



## Written submission from the Energy Technologies Institute to the House of Lords Economic Affairs Committee inquiry into the 'Economics of UK Energy Policy'

### Executive summary

1. Energy is a large component of GDP, and fundamental change in our energy sector is required by the challenge of decarbonisation. This makes energy policy over the next decade vital to long term UK economic performance and productivity.
2. A key challenge for energy policy is to move towards a more coherent framework to incentivise emissions reductions across the economy. A stronger whole systems perspective should inform policy choices and the allocation of policy support or subsidies.
3. More policy attention will be needed in the decade ahead on the challenges of decarbonising energy for heat and transport.
4. Energy policy needs to support UK capability in deploying a portfolio of the key low carbon energy technologies that offer most potential value to UK decarbonisation. This portfolio includes carbon capture and storage (CCS), a range of bioenergy technologies (including advanced gasification), new nuclear (large and small modular reactors), gaseous systems (including hydrogen), low carbon vehicles and supporting infrastructure, energy efficient buildings and low carbon heat options (including heat networks) and offshore wind. Targeted policy interventions may be required to address specific market failures that currently inhibit the development of these technologies.
5. New governance and regulatory arrangements that go beyond current sector-specific frameworks should be considered to enable efficient investment in transforming energy infrastructures.
6. Addressing issues around the burden of high energy bills will depend on delivering improvements in home energy efficiency and control over energy use for consumers, as well as changes in retail energy pricing structures.

### Introduction

7. The ETI is a public private partnership which is able to draw on the business and engineering expertise of key global players engaged in the UK energy sector (ETI private sector members: BP, Caterpillar, EDF, Rolls Royce and Shell).
8. This submission distils the implications for the economics of energy policy which arise from the ETI's strategic analysis of the UK's transition to a low carbon future. This analysis is based on rigorous whole-system analysis informed by our public and private sector members and our portfolio of technology development and knowledge building projects<sup>1</sup>.

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<sup>1</sup> Further details can be found in the ETI report 'Options, Choices, Actions: UK scenarios for a low carbon energy system transition', available via the ETI website [www.eti.co.uk](http://www.eti.co.uk)

9. We spend over 7.5% of GDP directly on energy (electricity, gas and liquid or solid fuels) and much more on energy-related goods and services. So **cost-effectively meeting our energy needs is of vital importance to overall UK economic performance, productivity and ultimately living standards.**
10. The long-term challenge of decarbonisation means that we will need over the next 35 years to radically reinvent this part of the economy (our national 'energy system' – or the combination of sources of primary energy, infrastructure and systems for transmitting and converting energy to meet our needs).
11. This increases the economic importance of energy policy to UK prosperity and reinforces the need for a coherent energy policy framework focused on delivering secure and sustainable energy to meet our needs as efficiently as possible. Addressing the UK's historic poor performance on productivity requires energy policy that delivers decarbonisation as cost-efficiently and productively as possible.
12. The fundamental nature of the changes needed to our energy production and supply industries make it vital that government provides strategic leadership, while enabling efficient delivery and investment by the private sector. Markets forces should play a central role, but market frameworks and key strategic choices on infrastructure and industrial strategy will need to be shaped and led by government and through energy policy choices.
13. Energy policy making should properly encompass all the policy interventions and instruments which impact on the economic signals driving the production, distribution and use of energy across the economy. This includes some aspects of policy which are not normally thought of as 'energy policy' or within the control of the government's department responsible for energy, including the way energy products and usage are taxed, as well as key aspects of policy on land use, transport, infrastructure and agriculture. The Committee on Climate Change (CCC) should continue to play a key role in providing joined up advice on the implications of carbon budgets for policy across all sectors of the economy.
14. The challenge of decarbonisation will lie at the heart of energy policy for decades to come. But current policies do not provide a consistent set of economic signals for cutting emissions across the economy, of which energy-related emissions make up the overwhelming majority. The implied carbon price (or the financial incentive) to reduce emissions varies arbitrarily across different economic sectors and activities. So a key challenge for energy policy is to begin the move towards a more coherent economy-wide framework that provides a level playing field and enables markets to drive efficiency in our national approach to decarbonisation.

### **What are the key economic challenges for the energy market which the Government must address over the next decade?**

15. The key economic challenges for the energy market over the next decade can only be fully understood as part of a longer term pathway to a very different low carbon future. Challenges in our electricity system are currently centre-stage, but over the next decade the government must give greater focus to the challenges of decarbonising heat and transport.
16. The government has been right to focus in the past few years on moving towards lower carbon electricity. This was clearly supported in analysis by the CCC and others on the best strategic sequencing of actions to cut emissions. Currently policy development is focused on incentivising investment in new gas generation to provide firm back up to renewable generation, while ensuring best value in other low carbon investment. However, the focus on gas carries risks for our ability to meet carbon budgets and could result in the stranding of investment in a new generation of gas plants as carbon constraints start to bite in future decades.
17. While unabated gas can play a role in the electricity mix, it is also vital to broaden the portfolio of low carbon electricity options by deploying carbon capture and storage (CCS) within the next decade. ETI's

analysis (supported by many others, including the CCC) points to the vital importance of CCS in enabling an efficient pathway for UK decarbonisation.

18. The emphasis on electricity also risks relative neglect of the complex challenges in decarbonising heat and transport, where significant progress needs to be made in the next decade. The ETI's analysis of the UK's low carbon transition is based on rigorous whole-system analysis informed by our public and private sector members, and points to the importance of building capability in a balanced portfolio of key energy technologies.
19. This portfolio includes key strategic options such as CCS and a range of bioenergy technologies which have flexible applications across all forms of energy use, as well as new nuclear (large-scale and small modular reactors), gaseous systems (including hydrogen), low carbon vehicles and supporting infrastructure, energy efficient buildings and low carbon heat options (including heat networks) and continued cost-reduction and innovation in offshore wind.
20. The challenge for energy policy is not only to support early proving and deployment of these options (through targeted innovation and industrial policy support), but also to create the market and regulatory frameworks that will enable investment and efficient deployment. In some cases this may require reformed governance and regulatory arrangements (for example to enable city-scale investments in new heat or hydrogen networks) which go beyond current essentially 'sector-specific' regulatory structures.

### **Has the market and the Government responded effectively to changes in external circumstances, such as significant shifts in technology and prices?**

21. The energy market is now shaped to a large extent by policy choices. Investments in new electricity generation are now impossible without explicit policy support of some kind, and the market for low carbon heat has been shaped by the design of policy and subsidy support.
22. The cost of some low carbon technologies also reflect the influence of domestic and international energy policies. Reductions in the unit costs of offshore wind are the fruit of nearly two decades of UK policy support (and subsidies) for wind energy (both on and offshore). Likewise reductions in solar energy unit costs reflect past UK and international policy support.
23. Clearly government energy policy choices are hugely influential. Despite this UK energy policy lacks a clear national strategy or framework for setting priorities in allocating limited policy support. Current energy policy comprises a complex mix of interventions and mechanisms for allocating policy support, which, because they are subject to frequent amendment, have the effect of limiting investor confidence in long-term signals.
24. The levy control framework is the main mechanism used to contain policy costs. But there is only limited forward visibility about the envelope of resources. The structure of top-up payments under contracts for difference means that imputed spending is driven to a significant extent by short term movements in energy prices. This also introduces instability into long term decarbonisation policy.
25. Electricity sector-specific issues tend to dominate because contracts awarded under the electricity market reform programme are the dominant mechanism for delivering further policy support for low carbon energy. Value for money is analysed and considered mainly in terms of the level of strike prices, rather than value to the broader 'system'.
26. This means that the allocation of limited resources is not informed by a whole system perspective on which technologies offer best value in enabling emissions reductions across the economy. In effect there is no mechanism for valuing the contribution of flexible, versatile technologies which can be applied across the energy system (i.e. not just within the electricity sector). Outside the electricity sector the

rewards for delivering emissions reductions are much less clear cut (e.g. in heat or industry) inhibiting incentives for investment and innovation.

27. Finally, the approach of financing policy support through energy bills leads to distortions (e.g. increasing the retail price of electricity relative to gas) and a more regressive impact on consumers than would be the case if costs were recovered through taxation.
28. The UK has led the world in introducing carbon budgets, which are an important guiding framework for long-term energy policy. But there is significant room for the government to introduce a more stable energy policy framework which adopts a whole system perspective and focuses on ensuring the UK can deliver an efficient and sustainable transition to a low carbon future.

### What are the emerging technologies which could materially change the energy market over the next decade and beyond?

29. Clearly a wide range of technologies have the potential to play a key role in the energy market over the next decade and beyond. ETI's approach to evaluating technologies is to take a whole energy perspective in assessing which technologies offer most potential value in enabling the UK to decarbonise its energy system as a whole. This perspective reveals the high value of versatile and flexible technologies (e.g. CCS and advanced gasification to produce hydrogen), and the potential for new forms of energy storage and transmission (e.g. hydrogen storage) to play a role in meeting the challenges of inter-seasonal demand swings in the heat sector.
30. From this perspective ETI would identify the following key technology groupings.

| Energy technology  | Priority areas for energy policy intervention   |
|--|---|
| Carbon capture and storage   | Government leadership and potentially investment to develop transport and storage infrastructure<br>Enabling finance for deployment of gas CCS<br>Incentives for capture of emissions from industrial sources |
| Bioenergy  | Development of advanced gasification technologies<br>Building feedstock supply chains (both domestic & imported)  |
| New nuclear  | Deployment strategy for large new nuclear capacity<br>Development and early deployment of small modular reactors, with heat networks  |
| Gaseous systems  | Development of strategy and engineering systems for gas energy vectors, including hydrogen, within future low carbon energy infrastructure systems  |
| Low carbon vehicles  | Coherent strategy for system integration, business models and infrastructure requirements for new low carbon vehicles   |
| Energy efficient buildings and low carbon heat options (including heat networks) | Strategy and policy for local area energy transitions (e.g. to smart systems and/or new heat network technologies)  |
| Offshore wind  | Continued technical innovation for cost reduction and extension of deployment to more challenging conditions  |

31. From an energy policy perspective, a number of these technologies are currently stalled or with policy frameworks that require significant development. While energy policy should provide a stable environment for private investment, targeted policy interventions will be required to address specific market failures that currently inhibit the development of key technologies and business models.

### **What should the future balance between the roles of the public and the private sector be?**

32. Government will always have a key role to play in energy policy, and the fundamental nature of the changes required to meet carbon targets means that government will have a key role to play in key infrastructure choices and the shaping of market and regulatory frameworks.

33. However, the current energy policy landscape is complex and compartmentalised with government driving technology choices and investment at quite a granular level. There is substantial scope to reform policy to strengthen the private sector role in driving innovation and investment. Market forces can play a stronger role in revealing the most efficient pathway to a low carbon future, within an overall energy policy framework that provides a level playing field for emissions reductions across all economic sectors.

34. ETI recently commissioned four think pieces by leading industry experts to examine options to reform energy network infrastructure governance and regulation<sup>2</sup>. All agreed on the need for new or reformed governance mechanisms to steer the transformation of the energy system and infrastructure, while also ensuring that a whole energy system perspective shapes decisions. All saw markets and competition playing a key role in enabling the right kinds of investment, but with a more prominent local and decentralised dimension to decisions on energy networks and operation.

### **How should the Government attract sufficient investment?**

35. The UK has a strong track record of creating stable attractive environments for investors in infrastructure. Many of the issues are familiar and common across the sector, including the desirability of long term stability, reducing policy-related risk and creating markets or regulatory frameworks that offer rewards for efficiently delivered and operated assets.

36. The UK government should ensure that it has credible plans and policies to meet its carbon budgets, and where possible, it should increase the long-term visibility to investors of its approach to allocating policy support.

37. Particular attention should be paid to the risks and market barriers facing investors in technologies and infrastructure that is of particular value to the UK's energy system. Where there are particular market failures (e.g. those highlighted by the Committee on Climate Change in relation to CCS transport and storage infrastructure), the government should structure targeted interventions.

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<sup>2</sup> <http://www.eti.co.uk/eti-publishes-industry-perspectives-on-how-to-deliver-efficient-networks-for-a-low-carbon-future-energy-system/>

## **What is the relationship between high energy costs and the loss of industrial capacity in the UK?**

38. The ETI has no specific expertise on this issue, but we are aware of analysis carried out by the CCC and others which suggests that energy costs have had a limited impact on recent changes in industrial capacity compared with other global market influences.

## **What preparations could be made to cope with the risk of a shortfall in energy supply?**

39. Over the long term the UK has to substantially change its energy supply towards low carbon sources. The transition will require forward thinking and clear strategy to limit the risks to our ability to deliver secure, low carbon energy in a way that is affordable and acceptable to consumers.
40. This points clearly to the value of an energy policy which adopts a clear 'portfolio' approach to limit the reliance placed on any one energy source or technology. This would reduce risks associated with any given source of energy supply proving unacceptably expensive or difficult to deploy (e.g. due to technical or social acceptance challenges).
41. A stronger forward-looking 'portfolio' approach to energy policy, ensuring a strong pipeline of investment in innovation, demonstration, early deployment and proving of business models will help limit risks and ensure that the UK always has a secure and sustainable basket of options to meet its energy needs<sup>3</sup>.

## **What alternate ways of pricing energy should be considered to reduce the burden of high energy bills, in particular on less well-off consumers?**

42. ETI's work on domestic energy use suggests that changing the way that energy is priced is only part of the picture in addressing the burden of energy bills on consumers, including lower income groups<sup>4</sup>. Key considerations will include enabling efficient investment in making homes more energy efficient and enabling consumers to make choices which suit their particular lifestyles and needs.
43. Few households currently realise that on average they use 80% of their energy for heat and hot water, and detailed consumer research reveals how people often find heating systems and solutions hard to control and align with their needs. So reducing the burden of high energy bills will not only require new ways of pricing energy, but will need to be combined with appropriate investments in improving building and heating system efficiency delivered in a consumer-friendly way, and the development of smarter systems and controls that enable consumers to take more control of their energy use.

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<sup>3</sup> <http://www.eti.co.uk/insights/development-insight/>

<sup>4</sup> <http://www.eti.co.uk/insights/smart-systems-and-heat-consumer-challenges-for-low-carbon-heat/>