

Prime Minister  
10 Downing Street  
London SW1A 2AA

30 January 2020

Dear Prime Minister

### **Achieving net zero through a whole systems approach**

In June 2019, the UK became the first major country to legislate for a net-zero target for carbon emissions by 2050. There is strong public support for Government enabling this change and the UK has world-leading capabilities in research and innovation to help inform the approaches we might take, but we must not underestimate the scale of this challenge.

Achieving net zero will require fundamental changes in our society and economy. Given the long timescales required to get innovation into individual homes and businesses and the scale of behaviour change needed by individuals, communities and institutions, we must start now.

Because of this we should not rely on the invention of new, breakthrough technologies to achieve net zero by 2050, though many will arise and prove their worth. The challenge today is to put in place the right infrastructure to implement and improve known and emerging technologies at scale, and to make the challenging policy decisions required to drive change across the whole system.

This will require very strong leadership from government, an open dialogue with citizens and innovative approaches to policy making and delivery across the UK, working with devolved administrations, local authorities and industries.

To support this, the Council for Science and Technology (CST) considered ***how the Government might use a disciplined and rigorous whole systems approach to deliver a better transition towards the net-zero emissions target (an integration of all relevant components as is often used in engineering to address complex and problems with many changing elements).***

We believe that a rigorous systems approach will reveal the effects that policy decisions in all areas of government will have on delivery of net zero, enabling

decision-makers to understand how different policies interact and influence the transition of the whole economy towards net zero. It will also enable government to understand the interaction between mitigation, adaptation and resilience, including the need to protect biodiversity and wider sustainability initiatives.

To support this, it is essential that decisions in both government and business are informed by access to data and analysis to understand the system. Understanding the interaction between societal and economic behaviours will enable Government to shape policies and regulations to create a market environment that increases consumer and business demand for low-carbon solutions and encourages sustainable private sector investment decisions.

We propose that a systems approach will also enable the leadership required to drive behaviour change across all areas of the economy, helping to guide decisions taken by individual citizens, businesses and investors. All need to hear consistent strong messages at a national level about the agreed pathways to achieving net zero and expected implications for sectors across the economy to give them confidence to invest and move at pace.

This overall pathway needs to demonstrate that it will minimise costs and support delivery of wider social and economic objectives to encourage other countries to follow our leadership and to ensure that our emissions are not simply exported.

Place will be an important lens through which to consider potential pathways and the implications of action on net zero. There will be opportunities to reinvigorate local economies in some areas as industry is decarbonised and different natural resources become increasingly important. Government has a responsibility to consider and manage the impacts in areas where existing industries will be disrupted.

We strongly believe that investment in R&D will be an essential part of the drive to decarbonise the economy both in the UK and overseas. Strong investment in fundamental research will give us the knowledge and capability to address a range of future needs that may not yet be fully understood. A triple track approach is needed (discover, develop, deploy) with greater emphasis on the R&D required to deploy and remove barriers to market-ready technologies that could help to mitigate climate change, and to accelerate those that are in advanced stages of development.

Drawing on the application of systems engineering, we offer recommendations on how a disciplined and rigorous systems approach may be used by Government to support the transition to net zero. Our recommendations fall into three parts:

- 1. Strengthen the institutions, governance frameworks and leadership structures needed across central government to galvanise action to achieve net zero.**

- The newly established Cabinet Committee on Climate Change should ensure the net-zero target is translated into all areas of government responsibility. This is essential to guide the development of specific actions needed in the coming years to achieve net zero by 2050. Strong leadership from the Committee is essential to maintain a sense of urgency and accountability;
- The Cabinet Secretary should establish a multidisciplinary operational group to support the development of the strategy and drive delivery across government;
- Government should develop a stronger, better integrated analytical hub to:
  - a) provide Ministers and the operational group with a broader understanding of systems and the interactions between technical, economic, environmental and social factors relevant to achieving net zero.
  - b) publish and share evidence and models and leverage the host of actors who wish to collaborate on this endeavour, making data available to inform decisions taken at a regional or local level.

## **2. Develop the analytical capability, flow of information, and reporting needed to inform decisions**

- Government should require all regulators to develop an explicit first-order objective to support the transition to net zero by 2050. This must be designed to support innovation and its implementation.
- To enable transparency and accountability across government, we recommend that government undertake and publish carbon emissions assessments for all public sector policies, including major infrastructure projects or investments.

## **3. Maximise the contribution of technology, mobilise financial systems and galvanise international collaboration**

- the Government should bring together public sector funders to develop a bold, coherent, mission-driven programme of public sector research and innovation investment to achieve net zero. This body should have the authority to influence spending decisions across departments, provide strategic direction for UKRI programmes and develop opportunities for leveraging business activity;
- To further support deployment of decarbonisation technology and infrastructure, the government should consider establishing a national infrastructure investment bank, with an explicit mandate to support the transition to net zero, to help manage risk, partner with the private sector, and bring down the cost of finance;
- To help households, businesses and public service providers make the investments needed to deliver the transition to net zero, the government should work with private sector financial institutions to establish frameworks and instruments to give them access to the required finance and support;
- Government should announce a clear, credible domestic plan for achieving net zero to set an example that could help inspire international action and commitment under presidency of the COP26 in Glasgow. It should build the

objective of fostering international action into its work and international collaborations on trade, investment, finance, technology, capacity building and R&D.

The attached paper expands on these recommendations and offers further detail on the application of a whole systems approach to meeting the challenge of delivering net zero by 2050. We would be pleased to discuss these recommendations with you or your Ministerial colleagues.

We are grateful to Lord Stern of Brentford (Chair, Grantham Research Institute, LSE) for leading this project with support from Professor Peter Bruce (Professor of Materials, University of Oxford, Vice President of the Royal Society); Suranga Chandratillake (General Partner, Balderton Capital); Dr Paul Golby (Chairman, Costain Group plc and NATS Ltd); Dame Ottoline Leyser (Director, Sainsbury Laboratory, University of Cambridge); Sir Jim McDonald (President, Royal Academy of Engineering); Dervilla Mitchell (Director, Arup); Colin Smith (former Director, Engineering and Technology at Rolls Royce); Professor Joyce Tait (Director, Innogen Institute, University of Edinburgh). We are also grateful to the policy teams and fellows at the Royal Academy of Engineering and Royal Society who helped inform our thinking.

We are copying this letter to the First Secretary of State, the Chancellor of the Exchequer, the Secretary of State for Business, Energy & Industrial Strategy, the Secretary of State at the Department for Environment, Food and Rural Affairs, the Secretary of State for Transport, the Minister of State for Universities, Science, Research & Innovation, the Chancellor of the Duchy of Lancaster, the Secretary of State for Housing, Communities and Local Government, the Cabinet Secretary, the Permanent Secretaries at BEIS, DEFRA, DfT and MHCLG and the Chief Executive of UK Research and Innovation.

Yours sincerely,



**Sir Patrick Vallance  
(co-Chair)**



**Professor Dame Nancy Rothwell  
(co-Chair)**