government Devolution Act 2016. Empowering cities can enable a more effective identification of and focus on local priorities, while strengthening governance structures at the local and city level will be crucial to avoid poor financial management and corruption. Involve Mayors in the design of recovery plans, which can help increase the effectiveness of investments that will impact their region/cities.
3. **Prioritise the recommendations of the National Infrastructure Commission, National infrastructure Assessment.** Working with a new NIB, and considering the National Infrastructure and Construction Procurement Pipeline for 2020–21, empower the NIC to develop and publish an updated pipeline of clean and sustainable infrastructure investments that will contribute to meeting the UK's 2050 decarbonisation targets and reflect these in the National Infrastructure Commission's National Infrastructure Strategy.

7.4 INDUSTRIAL STRATEGY REFORM TO SUPPORT INVESTMENT

Bring together the existing Industrial Strategy and Clean Growth Strategy to create a single forward-looking and coherent plan for strengthening the UK's human capital for the recovery and the low-carbon transition.

Develop research missions based on a range of metrics, including positive technology spill overs, as part of a *forward-looking strategy* to retain comparative advantage in future markets.[318] Push new innovation while supporting *large scale trials* of new technologies and business models (see Section 6.7).

318 The recommendations of the LSE Growth Commission Report (December 2018) ***Sustainable growth in the UK: Seizing opportunities from technological change and the transition to a low-carbon economy***

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Extend and integrate the focus of the *UK Industrial Strategy* on securing strong domestic supply chains to support the full spectrum of decarbonisation activities.[319] Government should also extend and integrate a focus on adaptation.

Aim to support intrinsically low-carbon industries across the regions, such as in education, financial services, pharmaceuticals and health care. It is important that the support is not just for industries in the environmental goods and services sector, which is significant but a relatively small part of the economy. For example, supporting zero emission vehicle manufacturing and supply chains across the regions to secure competitive advantage could create 80,000 regional jobs by 2030.

7.5 POLICY REFORM TO SUPPORT INVESTMENT, BY POLICY AREA:

With the presence of numerous interrelated market failures, the policy response that underpins the UK's recovery package, and is aligned with its long term objectives, is likely to cover a corresponding number of *different policy instruments*.[320] These are set out below. Reliance on any one of these policy mechanisms will not deliver cost-effective recovery and long-term decarbonisation, but the collection can be mutually reinforcing, providing a *clear and compelling signal* to entrepreneurs and investors alike.[321]

7.5.1 ENABLING, RESKILLING AND LEVELLING-UP

Adopt "just transition" employment measures to avoid workers falling into long-run unemployment after the crisis, including: job guarantees; retraining and reskilling for the future; incentives for employers via human capital tax credits; and boost training for workers, including apprentices, in new and emerging sectors.

Where workers become unemployed, adopt Active Labour Market Policies (ALMP). The UK should aim to move towards the OECD average expenditure level on Active Labour Market Policies, especially for 16–24-year olds and low-educated/low-skilled job seekers where it currently lags behind.

319 UK Industrial Strategy
320 Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment (June 2011) *The basic economics of low-carbon growth in the UK*
321 Bennett Institute for Public Policy (2019) *Mind over matter – how expectations generate wealth*

7. RECOMMENDATIONS

Initiate a Future Skills Programme to reskill and train workers for the low carbon economy. This can be applied immediately with the goal of keeping people engaged in the labour market once the current Job Retention Scheme lapses. This could include embedding sustainability across the educational curriculum, including a review of apprenticeship standards and T-levels and the setting up of sustainability standards, metrics and labels for tertiary level education courses.

Ensure adequate funding for education institutions (universities, colleges and schools) and skills/training, especially in the regions hard hit by COVID-19, to effectively reskill and retool workers for the jobs of the future (all low-carbon jobs, not just green jobs). As part of this, boost investment in lifelong learning initiatives, especially for low-skilled workers. Reform the apprenticeship scheme to ensure it is adequately funded, transparent, and SMEs who do not pay the levy are able to access the scheme effectively. This could include embedding sustainability across the educational curriculum, including a review of apprenticeship standards and T-levels and the setting up of sustainability standards, metrics and labels for tertiary level education courses.

Target ALMP policies in areas that need it most, i.e. where employment is severely disrupted by COVID-19 and the forces of change, such as Northwest and Northeast England and South Wales.

Target these policies at vulnerable and disadvantaged groups, including youth, women, disadvantaged students, apprenticeships and those at high risk of long-term unemployment.

Coordinate these policies with regionally targeted stimulus investments to create short term demand for labour and support local SMEs. Private finance can also be directly involved by establishing a Just Transition Investment Fund to channel institutional capital and private savings into green investments with positive social impact in left behind regions.

Integrate the issue of inequalities into decarbonisation policy and the provision of all government services, including urban planning and public procurement. Not only in terms of wealth inequality, but also access to key public services like transport, education, health, housing, and justice. Consider adopting a well-being / just transition lens across all climate policy.

7.5.2 FISCAL POLICIES

Reinforce the UK's carbon pricing regime to ensure prices are consistent with net zero. This suggests a politically feasible carbon price starting at around £40 per tCO_2 in 2020 and rising to £100 per tCO_2, or more, in 2050. This would mean a realignment of UK carbon prices. Some prices could fall while others rise, with a net impact likely to raise revenues. The new UK ETS will also need to be integrated into these reforms and include a price floor. Imposed through an explicit carbon tax or the auctioning of emissions allowances, there is potential to raise public revenue of around £15–20 billion a year until the early 2030s. A rise in the price of carbon on the EU emissions trading scheme to about €30 per tonne, led to a *30 per cent* rise in applications for new low carbon

innovations patents without crowding out patenting for other technologies.[322] The government should also aim to level the playing field by *closing the gap*[323] in the implicit carbon price for electricity use and gas which acts as a barrier to *heat pump deployment*.[324]

Aim to broadly equalise the cost of carbon emissions, across sectors and policies including standards and regulations. While different instruments may continue to apply across different UK sectors for some time, Figure 5 – carbon taxes, ETS, regulations, etc., broadly equalising costs across these instruments and sectors will lower the costs of decarbonisation. It will achieve this by incentivising emissions reductions where they are cheapest (alternative policies, e.g. R&D and industrial strategy, can work to bring down the cost of more expensive future mitigation options that will be needed to reach net zero).

Retain all pre-existing incentives for low-emissions car purchases such as Plug-in Car and Van Grants to build consumer confidence and support sales of new EVs.

7.5.3 STANDARDS, REGULATIONS AND PUBLIC PROCUREMENT

Adopt standards and regulations where market failures reduce responsiveness to prices to promote efficiency and drive innovation. For example, pushing forward with smart charging equipment standards under the Automated and Electric Vehicles Act 2018, bringing forward the phase-out date for petrol, diesel and hybrid vehicles to 2030 or soon thereafter, and introducing minimum energy efficiency standards to bring new and existing buildings to EPC band C by 2035 (2025 for low-income households).

All public expenditure, including procurement, should be aligned with net zero, to create incentives at scale for products and technologies that meet both financial and environmental needs. HM Treasury could lead by adopting green budget tagging methods (this will help the UK government evaluate the environmental impacts of its budgetary and fiscal recovery policies and their alignment with net zero), with the support of the OECD, the Coalition of Finance Ministers for Climate Action, and others.

322 *Calel, R. and Dechezleprêtre, S. 2016, Environmental Policy and Directed Technological Change: Evidence from the European Carbon Market. Review of Economics and Statistics. Volume 98; Issue 1; March p.173–191*
323 Advaniet al., 2013. Energy use policies and carbon pricing in the UK, Institute of Fiscal Studies and Grantham Research Institute on Climate and the Environment, LSE.
324 *This is as advocated for in the government's recent Future Homes Standard consultation, 2019.*

7.5.4 INNOVATION POLICIES

Scale up innovation policy, research, development and deployment to achieve the government target of 2.4% of GDP early, before 2027, and ensure a greater share for the regions. Public support for research, development, and deployment of new technologies in the UK has already driven remarkable, and often unexpectedly large, cost reductions in renewable and other energy technologies, but public innovation spending lags private spending in the regions. This will require a mixture of increased funding and further incentives for business innovation, including enhanced incentives for clean innovation. It should also strengthen the UK's research and development capabilities and collaboration between universities, industry and local policymakers. The UK's research is a vital element in its comparative advantage and future as 'Global Britain'. It is essential to enhance R&D and take more of it through to market deployment.

Accelerate the establishment of a clean innovation mission through a revised Industrial Strategy and honour the election commitment for £800 million to fund an equivalent institution to the *US Defense Advanced Research Projects Agency*.[325] This would provide greater coherence across new funding initiatives, including the Future Fund and the Clean Growth Fund, and ensure all are targeted at clean innovation.

Be clear that innovation strategies will often eventually need to 'pick winners' in terms of choosing which technology and infrastructure network to roll out (and the regulatory regime to support it), while maintaining a policy suite that provides incentives to tackle market failures and barriers that lets winners emerge. This could focus on funding early stage innovations and commercialisation of existing technologies and getting public innovation funds to the regions that may otherwise miss out.

Support innovation in *hard to treat sectors* such as aviation, haulage, steel and cement which could deliver significant job benefits in the medium and long-term.[326] Though associated with lower short run multipliers, innovation investment these key sectors is recommended on the basis of strongly positive long run growth and climate impact.

Explore establishing new high technology, collaborative research centres in the regions on the back of successes such as the AMRC in Sheffield and the APC in Warwick. Networks of universities on their own will not be sufficient, these collaborative centres leverage researchers, the private sector and other government bodies and institutions.

Design and implement exemplary net zero cities to boost local innovation. These establish competitions between cities/towns who show by a fixed date that they are on track for net zero, and then links additional funding to the winners.

325 Defense Advanced Research Projects Agency
326 The Energy Transitions Commission (November 2018) *Reaching net zero emissions: mission possible*

7.5.5 SCALING UP PRIVATE FINANCE

Align all private finance flows with the goals of the Paris Agreement. This will require private finance to adopt standards or taxonomies to help them assess their investments and portfolios against the net zero goal. Several standards/taxonomies are available to achieve this, but they have limitations which the UK will need to overcome when considering regulation in this area. A UK taxonomy and metrics could be developed that moves away from the binary classification of green or brown, and instead develops sector pathways and metrics that can measure the "50 shades of green", i.e. allow transparent assessment of where companies are on the pathway to net zero.

Accelerate the adoption of the three R's: reporting, risk and returns. Release the revised TCFD guidelines and make them mandatory across all large UK companies by COP26, including all London Stock Exchange listed firms. Consider the *Transition Pathway Tool* as the basis of disclosure reporting. Support the NGFS to accelerate the development of better data and analytic tools to improve climate risk management, and help to build a coalition of central banks and supervisors that commit to climate stress testing stress testing, with the Bank of England leading by setting a date for resuming its stress testing work. Make it mandatory for all financial sector actors to disclose a net zero plan and identify the opportunities and returns from the transition.

Achieve better coordination between monetary and fiscal policy, including ensuring that central bank measures, e.g. QE, are aligned with net zero and support green recovery packages.

7.5.6 CONDITIONAL BAILOUTS AND COMPETITION POLICY

Bailouts should be conditional on improvements against climate-positive criteria, including requirements to embrace newer, yet proven and cost-effective, standards, technologies and business models, commitment to net zero and climate targets, commitment to mandatory climate risk disclosure under TCFD, and commitment to collaborate through global R&D partnerships, for example in aviation and shipping. These conditions should be considered under Project Birch, designed to rescue strategically important UK companies.

One option worthy of further consideration is amending utility companies' funding models to enable more long-term investments to be made. For example, water companies have in the past noted that Ofwat and the water regulatory framework disincentivises natural capital investments with a long-term return beyond the 5 years of the price control period.

Strengthen the Competition and Markets Authority to prevent concentration resulting when large liquid firms acquire viable small firms facing financial difficulty under lockdown.

7.5.7 BEHAVIOURAL CHANGE

Explore policies to embed climate- and productivity-positive behaviours that were brought on by the response to COVID-19, for example investing in changes to travel routines, virtual learning and healthcare, the use of urban space and investment in the circular economy to reduce reliance on fragile supply chains.

Act to discourage negative behaviour changes from the response to COVID-19. For example, an increase in people avoiding public transport in favour of travelling on their own by car threatens to increase congestion and pollution. Rather than cutting back on investment in urban public transport, in response to falling ticket revenues, investment is needed expand capacity and increases services to help workers travel safely distanced (together with, for example, investing in testing and contact tracing capabilities in case of future outbreaks).

7.6 GLOBAL BRITAIN

A Global Britain can help ensure a more coordinated international response to avoid a global depression and build a better future. There are many options for an engaged global Britain post-Brexit.

Empower and give credibility to the UK COP26 Presidency and the G7 Presidency through a strong green recovery programme at home. A renewed and sharpened focus to the COP26 Presidency strategy could be around maintaining the developed country $100 billion public finance commitment to developing countries, strengthening country Nationally Determined Contributions (NDCs) that are due by COP26, and strengthening and accelerating multilateral development bank commitments to a green recovery and net zero through closer and more constructive engagement and direct funding.

Maintaining high levels of quality, Paris Aligned ODA. The UK should focus on raising the quality and effectiveness of ODA, ensure it is aligned with the goals of Paris Agreement, and maintain its level, even if the 0.7% of GNI ratio rises temporarily during the crisis. The UK should press for similar action across countries, including in the EU.

Sharing information and coordinating recovery packages with the EU in priority areas of mutual interest enhances the benefits of stimulus investments in the short and long term. Global trade means one country's exports require another country's spending on imports. The benefits of low carbon markets to any one country depend on how many others adopt similar investments. Some of the benefits of close cooperation with the EU are highlighted throughout the report. Working with the EU can promote learning and coordination and will raise the benefits of stimulus investments in the short and long term by boosting short and long run multipliers. For example, France aims to be a global leader on hydrogen. This will be crucial for the UK economy and it should collaborate rather than duplicate or simply import French hydrogen technology.

7. RECOMMENDATIONS

7.7 NEXT STEPS FOR THE EUROPEAN UNION

The EU is designing large recovery packages that will need to follow many of the same principles set out in this report, particularly around levelling up, innovation, regulation, bailouts and competition. The EU was one of the earliest and hardest hit regions affected by COVID-19 and, similar to the UK, faces systemic issues of low productivity growth and uneven distribution of income. For these reasons we highlight some key asks for the EU, in addition to sharing with the UK, that can help increase the impact of its own recovery packages.

- As the European Commission and EU members design recovery packages, they must ensure they are consistent with the recommendations in this report around strategy, fiscal expansion, the criteria set out for stimulus investments, institutions and policies, with a special emphasis on levelling up, skills, competition, innovation, regulation and bailouts.

- Eurozone members must address the uneven perception of sovereign debt risk under a single currency lacking cross-border fiscal flows and pan-European bank guarantees. The systemic risk to those countries with high public debt (which in the case of Italy and Spain have also been hit hard by COVID-19) highlights the importance of targeted policies to boost growth and retain solvency. Debt-to-GDP ratios in Greece, Italy and Portugal *are expected to hit* 220%, 180% and 150% respectively.

- Yet the eurozone remains emblematic of the degree to which excessive fiscal consolidation has aggravated public debt burdens over the past decade. This is because such policies have reduced growth, both through undermining demand and constraining investment in expanding supply. This mistake cannot be repeated. The drive towards fiscal consolidation since the financial crash has also shifted the entire eurozone into a globally destabilising current account surplus, exacerbating the imbalances caused by worldwide excess savings.

Despite all the challenges, European policymakers have made a strong start in delivering a strong and sustainable recovery. EU governments, the ECB and the European Commission have put in place measures to sustain income and employment, ease financial risks and maintain the flow of credit. The *European Commission Recovery Strategy* is likely to inject EUR 2.4 trillion over the period 2021–2027 and prioritise *low carbon*[327] and digital spending, where multiplier effects can be expected to be highest. Integrating the European Green Deal and the COVID-19 recovery effort is welcome, but the plans must be robust to lobbying by vested interests or member states seeking to *push back on ambition* and preserve fossil assets.

327 European Green Deal, 2020. European Commission

7. RECOMMENDATIONS

The Commission package is aimed disproportionately at lower income, higher debt southern European economies thereby promoting resilience and 'levelling up'. The *Just Transition Mechanism* will help mobilise at least €100 billion over the period 2021–2027 targeted at the most affected regions. In support of these measures, the ECB has recently expanded its asset purchase programme by around €1.4 trillion. Individual member states' fiscal stimulus plans range from around 3% of GDP in Romania, to a notable 50% of GDP in Germany.

Future packages must be coordinated with the UK and other partner countries to maintain the EU's global leadership role and share knowledge around institutional and political economy challenges associated with various recovery packages.

The EU must learn the *key lessons* and principles from EU climate policies of the last several decades and ensure they are front and centre when designing and implementing green recovery packages. These include:

- Recognising the importance of learning-by-doing and feedback (to maximise benefits and avoid policy failure);
- recognise that there is no "silver bullet" to bring the economy back to health and deliver sustainability (it is the package of investments, institutions and policies that together will restore supply and demand and create a stronger Europe with each member state requiring specific focus);
- continued coordination among key economic actors and sectors, integrating the complex network of existing policies including the *European Green Deal*;
- drawing on the best technical and economic knowledge and consulting closely with stakeholders to ensure transparency, stability and industry backing (this will involve all European countries drawing on the best expertise wherever it is located, including in the UK).

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