POLITICAL INTELLIGENCE

Obstacles to Net Zero

Technological

Introduction

World leaders have not done enough to deliver on their Glasgow Climate Pact commitments. That was the frank assessment of Alok Sharma, the UK's COP26 President, at an event in May to mark six months since almost 200 nations signed the agreement at the UN Climate Change Conference. He acknowledged the world had changed since he had fought back tears and apologised after a late amendment on coal was added to the COP26 deal. War has returned to Europe, inflation is spiking, debt is mounting, energy prices are rising, and people are struggling to feed their families as the world continues to deal with the shock of the Covid pandemic, he said. "But frankly we need to up the pace," he added. When countries meet in November at COP27 in Sharm El-Sheikh in Egypt, they must show a global audience, "that though the world has changed, our resolve has not."

Hosting COP26 helped spur the UK government to try and lead by example on climate change policy. The government's Net Zero Strategy—published just before the UN conference--set out the UK's ambition to reach net zero emissions by 2050. Since then, the focus has inevitably shifted to how the climate targets will be met. "It is easy for the government to have the rhetoric and goals of achieving net zero, yet this cannot be done without making hard choices," Lord John Krebs, Professor of Zoology at Oxford University and an active participant in the Environment Act passing through the House of Lords, told Dods Political Intelligence.

To shed light on the challenges the government faces in delivering its climate change policy, Dods Political Intelligence has produced four short reports, each exploring a key obstacle to net zero: economic and financial, regulatory, technological, and social. The final report also includes a case study of how these challenges are playing out in the drive to green the NHS, the world's first national health service to commit to reaching net zero.

This third report in the Obstacles to Net Zero series explores the technological obstacles to reaching net zero. It considers a range of technological options available in a net zero future, such as electric vehicles, and considers the development of as yet unprofitable technologies such as greenhouse gas removal.

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Technological options

The Conservative government has sought to frame the issue of climate change as a hurdle that can be cleared through the development and adoption of innovative technological solutions. Its 'Ten Point Plan for a Green Industrial Revolution', published in November 2020, set out £12bn in funding across the energy, transport, and housing sectors and the development of a wide range of low carbon technologies from low carbon hydrogen to new and advanced nuclear power, greener buildings, and investing in carbon capture, usage, and storage. The plan rests on assumptions that existing green technologies can be quickly scaled up and rolled out, and that new green technologies will be developed and work as expected.

The Sixth Carbon Budget produced by the Climate Change Committee's (CCC)—the UK's independent adviser on tackling climate change—identified that the UK was already meeting some energy and economic needs through the adoption of low-carbon technologies, but that these had not yet been deployed at a scale consistent with the government's net zero ambition. The Committee pointed to the energy sector as being successful in decarbonising, highlighting that half of UK electricity generation in 2019 was from low-carbon sources, including renewables and nuclear. However, the CCC said the energy generation sector could no longer be relied upon to deliver most of the greenhouse gas (GHG) reductions – and progress must extend to other emitting sectors of the economy, such as surface transport and housing.

The CCC's balanced net zero pathway—the route to achieving an equilibrium between the amount of GHGs produced and the amount removed from the atmosphere--is underpinned by both existing green technologies, and some not yet developed. The Committee's recommendation therefore rests on assumptions that the government will continue to invest in both innovations alike. Under the balanced pathway, emissions would fall most rapidly in the electricity supply sector, and the CCC advises that mature decarbonisation options already exist for replacing fossil fuel generation with renewable energy sources. Presenting more of a challenge are the buildings and transport sectors, and the CCC's modelling suggests that the markets and supply chains for low-carbon technologies such as heat pumps and electric vehicles will peak in the 2030s, following technological advances in the 2020s.

Whilst the CCC's balanced net zero pathway supposes that innovation will play a key role, it also rests on the assumption that behavioural change and resource demand management will be equally crucial. Other pathways that would enable the UK to reach net zero envisage how widespread innovation or widespread public engagement (more on this in the Dods UK Political Intelligence report on social obstacles to net zero) could positively impact the UK's ability to reach net zero, with the CCC's analysis finding that new innovations could see the UK meet its aims up to five years earlier. The selection of these two vectors of innovation and public engagement suggests that whilst both are necessary to fully decarbonise the economy, there is an interplay between the two. That could mean the public's reluctance to make major lifestyle changes toward low carbon behaviours, as reflected in some recent polling, could be counteracted through higher levels of green innovation. This highlights the importance of the acceleration of the rollout of those technologies which could enable easy green swaps.

The rapid growth of the electric vehicle (EV) market, like the development of wind power, is one such success. Whilst the initial uptake of EVs was slow, due to their high cost and underdeveloped charging infrastructure, demand has grown and they accounted for one in six new cars bought in the UK in 2021. The growth of the EV market and the economic success for

manufacturers, combined with extensive incentivisation schemes aimed at individuals and business alike, have shown that switching from petrol- or diesel-powered cars offers consumers a greener option that does not require a major change in their day-to-day life. Although public transport and active travel options are less carbon intensive, consumers appear to be more interested and more encouraged to make the simpler switch to an EV rather than taking the more drastic step of not owning a private vehicle at all. The government's decision to bring forward a ban on the sale of new petrol and diesel cars by a decade to 2030 is also expected to play a part in developing the EV market. However, some carmakers expressed disappointment in mid-June when the government announced it was ending subsidies for electric cars to focus its funding on expanding the public chargepoint network.

Developing as yet unprofitable technologies

One of the key challenges to achieving the UK's climate goals is how to drive significant investment in developing technologies that are either currently unprofitable or still in the theoretical or early phase of testing. A prime example is greenhouse gas removal (GGR) technologies, which the government considers to be a key weapon in its armoury to address residual emissions from sectors unlikely to fully decarbonise by 2050. GGR technologies range from afforestation—planting of trees to create a new forest, often on land not previously forested--to more theoretical forms of climate engineering such as ocean fertilisation, adding nutrients to the upper layers of oceans to boost activity of microscopic phytoplankton activity so it takes more CO2 out of the atmosphere. Two of the most common negative emissions technologies are bioenergy with carbon capture and storage, known as BECCs, and direct air carbon capture and sequestration, known as DACCS, which actively remove greenhouse gases from the atmosphere. While the government considers such technologies essential for achieving net zero, there is currently only one BECCS scheme underway in the UK. There are also concerns around the practicality of DACCS, especially its cost, scalability and the amount of electricity needed to operate it, which has deterred investment.

The House of Commons Environmental Audit Committee (EAC) concluded an inquiry on GGR and negative emission technologies (NETs) in March 2022. It found that while net zero "cannot be met" without these technologies, and the government was "failing to take swift enough action to roll out technologies, with both BECCS and DACCS at close to zero levels of deployment in the UK." It called for greater investment in the Biomass Strategy, which the government has said it will publish in 2022. The government's Biomass Policy Statement, published in November 2021, sets out its aims for biomass use across the economy, such as in electricity, heat, transport and industry sectors.

The EAC has warned of the potential signals that such technologies can give to industry without proper regulation, and advised that relying on the future potential of, as yet untested and unproven negative emission technologies to tackle climate change, could prove counterproductive if it reduces **the incentive for industries to prioritise cutting emissions. Philip Dunne, the Conservative chair of the EAC, states these technologies have not yet been developed at scale, and their impacts are not fully understood, making it inappropriate for firms to integrate these targets into their carbon reduction strategies. "Negative emissions technologies** are at close to zero level of deployment in the UK, and it is clear through our work that a lot of detail is yet to be fully explored by the government," he told The House *recently*, adding that the biodiversity implications of NETs was also not properly understood. This moral hazard argument would

appear to support the case for more rapid investment in GGR and negative emission technologies.

In October 2021 the government set the ambition of deploying at least 5 MtCO2/year of engineered greenhouse gas removals by 2030. Recognising the need to stimulate private sector involvement, the Net Zero Strategy says the government will need to "develop markets and incentives for investment" in GGR technologies and BEIS launched two consultations on proposed business models for the sector in April 2022. The government has also launched £100m innovation funding for Direct Air Carbon Capture and Storage (DACCS) and other GGRs, envisaging "significant deployment of mature BECCS technologies and commercial scale deployment of DACCS" by 2030.

One key challenge for the government and investors alike is deciding whether to focus finite financial resources on technologies with already proven potential or invest in a broader portfolio that includes those unproven at scale. There are also questions about whether the government should try to pick "winners" or let the market make these decisions. For example, while some have heralded the potential of hydrogen for heating homes, others have questioned its scalability across geographies. Clarity on which technologies are deemed to have government investment potential and long-term policy support is likely to be key in signalling to the private sector that certain technologies make a promising business case.

Alongside policy support, investors will need to be convinced that a sufficiently large customer base exists for them to invest in emerging technologies. As clean heat technologies are rolled out in homes across the country, they would likely benefit from a consumer awareness campaign to extoll the benefits of clean heat, as well as a consumer protection deal and impartial advice service, especially following the demise of schemes such as the Green Homes Grant, which has unsettled investor confidence. New technologies cannot be introduced in isolation either. For example, it would be ineffective to rollout new heat technologies without also upgrading the energy efficiency of the UK's aged housing stock, which is among the leakiest in western Europe. Green industries across the UK have proven that clean technologies can be rapidly scaled to become much more affordable, especially those that have benefitted from government support schemes. Offshore wind, for example, became around 60 percent cheaper in the UK in the decade to 2020, while battery technologies for electric vehicles became around 90 percent cheaper.

About Dods Political Intelligence

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