12th March 2020

Net Zero: Opportunities for the Power Sector

National Infrastructure Commission (NIC) report

Following on from its Smart Power report in 2016, the NIC has released a further paper on the power sector, specifically how the sector could help the Government meet its Net Zero ambitions. The report, entitled 'Net Zero: Opportunities for the Power Sector', highlights the work that is still to be done to transform the sector and to deliver a decarbonised, flexible, and secure energy system.

In its assessment, the NIC argues that the best way to achieve a low cost low carbon electricity system for the UK is to deliver at least 50% renewable generation by 2030, as part of the transition to a highly renewable generation mix.

The report rightly argues that the process of decarbonising heat will have a significant impact on the future demands of the power system. In light of this, and in the absence of a single pathway, the analysis considers two heating pathways:

1. **Electrification:** represents a future in which most of the heating sector has been decarbonised largely by using heat pumps.
2. **Greener gas:** represents a future in which heat is primarily provided by low carbon hydrogen.

Please view the last page of the briefing for a summary of the assumptions for both pathways.

Overall, it argues that the Government should not seek to prioritise one technology over another, and casts doubt on the ability of nuclear to provide capacity in a cost and time effective manner.

Sector specific analysis

Bioenergy

The modelling finds that there could be a role for Bioenergy with Carbon Capture and Storage under both pathways. It is suggested that as BECCS would serve as baseload capacity, meaning it would be generated constantly, rather than flex to meet demand.

- **They model that up to 50 MtCO2 could be captured by BECCS in power by 2050**[1]

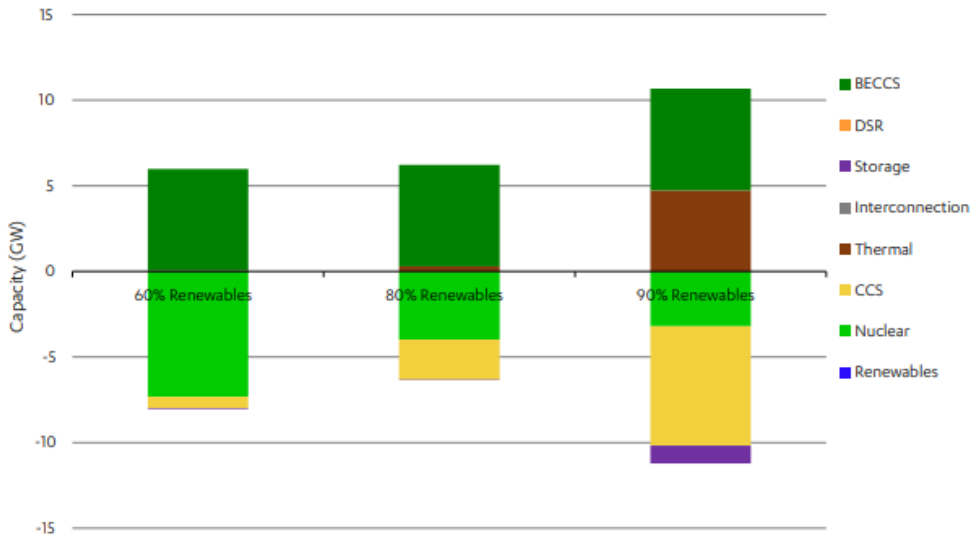
As a result, they envisage that BECCS could displace other inflexible technologies, thereby weakening their case.

- **They model that BECCS generation could reduce the capacity of nuclear by 3 – 7 GW across all scenarios, due to a stronger cost efficiency case.**

[1] This is based on 135 TWh primary of biomass feedstocks – well within current estimates for available supply.

They do however state that BECCS deployment would have little impact on costs, with hydrogen deployment likely to deliver lower electricity system costs and therefore would be more attractive than BECCS if delivered at scale.

Figure 1: Change in capacity in 2050 when introducing BECCS into the electricity system



They further state that BECCS could be better utilised in other sectors, but that was outside of their scope and called for more in depth analysis.

Storage

Referencing their previous Smart Power paper, published in 2016, the report calls for:

> **"The UK to become a world leader in electricity storage systems, interconnection and demand side response".**

Across both of the scenarios, 17.9 GW of interconnection comes online, performing a key role in balancing the system, especially in periods of low renewable output.

This is in line with the pipeline of interconnectors that are either in operation, under construction, or have been given regulatory approval from Ofgem.

Large volumes of storage, primarily lithium-ion batteries, and demand side response are included in the mix based on being able to make sufficient economic returns.

Solar

The technology, alongside onshore and offshore wind are viewed by the model as the least cost mix of renewables – and are viewed as an essential part of the energy mix in all scenarios, spanning from 60-90% renewable penetrations in 2050.

Across these scenarios, between 129 – 237 GW of renewable capacity is in operation by 2050, generating between 360 – 530 TWh of electricity across the scenarios modelled. This includes between 56 – 121 GW of solar.

Contracts for Difference

The report also makes recommendations regarding the Government funded Contracts for Difference (CfD) scheme, which is currently being consulted upon. They call for the Government to:

- Set out a pipeline of pot 1 Contracts for Difference auctions, to deliver at least 50 per cent renewable generation by 2030, as part of the transition to a highly renewable generation mix.
- Move technologies that have recently become cost competitive, such as offshore wind, to pot 1 following the next Contracts for Difference auction in spring 2019. Pot 1 should be used for the overwhelming majority of the increase in renewable capacity required
- Publish indicative auction dates and budgets for the next decade by 2020 over time take whole systems costs into account in Contracts for Difference auctions, as far as possible.
- Consider whether there is a case for a small-scale, pot 2 auction in the 2020s, if there are technologies which are serious contenders for future pot 1 auctions

Impact

The National Infrastructure Commission has an influential position as they were set up by Government to advise them on infrastructure developments. This paper fits in with wider work done by the Commission, which is aiming to help the Government plan to meet its Net Zero ambitions.

As the Government seeks to finalise its Heat Decarbonisation Roadmap, as well as broader initiatives in the area, particularly around Contracts for Difference (CfDs), this report will hope to influence that thinking.

Parameter /Scenario	Assumptions for electrification	Assumptions for Greener Gas	Comments
Annual Generation (TWh)	595	465	These total demand scenarios are comparable to the demand in the CCC indicative net zero scenario (650 TWh)42 and the National Grid ESO Future Energy Scenarios 2019 (400 – 450 TWh)
Emissions Constraint (MtCO2)	2.9	1	In the electrification scenarios as demand is similar to that in the CCC indicative net zero pathway a 2.9 MtCO2 constraint is used, as the Greener Gas scenario has a smaller power sector a lower emissions constraint of 1 MtCO2 is used.
Electric Vehicle deployment	Assumed 100% new sales are EVs by 2030	Assumed 100% new sales are EVs by 2030	In line with recommendations made in the Assessment by 2030 100 per cent of new car sales are electric vehicles.
Number of heatpumps	33 million 4kW heatpumps are installed in homes	N/a	These assumptions are based on Cost analysis of future heat infrastructure option
Energy Efficiency Measures	Heat demand is lowered by around 100 TWh against the counterfactual from energy efficiency measures		These assumptions are based on Cost analysis of future heat infrastructure options
Gas Prices	BEIS central gas prices are assumed, reaching 63p/ therm by 2050		BEIS fossil fuel price assumptions
Interconnector capacity assumed	17.9 GW	17.9 GW	This is based on the capacity of interconnectors either already in operation, under construction or with regulatory approval from Ofgem
Baseline level of nuclear to 2050	4.6 GW	4.6 GW	Assuming Sizewell B and Hinkley Point C are both online in 2050

12th March 2020

THE ASSOCIATION FOR RENEWABLE ENERGY & CLEAN TECHNOLOGY

THE ASSOCIATION FOR RENEWABLE ENERGY AND CLEAN TECHNOLOGY

80 Strand, London, WC2R 0DT

Tel: +44 (0)20 7925 3570 Email: info@r-e-a.net Web: www.r-e-a.net

Company no: 04241430 Registered in England and Wales