Ørsted – Written evidence (LES0006)

Ørsted welcomes the opportunity to provide evidence to the Committee's inquiry on this important topic.

Ørsted's vision is of a world run entirely on green energy. Ørsted develops, constructs, and operates offshore and onshore wind farms, solar, bioenergy, energy storage facilities, renewable hydrogen, and green fuels facilities. Headquartered in Denmark, Ørsted employs over 8,000 people including over 1,400 in the UK. Globally, Ørsted is the market leader in offshore wind, and our UK offshore wind farms generate over 7% of the nation's electricity.

To secure our vision, Ørsted is exploring the value of co-locating our renewable generation assets with long duration energy storage (LDES) to maximise the contribution offshore wind can make to a low carbon electricity system. We ask that Government delivers enabling policies for LDES without delay, including a revenue stabilisation mechanism to support prompt delivery of this technology in the next decade.

Ørsted strongly believes that energy storage, including when co-located with renewable energy generation, will be paramount to the continued success of renewable energy deployment in the UK, and to achieve the UK Government's target of a secure, net zero electricity system by 2035[1]. LDES technologies will provide significant benefits to the security and sustainability of the energy system due to the capacity to store energy over 12 hours and in some cases over several days will help to smooth the variability of renewable generation. Some LDES technologies can also provide other system benefits which are currently maintained by fossil fuel dependent thermal generation.

Ørsted recently signed an MoU with Highview Power[2] which is a leader in Liquid Air Energy Storage (LAES). We are currently undertaking a feasibility study in partnership, with a focus on revenue opportunities, technological challenges, and regulatory barriers. As a developer and investor, Ørsted is positive about the added benefits of co-locating LDES with renewable generation. Siting both technologies together can help mitigate the impact of curtailment events, where offshore wind operators are asked to turn off generation at times of low demand or transmission constraint (which effectively wastes the potential to generate green power). Curtailment increases costs to consumers and generators:

- Consumers not only forgo the lost generation of curtailed assets, but will face the cost of the payments made to those generators to curtail
- Some generators under CfDs receive no compensation for curtailing under the negative pricing rule[3], which creates a cost that those generators have to recover from their auction bids

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[1] UK Government (2023) Powering up Britain: Energy Security Plan, online

[2] Ørsted (2023) Highview Power and Ørsted collaborate to unlock greater value from the next generation of wind farms, online

[3] LCCC (2023) CfD levy, online

Storage supports the operation of the electricity system, in which local system stability is an important requirement, and precisely where co-located solutions can deliver benefits.

Ørsted would therefore encourage the Committee to explore the case for LDES, including recommending that the Government implement a suitable revenue stabilisation mechanism and examine what other enabling policies can be introduced to ensure that LDES is deployed at pace.

Our answers to the call for evidence can be found in the section below. Ørsted would be happy to discuss the specific opportunities and challenges for energy storage in the current market. Please contact Katie Davies (KADAV@orsted.com) if you have any questions or if you would like to discuss further.

Answers: Response to questions

Question 2: How sensitive is the amount of storage needed to assumptions about the future balance of supply and demand on the grid?

Ørsted is actively working towards the UK Government's commitment to achieve a net zero electricity system by 2035, where renewable electricity will be essential to the UK's energy security and responsible for meeting the majority of demand. This is in line with analysis, such as National Grid ESO's Future Energy Scenarios. We are positive about the likelihood of achieving this, subject to policy decisions which maintain momentum and investor confidence.

Storage is crucial to managing the inherent variability of renewable generation and multiple technologies can play a role in this, over a range of time periods. Therefore, it is expected that long-duration energy storage and flexibility will be of vital importance to the system across a range of locations and durations. AFRY's report to BEIS in 2022 concluded 3GW LDES would need to be added to the system by 2035, as a no regrets option[4] but it is unclear how much storage will be required beyond that.

The Government should ensure there is a long-term roadmap for the contribution of LDES in the energy system to provide confidence to investors. This will also provide positive signals to renewable investors as the additional storage will have a positive impact on constraint and curtailment events. As we discuss in the answer to Question 7, this could be a role for the Future System Operator (FSO).

[4] AFRY (2022) 'Benefits of Long Duration Electricity Storage' report to BEIS, online

Question 3: Which technologies can scale up to play a major role in storage?

It is important that Government recognises that a range of technological solutions will need to play a role in delivering the energy system's storage needs. Given the pace of delivery needed in the next decade to achieve a net zero electricity system, Government should prioritise enabling technologies to come to the market driven by the ability to meet the system's need rather than at this stage selecting specific technologies to pursue. Moreover, as LDES technologies are rapidly innovating, it is important that capacity improvements or new technologies are not limited by rigid categorisation.

Some LDES technologies which are based on synchronous generation such as LAES can provide advanced system services beyond electricity arbitrage, including grid stability, inertia, and dynamic response. These services will be especially important to support a high renewables system as the proportion of traditional thermal generation capacity (that would normally provide such services) reduces.

As a developer looking to invest in LDES, Ørsted takes a comprehensive view of technologies in the market, including those that can be co-located with generation projects and the corresponding system requirements at that site. Factors which play a key part in this decision making are:

- Projected revenue – including ability to manage revenue risk through multiple revenue streams i.e. arbitrage, ancillary services
- Costs – both CAPEX and OPEX
- Technology readiness level - including alignment with timelines for generation asset build
- Location, which includes:
    - Location on the system – location relative to transmission constraints that create a storage need, as well as proximity to renewable generators in order to co-locate
    - Geographical location – some LDES requires specific geography i.e. reservoirs or salt caverns; geography may also impact planning and consenting decisions
- Planning restrictions – for example LAES will require storage vessels approximately 50m high

Question 4: What policy support is currently in place to support deployment of storage technologies? Is it sufficient to support deployment at scale?
AND
Question 7: What steps should the Government take now to ensure this storage can come online later in the current decade?

The industry is anticipating the publication of the next consultation on LDES, following DESNZ's commitment to developing policy to enable investment by 2024[5] and considering the enthusiasm and consensus from industry about the need for a robust policy regime for LDES.

Without quick and decisive action from UK Government to signal support for LDES, there is a real risk that investment in LDES – including co-location with renewable generation – stalls. Ørsted encourages the following actions to ensure LDES can be deployed in the next ten years:

Revenue stabilisation
As noted above, the higher CAPEX costs of LDES are a significant barrier to investment in technologies, particularly in its early stages, and forecast revenues from markets such as the BM are not sufficiently stable to base investment decisions on. As we have seen with revenue support for renewable generation and interconnectors, a revenue stabilisation regime is an effective means to reduce technology costs and the risks associated with early investment. Ørsted supports a cap and floor regime that could be easily implemented due to parallels with the interconnector regime. Early support for LDES will also have the added advantage of providing revenue stabilisation whilst also protecting the bill-payer.

Based on the current landscape for LDES, including planning and grid connection timeframes, we expect the scheme would need to be in place by the end of 2024 to ensure investment decisions are made in the coming years and delivery can be guaranteed by the early 2030s.

Access to markets
As discussed in the response to Question 6, LDES technologies may participate in markets for system services, such as ancillary services, Balancing Mechanism and Capacity Market. The Government should take steps to ensure that access to markets for LDES technologies is appropriate, and consult on reforms to markets, as necessary.

Strategic planning
We believe the sector would benefit from a robust view of the electricity system's need for LDES in 2035 and beyond. This would help investors to identify which LDES projects would have the most benefit to the system, and where they should be located, helping to accelerate investment in the next decade and reduce risk.

Government has signalled its intention for the Future System Operator (FSO) to take the lead in developing a whole-system strategy for LDES in its recent Strategy and Policy Statement (SPS)[6]. However, the intended remit of the FSO has not yet been shared with industry for consultation, which given the intended launch date of 2024 could impede its ability to take on this role.

For developers like Ørsted, strategic planning activity could also be aligned with development pipelines, to ensure that all opportunities for the co-location with

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[5] BEIS (2021) Facilitating the deployment of large-scale and long-duration electricity storage: call for evidence, online
[6] DESNZ (2023) Strategy and Policy Statement for energy policy in Great Britain, online

storage technologies can be captured. This could encourage more integrated projects, reduce revenue risks and bolster investment decisions for renewables.

Review of Electricity Market Arrangements (REMA)
DESNZ's has been tasked with delivering the REMA workstream, to ensure that the electricity market supports electricity system decarbonisation by 2035. While REMA continues to weigh up the design options, we strongly recommend the delivery of a revenue stabilisation mechanism for LDES in the short to medium term as a no regrets option, in parallel to the REMA programme.

Question 6: Beyond the cost of deploying long-duration energy storage, what major barriers exist to its successful scale up?

Markets and revenue certainty
LDES is currently very capital intensive with lead times longer than other technologies, such as Lithium-ion batteries, which do not fall within the LDES asset class. While there are opportunities to stack revenue by participating in multiple markets, such as the Balancing Mechanism and ancillary services, uncertainty about access to, and the sustainability of, these markets is a key blocker to investment in LDES. Moreover, there is a risk of price cannibalisation from batteries which are currently better able to participate in markets such as the Balancing Mechanism, as they can cycle multiple times a day and target peak demand times (where balancing prices are highest), compared to LDES. This is why a market stabilisation regime is critical for early deployment of LDES to enable this technology to access the market.

Grid connections
Industry regulations under the Grid Code and CUSC (Connection Use of System Code) require updating to better provide for connection requirements suited to LDES, especially when storage is co-located with offshore generation. More clarity is needed on how current requirements interact with the OFTO (Offshore Transmission Owner) regime. This would benefit from overarching guidance from Government, including how LDES should be treated.

Planning and consents
It is not clear how LDES technologies will be defined in the planning regime and whether the system and energy security benefits will be treated in the same way as renewable generation under the Nationally Significant Infrastructure Project definition.

8 September 2023