Department for Business, Energy & Industrial Strategy

BEIS Areas of Research Interest

The Department for Business, Energy and Industrial Strategy works to ensure that the economy grows strongly in all parts of the country, based on a robust industrial strategy, and that the UK has secure energy supplies that are reliable, affordable and clean. We encourage investment and innovation that fully utilises the UK science base, and also seek to enable a whole economy approach to deliver our climate change ambitions.

To achieve these aims we need robust research, helping us to: understand growth and consumer behaviour; choose between different routes to delivering our objectives; and to be well prepared for the future.

This document sets out a summary statement of our research needs under a number of thematic headings. It has been developed to inform those who fund and provide research about some of the most important research questions and challenges facing BEIS. By clearly setting out our research interests we hope to stimulate dialogue about opportunities for aligning priorities, and ultimately delivering impact.

Our needs are driven by immediate policy priorities and long-term requirements. The timescales involved in prioritising, planning and completing new research often make it more suitable for addressing long-term requirements. However, we are also aware that there is a wealth of existing research and on-going programmes that may be suitable to address our more immediate needs. We are interested in both encouraging new relevant research and in engaging with existing programmes.

Growth, affordability and distributional impacts

1. Raising UK productivity is a key economic policy challenge for this parliament, and BEIS has an important role to play in developing and shaping policies in this area. We need research to better understand:

   - What drives differences in productivity growth within and across UK sectors and regions, and how this compares internationally;

   - If the UK's economic model has changed as a result of the financial crisis, and if and how this will impact future productivity, wages and employment; and

   - How the UK's economic model is shaped by its integration with the EU single market and customs union; and how this will change with exit from the EU.

   - The drivers of income distribution, and effective interventions – for example protection for vulnerable and fuel poor households.

2. As part of these efforts, we would like to understand how we can better promote competition and innovation to deliver markets that work for consumers, help businesses grow, and address energy challenges.

3. BEIS is responsible for the development of a robust Industrial Strategy, to deliver growth for all of the UK. We have recently published a White Paper outlining our initial thinking, and seeking the views of others. We're interested in research that can help inform our work in this area.

Understanding people, institutions and markets

4. We aim to improve our understanding of how people behave, whether as individuals at home or work, or as part of communities, businesses, supply chains, workforces and markets. Research challenges in this area include understanding:

   - The drivers and effects of different types of consumer behaviour, and how access to information, tools and advice impact decision making;

   - Key issues that prevent markets from achieving their full potential. Whether problems are due to anti-competitive behaviour or market failures;

   - Investment-related behaviour and choices, particularly in response to incentives and new market mechanisms;

   - Delivery chains and business models and how they might evolve as a result of market developments;

   - Local areas and communities, and how they can empowered to and capitalise on opportunities to increase economic growth;

   - How day-to-day behaviour and the use of homes and workplaces (and the technology within them) affects patterns of energy demand; and

   - Decision-making in relation to skills development, and how to encourage engagement with better information to guide decision-making at all stages.

Small & Medium Enterprises

5. Entrepreneurs are essential ingredients in competitive markets. Small and Medium Enterprises (SMEs) accounted for half of total UK economic output in 2015. Raising the productivity of the whole economy requires resources to flow to those businesses with the greatest potential. Research is needed to better assess and understand the health of the enterprise population and provide new insights on what drives or hinders business growth.

6. Deficiencies in leadership and management capabilities are known to impact productivity. Evidence suggests that bespoke, in-work development is most effective at building capabilities among small business owners and managers, but there is much that is not known. Through research we want to deepen our understanding of this area and what can be done to improve outcomes.

Place

7. We aim to improve our understanding of what impact local economic policies have, and what are the factors that hold places back, in order to help local partners consider what assets they need to develop to increase local productivity and become more prosperous . Research challenges in this area include understanding:

- How diversification can increase the resilience of local areas in the face of structural change;
- What really works in the different local policy areas;

- The drivers of businesses' location choices, how various incentives and market conditions affect companies' decisions, and how local areas can develop the assets needed to attract firms; and

- The role of commercial property in driving local economic growth, local labour markets, and productivity.

Effective product safety regulation

8. Effective regulation of the safety of products reduces risks to citizens and supports businesses to trade with confidence in a fair market. We need research to better understand the drivers of citizens' behaviour, particularly in regards to engaging with safety messages and product recalls.

Smart, big data and computing

9. BEIS needs to understand how smart technology can help support its objectives, including growing the economy, and ensuring the UK has a reliable, low-cost and clean energy system.

10. Research is needed to understand how to generate and use data to improve energy efficiency; to develop more effective and better balanced energy networks; to create an energy market that works for the consumer; and to ensure the highest standard of cyber security.

Science technologies and innovation

11. Innovation is a key driver of growth and productivity. BEIS is working to nurture the UK innovation system through creating the best environment for research excellence and innovative businesses, access to world-leading talent and cutting edge technologies, and commercial exploitation of university and HE intellectual property – for example through the establishment of UK Research & Innovation. We need continuing research on how innovation systems function in different environments, and the value and relevance of potential metrics for effectiveness and investment efficiency.

Understanding climate change

12. At a fundamental level the evidence underpinning climate change is now well understood, and the role of human induced change is unequivocal, but key uncertainties remain. Critical over the coming years will be a research to support a better understanding of the impacts and risks of climate change faced at global, national and local scale and how to communicate these effectively. Key to this will be the availability of long-term observational data sets and an improved understanding and modelling of earth system processes.

13. We also wish to continue to improve the quality of the UK Greenhouse Gas Inventory. This requires verification research and improved data and methodology for inventory compilation. Including, how socially acceptable

management of soil and biomass carbon in the UK and globally could influence the climate, and how to better assess changes in carbon stock.

Reliable, low-cost and clean energy

Deliverable, cost-effective pathways to meet our carbon targets

14. Carbon budgets, and the 2017 Paris Agreement, require the UK to pursue sustainable low carbon, energy secure pathways towards 2030 and beyond. It will be important to strengthen our understanding of the most cost-effective and deliverable ways to make this transition, their co-benefits, possible trade-offs and social acceptability, as well as technical and practical constraints, and insight into future trends.

15. We also need to explore the challenges and opportunities of meeting the Paris Agreement's long-term goal of net zero emissions and what it implies for energy systems, industrial processes and land management, both globally and within the UK. Particularly the potential for negative emissions technologies, including bioenergy CCS, to contribute to achieving our climate goals in a sustainable way.

Cost-effective renewable electricity

16. Generating electricity from renewable sources is critical for the decarbonisation of the UK energy system. We want to continue to focus on where we can really make a difference, and further drive down the cost of renewable technologies to make them a cost-effective alternative to fossil fuel generation. We are keen to understand all technologies, and critically, how to decrease the cost of renewables generation.

17. Specifically, we currently hold a strong global position in offshore wind, and are seeking to continue to grow this technology. We are therefore keen to investigate technologies that could reduce costs in offshore wind.

18. By their nature, weather-driven renewable technologies are intermittent. We are therefore interested in complementary technologies, in particular cost-effective storage, to better match electricity demand with supply.

Nuclear

19. While dealing with historic nuclear liabilities, securely, safely and effectively remains a key government responsibility, we have a renewed interest in exploring new opportunities for nuclear power, including through the development of small modular reactors, and other emerging technologies such as Gen IV and fast reactors. We are interested in research to understand how the costs related to the whole nuclear lifecycle can be brought down through further innovation, and the role that nuclear energy may play in other markets such as heat.

The future of fossil fuels

20. We need greater insight into the cost and operability of carbon capture utilisation and storage (CCUS), and the potential to drive improvements. There is a need for research and development of novel CCUS technologies.

21. We wish to explore opportunities to exploit shale gas resources, and enable an industry to develop, in a socially and environmentally responsible way. To do this we need research to understand the impact of shale extraction over the lifecycle of operations, and how to minimise this; environmental uncertainties and effective monitoring; and consumer attitudes and community requirements.

22. Gas and coal will continue to be extracted and used in power generation. Research is needed to improve energy efficiency and reduce environmental impact over the lifecycle of their use and operation, and provide insight for decision makers during the transition to a low carbon future.

Low carbon heat

23. We need to transform how we use and generate heat, in homes, public buildings and workplaces – from offices to heavy manufacturing plants. We believe that hydrogen, heat networks and electricity, alongside the use of bioenergy, are the energy vectors that show the greatest potential for decarbonising heat at household, commercial and industrial scales. Understanding how these might they be applied in a cost-effective way, the trade-offs and synergies between them, what supporting technologies and fuels are required to enable them, and the barriers to their deployment in buildings and homes remains uncertain and requires further research.

Networks

24. We are interested in exploring options to decarbonise the gas grid – this may mean extensive use of bio-methane or transitioning to a hydrogen gas vector. This requires research on the operation and performance of alternative gas networks; the costs of such networks including the production of low carbon gases; and consumer acceptability.

25. Scenarios for decarbonisation which replace fossil fuels with electricity in heating and vehicles place significant strain on the electricity network. We are interested in research that helps us understand and increase network capacity, and balances demand.

Energy efficiency and demand response

26. Further research on tools and approaches to overcome the barriers to take up of energy efficiency is needed. In particular in public buildings, commercial buildings (including offices and retail buildings) and homes. There is also a need for the development of cost-effective materials and components with improved thermal performance.

27. With an increasing proportion of electricity being generated using intermittent renewable sources, we are interested in research that could increase the quantity and quality of demand side response schemes.

Industrial decarbonisation

28. Alongside the Industrial Strategy, we are seeking research to reduce carbon emissions from industry cost-effectively, in particular through industrial carbon capture use and storage; energy efficiency; heat recovery; and using novel vectors and fuels.

Policy evaluation

29. Alongside the research required to support policy development and decision-making, we also need research to help us evaluate our policies. Given the innovative nature of our policies, it is likely that BEIS will need novel methods for their evaluation. In particular for complex policies, including those that interact with other government departments' policy portfolios. Key areas of interest are:

   - Understanding how best to evaluate the interactions and synergies between different policies;

   - Learning from policy implementation and delivery to inform policy changes and future policy development to maximise policy impact; and

   - Understanding how to measure innovation outcomes and impact, including co-benefits, to enable policy learning.

30. Long-term datasets, collecting parameters related to markets, growth, energy and the environment, and their interactions with people and businesses are critical in enabling improved understanding and evaluation of policy. Helping us establish baselines, better understand process and change in systems, and validate the models we use against the reality of our complex world.