NET ZERO – THE UK'S CONTRIBUTION TO STOPPING GLOBAL WARMING: COMMITTEE ON CLIMATE CHANGE REPORT MAY 2019

ORE Catapult Summary Briefing

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Contents

1 Summary

Key report findings with direct impact on offshore wind and other offshore renewables:

- The report outlines the need for "at least 75GW" of offshore wind by 2050.
- Offshore wind expected to account for 50% of UK electricity generation by 2050.
- The report gives the view that there is technical potential for 245GW of bottom-fixed wind in UK waters, but it is not clear to what extent this takes all constraints into account.
- The report acknowledges that "floating wind turbines would increase the potential for deployment in deeper waters."
- 75GW of offshore wind, requiring a build-out rate of 4GW per year, is ambitious but achievable.
- There is a need for improved system flexibility to allow up to 75% variable renewables penetration.
- This improvement will come from a mix of battery storage, interconnection and fast-response gas plant as well as demand-side management and improvements in system operation.
- The role of the UK in enabling decarbonisation on a global scale is recognised and gives a platform for continuing to lead in innovative technologies (could include floating wind and marine energy).
- Some form of financial support for renewables is expected beyond 2030 and the need to maintain investor confidence is seen as critical.
- The Government has recognised the importance of developing skills in its Industrial Strategy and Sector Deals. These should be used to tackle any skills gaps that would otherwise hinder progress.

2 Overview

2.1 Headline Recommendations

1. The UK should legislate as soon as possible to reach net-zero greenhouse gas emissions by 2050.
2. The aim should be to meet the target through UK domestic effort, without relying on international carbon units.
3. This target is only credible if policy to reduce emissions ramps up significantly:
    a. The target can only be delivered with a strengthening of policy to deliver emissions reductions across all levels and departments of government.
    b. Policies must be designed with businesses and consumers in mind.
        i. They must be stable, long-term and investable.
        ii. The public must be engaged.
        iii. Other key barriers such as low availability of necessary skills must be addressed.
4. Progress has been too slow in a number of areas: low-carbon heating, hydrogen, carbon capture and storage (CCS) and agriculture and land use.
5. As well as driving deployment, Government must ensure that the necessary infrastructure is delivered.
6. HM Treasury should undertake a review of how the transition will be funded and where the costs will fall.
7. Scotland should aim for net-zero GHGs by 2045 as it has proportionately greater potential for emissions removal than the UK overall.
8. Wales should set a target for a 95% reduction in emissions by 2050 as it has less opportunity for CO_2 storage and relatively high agricultural emissions that are hard to reduce.

2.2 Scenarios

The report focuses on three possible scenarios:

1. **Core** – Low-cost low-regret options that make sense under most strategies to meet the current 80% 2050 target.

2. **Further Ambition** – More challenging and on current estimates are generally more expensive than the Core options and provide 96% GHG emissions reduction.

3. **Speculative** – Currently have very low levels of technology readiness, very high costs, or significant barriers to public acceptability and provide 100% GHG emissions reduction.

3 Implications for Offshore Wind

3.1 Headline

The report outlines the need for "at least 75GW" of offshore wind by 2050.

3.2 Electricity Generation Mix

The report expects UK electricity demand to increase from 300TWh in 2017 to 500TWh in the Core scenario, 600TWh in the Further Ambition scenario and up to 1,350TWh if adding Speculative measures. The expected trend in overall electricity demand and supply from offshore wind is shown in Figure 1. Offshore wind is expected to account for approximately 50% of generation in both the Core and Further Ambition scenarios. The generation mix required to achieve Net Zero is not fully explored but would require increased levels of all low-carbon technologies – Figure 1 shows offshore wind continuing to provide 50% of demand in this scenario.

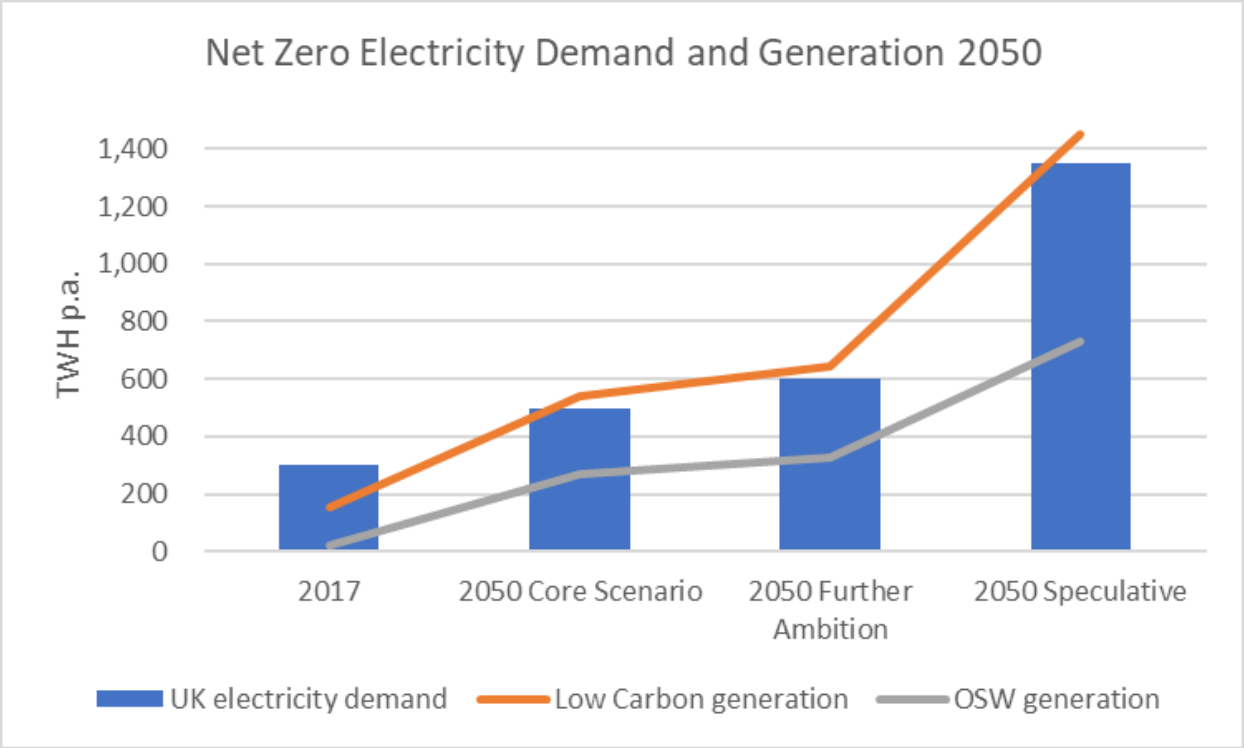

Figure 1: Electricity Demand and Generation 2050

3.3 Importance of Renewables

Variable renewables are currently the lowest cost low-carbon generation options with the lowest barriers to deployment. Intermittent shares of up to 50% are deemed to be manageable within the constraints of managing the grid and avoiding high costs from under-utilised capacity, with shares of over 50% possible with improved system flexibility. Renewables are assumed to contribute at least 59% of generation in 2050, though this should not be considered an upper bound for renewables deployment in the UK.

Figure 2 shows the modelled generation mix for 2050 under the Core and Further Ambition scenarios.

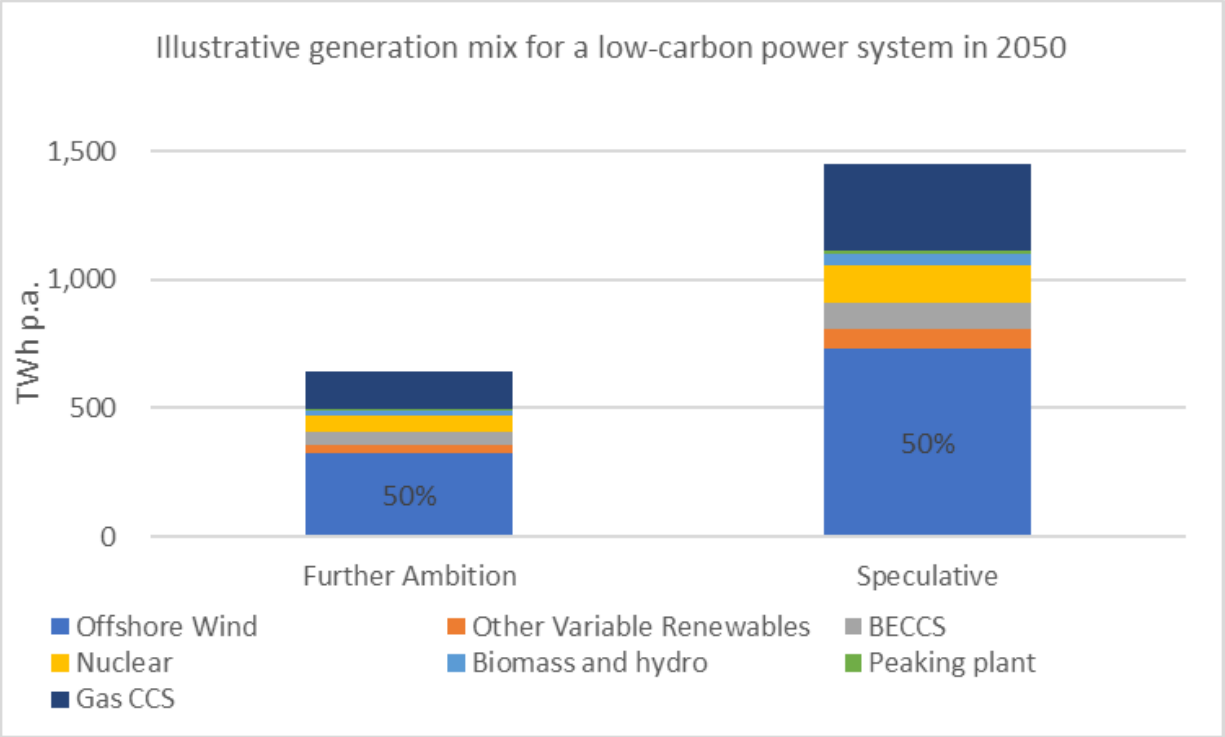

Figure 2: Illustrative Generation Mix 2050

This requires an increase to at least 75GW capacity and potentially as much as 170GW if all Speculative measures were put in place. Key drivers of additional electricity demand in the Speculative scenario are electrolysis, resistive heating, Direct Air Carbon Capture and Storage (DACCS), further electrification of HGV's.

3.3.1 Offshore Wind Potential

The view of the authors is that "**there is a technical deployment potential for up to 245 GW of fixed offshore wind in UK waters**. However, a more detailed, and co-ordinated review of the practical deployment potential - which considers the potential energy requirements, ecological constraints and military and shipping needs of the UK's waters - could reduce this figure significantly."

With these expected constraints in mind, the report also acknowledges that **"floating wind turbines would increase the potential for deployment in deeper waters."**

3.3.2 Clear Support for Offshore Wind

The report singles out offshore wind as the main renewable electricity source (as shown clearly in Figure 2) and mentions "75GW" or "at least 75GW" of offshore wind by 2050 in a number of places.

For example:

"The Contracts for Difference signed to date for low-carbon generation, plus the aim in the Offshore Wind Sector Deal to deploy 30 GW of offshore wind by 2030, are important steps in power sector

decarbonisation. Consistently strong deployment of low-carbon generation will be needed in order to quadruple low-carbon supply by 2050 (e.g. including **at least 75 GW** of offshore wind)."

And:

"Our Further Ambition scenario (see section 3 (a)) **involves up to 75 GW by 2050**. That would require up to 7,500 turbines and could take up as little as 1-2% (around 9,000 km2) of the UK's seabed."

3.4 Offshore Wind Targets

The requirement for **75GW of offshore Wwnd is seen as ambitious but achievable**.

"Deployment of offshore wind at up to 4 GW/year is more than double historical deployment rates. However, the offshore wind market has already scaled up from almost no deployment a decade ago. Furthermore, the UK is an ever-smaller share of a growing offshore wind market, suggesting increased deployment could be managed. However, the increasing size of offshore turbines and foundations may indicate a need to scale up UK-based production facilities."

3.5 System Flexibility

The modelled scenarios for 2030 and 2050 see variable renewables providing 50-75% of overall electricity production and are contingent on system flexibility improving. These improvements in system flexibility can come from increased deployment of battery storage, interconnection and fast-response gas plant as well as demand-side management and improvements in system operation.

4 Support for Further and Deeper Innovation

4.1 Technology Development and Knowledge Sharing

The report **recognises the importance of technology development and knowledge sharing** and emphasises the role the UK and, in particular, **ORE Catapult** has played in global offshore wind development:

"The UK has made a significant contribution to this technological progress through its offshore wind sector. It has consistently been the largest global market (over one third of the global installed capacity in 2017 was in UK waters) and costs have fallen to the point that projects are being contracted across Europe with no or minimal subsidy. UK institutions that contributed to falling costs are also engaged in international collaboration, for example the Offshore Renewable Energy Catapult has been helping address technical and engineering challenges in the Chinese market."

4.2 Importance of UK Showing Global Leadership

The role of the UK in enabling decarbonisation on a global scale is recognised and gives a platform for continuing to lead in innovative technologies (could include floating wind and marine energy):

"The dramatic reductions in offshore wind costs during this decade, due to deployment led by the UK, highlight the value of 'learning by doing' in achieving cost reductions via deployment, including the importance of good policy design, rather than relying only on research and development. As well as reducing future costs of UK decarbonisation, UK deployment of less-mature technologies also reduces the costs for other countries, making global action to tackle climate change more tractable."

"Learning-by-doing. In many cases, the biggest driver of cost reduction will be deployment at scale, both through reduced technology costs and reduced cost of capital - both of these effects have been apparent in the last decade for offshore wind. Policy frameworks will need to drive deployment of some less-mature solutions, even if these have higher costs than other low-carbon technologies in the near term."

5 Key Policy Recommendations Directly Relevant to Offshore Wind

5.1 Investor Confidence

The report emphasises "the importance of ensuring that policies are designed with investors in mind. They should be clear and stable and avoid exposure to unnecessary risks. The long-term contracts offered under the Government's Electricity Market Reform are a good example of an effective policy and have been vital to reducing costs for renewable power."

5.2 Industrial Opportunities

The report also recognises there could be industrial opportunities. "With appropriate policy and support there could be an industrial boost to the UK from being one of the early movers in some key sectors (e.g. specialised supporting services like finance and engineering for low-carbon technologies, carbon capture and storage), with potential benefits for exports."

5.3 Skills

There is also a focus on skills: "The Government has recognised the importance of developing skills in its Industrial Strategy and Sector Deals. These should be used to tackle any skills gaps that would otherwise hinder progress."

5.4 Infrastructure Requirements

Focus on infrastructure: "Reaching net-zero emissions will require development or enhancement of shared infrastructure such as electricity networks, hydrogen production and distribution and CO_2 transport and storage. Government, in partnership with the National Infrastructure Commission, should give urgent consideration to how such infrastructure might best be identified, financed and delivered. Regional coordination will be required, including for transport where powers are devolved."

5.5 Continued Support for Renewables

Some form of financial support for renewables is expected beyond 2030: "Government intervention may still be needed, for example by backing long-term contracts aligned to expected wholesale prices. Policy and regulatory frameworks should also encourage flexibility (e.g. demand response, storage and interconnection)." And:

"While key options like offshore wind look increasingly like they can be deployed without subsidy, this does not mean they will reach the necessary scale without continued Government intervention (e.g. continued auctioning of long-term contracts with subsidy-free reserve prices)."

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