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How effective has the Government's offshore wind Sector Deal been in moving the sector towards becoming an integral part of a low-cost, low-carbon, flexible grid system and boosting the productivity and competitiveness of the UK supply chain?

1. Offshore wind is a success story for the UK. Long term government support has underpinned innovation and investment in the sector, helping to drive down costs while contributing to decarbonisation of the economy.
2. The aim of the Offshore Wind Sector Deal is to build on this success, particularly in the context of offshore wind increasing around the world opening new export opportunities. Since the Sector Deal was signed, the government and the sector have worked closely to make progress on delivering the commitments.
3. A new Offshore Wind Growth Partnership (OWGP) has been established, chaired by Martin Whitmarsh, the former CEO of McLaren Racing and Team Principal of McLaren Mercedes Formula One team. This is a £100 million, 10 year business transformation programme to support the growth of UK businesses looking to capitalise on the huge opportunities offered by the growth in offshore wind around the world. The OWGP has four strands:
 - Collaborating for growth – enhanced engagement between developers and supply chain to increase competitiveness and build capacity.
 - Business competitiveness – a structured business improvement programme for the existing supply chain.
 - Building new capacity – increasing the breadth of the UK supply chain and enabling new entrants.
 - Supply chain futures – developing new innovations and new UK intellectual property in areas such as robotics, advanced manufacturing, automation and new materials.
4. The OWGP held its first funding competition with two calls: a) competitiveness from advanced manufacturing techniques and b) advanced sensors, Internet of Things, and communications solutions. £364,000 of funding was awarded to seven UK companies from industries including oil & gas, manufacturing and robotics, with a further £156,000 leveraged from match funding. Further programmes are being developed and will be announced in due course.
5. The sector has established an Offshore Wind Innovation Group with industry, academic and public sector representatives. This group has built on the technology roadmaps of the Offshore Wind Innovation Hub (Turbines, Substructures, Electrical Infrastructure, and O&M and Windfarm Lifecycle) to develop an innovation support plan.
6. Led by Baroness Brown of Cambridge, the sector has finalised a delivery plan for the Sector Deal's Solving the Integration Challenge workstream. This workstream is identifying both innovative solutions to system integration to support the transformation of the power grid, and research and development

- funding/policies required to accelerate the role of hydrogen within an energy mix with a high level of offshore wind deployment.
7. Eight offshore wind regional clusters are being developed across the UK. These are a collaboration between offshore wind developers, regional supply chain companies, public sector and education bodies. The aim is to increase the productivity, competitiveness and innovation across the sector, while helping to grow the local, coastal economy.
 8. The sector has appointed a Diversity Champion to lead work across the skills and diversity agenda and an Investment in Talent Group has been established, comprised of senior representatives across the sector. In addition to the target of increasing the number of women working in the sector, the sector now has additional targets to increase the number of Black and Minority Ethnic workers in the sector from 5% today to 9% in 2030, aiming for a more ambitious target of 12% if feasible and a target that 2.5% of the employed workforce will be apprentices. This apprenticeship target will include technical and non-technical apprentices, new entrants and people on apprenticeships to be upskilled. This figure will be reviewed regularly.

What level of output can the sector deliver in the UK, and what Government support would be needed to achieve this?

9. The UK has the largest installed offshore wind capacity in the world, with around 9.8GW operational which is set to rise to 19.5 GW by the middle of the decade. In 2019 offshore wind supplied 9.9% of the UK's annual electricity generation¹.
10. The UK's forward pipeline is substantial. In Q1 2019, the UK's total pipeline stood at 33.2GW² – this includes projects which are operational, in construction, in pre-construction, with planning consent, in the planning system and in early development. In addition, there are a further 2.5GW of extension projects which could sign Agreements for Lease with The Crown Estate following the conclusion of the plan level Habitats Regulations Assessment. The Crown Estate is also currently running a new seabed leasing round (“Round 4”) in English and Welsh waters which could bring forward a further 7-8.5GW of projects. Crown Estate Scotland is also currently running a new seabed leasing round (“ScotWind”) to bring forward projects, though an upper GW figure is not yet specified.
11. The Government notes that the Committee on Climate Change cited a figure of 75GW of offshore wind by 2050 but has not itself estimated an upper limit on potential deployment in the context of net zero. We will continue to work with stakeholders to better understand what additional resource might be unlocked over the longer term, whilst being mindful that deployment needs to be balanced against environmental impacts, impacts upon other existing

¹ Energy Trends: March 2020, BEIS, p61, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875381/Energy_Trends_March_2020.pdf

² Offshore Wind Operational Report January – December 2018, The Crown Estate, p21 <https://www.thecrownestate.co.uk/media/2950/offshore-wind-operational-report-2018.pdf>

users of the sea, local communities and other potential future usages of the seabed such as Carbon Capture Usage and Storage.

12. It is worth noting that the vast bulk of the pipeline described above relates to fixed bottom offshore wind. Floating offshore wind could open up significant new areas of the UK's seabed resource and increase the overall pipeline further.
13. The Government's Renewables Obligation and Contracts for Difference (CfD) support schemes have been successful in bringing forward offshore wind deployment and providing the long term certainty which has driven investment and significant cost reduction. The Government is currently carrying out a public consultation in preparation for the fourth CfD allocation round which will be held in 2021 and has committed to subsequent allocation rounds approximately every two years after that.

How might the UK take advantage of further technological advances in offshore wind technology, particularly in relation to floating arrays?

14. In November 2019 BEIS published the Energy Innovation Needs Assessments³ which look at possible areas of future innovation support. The Offshore Wind Sub-Theme analysis suggested the following areas for consideration:
 - Enable turbines to be constructed in deeper waters, enabling deployment to occur in locations that are currently too deep for wind farm construction to be economically viable.
 - Digital design to reduce manufacturing costs.
 - New materials to reduce turbine costs.
15. Floating offshore wind could enable deployment in deeper water sites where fixed bottom foundations are either not technically feasible or uneconomic. Floating wind also offers an opportunity to diversify the geographical location of the offshore wind fleet which could have wider system benefits if, for example, projects on the west coast are able to generate when there is little wind on the east coast.
16. As part of the consultation on changes to the fourth CfD allocation round, we are seeking stakeholders' views on proposals to define floating offshore wind separately to fixed bottom offshore wind and to give the technology a separate administrative strike price (which will act as a reserve or maximum price in the auction). We are also seeking views and evidence on additional benefits floating offshore wind may bring, including wider system benefits.
17. Crown Estate Scotland's current ScotWind leasing round, is expected to offer areas for development which are suitable for floating offshore wind. In English, Welsh and Northern Irish waters, The Crown Estate provides an on-going opportunity for developers to access the seabed for the testing and

³ Energy Innovation Needs Assessment: Offshore Wind Sub-Theme, BEIS, 2019
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845662/energy-innovation-needs-assessment-offshore-wind.pdf

demonstration of emerging technologies including floating wind for projects up to 100MW.

What support does the sector require to keep pace with the most cutting edge innovations, such as in blade technology?

18. BEIS's Energy Innovation Needs Assessment suggested possible priority innovation areas in offshore wind are:
 - Grid integration;
 - Logistics and Installation, smart operations & maintenance;
 - Next generation turbines;
 - Floating offshore wind.

19. Specialised components, such as blades and drive train parts, are key to increasing yields and could be aligned with existing UK facilities. There are existing innovation opportunities, such as further development of blades, converters, and gearboxes, which could provide the UK with a significant competitive advantage and likely increase the UK's market share of value associated with turbines. Improved blade design is seen as key to increasing yields and is already a UK strength with two UK facilities – Siemens Gamesa in Hull, and MHI Vestas on the Isle of Wight - currently producing blades for offshore wind turbines.
20. Current support from the BEIS Energy Innovation Programme includes funding of £1.46 million for development of an extra light wind turbine blade by the company ACT Blade Ltd. This project will design, engineer and manufacture a scaled down prototype and test in a simulated environment the first commercial configuration of the extra light blade for offshore wind use.
21. Other projects include:
 - Demowind 1 & 2 - £8 million funding for a range of technologies including bigger turbine components. Whilst bigger turbines have been key to reducing the levelised cost of energy (LCoE) to date, innovations in other supply chain elements will be key to further reducing LCoE.
 - Offshore Wind Innovation Hub - £1.2 million
 - Composites - £400,000 case study to deliver a 20MW scale offshore wind turbine

22. The Government is also taking steps, through innovation, to help unlock deployment potential. In March 2020, the Government launched a £2 million innovation competition, run by the Defence and Security Accelerator (DASA), seeking proposals that can provide future offshore windfarm mitigation for UK Air Defence surveillance; including alternative technologies that could fill or remove gaps in radar coverage. The window for submitting proposals closed on 17 April and DASA are currently evaluating the proposals received.

What is the UK industry doing to promote the sustainability of offshore wind arrays throughout their entire lifecycle from development through to decommissioning and to improve maintenance and end-of-life repair?

23. In 2019, Blyth – the UK’s first offshore windfarm – was decommissioned having reached the end of its technical lifespan. The two 2MW turbines were removed, one turbine was recycled and reused for spare parts in the operator’s onshore fleet and the other turbine is being used for training purposes in the Port of Blyth⁴.
24. Over the next few decade, we will see more of the older UK offshore windfarms approaching 20 years of operation and more operators beginning to assess the different end-of-life options which could include project life extensions, repowering or decommissioning. Estimates of the technical lifespan of an offshore wind farm range from 25 to 30 years, and The Crown Estate’s seabed leases typically account for two project lifecycles to enable repowering should the operator choose to do this.
25. In terms of decommissioning, under the provisions of the Energy Act 2004, the Secretary of State may require a person who is responsible for an Offshore Renewable Energy Installation to prepare a costed decommissioning programme and ensure it is acted upon. These cover both offshore windfarms and the offshore transmission asset. The Secretary of State can approve, modify or reject a programme, and can also require the responsible person to provide financial security as part of the conditions under which the programme is approved. The Secretary of State is required to review the programme from time to time. The purpose of these provisions is so that a person who constructs, extends, operates or uses an installation or related electric line should be responsible for ensuring that it is decommissioned at the end of its useful life, and should be responsible for meeting the costs of decommissioning (the “polluter pays” principle).

How well is the UK industry managing the environmental and social impacts of offshore wind installations, particularly on coastal communities with transmission-cable landing sites?

26. The social and environmental impact of offshore wind installations are assessed during the development consent process for individual projects and that includes an assessment of cumulative impacts. The Secretary of State considers representations from statutory advisors, local government, Non-Governmental Organisations and wider interested parties before deciding whether to grant consent for an offshore wind development. If consent is granted, it is because any adverse effects are considered acceptable when balanced against the benefits of the project.
27. In the context of a significant increase in offshore wind deployment - to 2030 in the short term and to meeting net zero by 2050 in the longer term - it is likely that a more coordinated approach would reduce the local environmental and social impacts compared to an approach that connects windfarms

⁴ <https://www.eon.com/en/about-us/media/press-release/2019/eon-decommissions-blyth-offshore-wind-farm.html>

individually. The Government is considering a project to look at the potential for taking a more coordinated approach to connecting offshore windfarms to the grid.

How well is Government policy supporting innovation in transmission technology to improve the efficiency of electricity transmission?

28. The current regime for offshore transmission introduces an element of competition in order to promote efficiencies in the operation of offshore transmission. Typically, the generator builds the transmission link which is then transferred to an independent offshore transmission owner (OFTO) following a competitive tender process managed by Ofgem. It is also possible for the generator to follow an ‘OFTO-build’ approach in which the construction of the transmission link is subject to competition and built by an OFTO. So far, all generators have chosen to build their own transmission links.
29. The BEIS Energy Innovation Needs Assessment analysis⁵ highlighted the area of transmission, stating:

“Grid Integration: Smoothing the variability of wind energy and decreasing the costs of transmission would increase the capacity of existing and future offshore wind farms as well as unlock sites that are currently out of the feasible, cost effective transmission distance. Innovations that facilitate longer distance AC⁶ transmission (such as mid-point reactive compensation) and HVDC⁷ are essential to creating improvements in long distance transmission and energy storage innovations as well as better use of advanced wind modelling will reduce offshore wind variability. It is important to note that regulatory barriers, as well as specific technological knowledge limitations, need to be overcome for the UK to advance in this area”.

Looking to the future, what can the onshore wind sector learn from the offshore success story?

30. We now have over 14GW of onshore wind capacity installed in the UK (a 4.6% increase from 2018), the majority located in Scotland and Wales. The BEIS Public Attitudes Tracker (September 2019) showed that 78% of those surveyed supported onshore wind (an increase of 12 percentage points, from 66%, in March 2012).
31. In 2019 onshore wind generated 32.2 TWh, accounting for 9.9% of total electricity generation and 27% of total generation from renewable sources⁸. Going forward, onshore wind will continue to be an important part of the

⁵ Energy Innovation Needs Assessment: Offshore Wind Sub-Theme, BEIS, 2019, p22, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845662/energy-innovation-needs-assessment-offshore-wind.pdf

⁶ Alternating Current

⁷ High Voltage Direct Current

⁸ Energy Trends: March 2020, BEIS -

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875381/Energy_Trends_March_2020.pdf

renewable energy mix and is poised for worldwide growth, thanks to cost reductions seen in recent years.

32. Government has recently confirmed that it intends to hold a 'Pot 1' CfD allocation round in 2021, in which onshore wind will be able to participate. This is a positive announcement for the sector and will encourage the further deployment of onshore wind.
33. The industry is also seeing some merchant deployment, although this is quite limited in scale at present.
34. Community support for new onshore wind developments continues to be important, with developers needing to engage and involve communities. Developers are also encouraged to support local communities throughout the lifetime of the site (community benefits). This can take the form of (but is not limited to) benefit funds supplied via direct monetary payments, benefits in kind such as funding of local projects or energy discount schemes, or through community investment and shared ownership.
35. Government is currently consulting on updating the existing community benefits and engagement guidance for England⁹ and consulting on creating a register of community benefit schemes delivered by onshore wind projects in England. Government is inviting views from the Devolved Administrations and industry on these proposals through the 'CfD Allocation Round 4 Consultation – proposed amendments to the scheme'.^{10 11}

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⁹ <https://www.gov.uk/government/publications/community-benefits-and-engagement-guidance-for-onshore-wind>

¹⁰ <https://www.gov.uk/government/consultations/contracts-for-difference-cfd-proposed-amendments-to-the-scheme-2020>

¹¹ Consultation questions are as follows:

1. How can the government better ensure that the local impacts and benefits of renewable energy developments are taken into account across the whole of GB?
2. What exemplifies 'best practice' when it comes to engaging with and supporting local communities on renewable energy developments? Examples of specific projects and/or developers would be welcomed.
3. How should the government update the existing community benefits and engagement guidance for onshore wind to reflect developments in best practice for engagement between developers and local communities?
4. Should the government consider creating a register of renewable energy developments in England that list available projects and associated community benefits?