Keeping the Power on: our Future Energy Technology Mix

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This Evidence provides a comprehensive analysis of the UK's energy sector's state, its challenges, and the strategies needed for a transition towards sustainability and resilience. It is based on a balanced and critical consideration of various sources and perspectives. The Evidence is submitted to assist the Committee in understanding the complex and interconnected issues around the UK's energy future.

Executive Summary

- While the energy sector theoretically welcomes new technologies, adoption is often hindered by outdated regulatory frameworks, entrenched interests, public acceptance issues, and technological challenges. Innovative solutions like energy storage and smart grids are crucial but face challenges.
- Government support is critical for developing innovative energy infrastructure. The UK Government has committed t
an be inconsistent and influenced by short-term political considerations.
, consistent support for all technology development stages is needed for an
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gy security.
echnologies, including wind and solar power, nuclear power, and emerging
hydrogen energy and CCUS, can enhance UK's energy security. However,
escale deployment needs concerted efforts to overcome technical, economic,
d regulatory challenges. -zero emissions quickly and affordably requires a diverse energy mix, systemic changes, and a careful strategy. This includes combining renewable sources, nuclear power, hydrogen, bioenergy, and energy efficiency measures. The transition pathway must be guided by fairness and inclusivity principles.
- UK energy solutions must consider regional variations in energy resources, economic structures, and social conditions. Leveraging local strengths fosters a diverse, resilient energy system. However, regional approaches must be integrated into a nationwide strategy for a balanced and coordinated transition.

1. **Is the energy sector open enough to new-generation technology?**

1.1 The energy sector theoretically accommodates new technologies. Recent years have witnessed a surge in innovative advancements, including renewable energy technologies like solar and wind, electric vehicles, and energy storage systems. However, the adoption and integration pace of these technologies is dictated by diverse factors.

1.2 Regulatory frameworks are vital in shaping the industry's openness to new technologies. Unfortunately, regulatory structures often lag technological advancements. This disconnects

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2.3 However, government support can be inconsistent and is often influenced by short-term political considerations. For instance, the zero-carbon homes policy, which would have required new homes to be built with high energy efficiency standards, was scrapped in 2015. The Swansea Bay Tidal Lagoon project, which could have been a trailblazer for tidal power in the UK, was cancelled due to cost concerns.

2.4 Similarly, while the Ten Point Plan highlights nuclear power and hydrogen, they have seen less policy support than offshore wind. Nuclear power plants face significant challenges with high upfront costs and long construction times, while the hydrogen economy is still in its early stages and lacks a clear roadmap.

2.5 For an effective transition towards a sustainable and resilient energy system, government support must be consistent, long-term, and encompass all stages of technology development. It also needs to account for the systemic nature of energy transitions, which involve technologies and the supporting infrastructure, market structures, regulatory frameworks, and social aspects.

3. Is the Government's plan for energy security sufficiently long-term?

3.1 Energy security involves having a dependable, affordable, and sustainable energy supply. It is a complex issue that goes beyond simply having enough energy resources. The nature of

their impact on food prices, deforestation, and net carbon emissions when considering the full lifecycle.

5.3 Given these concerns, some could argue that first-generation biofuels should have been abandoned. However, their development has paved the way for second and third-generation biofuels, which use non-food crops or waste materials and have a better sustainability profile.

5.4 Carbon Capture and Storage (CCS) has been criticised for its slow progress. Despite

6.7 Principles of fairness and inclusivity should guide the pathway to net zero. The transition should be just, ensuring that vulnerable groups and regions are not left behind and that benefits are shared broadly.

7. **Are the energy solutions universal across the UK, or are there regional and local approaches to fuel and energy?**

7.1 Energy solutions cannot be universally applied due to regional resource variations, economic structures, and social conditions. Instead, local and regional strengths should be leveraged, fostering a diverse and resilient energy system.

7.2 The UK exhibits significant regional variation in energy resources. Scotland, for instance, is rich in wind and wave resources, while Southern England receives more sunlight, making it suitable for solar power. Northern England and Scotland have the potential for carbon capture and storage due to their North Sea oil and gas em.th(b) (sina)4 (l ( )]TJ [begln(i)-2 (r)-2 ((sh)10a)-