ENERGY RESEARCH FOR **A GREEN RECOVERY**

DR. CLARE RICHARDSON-BARLOW
PROF. PETER TAYLOR

UNIVERSITY OF LEEDS

Emissions and Energy after Covid-19

Covid-19 has directly affected the energy sector, with varying challenges seen across the whole energy system. Whatever happens next will be crucial to any green recovery.

First, declines in energy use following disruptions to international travel, trade and economic activity have resulted in a global reduction of carbon emissions. But these declines in energy consumption are unlikely to reflect society's post-Covid economic needs. For example, global electricity demand is projected to rebound by 3 percent in 2021 (IEA, 2020a). Sustained emissions reductions will be challenging to maintain, as governments release economic stimulus packages that include plans for industrial activity and infrastructure development. High rebounds could have negative environmental impacts. (IEA, 2020a).

Second, the global progress of clean energy technologies could be in doubt. Renewable electricity showed impressive resilience during the height of the crisis (IEA, 2020b), increasing by almost 7 percent in 2020 while electricity demand decreased. This resilience could be impacted in 2022 if government, policy and financial support is not forthcoming in future due to post-Covid policy constraints. As priorities shift toward economic recovery, there is a danger that energy and climate resilience could take a back seat.

Third, balancing the needs of energy access, clean energy utilisation and economic recovery will prove challenging worldwide as these goals may contradict each other in national, regional, and international recovery efforts. Globally, Covid-19 recovery packages exceed £10 trillion – triple the 2008-9 financial crisis response – and include a variety of fiscal and spending measures focused on improving the negative economic, human, and societal effects of the crisis (World Bank, 2020). How governments incorporate energy access, energy demand, and sustainability targets into their plans remains to be seen.

As the world recovers from the Covid-19 pandemic, experts are calling for action that will help to boost economies while also tackling climate change as energy use rebounds.

The UK Government focus is on a 'green recovery' that marries economic recovery with the UK's target for net-zero greenhouse gas emissions by 2050.

Criticism of the government's approach highlights its focus on infrastructure spending as well as a lack of attention given to social equity and justice.

University of Leeds research highlights these gaps and provides potential solutions, with a focus on community driven and interdisciplinary energy research.

The University's energy research covers six interdisciplinary clusters: behavior and society, environmental, business, economic, political, scientific and technical.

The UK's Green Recovery

In the United Kingdom, the Covid-19 recovery plan has taken the form of fiscal incentives aimed largely at industry, infrastructure and job growth (HM Treasury, 2020a). This approach is being framed around a 'Ten Point Plan for a Green Industrial Revolution' and further packaged in a 'Build Back Better' campaign, with talk of 'levelling up' across the country (HM Government, 2020).

According to the national government, this includes billions of pounds in spending to tackle Covid-19 in 2021 alone, focused funding on public service improvements, and achieving net zero targets, all underpinned by a commitment of £100 billion in infrastructure spending and a focus on job creation. The UK's recovery plans include specific measures for the energy sector, including a £3 billion package for environmental initiatives, £1 billion committed to decarbonizing public sector buildings and roughly £1.3 billion for various energy efficiency improvements in homes across the country.

While this approach has been cautiously welcomed, critics have noted the government's prioritisation of infrastructure development, as well as a lack of attention given to social equity and justice. Experts question whether or not current recovery infrastructure plans could actually 'lock in' future high emissions (The Guardian, 2020). Climate campaign group Plan B has formally challenged the legality of the Government's recovery plans given the climate impact, citing UK climate targets and net zero goals as reason the government's approach to a green recovery violates national interests (Plan B, 2020). There are also questions regarding how much of the funding pledge for the UK Green Recovery is actually new; and how much will be used to realise economic and infrastructure growth versus green and sustainable actions that move the UK closer to net zero, not farther from it (Carbon Brief, 2020).

"Covid 19 has shown quite clearly how universities must put themselves at the heart of global communities, addressing global challenges and positively shape our world. The University of Leeds is ideally placed to bring together local, national, and international partners, including industry, the third sector, policy makers and Government, and the public. Working together we can develop and deliver real solutions that will change society."

Professor Nick Plant, Deputy Vice-Chancellor: Research & Innovation, University of Leeds

Providing the evidence base for a fair and inclusive green recovery

Energy research at the University of Leeds is driven by 200 researchers and around £50 million in current grants across a variety of networks.

For many years, our researchers have been addressing global, regional and national challenges across the entire energy landscape, much of which is directly relevant to ensuring a green recovery. The University's energy research can be grouped into six clusters; behavioural & societal, business, economic, environmental, political, and scientific & technical. Our work in these fields is addressing the issues involved in global and regional energy concerns and intersects with a national Covid-19 recovery plan that takes local and community needs into account.

Researchers from across these clusters work together on interdisciplinary projects such as the business and economic cases for how individuals consider efficiency and retrofit investment in their homes, and how councils can support these. These interdisciplinary approaches to energy research are a trademark of University of Leeds research, providing joined-up solutions in areas where current government policy doesn't go far enough.

Behaviour & Society

Our research looks at how behavioural and societal changes can influence energy choices and decision making. This includes:

- What behaviour change can influence net zero.
- People's lived experiences of fuel poverty.
- Social relationships and their impact on energy use and decision making.
- How behaviour change can facilitate shifts in generally acceptable attitudes in local and regional communities.
- Working with regional transport authorities to look at improving decision-making processes as a result of national decarbonisation efforts.
- Working with the Environmental Justice Commission to identify what a 'just transition' looks like in places that have historically been hit hard by energy transitions.

Environmental

Understanding how the environment can be protected and harnessed at local, national and global levels is essential for delivering a green recovery. Our research in this area includes:

- Research that intersects food production and sustainability targets in order to identify solutions to global biodiversity loss.
- Monitoring and reducing emissions from energy generation and use.
- Reducing costs and the life cycle impacts of the UK's offshore wind farms.

Business

Researchers at Leeds are examining how businesses can help facilitate societal change towards achieving national and global energy targets. This includes:

- Examining how finance and ownership models have technical and social impacts on energy systems.
- Identifying innovative business models for energy transitions locally and globally.
- Redesigning business and work spaces (literally and figuratively) for sustainability targets.
- The unique financial considerations of large and small-scale energy projects.
- Local jobs- and skills-driven approaches to district heating challenges.

Researchers are also working with local government bodies, including the Leeds City Region Local Enterprise Partnership, on projects including:

- How existing and new jobs can play a role in the efficiency and sustainability changes required for infrastructure projects.
- Designing new "prosumer" business models for encouraging active public participation in energy transitions.

Economic

Our research, including work within the Centre for Climate Change Economics & Policy, goes beyond the economic impacts of energy transitions and a changing climate. It includes:

- Exploring how local, national, and regional economies can be made more resilient by means of increased circularity in energy, food, and waste systems.
- Ways in which economic recoveries can address fairness and justice in energy systems.
- Supporting pensions, insurance, and other large institutional investor portfolios in their approaches to energy transitions.
- Ways in which traditional thinking on sustainable consumption can be altered to better reflect societies' needs in an energy transition.
- How to retrofit millions of UK homes to make them more energy efficient.
- The implications of the government's Build Back Better infrastructure & investment strategy.

Political

Research at Leeds helps to develop energy policy and support decision-making at a variety of governance levels including:

- Examining ways in which local governments can be properly resourced and empowered to develop projects that will allow them to 'green' their local and regional economies.
- Research into governance of energy transitions in emerging markets, political movements and their impact on energy and climate change adaptations and identifying new models of democracy and governance that provide an alternative to the traditional policy focus on economic growth.
- How expertise can influence regulatory legitimacy, particularly in relation to hydrocarbon extraction in the UK.
- Increasing community engagement in circular economy solutions to energy and waste management.
- Developing support for community hubs that encourage city transport planning which incorporates community social enterprise and grassroots movements.

Scientific & Technical

Scientific research at the University of Leeds spans a variety of energy-related areas, including:

- Complex emissions modelling processes to produce a whole systems carbon footprint of the UK.
- Innovative processes for producing hydrogen.
- Understanding the potential for alternative fuels in industrial applications.
- Integration of storage and distributed generation into smart energy networks.
- The increasing competitiveness of biofuels owing to the production of blended biofuels.

Our technical energy-related research explores whole systems approaches to energy transitions and the specialised solutions needed to realise global change, including:

- Civil engineering answers to the challenges of storing heat underground.
- Identifying materials for high-temperature energy applications.
- Innovative ways of applying renewable energies to heavy industries.

The University of Leeds leads the Materials & Products and Transport & Mobility themes at the Centre for Research into Energy Demand Solutions (CREDS). Here researchers are looking at how to decarbonise industries, such as the UK steel industry, and are identifying the barriers and opportunities for increased transport flexibility, crossing the business, policy, and scientific & technical clusters. The University leads the Industrial Decarbonisation and Energy for Mobility themes at the UK Energy Research Centre (UKERC).

Research Collaborations

Researchers from across the University collaborate extensively with stakeholders from industry, government and civil society, working together to develop solutions that tackle major societal challenges.

Community Engagement

Community engagement is vital to the buy-in, implementation, and inclusion of energy transitions and our researchers work extensively with partners in the third sector and local communities.

In late 2020 and early 2021, University of Leeds researchers and stakeholders in the public and private sectors joined together to identify the key challenges associated with revitalising the North of England via the energy transition towards decarbonisation. Attendees worked together to identify the key challenges of regional revitalisation, such as: delivering local, low-carbon energy infrastructure in a socially equitable way; facilitating the rapid take-up of hydrogen in domestic applications; deploying smart local energy systems to ensure national energy objectives can be met; and developing and deploying the next generation of hydrogen and CCUS technologies for industrial applications. These challenges were used to co-develop funding proposals and new projects that will contribute to revitalising the North. In addition, local communities have been incorporated into council and LEP climate and energy strategies, developed in partnership with University of Leeds researchers.

Industry Engagement

Industry engagement is an important component of the University of Leeds's energy research and is crucial for the continued economic, political, and technical success of the energy transition. Close collaboration with industry has been key to energy research success by ensuring their views and experiences are incorporated into research projects.

In addition, we work closely with industrial partners on their projects, such as fuel switching for glass manufacturing, where we are advising on trials replacing natural gas with hydrogen and biofuels. Engaging industry partners has also encouraged 'whole industry' solutions, such as those identified via the Centre for Research into Energy Demand Solutions' project, Decarbonising the Steel Industry, which aims to fully decarbonise the UK steel industry by 2050 in order to meet the UK's Net Zero targets. Similarly, University of Leeds spin out company, C-Capture, is involved in a bioenergy with carbon capture and storage (BECCS) pilot project at Drax power station, the first of its kind in the world.

Policy Engagement

At a national level we work with partners such as, the Department for Business, Energy and Industrial Strategy (BEIS), and the Scottish Government.

Our researchers have played an important role in helping to inform a number of the UK Climate Change Committee's reports, including the influential 2019 Net Zero report. University of Leeds research has been incorporated into a variety of energy policies, including through the National Infrastructure Commission, the former UK Department for Energy and Climate Change (DECC) and the Department for Energy, Food and Rural Affairs (DEFRA).

On a regional level, University of Leeds researchers have helped the Leeds Climate Commission to develop its own climate strategy and Net Zero Carbon Roadmap for Leeds. Bradford, Edinburgh, Leeds and other city councils have also received support in developing their own green and sustainable approaches to development. Regional collaboration on the development of the Yorkshire and Humber Climate Commission has also been supported by University of Leeds researchers and partners across industry and policy.

In district and city councils across the UK, University researchers help to support and develop energy and climate strategies. This work includes encouraging them to incorporate circular economy approaches in energy consumption and development.

Internationally the University engages with partners on every continent, with students from all over the world participating in energy and economic research. Our researchers play an important role in the Intergovernmental Panel on Climate Change (IPCC), contributing numerous authors for their scientific assessments which have helped to shape international climate action. Our researchers are participating in a variety of international collaborations, including The Global Commission on the Economy and Climate, encouraging economic policies that reduce climate change risk globally and support transitions towards low carbon development. Other projects include the development of climate, energy, and waste policies in China, India, Uganda and elsewhere, and innovative approaches to city-level sustainability adaptation and the role of 'prosumerism' in Europe.

Implications for a UK green recovery

The UK's Green Recovery provides the opportunity for a much-needed financial boost to help the country recover from the Covid-19 pandemic, while accelerating progress towards its climate change goals. However, whether the current plans will deliver on these twin goals is unclear.

A strong national focus on infrastructure and industry drives the current approach, but University of Leeds research shows that more focus on social equity and local action would also serve the UK's clean energy, decarbonisation and economic goals. Stronger local industry engagement would benefit the communities in which they operate, and council engagement with barriers and solutions needs to be encouraged for true community-driven solutions.

University of Leeds researchers are now developing plans for future research that will support the UK's short and long-term Green Recovery. Whatever the ultimate direction of national policy, the University of Leeds will continue to undertake world-leading research that brings academic, business and government representatives together with citizens to find the most appropriate answers to their energy challenges.

References

Carbon Brief. 2020. Media reaction: Boris Johnson's '10-point' Net-Zero Plan for Climate Change. [Online]. November 18, 2020. [Accessed January 21, 2020]. Available from: https://www.carbonbrief.org/media-reaction-boris-johnsons-10-point-net-zero-plan-for-climate-change

Forster, P.M., Forster, H.I., Evans, M.J. , *Gidden, M.J.*, *Jones, C.D.*, *Keller, C.A.*, *Lamboll, R.D.*, *Le Quéré, C.*, *Rogelj, J.*, *Rosen, D.*, *Schleussner, C.F.*, *Richardson, T.B.*, *Smith, C.J.*, *Turnock, S.T. 2020.* Current and Future Global Climate Impacts Resulting from COVID-19. *Nature Climate Change.* 10, pp. 913–919.

Friends of the Earth. 2020. Policies for Green and Fair Recovery Plans Across the UK. [Online]. [Accessed December 02, 2020]. Available from: https://policy.friendsoftheearth.uk/policy-positions/policies-green-and-fair-recovery-plans-across-uk

Goldsmith, Z. 2020. Building Back a Green and Resilient Recovery. [Online]. July 8, 2020. London: Foreign & Commonwealth Office. [Accessed February 1, 2021]. Available from: https://www.gov.uk/government/speeches/building-back-a-green-and-resilient-recovery

Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J., and Zenghelis, D. 2020. Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change? Smith School Working Paper, pp. 20-02.

HM Government. 2020. Powering our Net Zero Future. *Energy White Paper.* London: Business Energy and Industrial Strategy.

HM Treasury. 2020a. National Infrastructure Strategy. London: HM Treasury.

HM Treasury. 2020b. Spending Review to Fight the Virus, Deliver Promises and Invest in UK's Recovery.

IEA. 2020a. Electricity Market Report. Paris: IEA.

IEA. 2020b. Renewables 2020. Paris: IEA.

IEA. 2020c. Sustainable Recovery. Paris: IEA.

IEA. 2020d. The Impact of the Covid-19 Crisis on Clean Energy Progress. Paris: IEA.

IMF. 2020. Greening the Recovery. *Fiscal Affairs.* Washington, D.C.: IMF.

IMF. 2021. IMF Fiscal Monitor Update, March 2021. Washington, D.C.: IMF.

McKinsey & Co. 2020. The £10 Trillion Rescue: How Governments can Deliver Impact. [Online]. *McKinsey & Co.* [Accessed January 18, 2021]. Available from: https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-10-trillion-dollar-rescue-how-governments-can-deliver-impact

OECD. 2020. Making the Green Recovery work for Jobs, Income and Growth. Paris: OECD.

Plan B. 2020. Young People vs The UK Government. [Online]. [Accessed January 21, 2021]. Available from: https://planb.earth/wp-content/uploads/2020/12/PR-12-Dec.pdf

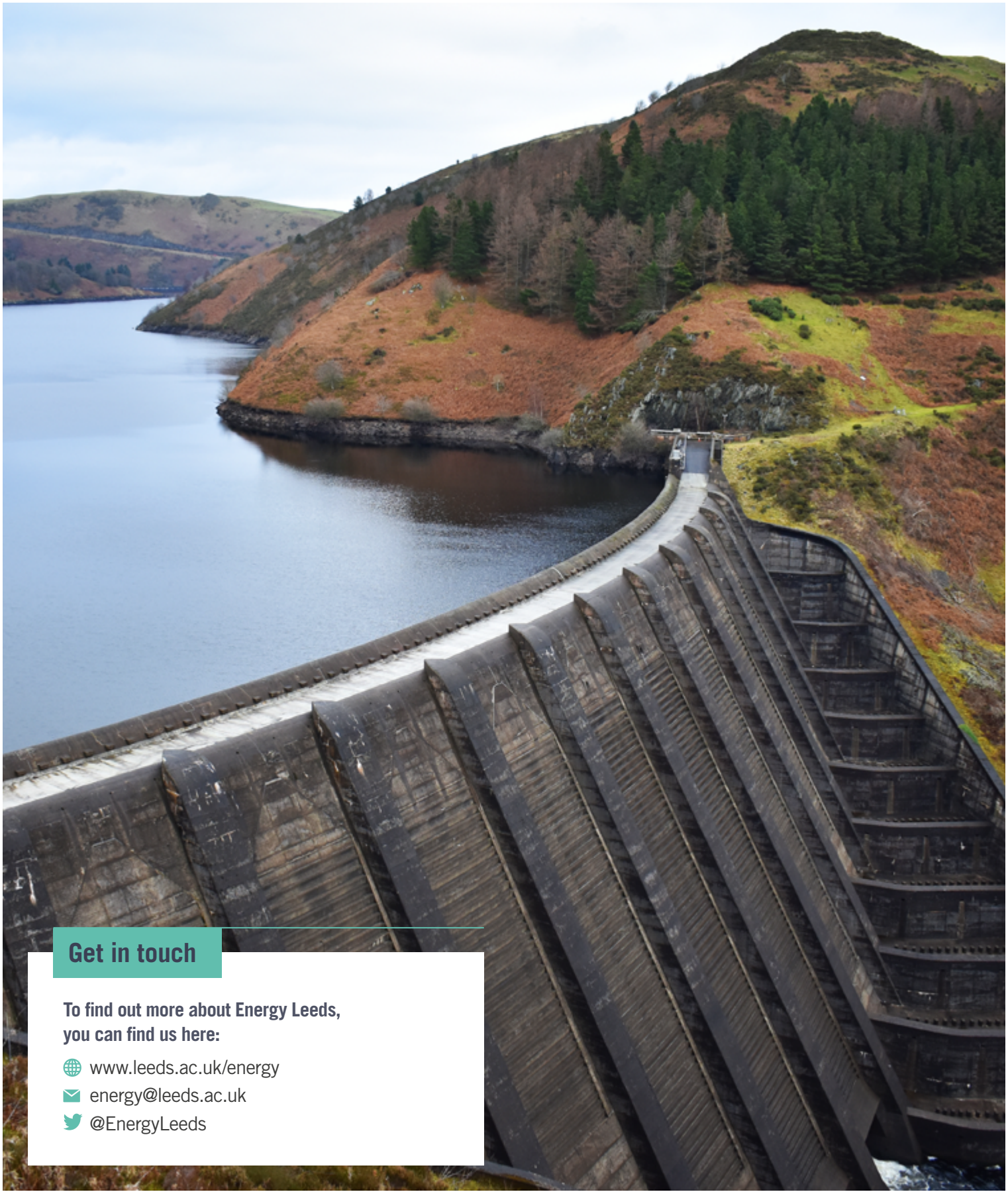
Prime Minister's Office, 10 Downing Street, Department for Transport, Department for Business, Energy & Industrial Strategy, The Rt Hon Boris Johnson MP, The Rt Hon Grant Shapps MP, and The Rt Hon Alok Sharma MP. 2020. PM Commits £350 Million to Fuel Green Recovery. London: Department for Transport, Department for Business, Energy & Industrial Strategy.

The Guardian. 2020. "Rishi Sunak's spending review 'will fail to kickstart green recovery'." *The Guardian.* November 25, 2020. [Online]. [Accessed February 1, 2020]. Available from: https://www.theguardian.com/politics/2020/nov/25/rishi-sunaks-spending-review-will-fail-to-kickstart-green-recovery

World Bank. 2020. Supporting Countries in Unprecedented Times: Annual Report 2020. Washington, D.C.: World Bank.

World Bank. 2021. Building a Green, Resilient, and Inclusive Recovery: Speech by World Bank Group President David Malpass. London: World Bank Group.

World Health Organisation. 2021. WHO Coronavirus Disease (COVID-19) Dashboard. [Online]. [Accessed February 8, 2020]. Available from: https://covid19.who.int



Get in touch

To find out more about Energy Leeds, you can find us here:

www.leeds.ac.uk/energy
energy@leeds.ac.uk
@EnergyLeeds

Energy Leeds

UNIVERSITY OF LEEDS
University of Leeds
Leeds, United Kingdom
LS2 9JT
www.leeds.ac.uk