
Consultation response

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Keeping the power on: our future energy technology mix

The UK Green Building Council is an industry network with a mission to radically improve the sustainability of the built environment by transforming the way it is planned, designed, constructed, maintained and operated. As a charity with over 700 member organisations, we span the entire sector from some of the largest property owners, managers and developers, manufacturers, multidisciplinary advisory and engineering firms, energy providers and distributors and banks through to public sector bodies including the NHS, MOD and many local authorities as well as many SMEs.

Background

This Energy Security and Net Zero (ESNZ) Select Committee inquiry is to look at how the energy mix of the UK needs to change in the near future and what technologies (small fission reactors, hydrogen, geothermal, tidal, wave, solar, batteries storing renewable-derived energy, and biomass) might be applied immediately to deliver a national capability to keep the power on while delivering against net zero targets. The focus would be on what on-demand generation technologies might be deployed when renewables are insufficient to meet demand. This would touch on current options needing investment in both resource and skills development and any regional variations.

As part of this it has issued a call for evidence - <https://committees.parliament.uk/work/7832/keeping-the-power-on-our-future-energy-technology-mix/>

Overview

UKGBC welcomes this inquiry from the ESNZ Select Committee. We also recognise the opportunity the Committee will have to integrate the findings of this Inquiry with the work the Committee has instigated to look at *'Heating our Homes'* and *'A flexible Grid for the future'*.

There is also scope to engage with the Environmental Audit Committee (EAC) on their emerging thinking from the two current Inquiries *'Enabling sustainable electrification of the UK economy'* and *'Heat resilience and sustainable cooling'*.

We intend to invite members of both Select Committees to an event in October to consider these issues in the round, and the systemic implications for homes, buildings and the whole energy system. Taken together they will inform the imminent and strategic choices the UK needs to make on the future of domestic energy supplies and technologies.

We note the need to mitigate emissions, eliminating and switching away from fossil fuel uses; to adapt to future needs, be they climate impacts, such as extreme weather; to reflect an increasingly digitised world and the associated expectations of smart technology; and to protect the UK economy from future global energy price shocks. Developing greater resilience is a common factor among these forces and drivers.

There is also a balance to be struck between how much of the solutions are led by user and domestic considerations, and how much by energy system considerations.

In the early 1970s the UK made a national decision to switch from town gas to 'natural' gas. This we could characterise as a system led choice, the availability of new and then cheaper fossil fuel supplies from the North Sea reinforcing a switch from 'town gas', it becoming more expensive to produce. The privatisations of the 1990s increased the relative importance of consumer choice, yet that constrained by a focus on choice within a retail energy market more than choices in domestic energy set-up.

This lack of choice in domestic energy set-up can be seen to be changing as EV penetration is giving home owners the opportunity to create home-based energy systems that support their EV, with a much cheaper running cost than public or third-party charging points, i.e. fitting domestic solar PV to capture electricity for self-supply, with smart controls and a battery to store the solar for overnight charging. In some cases, such set-ups can provide support to the local distribution grid, passively as they reduce peak and overall demand and actively when they export electricity. We note the current values for the Smart Export Guarantee (SEG) tend to incentivise self-supply over system support.

Of the existing 28-29m homes in the UK some 40%, ~10+m have off street parking capability, supporting user led EV charging and self-supply – at scale this has significant potential to impact on overall and peak electricity demand, reducing the amount needed to be supplied by the grid.

This impact has in part been recognised by Ofgem and BEIS (as was) in the 2021 Smart System and Flexibility Plan 2.0, which highlights the £billions of potential savings to be made if the demand side of the energy system is flexible, to mirror the variability of the renewable supply side. While this requires a smart, more digitally capable demand side, it reduced the need for and cost of grid upgrades and lowers the peak generating capability needed at any one time, saving on generation costs.

Securing these cost savings and realising the potential of such a flexible, optimised energy system, requires smart, digitally capable homes with designed and built-in energy storage, integrated with appropriate home-based EV and solar technologies. What we do to enable and thus lock-in at the home and building scale in turn enables, or constrains, the ability of the wider system to be flexible, to be lower cost, and in turn to be less dependent on fossil fuels. This in turn frames the future energy technology mix the UK will require.

In the context of the Inquiries of the Select Committee we have therefore started with a consumer led lens, which in turns points to a homes and buildings starting point, i.e. this submission to the '*Keeping the power on: our future energy technology mix*' follows on from our submission to the '*Heating our homes*' Inquiry, and will in turn be followed by our '*A flexible Grid for the future*' Inquiry response.

A customer, user led lens would ensure that homes and buildings were capable of supporting user needs today and into the future, noting mitigation, adaptation and digital forces and drivers above.

In addition to a smart approach, nature-based and passive cooling solutions will be critical in keeping the lights on. One of the largest anticipated draws on the electricity system in the coming years is for cooling. Investing in solutions such as trees and green spaces, shutters, blinds and whitewashing can avoid much of the demand for electricity hungry air conditioning units.

The major opportunity this year is to **set a modern Standard for new build** that prompts design and build of smart energy-capable homes and buildings also designed with nature-based and passive cooling. Such a standard would look to ensure thermal comfort (winter warmth, summer coolth), energy efficiency and capability, water efficiency, digital connectivity; with measurement, mitigation and minimum standards for embodied carbon. UKGBC's five tests for a net zero and climate resilient future Homes Standard can be accessed [here](#). UKGBC supports the Future Homes Hub's Contender Specification 4 alongside other measures to help deliver water security, manage climate impacts such as flooding, overheating. We believe this is the only Contender Specification capable of avoiding huge additional grid costs over the coming years.

It will also provide for local economic benefits in upgrade jobs, and energy returns to home and building owners.

For developments of a large scale, we recommend they should be required to follow the dynamic thermal modelling approach (TM 59) which will help take into account overheating risk for a location.

While **existing homes and buildings** have been planned and built to different expectations of performance, reflecting expectations of stable weather patterns, evolving building technologies, designs, and planning policies, they will inherently underperform and be less resilient or adapted.

All future programmes to retrofit or upgrade homes should take account of location, ideally look to take an area-based approach where possible (enhancing affordability and allowing scale solutions that suit the location) and ensure overheating is considered as part of a rounded approach to thermal comfort. This could form a part of local planning, be included in local area energy planning (LAEP).

To take into account individual home and building owner action overheating /thermal comfort should be included in building regulations and planning permissions for extensions and significant renovations.

The National Adaptation Plan (2023) should do more to take account of what is need for, and the potential of, adaptation measures for homes and buildings (<https://ukgbc.org/news/action-to-tackle-overheating-in-our-homes-is-largely-missing-from-the-national-adaptation-programme/>)

Key to greater resilience is the nature and function of the home, and those other buildings we use for offices, to provide public services and for in-door leisure activities. With today's understanding of the interaction between the fabric of a building and its environment, and of the ways in which homes and buildings place demands on utility infrastructures, it is possible to design and build for resilience in the face of expected climate impacts.

It is therefore essential that we urgently adapt and update our planning, development and building policies to reflect the capabilities that we want new buildings to have in the future. It is simply untenable that new homes and buildings could still be built to designs and with technologies from the 20th century.

In updating these policies, we can also release other benefits, including greater infrastructure resilience, local jobs, and improved quality of life; not least when recognising that no building is an island – each is part of a wider system of connected infrastructures that when well-planned can add value to each other.

In doing so we should also be clear to differentiate between different and differences in fuels, and the technologies that use those fuels give to users a given or particular set of outcomes and performance – in taking a standards-based approach we allow for the most appropriate technologies, and hence fuels to be deployed to provide the services people are going to need and expect, while achieving decarbonisation.

Terms of reference questions

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

At this stage of the evolution of the energy system it is important to acknowledge the fundamental changes in the drivers from those that have given us the current system, not least the need to decarbonise, the ubiquity of renewables driving decentralisation and the increased expectations of consumer choice, often digitally enabled.

New technology and innovation will be occurring in all four domains, and only part of it will be about new generation – some will be about efficiency, productivity, and flexibility in energy use, all of which in turn affect the generation landscape. As the Smart System and Flexibility Plan 2.0 (Ofgem & BEIS July 2021) highlights billions of pounds can be saved if the system transitions to one that is flexible and optimised.

The energy sector should be as, if not more, open to new technology for energy use, efficiency, productivity and flexibility as it might be for generation. This would open it up to digital solutions, demand management solutions, as well as consumer led solutions such as homes that are equipped with energy capability, from solar PV to smart control and storage enabling them to self-supply an associated EV. With over 10m homes capable of such smart capability the nature of new generation takes on a whole new dimension.

2. Does the Government sufficiently support development of innovative energy infrastructure?

No, not least in failing to recognise homes and buildings in aggregate as an infrastructure capable of playing a huge strategic role in as thermal energy stores, shifting load to reduce peaks as well as demand reduction and generation. If they did that, and guided the National Infrastructure Commission, and others, to assess accordingly we would be closed to having energy infrastructure that would meet future needs, i.e. be smart and digitally enabled, be supportive of decentralised flexibility, support faster EV penetration and greater renewables capability.

Considerations of energy infrastructure need to start with the user, their home and their workplace.

3. Is the Governments plan for energy security sufficiently long term?

In the absence of a national retrofit strategy and a Future Homes and Buildings Standard that ensures the end to building homes that still require retrofit, it is difficult to say the government's plan is sufficiently long term. Without these, homeowners will be locked in to excessive energy use, and potentially fossil fuel-based energy uses, thus extending the country's dependency on globally traded commodities and the price shocks that that will eventually entail.

4. What current technologies could usefully be deployed at scale to deliver better energy security in the UK?

Retrofitted existing homes and buildings and genuinely modern new homes built to a future Home Standard that, in energy terms, requires:

- due regard to siting and orientation of new build
- high energy performance standards, to include both energy use and energy capability. This would include
 - A thermal energy demand limit /cap
 - More effective fabric performance standards (and building control to ensure compliance)
 - Inclusion of solar PV, battery storage and associated energy system controls to support flexibility

All of which is best supported by dynamic demand modelling.

Such a standard could also help deliver water security, manage climate impacts such as overheating and flooding, and provide for local economic benefits in jobs for upgrades, and energy returns to home and building owners.

5. Are there technologies that have not been able to develop their potential and should be abandoned?

Nothing to add here.

6. What energy generation mix will get us to net zero the quickest in the most affordable way?

Given the significant proportion of demand created by domestic uses, for heat, mobility and power a modern Future Home Standard to could make a meaningful difference to future net demand expectations, both directly through the nature of what gets built new, and by setting the scene for what upgrade works need to be capable of for existing homes.

Net Zero is clearly a fundamental challenge, yet as a strategy it does little to tell us what should happen when or in what order. Most localities, let alone the UK as a whole need to do more work on how energy is currently used, and how that demand could be changed, mitigated or managed, before we can conclude the scale and nature of generation required. The nature of the building stock we will have, and have upgraded makes a significant difference.

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

There are potentially universal principles, e.g. use energy efficiently, make the most of renewables by collocating demand and generation to reduce losses, yet the geology, geography, and settlement structures of the UK offer significant variety in what will work best, and what may be available to fulfil local potential.

The existing building stock is a key variable, hence our emphasis on the standard of existing and future homes and buildings.

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