DESNZ Committee

4. **Keeping the power on: our future energy technology mix** – Exploring how the energy mix of the UK needs to change to deliver enough capacity while delivering against Net Zero targets.

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

As an Island nation, the UK has the ability to harness huge indigenous energy resources which could allow the UK to become a net exporter of energy.

The question does not clarify whether the Committee means 'new' as in 'new technologies' or new as in increased new generation plant. If the committee is implying the first, then the answer is yes. The UK government should be open to 'new' technologies, but not get distracted by 'silver bullet' solutions which avert focus from the delivery of existing technologies in the here and now. CCUS and Hydrogen are both likely to have a role in our Net Zero future, but there is a significant gap between the likely delivery/ scale and the over hyped expectations. Optimism bias, vested interests and the leaning to simplify complex problems with 'new' solutions are a real and significant barrier to delivery of existing technologies that are proven and can deliver to expected timescales.

The capacity market is currently the only mechanism to bring forward generation and flexibility to meet the resource adequacy question. Although this is under review, the continuation of a siloed approach across CfD and the Capacity Market does not allow for whole systems thinking or a joined up approach. 1 GW of hydropower could be brought forward if the CfD was 'tweaked' to reduce the lower parameter from 5MWs to 1MWs. 1 GW of Hydropower would reduce the requirement for 1GW of capacity within the capacity market as the generation profile of Hydropower means that it will be generating across times of grid stress (winter, peak tea time demand) The current mechanisms fail to recognise or consider these cross benefits.

Pumped Storage Hydropower will deliver much needed security, storage and flexibility on to the grid, yet it is being compared with other technologies, such as the interconnectors which is not a helpful or suitable comparison to make.

Tidal Range currently receives no support and it is suggested that Government forms a partnership with Industry as they did to support the off-shore wind industry nearly 20 years ago. Tidal Range offers a significant resource of up to 20GW of non-weather dependent, time tabled energy generation near to increasing centres of demand (Cities such as Cardiff and Liverpool that will see their demand increase 2.5 times as we electrify heat, transport and industry) this circumvents the significant barrier that the grid is posing in the plans to decarbonise the grid by 2035.

CM and CfD are Market based mechanisms which will only go so far towards delivery of a Net Zero Grid. It is hoped that the FSO can see the gaps and flaws and help make suggestions to realign policy to address the gaps.

The Grid is physics and decarbonising the grid cannot be done using market solutions set by policy makers without understanding the nature of grid. Real time Generation profiles, not Total Installed Capacity needs to be considered when we're thinking about what should be brought forward as a priority through the CfD. The non-price factors should be brought forward as key enablers for

decarbonising the grid. This should include crucial review of what the CfD is not bringing forward across the grid, ie smaller scale generation that will be needed to decarbonise across the distribution network. Hydropower, Anaerobic Digestion, Smaller scale onshore wind will all enable local place based, net zero transition (despite grid constraints across the Transmission networks)

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

The Electricity Grid is our biggest energy infrastructure and is not ready for a high penetration of intermittent decarbonised generation such as wind and solar. The £54 Bn being invested as part of the Holistic Network Design is for Transmission level reinforcements, but will do nothing to alleviate the issues that cascade down to the Distribution and rural areas of 'weak' grid that will be unable to support the electrification of heat, transport and Industry.

Huge amounts of innovation must take place if the Electricity Gris is going to be able to deliver the Net Zero ambitions of Government and this should be the main priority over creation of new infrastructure for Hydrogen and CCUS.

The Strategic Innovation Fund and pathfinder funding is a great way to bring forward innovation which can maximise the potential for the UK grid to decarbonise, however, there is not enough funding and the competitive rounds of funding, where only 3 projects get feasibility funding and then 1 progresses to demonstrator, this is not enough.

There is much emphasis on funding for Hydrogen transmission and storage and CCUS. This is large scale infrastructure and the use case has not yet been proved. The BHA would recommend that this continues to be researched as an addition to a Net Zero transition that is not reliant on either Hydrogen nor CCUs (with abated gas).

There is a tendency to always focus on the large scale 'solutions', whereas multiple small solutions scaled up will have a cumulatively large impact. Generation at the Distribution network will play a key part in the net zero transition, but currently has no incentives and is overlooked by policy. Local, place based, whole systems solutions or SLES (Smart local energy solutions) must be given weighting in policy consideration, as these solutions will not be hamstrung by Transmission Grid constraints and will be able to be deployed despite of these issues.

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

No. The Government wants to decarbonise the grid by 2035 and reach Net Zero by 2050. Many Hydropower and Pumped Storage Hydropower plants are designed for 80 year life cycles, and with refurbishment, can continue to generate well after this design date. This is true energy security.

Energy security should encompass maximising the UK's indigenous energy generation with a 100 year plan. Just as our electricity grid, water/ wastewater and rail infrastructures are utilised for this duration of time, so too will energy infrastructure we implement today. Electricity is a societal necessity as important as water/ wastewater and with so many factors of modern life interdependent on electricity, Energy security is a critical infrastructure and can not be left to chance.

The ESO has the Future Energy Scenario pathways, these are to 2050 and should be extended to 2075 and then projected to 2100.

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

Table 1 – The BHA 'Asks' to Government

	Hydropower:	**Pumped Storage Hydro:**	**Tidal Range:**
Potential deployable capacity	1GW	15GW`	20GW
What is the BHA calling for?	Move to 'Enhanced' Levelised Cost of Energy inc whole systems benefits. Replace 1 GW of coal with 1GW Hydropower. CfD tweak for AR6: – Strike price £140/180MWh. – Reduce >5MW to >1MW. – Ring fence and aggregation potential for Capacity Market inclusion	A cap and floor, to enable delivery of the **15GW** called for in this CCC report	Regulated Asset Base, used for Nuclear, to enable delivery of 20**GW**
What are the main barriers to support?	Hard to raise relevance (seen as, too small, can't scale, too expensive)	Geographically constrained, market can deliver batteries	Too expensive (ie, Swansea Bay)
Why are these technologies important?	Resource adequacy, hydropower is cheaper than gas peakers (Reservoir hydro currently provides 900GWhs of storage and load follows)	Storage, reduced curtailment and balancing costs, grid stability/ flexibility (pumps and generates) currently 29GWhs, pipeline 135GWhs	Non-weather dependent, generation near increasing demand centres (circumvents transmission constraints), flood defence, socio economic value.
The counter points:	**Longevity:** All these technologies are intergenerational assets that will deliver well beyond 2050 – true energy security. **Resource adequacy:** What's the answer to 3 week Low wind period in 2035? These technologies will help alleviate this risk. **Energy sovereignty:** Gas interruption, interconnector failure, French nuclear fleet refurbishment. **Reliability:** Hydro/ PSH/ TR are all proven, reliable, long lasting & deliverable		

	Cost: LCOE: cheapest kWhs will not deliver a stable grid. Lowest cost is not always best value. We need to move to 'Enhanced' LCOE and account for Non price factors. **Path to net zero:** • Fraught with delivery risk and time slippage • To mitigate risk, we need diversity. • We need all technologies being progressed rather than a favoured few. **Grid:** How can we deploy localised energy solutions that will not be hampered by Transmission constraints.

As stated in the table above there are proven technologies that need support to deploy. Government has always been reticent to support 'proven' technologies as they feel that they should not be 'subsidised' if they are no longer innovating and are market ready. However, the energy market suffers from market distortion and market failure. Energy price volatility is a product of global gas markets and will continue to be unstable. Creating a stable price mechanisms is not giving subsidy, but is giving certainty to investors and allowance of bankable business models that will allow deployment. The Government investing in these longer term price signals is an effective way to help deploy a stable, operable, decarbonised grid, for technologies that will be generating many years after the 15 year incentive mechanism and will offer value to consumers.

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

It is worth pursing all avenues, however, too much focus on 'silver bullets' is dangerous. There needs to be consideration of deploying all technologies that are known to have low deliverability risk. As with investor portfolios, have a spread of technologies will help mitigate risk.

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

The Future Energy Scenarios should be followed and implemented as the DESNZ delivery plan with 6 monthly progress updates and scrutiny to ensure an understanding of technologies that are not getting deployed at their expected delivery rates are picked up and mitigation is possible. For example the CfD Auction Round 4 off-shore wind may not be deployed due to escalating costs due to inflation. Learning should be taken from this and in future there should be a mitigation plan in place to cover this unexpected lack of generation in the pipeline.

Moving away from the Levelisied Cost Of Energy as the most important metric is key. This metric is not nuanced enough to develop a stable, secure, operable decarbonised grid and reflect true value for consumers. A whole system approach with a view holistically across net zero must replace this base line of cheapest kWh.

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

Vertically integrated planning

The ESOs Future Energy Scenarios (FES) takes a **whole systems approach**, and this approach needs to be cascaded down with more detail to the Distribution FES and a concerted effort to bring forward further granularity of detail through Local Area Energy Plans, Community based Local Area Energy Plans and then down to Sub-station level Local Area Energy Plans. This strategic, vertically integrated planning approach must be developed if best value for the consumer is to be realised through an efficient process of reinforcements. The proposal by Ofgem to introduce 'Regional Systems planners' could facilitate this approach and use a deep understanding of the distribution network to understand and create local, place based solutions.

Some of the Rural grid is 'weak' and will not have the capacity to meet electrification requirements. The cost of reinforcing the entire rural grid would be cost prohibitive, take too long, not be a priority and there isn't likely to be sufficient workforce to deliver. The solution will be to create local, place based solutions where new demand is met by new generation in Smart Local Energy Systems (SLES). Local balancing, local flexibility, digitalisation, Active Network Management will all need to be deployed to ensure the best and most cost efficient solutions are developed. This cannot happen organically, or piece meal, but will need holistic, whole systems planning which will require adequate skill and resource.

Each area will have a different solution, however the process for finding that solution through planned as stated above, will be the same.

Each are will have different assets that can be utilised. For example Cardiff and Liverpool have the potential to access off shore wind and Tidal Range. Manchester has the ability to access on-shore wind. This potential should be reviewed and fed into the Local Area Energy Plans and how development would enable a stable, operable secure, decarbonised grid.

Great inroads have been made into decarbonising the grid, but with so many projects queued to connect to the grid, there is a tendency to complacency, when indeed, the hardest part is yet to come. Whole systems, holistic thinking, partnerships across TOs, DNOs, Ofgem, DESNZ, developers and indsutry must be tightened (so much easier now with roundtable gatherings being run via Teams etc) We are entering a period of innovation, but we must remember the fundamental physics of the grid, which will need to be powered by electrons generated from renewable energy. This generation needs to be dispersed across the country, across different areas of the grid and across many technologies.