

Consultation response: 'Clean Growth Strategy'

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This is a submission by the ESRC Centre for Climate Change Economics and Policy and the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science to the consultation on the UK Government's *Clean Growth Strategy*, which was published on 12 October 2017. It includes comments on the overall Strategy, and specific comments on key sections of the document.

Overall Strategy

The Strategy should represent the Government's statutory fulfilment of its responsibility, created by the Climate Change Act (2008), to set out proposals and policies for meeting the Fourth and Fifth Carbon Budgets, covering the periods of 2023–2027 and 2028–2032, respectively. Unfortunately, the Strategy fails to do this. As the Technical Annex acknowledges, the additional policies outlined in the Strategy are projected to be insufficient to limit domestic emissions of greenhouse gases over the period between 2023 and 2032 to meet the Fourth and Fifth Carbon Budgets (p.145). Emissions are projected to exceed the Fourth Carbon Budget by 116 million tonnes of carbon-dioxide-equivalent (CO₂e), and the Fifth Carbon Budget by 167 million tonnes of CO₂e.

Updated projections (Department for Business, Energy & Industrial Strategy [BEIS], 2018) published by the Government in January 2018, to take account of the new policies and proposals contained in the Strategy, indicate a slightly smaller failure to achieve the Fourth and Fifth Carbon Budgets through domestic reductions in emissions between 2023 and 2032. They project that emissions will exceed the Fourth Carbon Budget by 64 million tonnes of CO₂e, and the Fifth Carbon Budget by 116 million tonnes of CO₂e.

It is additionally unfortunate that the Strategy's Executive Summary does not include a clear acknowledgement of the projected shortfall in emissions reductions, but instead claims 'in this Strategy we have set out stretching domestic policies that keep us on track to meet our carbon budgets'. However, it also states that 'we are prepared to use the flexibilities available to us to meet carbon budgets, subject to the requirements set out in the Climate Change Act, if this presents better value for UK taxpayers, businesses and domestic consumers'. This is not persuasive. The Fourth and Fifth Carbon Budgets were set on the advice of the Committee on Climate Change, which seeks the most cost-effective path towards the goal of reducing annual emissions by at least 80 per cent by 2050 compared with 1990. Any significant deviations from the path recommended by the Committee is likely to mean emissions reductions are not achieved cost-effectively. We expect the Committee to examine this issue in detail when it responds in early 2018 to the publication of the Strategy.

Nonetheless, the Strategy correctly recognises that the transition to a low-carbon economy should not only enable the UK to reduce its annual emissions of greenhouse gases in line with the Climate Change Act and its contribution to the Paris Agreement, but also should provide a source of sustainable economic growth over the next few decades. This is a welcome contrast to the Green Paper on the Industrial Strategy, published by the Government in January 2017, which wrongly characterised action on climate change as a drag on economic growth. Numerous studies show, for instance, that investments in low-carbon innovation create spill-overs that benefit the wider economy (e.g. Dechezleprêtre et al., 2016), and that there is growing demand from both inside and outside the European Union for the UK's low-carbon goods and services (e.g. Carvalho and Fankhauser, 2017).

Building on the UK's strengths: green finance

The Strategy correctly recognises the UK's leadership on green finance, and the potential for further expansion of low-carbon financial products and services. The creation of the Green Finance Taskforce should provide the Government with expert advice and guidance in this area. The Taskforce should focus on the following four main areas.

First, clear and forward-looking policy will be necessary to encourage funding in sustainable infrastructure and clean technologies from private equity firms, institutional investors and capital markets. The Taskforce should focus its discussions with the private sector on the concrete commitments it is seeking from the UK Government in order to increase investors' confidence, particularly in energy efficiency, transport beyond 2020, carbon capture and storage, and mature low-carbon energy generation.

Second, public sector support may be necessary to help crowd in private sector investment. Although there is interest and capital available, investors remain uncertain about the risk-return profiles of available projects, particularly in emerging technologies. The sale of the Green Investment Bank and the lack of clarity around the UK's relationship with the European Investment Bank have created additional uncertainty. We recommend the Taskforce examines in more detail what types of projects might be affected by the change in the ownership of the Green Investment Bank, and the potential loss of funding from the European Investment Bank, and that it investigates the need for additional support from the public sector through other channels.

Third, mobilising capital markets and institutional investors will also be key to scaling up finance for the low-carbon transition. To mobilise capital markets, investors could benefit from additional information about investment risks and opportunities in high- and low-carbon assets, and from greater availability of sustainable financial products such as green bonds. We suggest that the Taskforce focuses on how best to incorporate climate-related risk into existing financial disclosure processes and how to support the issuance of bonds for renewable energy and other low-carbon projects, for example through standardisation.

Fourth, further work is required to ensure that green and sustainable finance supports clean growth in all parts of the UK – the so-called 'place-based agenda'. There is growing interest from local authorities across the UK in mobilising green finance for their areas, but no structured framework for interacting with financial institutions. Community energy projects are showing positive signs, but remain sub-scale. We suggest that the Taskforce works with the finance sector, local authorities and others to develop a shared agenda on how the UK's strong capabilities in green finance can be better connected with local needs.

The Strategy states that the Government's actions will include: 'Working with mortgage lenders to develop green mortgage products that take account of the lower lending risk associated with more efficient properties and the reduced outgoings for customers living in more efficient homes' (p.49). While supporting energy efficiency can be an effective way of reducing energy costs for households and businesses at the same time as reducing greenhouse gas emissions (Committee on Climate Change, 2017; Department of Energy and Climate Change, 2014), there is very limited evidence that this leads to lower risks for mortgage lenders. It is important that policymaking on the topic of green mortgages is based on robust evidence and is realistic about the impact of the proposed intervention.

The claim that energy-efficient households have lower mortgage default risk is intuitive, but it needs better empirical corroboration. Robust empirical analysis of the relationship between energy efficiency and mortgage default is limited; one study from the United States is often cited (Kaza et

al., 2014), from which it is difficult to draw conclusions for the UK. In particular, it is not clear whether or not the study presents a sufficiently convincing case for causality instead of correlation – that is, if higher energy efficiency is indeed the explanation for better repayment behaviour. There is evidence that indicates energy efficiency measures tend to be adopted by those with higher incomes as well as those with greater concern for the environment (Allcott et al., 2015). Higher income is also associated with better repayment behaviour. Kaza et al. (2014) try, in part, to control for this by using credit scores and average income, but the authors did not have access to household-level data on income and so were using average incomes for zip code areas in the United States. Hence, one cannot be confident that the authors eliminated the possibility that income level or another underlying omitted variable is associated both with energy-efficient mortgages and lower default risk. Also, given that the study is based on 75,000 owner-occupied households largely concentrated on the east coast of the United States, it is unclear to what extent its results are generalisable to other geographies.

It would therefore be useful to have UK-based evidence before proceeding with policies or proposals that assume green mortgages have a lower default rate, and the Government should seek further evidence on this issue for the UK.

The Government should also identify the most significant barriers to energy efficiency, including not just the availability of financial support for energy efficiency improvements, but also their design. As noted in the submission by McCoy and Neuweg (2017) to the Government's consultation on the Green Deal Framework, householders who were offered financing for energy efficiency improvements did not take up the offer as anticipated, in part because of a lack of awareness, administrative complexity and because the interest rates offered were not sufficiently attractive.

The growing rental market in the UK also creates mismatched incentives, as the householders that would benefit from lower energy costs are not the ones who are taking out mortgages. So, while encouraging the private sector to develop green mortgage products could be useful, it is unlikely, on its own, to be sufficient to provide a widespread boost to energy efficiency.

In summary, the Government should seek more research about the link between green mortgages and defaults before proceeding in this area. Efforts to encourage energy efficiency via green finance should also consider the design of the scheme on the supply side. The Government should also link up policies to increase demand for energy efficiency, through raising minimum standards for rental properties, for example.

Delivering clean, smart, flexible power

The Strategy states that emissions from the power sector 'could need to be close to zero' by 2050, or even negative, by generating electricity from bioenergy with carbon capture and storage. It also recognises that these emissions cuts must be achieved even as decarbonisation of other sectors, such as transport, leads to an increase in demand for electricity. The Strategy outlines a pathway for the power sector consistent with these objectives, through which annual emissions are reduced from about 80 million tonnes of carbon-dioxide-equivalent in 2017 to 16 million tonnes in 2032 (the end of the Fifth Carbon Budget period), and 4 million tonnes or less by 2050. However, it is unclear if the policies and proposals outlined in the Strategy will be sufficient to achieve this pathway.

The Strategy's Technical Annex suggests that current policies would reduce annual emissions from the power sector to 15 million tonnes CO₂e by 2032 (p.147). However, it seems unlikely that current policies, particularly in relation to support for low-carbon electricity generation and carbon pricing, could deliver such a reduction.

The baseline for the Strategy's claims about the power sector are projections published in March 2017 by the Department for Business, Energy & Industrial Strategy (BEIS). The Strategy notes that these projections have been revised and 'takes into account changes in electricity demand due to other changes in energy-consuming sectors, such as transport, homes and industry', as well as 'a number of model updates and improvements', which affected 'the electricity demand profiles of key technologies and how this demand might be shifted, the availability of electricity storage technologies, and assumed system operability requirements' (p147; footnotes to Table 6). No further details about the updated projections to 2032 are provided in the Strategy, other than to note that unabated coal will be phased out by 2025 and low-carbon sources of power will provide more than 80 per cent of electricity generation by 2032.

The updated projections were eventually published by BEIS (2018) in January 2018, and provide some additional insights into the assumptions that the Government is making. The reference case indicates that annual electricity supply increases from 324 to 328 terawatt-hours between 2016 and 2018, then declines irregularly to 272 terawatt-hours in 2025 before increasing to 368 terawatt-hours in 2035. The proportion of electricity generated by low-carbon sources is projected to change from 44.4 per cent in 2016 to 57.6 per cent in 2020, 69.1 per cent in 2025, to 80.1 per cent in 2032 and to 82.9 per cent in 2035. The reference case assumes that no carbon capture and storage is used within the power sector until 2035. The amount of electricity supplied by renewables is projected to rise from 79 terawatt-hours in 2016 to 149 terawatt-hours in 2025 and 175 terawatt-hours in 2032. It should be noted that the actual amount of electricity generated by renewable sources in 2016 was 83.2 terawatt-hours, according to BEIS (2017c).

The Technical Annex of the Strategy also outlines three potential pathways to 2050: one in which decarbonisation across all sectors is achieved by increasing electrification, one in which hydrogen is used for transport and heating, and one in which bioenergy, carbon capture and removal enable the power sector to reach net negative emissions of 22 million tonnes CO₂e by 2050 (Table 10).

The Government has already secured new renewables capacity through two auction rounds of Contracts for Difference. The results of the first auction, published in February 2015, resulted in funding for 25 projects with a combined capacity of 2.1 gigawatts. Assuming that these operate at the average load factor cited by Her Majesty's Treasury (2017a), they will generate about 8 terawatt-hours annually from 2018–19. The results of the second auction, published in September 2017, resulted in funding for 10 projects with a combined capacity of about 3.3 gigawatts. Assuming that these renewables operate at the average load factor cited by Her Majesty's Treasury (2017a), they will generate about 14 terawatt-hours annually from 2022–23. In addition, the Government signed earlier contracts for eight projects through the Final Investment Decision Enabling for Renewables, with a combined capacity of about 4.5 gigawatts. About 3.5 gigawatts is still to be delivered, and assuming that these renewables operate at the average load factor cited by Her Majesty's Treasury (2017a), they will generate about 15 terawatt-hours annually from 2021–22. Based on these calculations, contracts already exist to generate an additional 37 terawatt-hours annually from renewables before 2025, which is significantly short of the rise assumed by that date in the January 2018 projections.

The Strategy also confirmed that up to an additional £557 million (in 2011–12 prices) would be made available to support less established renewables, including offshore wind, with the next auction of Contracts for Difference scheduled for Spring 2019. It is not clear if this will be sufficient to ensure additional renewables capacity in line with the Government's projections. Her Majesty's Treasury (2017b) published in its Autumn Budget 2017 the results of its review of support for low-carbon power through the Levy Control Framework. It concluded that it would respect all existing contracts for low-carbon electricity, plus the £557 million (in 2011–12 prices) earmarked for further rounds of auctions of Contracts for Difference, but 'no new low carbon electricity levies until 2025'. The

decision by Her Majesty's Treasury to prevent any further support for low-carbon electricity before 2025 could imperil the Government's plans for the development of renewables and hence the achievement of the Fourth and Fifth Carbon Budgets.

The Strategy makes clear that the Government will continue to rely primarily on technology-specific subsidies to increase the amount of electricity generated by renewables. However, as noted by Curran et al. (2017), once renewables have overcome the market failures that currently favour fossil fuels, carbon pricing, rather than subsidies, would be a more cost-effective policy for reducing emissions of greenhouse gases. However, they acknowledged that the proportion of electricity generated annually, on an output basis, from coal had reduced rapidly, from 39.2 per cent in 2012 to 9.0 per cent in 2016. The Government has attributed the dramatic drop from 22.4 per cent to 9.0 per cent between 2015 and 2016 to the increased Carbon Price Support Rate of £18 per tonne of CO₂e, which took effect in April 2015 (BEIS, 2017c). It should be noted that, although the proportion of electricity generated by renewables rose from 8.1 per cent in 2012 to 25.7 per cent in 2016, the share from natural gas increased over the same period, from 27.5 to 42.2 per cent.

The Government has not published details of its assumptions for the January 2018 projections about the development of the carbon price. The previous projections, published in March 2017, used assumptions about the development of the carbon price that were described by BEIS in November 2016. The total carbon price, consisting of the carbon price in the European Union Emissions Trading System plus the Carbon Price Support Rate of £18 per tonne of CO₂e, remains constant in real terms after 2020–21. However, the projected price in the EU Emissions Trading System exceeds the total carbon price from the mid-2020s, and reaches about £35 per tonne in 2030 (in 2012 prices). Beyond 2030, the total carbon price increases linearly to about £200 per tonne in 2050 (in 2012 prices). Neither the March 2017 nor the January 2018 projections explicitly indicate what assumptions were made about support for low-carbon power. The report of the 2018 projections states that the Government is unable to provide a breakdown of the individual effect of each of the policies affecting greenhouse gas emissions from electricity generation, 'due to the highly interrelated nature of power supply markets'.

In its Autumn Budget in November 2017, Her Majesty's Treasury published the results of its review of carbon pricing. It concluded that the current total carbon price (consisting of about £6.50 per tonne of CO₂e in the EU Emissions Trading System and the Carbon Price Support Rate of £18 per tonne) is 'set at the right level', and 'will continue to target a similar total carbon price until unabated coal is no longer used'. The Treasury has refused to publish any details of its analysis.

Curran et al. (2017) warned that the current low level of the total carbon price in the UK traded sector is inconsistent with the recommendations of the High-Level Commission on carbon prices, which was co-chaired by Joseph Stiglitz and Nicholas Stern. The Commission's final report (Stiglitz et al., 2017) estimated that the appropriate carbon price across the world will need to be US\$40–80 (£31–62) per tonne of CO₂e by 2020, and US\$50–100 (£39–77) per tonne of CO₂e by 2030, to be aligned with meeting the goals of the Paris Agreement.

The Government's 2018 projections suggest that the amount of electricity supplied by coal will decline from 29 terawatt-hours in 2016 to 6 terawatt-hours in 2025, and thereafter to zero. Although Her Majesty's Treasury indicated that the current level of the total carbon price should be enough to ensure that coal without carbon capture and storage is eliminated from the power sector by 2025, other analysts have urged caution. For instance, Aurora Energy (2017) has warned that coal may enjoy a revival in the 2020s against natural gas as a source of electricity. They warn that the price of natural gas could increase following the end of the current 'glut' in the supply of liquefied natural gas, and coal prices could fall due to lower consumption levels in China.

It is not clear from the Strategy and other government publications when, if ever, the carbon price applied to the UK power sector will increase significantly. In the absence of a signal of a strong carbon price in the medium to long term, it is unlikely that there will be increased investment by the private sector in low-carbon sources that are not already available. In particular, the low carbon price does not encourage investments in carbon capture and storage. This could be a serious policy error as carbon capture and storage combined with bioenergy is currently the only feasible option for achieving negative emissions, and without this technology, the UK is unlikely to be able to make a full contribution towards the goals of the Paris Agreement and an ambition to reach zero net emissions.

Climate science

The Strategy includes a section in Annex C that outlines the rationale for tackling climate change. It is important to note that awareness of the risks of climate change, both in the UK and abroad, increases support from business, communities and individuals for policies and proposals to reduce emissions, such as those included in the Strategy. Despite its importance, no government department or agency currently takes lead responsibility for raising awareness of the risks of climate change. The most recent tracking survey in March/April 2017 commissioned by BEIS shows that while 71 per cent of the public is fairly or very concerned about climate change, only 43 per cent agrees with the scientific consensus that human activities, such as greenhouse gas emissions, are the dominant cause.

There is a particular weakness in the way in which government departments and agencies communicate about the impacts of climate change in the UK. No government department or agency has lead responsibility for this and the Government has refused to accept the advice of the Committee on Climate Change that this should be given higher priority. The Environment Agency has ended support for local climate change partnerships which communicated to communities and businesses about the impacts of climate change. The Met Office still fails to communicate adequately about the impacts of climate change in the UK. For instance, it did not discuss climate change in its most recent report about the state of the UK climate (Kendon et al., 2017), and did not mention climate change when announcing that 2017 was the fifth warmest year for the UK since records began in 1910. The UK's nine warmest years on record have occurred from 2000 onwards, along with six of the seven wettest years. Climate change is making the UK warmer and wetter, with increased risks from extreme weather such as heavy rainfall and heatwaves.

The Strategy notes six key research priorities in its Annex C. It should also include a priority for communicating about climate change, particularly its current and future impacts in the UK.

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