Written evidence submitted by National Engineering Policy Centre (NZG0082)

National Engineering Policy Centre Response to BEIS Select Committee Inquiry into Net Zero Governance

Key messages

1. A recent IPCC report[1] demonstrates the need for governance and regulatory approaches that embed an effective and just transition to net zero. The latest Climate Change Committee (CCC)'s 2021 Progress Report to Parliament states that government progress has been slow on overarching challenges towards net zero. There is a need for strong governance of the transition within government to ensure policy decisions are routinely made compatible with net zero.[2]

2. The UK's system of legislative governance, built around the CCC, is world leading. However, there is no formal system of governance for translating high-level targets to national and local levels. A model which provides a credible and comprehensive plan accounting for all emitting sectors is urgently needed. The right system could accelerate progress on emissions reduction and unlock new solutions across all sectors of the economy while addressing existing needs of communities in the UK.

3. The UK has achieved a significant amount of progress toward decarbonisation. This has been predominantly 'in the background' without significant disruption to individual lives and behaviours. This is no longer possible. As engineers and technologists, we know that technology alone cannot deliver net zero. The benefits technology offers will only be realised with sustained effort, changes to the way they are valued, increased and sustained public buy-in, and well-resourced mission-based approaches to innovation[3].

4. Many technologies needed for decarbonisation are available for use but have not been implemented or used at scale due to shortcomings in other areas. Sustainability is often not valued appropriately in policy and finance decision-making. Whole system thinking that places the goal of decarbonisation and the needs of communities at the forefront, while also understanding the context in which technologies may be used or misused, will produce the smoothest and most beneficial transition to net zero.

5. Government must recognise the opportunity for a 'sociotechnical transition', across all levels of government and within the wider economy and public. An estimated 43% of emissions reduction required to reach net zero by 2050 will come from measures combining low-carbon technologies with societal or behavioural changes and 16% through largely societal or behaviour changes.[4] An enabling

[1] Climate Change 2021: The Physical Science Basis, IPCC, 2021
[2] 2021 Progress Report to Parliament, Climate Change Committee, 2021,
[3] Radical Innovation, Royal Academy of Engineering, 2020

environment that provides low carbon personal choice is required. There is a rich evidence base showing that policy and technological interventions for decarbonisation are de-risked and improved by deliberative and inclusive public engagement.

Question one

What are the key requirements for a governance structure that can deliver cross-Government climate action at the pace, scale and over the duration required to meet the carbon budgets and the 2050 net zero target?

A) Are the Government's existing net zero governance structures effective in this role, both in terms of coordination across Whitehall, and coordination with the devolved administrations and local and regional authorities?

6. There is a significant gap between how we currently govern and control carbon emissions and the transformation required across several vital, interconnected systems of infrastructure, regulation, finance and human behaviour. This must occur at unprecedented speed and be maintained over a far longer timescale than current policy horizons of governments.

7. Reaching net zero requires maturing new industries and ensuring the transition improves outcomes and wellbeing. The scale of change and potential impact on vulnerable communities means that governance and scrutiny mechanisms must ensure policies are both sufficient and fair. This will require frank consideration of who bears costs and who benefits and should be informed by deliberative engagement with stakeholders and publics.

Terminology

8. Question one notes the need for 'coordination' which can be interpreted as requiring direct administrative control. While there are areas where more direct and purposeful coordination of this kind is needed within government, there are others where for example greater levels of devolution to regional and local levels are the best option.

9. Models of governance sit on a spectrum between tightly controlled co-ordination through to 'alignment', achieved through shared goals and principles leaving room for experimentation and innovation. In many areas, net zero is likely be achieved through enabling innovation at local and regional levels and this may be better achieved through 'alignment' rather than top-down 'coordination'. An example of this approach is the Nationally Determined Contributions (NDCs) submitted by nations. Replication of this at the sub-national level, combined with appropriate shared understanding of the parameters for change and mechanisms for scrutiny and assurance, would be an example of encouraging alignment.

The current governance system

10. The CCC is an example of innovation in governance, making the UK a leader in responding to climate change. Its technical role analysing commitments and setting legally binding targets based on the best expertise and evidence will remain crucial at the parliamentary and legislative level. Carbon budgets are set by the CCC on a national basis without prescription of how they are to be reached[5] and no formal system for translating them into policies and delivery sub-nationally. Often this has not provided the stability needed by investment and engineering communities to fund and build capacity to decarbonise. Decarbonisation is generally approached by policymakers with strategies for individual sectors.

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[4] The sixth carbon budget: the UK's path to net zero, Climate Change Committee, 2020
Figure B2.2, Role of societal and behavioural changes in the Balanced Net Zero Pathway (2035).
[5] *Net Zero – how government can reach its target*, Institute for Government, 2020

11. Without a broader strategy threading through all government policy and accounting for connectivity and mutual dependence across sectors (e.g. energy and transport), failures may cascade[6] and result in serious infrastructure failures with severe consequences for those affected and for reaching net zero[7].

12. Current systems of net zero governance focus primarily on regulating the supply of materials and energy. This is not effective where human choices and behaviours play a prominent role in the outcome and policies addressing demand reduction are required.

What must a net zero governance system accomplish?

13. The speed required, risks associated, and potentially transformative benefits of reaching net zero requires[8]:

    a) A vision and strategy for the social, political, economic and technological basis for reaching net zero with strategies that produce demonstrable action through clear responsibilities and timeframes.
    b) An administrative and cultural shift towards a greater risk appetite and faster deployment of solutions at scale, with acceptance of and learning from higher failure rates.
    c) Accounting for the high levels of uncertainty associated with reaching net zero, balancing what can be planned with high degrees of certainty and where flexibility and continuous adaption are needed to accommodate unexpected changes.
    d) Security and greater certainty on the key national policies and decisions which will impact planning at devolved, regional and local levels, enabling investment to bring crucial new economic sectors online.[9]
    e) New forms of collaboration in policy with the public and private sectors and civil society to ensure public understanding and consent, ideas and needs are harnessed, and the necessary behavioural changes are deliberated on and enabled.
    f) Emission reduction plans in each sector that translate into reduced real emissions, avoiding offshoring or other high-emission activities.
    g) Checks against unanticipated potential impacts, especially that would 'lock in' high-carbon pathways.[10]
    h) Independent and transparent expert assurance of outcomes and the technical capacity and access to data this requires. Crucial will be whether outcomes 'add up' to net zero without presenting other unacceptable risks such as those associated with democratic mandate, finance and alignment with global strategies and/or geopolitics. This will require a timely and transparent assessment of policies and decisions which should include consideration of data quality and completeness, full life cycle assessment, and clear justification for what emissions are 'owned' by whom.[11]

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[6] As noted in Box 1, greater alignment and accounting for interdependence does not necessarily mean direct coordination, but may be facilitated by mechanisms such as strategic alignment, communication, and a deliberate focus on the interfaces and potential gaps in between the various actions of policymaking and regulatory bodies. This may be imagined as the difference between giving orientation in the form of a compass (alignment) or a fixed mapped route (coordination).

[7] See the Living Without Electricity, Royal Academy of Engineering, 2020, for a case study of the cascading set of failures that can occur across multiple sectors from single points of infrastructure failure. *Living without electricity – One city's experience of coping with loss of power.* Royal Academy of Engineering, ISBN 978-1-909327-26-9, May 2016

[8] This is an illustrative list of qualities, and not comprehensive or definitive.

[9] For example, building retrofit which integrates novel zero carbon heating mechanisms with connection to smart grid systems, and where it is crucial to provide lead time to develop supply chains, skills and investment.

[10] Particularly important for infrastructure that has long lifespans. For example, collaboration is required to ensure decisions taken on infrastructure by the DfT are better aligned with decisions impacting town planning in DLUHC. This enables policy ideas and solutions which are only possible to consider when previously distinct sectors align (in this case national transport infrastructure and town planning) and stakeholders are able to co-create plans, goals and mechanisms of implementation and evaluation.

[11] Formalising a stronger system will require resolving the issue of 'system boundaries' and responsibility for scope III emissions e.g. how and whether it is appropriate to consider the speculative impact on motor traffic of a new rail route as part of its justification. Currently there is not sufficient scrutiny or incentive to do this objectively and transparently. Care must be taken that GHG emitting activities which fall between obvious responsibilities do not 'fall through the cracks' with incentives to dispute responsibility, but instead different parts of government are incentivised to work collaboratively to

i) Innovation and experimentation in specific places and sectors, provided it is compatible with the constraints of net zero as determined by consistent evaluation and communication of results and learning.

14. The governance system must link global trends, the UK Carbon Budgets, national policies, local and place-based governance and innovation. Responsiveness to international context, including interfaces with international bodies or groups, must be maintained to avoid 'races to the bottom' where the weakest standards and enforcement become the norm. Trade, the environmental impact of imports, supply chain data accuracy and international standards are examples of areas where integrity and progress must be maintained internationally. Local place-based transitions will play a vital role in decarbonisation; empowering and supporting communities to facilitate local transitions is an important mechanism to enable climate goals to be achieved while addressing other local priorities and ensuring buy-in. This requires flexibility, experimentation, innovation and feedback of lessons learned.

B) What alternative governance structures could be established to coordinate and deliver cross-Government action on climate change more effectively?

15. The following models focus on the need for and structure of an 'implementation body'. Cashmore et al 2020[12] provides useful further discussion.
    a) The Council for Science and Technology (CST)[13] (**Figure 1**) focuses on the relationship between branches of central government and new bodies within them and places emphasis on the role of the Cabinet Committee on Climate Change, reasoning that the ability to drive through the necessary alignment across departments requires this level of authority.
    b) '*Our vision of the built environment*'[14] sets out some core functions and processes for achieving sustainable, low carbon built environments including enablers of connection across multiple levels of policymaking and local and place-based participation.
    c) *IGov*[15] provide a model focused on the energy supply system, rather than net zero as a whole, but explores in more detail the technical requirements and relationships to bodies such as Ofgem, the CCC, National Infrastructure Commission and the broader public and private sectors.

Figure 1: Structure proposed in the CST letter for net zero delivery[16]

achieve the best outcome.

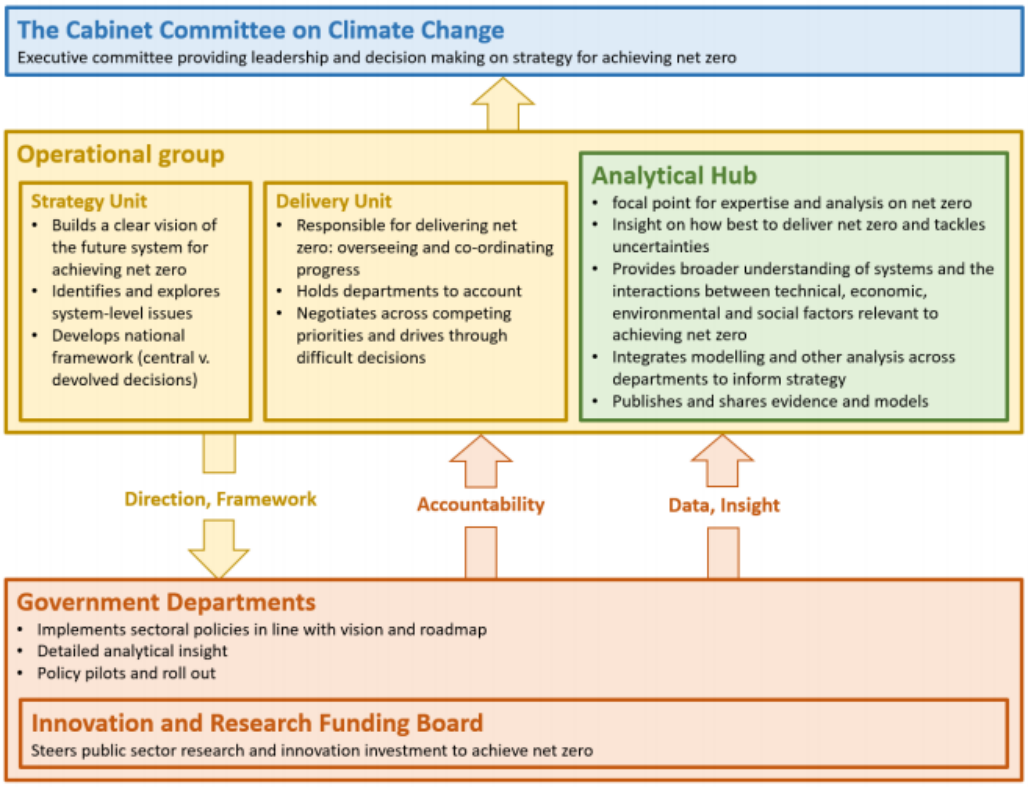
[12] Complete Energy System Reform, Cashmore et al, 2020. Available upon request.

[13] Achieving net zero carbon emissions through a whole systems approach, Council for Science and Technology, 2020

[14] Our Vision for the Built Environment, Construction Innovation Hub, 2021

[15] Enabling the transformation of the energy system: Recommendations from IGov, IGov, 2020

[16] Achieving net zero carbon emissions through a whole systems approach, Council for Science and Technology, 2020



16. More learning can be captured from the practical experience of system thinkers using these approaches for impact, including in international development[17] and in charitable organisations tackling complex social problems[18].

C) What metrics should the Government use to measure their progress towards net zero?

17. Different ways of measuring carbon emissions can produce drastically different results and policymakers must be familiar with these and how they each relate to different kinds of immediate and future emissions. Some examples include:
    - **Embodied/Embedded carbon**: The carbon dioxide equivalent (CO2e) or greenhouse gas (GHG) emissions associated with the non-operational phase of the project. This includes emissions caused by extraction and processing of raw materials, the manufacturing (including of components), transportation, assembly, maintenance, replacement, deconstruction, disposal, and end of life aspects of the project.
    - **Operational emissions**: The per unit emissions of the scheme (e.g. emissions per kWh, emissions per Tonne mile of freight moved) and the annual standing emissions created by operation of the scheme.
    - **Investment emission**: The total emissions as a result of the investment, i.e. emissions resulting from the design, manufacture, installation, construction etc. of the scheme, plus the decommissioning of existing assets that the scheme makes redundant.
    - **Displaced emissions**: The emissions reduced by displacing an emission intensive activity with an alternative with lower emissions.

18. There are legitimate disagreements on appropriate metrics for net zero, including how to treat operational and embedded carbon and how to account for carbon flows in the 'natural world'. Many current measures for GHG emissions use a calculation to convert emissions to their equivalent in terms

[17] The Social Innovator's Guide to Using Systems Practice to Tackle Difficult Problems in Complex Environments, Acumen Academy, 2019
[18] System Changers, Lankelly Chase, 2022

of CO_2, represented as $MtCO_2e$. While useful at the high level, for net zero governance the real-world differences between different sources of emissions may be significant[19], as is the real-world difference between CO_2 removed from the atmosphere and stored underground versus the elimination of emissions at their source.

19. Temporality is a key issue. Some measures, such as tree planting or the speculative knock-on impacts of infrastructure deployment, may be considered as investments in future carbon reduction but counted early. These actions are reliant on conditions being met for the carbon savings to be realised and carry risks and uncertainty. Metrics should ideally reflect the environmental, social and economic outcomes already achieved. Metrics and decisions that rely on specific future conditions should always be marked as such and conditions should be clear.

20. The metrics used by a net zero delivery body should be transparent and under continuous external review and assurance and should capture the cumulative change in carbon emissions. This involves measuring changes in both the activities that are being successfully ramped up as well as the true extent to which emitting activities are being phased out. For example, growth of supply metrics such as 'EV miles driven' do not reflect improved environmental outcomes if they do not directly displace petrol-miles.

21. Single, simple metrics should be resisted. Overarching metrics will be misleading if the underlying data is erroneous or incomplete and can obscure complex calculation processes.[20] Net zero targets should not enable oversimplification but should force engagement with the real physical and environmental changes at play.

22. The impact metrics have on either promoting understanding or obscuring important detail is an important consideration. Policymakers need sufficient understanding of the whole system to make effective decisions. The Government Chief Scientific Advisor has called for a 'live dashboard'[21] and others describe 'system maps'. These forms of modelling come with risks, including difficulties in communicating underlying assumptions and uncertainties. Any approach should be in line with evolving best practice in both technical and social sciences to account for the ways in which decision making occurs in context.

Question two

What governance structures would enable HM Treasury to give greater priority to the net zero target and the carbon budgets in its financial and economic decisions?

How could HMT better ensure that spending decisions contribute to achieving net zero in the long term?

23. Processes for valuation of, for example, infrastructure do not currently capture climate risks or benefits appropriately over the full lifecycle of infrastructure assets. Changes to the HMT Green Book are beginning to address this, but more is required. Least-cost optimisation fails to capture co-benefits such as health improvements. Guiding principles and flexibility are required.

24. Economic decision-making cannot be entirely separate from the analytic and strategic functions of a net zero delivery body. Much that is currently considered to be 'external' to the economy – for example, the impacts of waste or impacts on 'natural capital' - must be brought into our appraisal of decisions and require reconsideration of some economic structures.

Question three

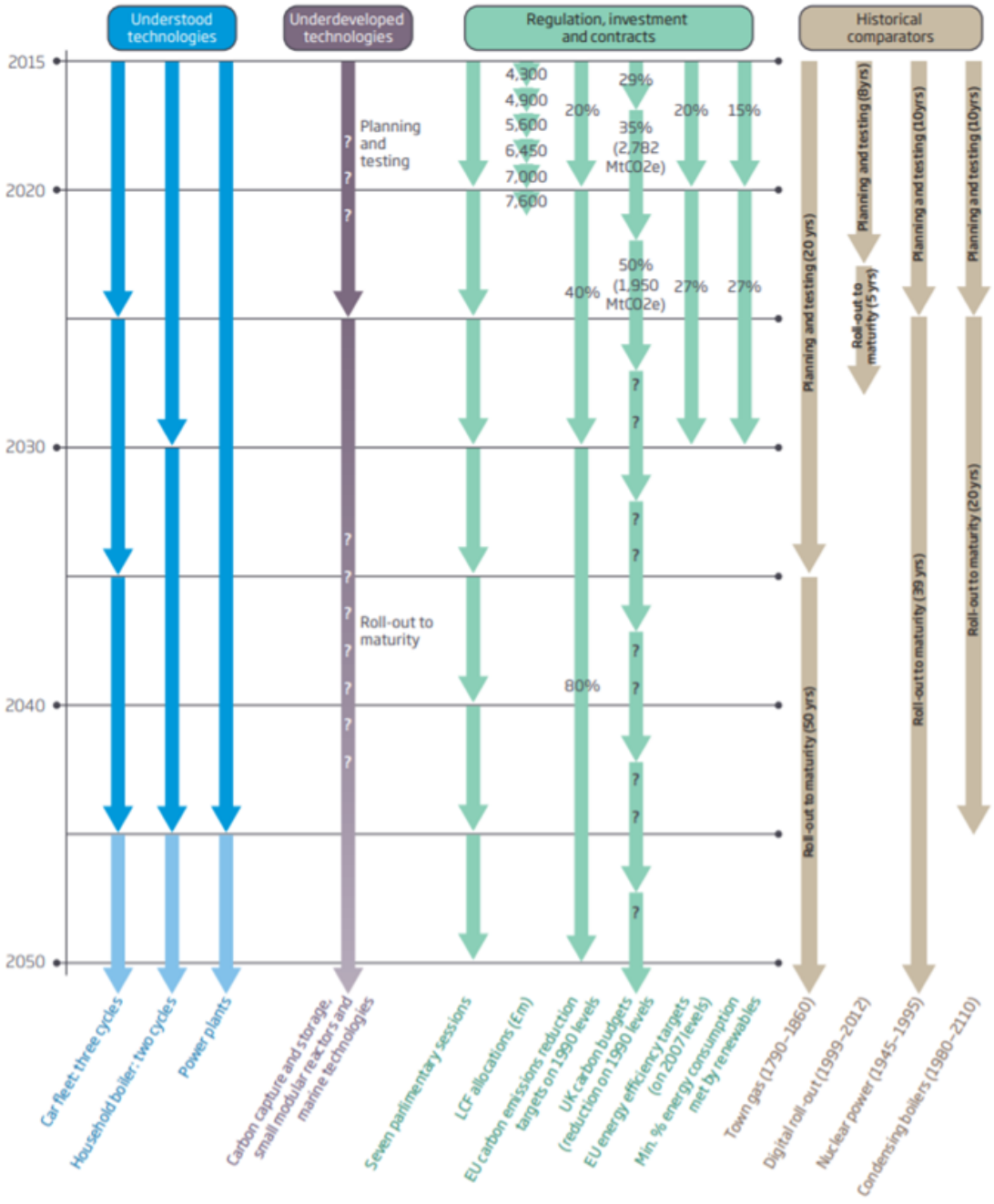
[19] See for example: Undoing Equivalence: Rethinking Carbon Accounting for Just Carbon Removal, Carton et al, 2021
[20] There are many existing known and unknown gaps in our knowledge regarding quantities of emissions from different sources, for example while there is good practice, emission data from leakage and flaring in the global petroleum supply chain is considered unreliable due to poor loss control.
[21] The need for action on climate change is urgent, Vallance and Belcher, 2021

What signals and support does business need from the Government in order to deliver cross-economy decarbonisation in line with the carbon budgets and the net zero target? What delivery function should Government provide itself and are relevant regulatory bodies mandated and resourced effectively to deliver on Government priorities?

A) How do policy and regulatory signals and support vary between Government Departments (and how have they varied over time)? How is this affecting business activity on climate change?

25. Large-scale infrastructure transformation is needed. It is important to factor realistic engineering timeframes into reaching net zero. It is common for the roll-out of large infrastructure or major refit programmes to take a significant time (see **Figure 2**). With a need to frontload emissions reduction to avoid the worst impacts of climate change and meet the fifth and sixth carbon budgets, there is very little room for disruption or policy uncertainty. Policy stability must extend beyond parliamentary terms. The detrimental effects of policy instability are clear, for example difficulties in rolling out a stable scheme for home energy efficiency improvements.

Figure 2: Illustrative engineering timescales (from A Critical Time for Energy Policy (2015), Royal Academy of Engineering)



Question four

The BEIS Committee will be working with the Environmental Audit Committee on this inquiry and inviting guests from other select committees. We are also interested in comments on the effectiveness of current parliamentary scrutiny arrangements for climate change and proposals to improve this

26. Current mechanisms for scrutiny do not account for the breadth and complexity of net zero. Environmental data and credentials of major projects have been questioned, often over accounting of direct or indirect emissions, and whether the lifecycle environmental impacts have been considered.

27. Expert scrutiny important where complex environmental data is considered. For example, the Sustainability Appraisal used to calculate the emissions of high-speed trains for the HS2 project took the data from Eurostar trains operating in France using low-carbon "nuclear" electricity and incorrectly compared it with data on UK intercity trains, at the time powered by electricity produced by coal fired

power stations[22]. Sources of data and analyses need to be robustly scrutinised by independent technical experts to ensure the narratives created and communicated are justified.

28. There are examples of policies falling between government departments that would benefit from better cross-departmental working, including better visibility and account taken of impacts of policies or decisions on areas under the auspices of other parts of government. For example, energy efficiency of homes falls between Treasury, BEIS and DLUHC, with other key stakeholders including the new building safety regulator, Ofgem, and planning organisations. Scrutiny needs to include these interfaces to prevent policy or scrutiny failures and to realise opportunities for joined-up policies.

29. Scrutiny arrangements must involve bodies such as the CCC and the net zero delivery body/analytical hub to provide independent technical assurance. The question of whether it 'adds up' to a net zero outcome is crucial. Metrics require the greatest care and more effective challenge to progress is measured against the absolute scale of climate change rather than relative to the past.

30. There are possible scenarios in which net zero could be technically achieved, but the social outcomes are poor or unacceptable; perhaps due to offshoring of emissions, or the creation of inequality or injustice, or the creation of other environmental impacts. A joined-up, systems approach that takes account of all social, environmental and economic dimensions is needed.

31. A model to consider is from the Royal Commission on Environmental Pollution (RCEP), which provided targeted, issue-dedicated, interdisciplinary advice and transparent and credible processes. Such scrutiny can answer complex questions about whether a project is working towards net zero, what other outcomes are being achieved or are lacking, and whether outcomes are fair.[23]

32. Scrutiny of the technical aspects of net zero must occur at the same variety of scales and levels as its governance and must scrutinise the process, outcomes and performance of the system as a whole. This can be at least partially achieved by a combination of:
    a) Legislative scrutiny by the CCC
    b) Greatly expanded technical scrutiny and assurance
    c) Assurance of processes and outcomes, such as with the RCEP model
    d) Expanding policy scrutiny at the interfaces between policy areas

    It is necessary to ensure that scrutiny is both built into the process of net zero, and that the scrutiny reflects the systems approach that government must take.

[22] Response to consultation on High-Speed Rail, R J Kemp, Lancaster University, 2011
[23] This potential of the Royal Commission on Environmental Pollution model for modern advice mechanisms is described in Knowledge, policy, and expertise: the UK royal commission on environmental pollution 1970–2011, Owens, 2015