

Pathway to 2030

Holistic Network Design

FAQs



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1. Document purpose

On 7 July 2022, we released our Pathway to 2030 Holistic Network Design (HND) publication which sets out a single, integrated design that supports the large-scale delivery of electricity generated from offshore wind, taking power to where it's needed across Great Britain.

The HND facilitates the connection of 23 GW wind, helping to deliver the Government's ambition for 50 GW connected offshore wind by 2030. This is a first step towards more centralised, strategic network planning that is critical for delivering affordable, clean, and secure power, as we journey towards our net zero future.

Following the publication, we hosted several webinars to talk through the content of the HND and its respective reports including the *Pathway to 2030 Industry Code, Standard and Licence Recommendation Report*. This document provides responses to all the questions asked at these webinars.

The answers included in this document are accurate at the time of publication and should be taken as the most up to date position if different to those given in the webinar.

2. Design

1. On the map, what is the difference between solid and dotted purple lines? Are dotted purple lines Alternating Current (AC) or Direct Current (DC)?

The solid purple lines are options that have been included in previous Network Option Assessment (NOA) cycles and have been reaffirmed in the latest assessment.

The map contains three dotted purple lines. These are new network needs identified through the Holistic Network Design (HND). The dotted lines highlight the need to connect two points on the grid; they do not represent a proposed route.

The new needs (the dotted purple lines) will be developed by the Transmission Owners (TOs). They will undertake further detailed design assessments, to ensure a solution which balances the needs of the electricity system, environment, communities, and cost to energy consumers is taken forward. This will be done in line with the democratic planning and consenting processes.

2. The map of the east coast shows very widely spaced cables. Is this intentional, or just to make the map easier to read? Is it expected that someone (the Crown Estate and Scottish Crown Estate?) will set out defined "power corridors" for offshore cables?

The map is purely indicative, route corridors are not defined by the HND. Route corridors will be developed as part of the Detailed Network Design (DND) stage, which will be carried out by the party responsible for developing the infrastructure.

3. It is difficult to understand what the HND is setting out to achieve, given the statement that, "The TOs will now take these options forward for detailed design, exploring many different route options, including onshore, offshore or a combination of both. "Is it correct to assume based on the above that all the options shown in the HND are subject to significant change by the TOs?"

The HND is setting out the Electricity System Operator's (ESO's) recommendations for onshore and offshore network requirements to connect offshore wind to meet the 2030 government ambition of 50 GW.

The DND will follow the HND, and this will set out much greater detail behind the recommendations made in the HND including specific routes and technologies.

It is possible that design changes will occur as more details are understood, however, the HND represents our current, best view of the pathway to achieve the Government's 2030 ambitions.

4. Looking at the coordinated design, the total costs of connection was not reduced. The focus was on the connections to produce a secure network with many interconnections. Those interconnectors will give flexibility to the system. It needs to be confirmed that the holistic design may

release capacity at the main onshore National Grid network which is a constraint bringing forward connection dates for distribution connected plants?

The HND's use of interconnections between offshore wind farms does improve the onshore network capability.

This is demonstrated through our analysis which shows that the coordinated design increases the availability of offshore wind on the system by 32 TWh over a ten-year period from 2030, equivalent to powering 10 million homes for an entire year.

This additional capacity helps reduce constraints on the system, it is not possible to say whether this would bring forward connection dates for distribution connected plants.

5. For the radial connection for the two windfarms in the Irish Sea, has the HND assessed the existing barriers to coordination and how these can be overcome in time (e.g., legal and insurance limitations, risk of asset stranding, how to assess the environmental impact of interconnected projects with their own Development Consent Orders (DCOs))?

The radial design with a shared cable corridor was proposed by the developers and we believe it is more economic and more deliverable than a solution with offshore electrical integration. The environmental and community impact would be similar for both options.

In general, we have only proposed coordinated solutions where they performed better against all four network design objectives.

6. Is there any evidence that the proposed offshore design in the East Coast Region can be built?

Our development of the design has considered many factors including the technology availability, operation, and supply.

We agree that the East Coast design is complex and that they potentially increase the technical difficulty and timeframes required for construction and commissioning. To help mitigate this we envisage that a modular approach to offshore platforms in the recommended East Coast design will aid deliverability and make the design more expandable for future requirements. More information is included in our *Holistic Network Design*¹ document.

7. Looking at the details the sheer volume of work to be completed is huge. A 2030 target does seem unrealistic considering the time it does take to complete designs, mobilisations, procurement, build phase and commissioning. Surely a realistic target is at least 2035 if not 2040?

We believe that our proposed design is ambitious yet realistic. As set out in the HND publication, for the 2030 ambitions to be achieved, the ESO, Government, Office of Gas and Electricity Markets (Ofgem) and TOs will work innovatively and collectively to deliver the level of ambition set out in the HND, and as committed to in the British Energy Security Strategy² (BESS) and equivalent activities in Scotland. This includes:

- Significantly reducing the time taken from development to construction of strategic infrastructure projects, including expediting the consenting and regulatory approval processes.
- A regulatory framework to allow for strategic and anticipatory investment within the Pathway to 2030 workstream.
- The designation of transmission network infrastructure required for 2030 as strategic.

¹ <https://www.nationalgrideso.com/document/262681/download>

² <https://www.gov.uk/government/publications/british-energy-security-strategy>

- Commitments from the TOs to accelerate delivery of their reinforcement projects once detail of the changes set out in the BESS are confirmed, with the aim of delivering all necessary infrastructure by 2030.
- Supply chain availability to deliver the recommended network.
- The consideration of mitigation and strategic environmental compensation where needed.

8. When the Offshore Transmission Network Review (OTNR) was launched, why did the ESO not push for an offshore main ring off the East Anglia coast to take all Norfolk Suffolk and Essex windfarms, rather than using onshore pylons?

The OTNR defined which windfarms were in scope based on how well progressed they were. The Terms of Reference³ (ToR) set this out.

9. Which organisation made the decision to scope out the East Anglia projects, so the ESO did not include them in HND? Can the ESO provide an explanation why a little over 18 months ago it was proposing a coordinated Offshore Transmission Network (OTN) which included East Anglia and yet this HND dismisses the whole region in a single page with the suggestion that a number of the projects are “well-developed”?

The OTNR defined which windfarms were in scope based on how well progressed they were. The ToR set this out.⁴

In December 2020 we published our *Phase 1 final report*⁵ in which we presented three conceptual network designs; the status quo approach, commencing coordination from 2025 and commencing coordination from 2030. The report recognised that delivering the extent of integration required to commence coordination from 2025 would be extremely challenging and potentially risk progress with offshore wind towards the Government’s 2030 ambitions and that coordination from 2030 was more feasible.

10. Can you provide a definition of holistic in the context of the HND?

The HND is holistic as it recommends a network that both connects wind farms to shore and transports the power to where it will be used for those offshore wind projects in its scope. These factors have previously been planned separately. In addition, it has holistically considered four network design objectives when considering the connection arrangements for in scope offshore wind farms: cost to consumers, deliverability and operability, impact on the environment, and impact on local communities.

11. An offshore main ring for East Anglia was floated years ago, pre-dating the projects that are excluded from the HND. Why has it taken so long for it to be recognised as a viable approach? Why are we not considering an offshore main ring for east Anglia?

The initial approach to connecting offshore wind was developed when offshore wind was in its early stages of development globally. The approach taken at the time de-risked project delivery for early projects and supported their delivery at least cost to consumers. Earlier studies assessed that the costs of more

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946574/presentation-17-10-20.pdf

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946574/presentation-17-10-20.pdf

⁵ <https://www.nationalgrideso.com/document/183031/download>

coordinated approaches were not justified based on the capacities of offshore wind expected at that time. The Government's Net Zero commitments and 2030 offshore wind ambitions have now increased expected offshore wind capacities, making the case for a more coordinated approach to connecting it.

12. Why have the future sources of supply in the Irish Sea (16 GW by 2050 according to Future Energy Scenarios (FES) 2022) not been considered, as installing early now for the current developments would facilitate those future developments?

The HND is a part of the OTNR Pathway to 2030 workstream and as a result is focused on meeting the Government's 2030 ambitions, with delivery by that date being a key objective.

Therefore, the HND has considered volumes in the Irish Sea that align to 2030 timescales. As Ofgem has set out, network planning will evolve to a Central Strategic Network Plan (CSNP). This will take account of long-term developments and will facilitate investment ahead of need.

13. It is stated that the HND will have cost savings but these savings as far as I can see will only be made from 2030. Does this mean that the current projects and especially the high number of offshore wind farms (OWFs) proposed for East Anglia but excluded from the HND, will continue to see higher costs to consumers along with continuing constraint payments, due to the lack of capacity availability on the grid currently until all grid reinforcements are constructed and operational?

The savings from the HND are from 2030 as those are the timescales the projects within the HND are expected to connect in.

The annual NOA⁶ process has recommended a series of investments needed during the 2020s and 2030s, to upgrade and develop the network. The NOA recommends a pipeline of economically optimal investments in the next decade and beyond to address rising constraint costs.

14. The HND fails:

- **To meet its ToR by not providing a network solution suitable for the whole nation and makes limited provision for developments beyond 2030.**
- **To meet its ToR by not properly seeking to discover the impact on affected communities - this was specifically required to be given equal weight with the other objectives.**
- **To properly consider the possibilities for an OTN for a significant area of the country (East Anglia) which has a substantial offshore wind industry.**
- **In its analysis of the economics of the proposals by using a deeply flawed methodology and ignoring the cost to the environment and communities.**

Does this not demonstrate that both this HND report and the ESO itself are simply not fit for purpose?

The terms of reference for the HND and other OTNR documents set out the aim and scope of the HND as coordinated onshore and offshore network infrastructure that connects the Leasing Round 4 and ScotWind projects by 2030. This is to be consistent with achieving Government offshore wind targets of 50GW by 2030 for Great Britain (GB), including 11 GW by 2030 for Scotland, while protecting system security, reliability and resilience.

⁶ <https://www.nationalgrideso.com/research-publications/network-options-assessment-noa>

The approach to balancing the four design objectives is set out at a high level in in the *Pathway to 2030 Holistic Network Design Summary Report*⁷ and *Holistic Network Design document*⁸ and in more detail in the *Holistic Network Design Methodology*⁹.

The OTNR Project Management Board agreed that the ESO had met the terms of reference for the HND at their June meeting.

15. How has the last willingness to pay survey by National Grid Electricity Transmission (NGET) influenced your design?

When the onshore transmission owners progress the development of onshore assets (the DND stage), they will be able to use the results of these surveys to determine the appropriate balance between cost and visual impact and justify their decisions to Ofgem when seeking funding for these projects.

16. We are concerned the HND is based on data that is grossly flawed. The economic analysis relies on a cost benefit analysis that compares forecast capital costs and monetised transmission benefits, but which takes no account of the cost of the disruption to people's lives and livelihoods. During the construction phase of the radial connections, and the consequential reinforcement to the transmission grid there will be major impacts on the community and the environment that will carry significant cost. The damage to schools, farming, tourism, and industry have not been evaluated or included in the calculations. Necton are also concerned about the long-term adverse effects of huge onshore substations and pylons on tourism when there is a 'National Infrastructure can't be challenged' attitude to planning applications and adequate mitigation is not provided. This will affect tourism, not just during construction, and we would like to know why it is not included in the HND costing.

Connecting 50 GW of offshore wind by 2030 will require infrastructure to be housed in different communities around GB. The HND recognises the impact of this by balancing the four objectives which explicitly include community impact. This applies to the infrastructure within the scope of the HND as set out in the ToR, the infrastructure referred to a Necton is associated with projects that were not in scope of the HND.

3. Early Opportunities

17. These five projects off East Anglia that have confirmed their commitment to coordination. What form might this take? Would it be offshore integration? Would it be onshore integration?

There are several options under consideration by the five projects. All options under consideration seek to provide benefits in terms of community and environmental impact compared to radial connections. Which option is ultimately taken forward is a matter for the projects.

18. How many other Early Opportunities pathfinder proposals were there, and how were the evaluated and selected? What are the benefits of the pathfinder projects?

Around 16 pathfinder applications were received. Four have been taken forward so far. Successful proposals were ones that the Department for Business and Industrial Energy (BEIS) deemed to be leading the way in utilising the enabling regulatory and policy changes being developed under the Offshore Transmission Network Review (OTNR) to deliver real world change as soon as possible and provide important learnings for

⁷ <https://www.nationalgrideso.com/document/262676/download>

⁸ <https://www.nationalgrideso.com/document/262681/download>

⁹ <https://www.nationalgrideso.com/document/239466/download>

other parts of the review. Some proposals were from ineligible projects that have been included in the Holistic Network Design (HND) and some did not require the changes being made in the OTNR and therefore could be progressed by developers without our support. There were several proposals, such as those in East Anglia, which we deemed not ambitious enough. This has led to the further work with the five projects in East Anglia.

19. You cite Equinor as a Pathfinder in running Dudgeon and Sheringham Shoal extension projects together. That plan was in their initial proposal several years ago, they haven't brought anything new to the table?

Equinor's proposal for shared transmission infrastructure between the Sheringham Shoal and Dudgeon extension projects in East Anglia was selected in the first tranche of voluntary, opt-in Pathfinders. This project includes the sharing of a connection of two wind farms to shore. Pathfinders selected met the criteria to be designated by demonstrating the project could deliver real world change as soon as possible whilst providing learnings for future for the OTNR. The OTNR will continue to work with selected Pathfinders to enable effective delivery by addressing regulatory and policy barriers.

20. Why would Hornsea Three storage not be able to go ahead without the OTNR changes?

Hornsea 3 (like all signed connection agreements) has a connection agreement for a specific volume of Transmission Entry Capacity (TEC). Including storage within that TEC means some changes are required to the process around how TEC is managed, allocated, assessed, and permitted.

4. Onshore works

21. Could any of the immediate onshore proposals be minimised or removed entirely through growing the ambitions of the offshore network? As a follow on what will the future onshore grid look like? Can this be minimised through increased offshore transmission capacity?

As the Pathway to 2030 publication identifies, the GB grid already utilises some offshore transmission links and previous Network Options Assessments (NOA'S) have recommended a significant expansion in offshore transmission capacity.

However, the grid will always require a balance of offshore and onshore transmission to get electricity to where it will be used. It is not possible to fully replace onshore transmission with offshore transmission. The Holistic Network Design (HND) has sought to utilise offshore transmission to move power across areas that are currently constrained onshore – this removes the need for further onshore reinforcements.

For specific projects the options proposed by the Transmission Owner (TO) are guided by the National Policy Statements (NPS).

22. Will the onshore work be developed by the onshore TO's if these are going to competition for 'build and own'?

Onshore works could potentially be subject to onshore competition through the Competitively Appointed Transmission Owner (CATO) model. Decisions on delivery model and whether to apply competition will be made by Ofgem.

BEIS recently published the Government response to their consultation on Competition in Onshore Electricity Networks¹⁰ where more information can be found. It is also worth noting that BEIS confirmed that certain strategic projects which are likely to engage in the market between now and 2026 will, where it is in consumer interests, be exempt from the introduction of onshore network competition. This will help reduce the impacts of

¹⁰ <https://www.gov.uk/government/consultations/competition-in-onshore-electricity-networks>

uncertainty about when competition will be in force and reduce the likelihood of adversely impacting delivery timelines for strategic projects that are key to delivering on targets such as our 2030 offshore wind target, during the period in which competition is implemented. Ofgem will publish a consultation that includes a list of projects that it considers should be exempt and will publish its final decision by the end of 2022.

23. Will the onshore network be entirely underground, or will there be overhead cables?

This will be determined in the Detailed Network Design (DND), project development process and consenting process, and will balance both environmental/community impact and consumer impact. The TO's will take this forward, guided by the NPS.

24. Will the scope of the onshore transmission system work for non-radial design deliver considering the Large Onshore Transmission Investments (LOTI) methodology the same as large onshore investment requirement?

Anything non-radial is solely related to offshore transmission so the LOTI methodology would not apply as that solely relates to onshore transmission.

25. Five Estuaries is currently consulting on the substation site of Lawford. Does this mean that Nautilus/EuroLink or Sea Link might join the network here too?

The Interconnector Register (dated 2 August 2022), which sets out a list of interconnector projects that hold connections with us indicates that Nautilus and EuroLink will connect to Leiston. Any changes to their connection points they will appear in this register. Specific interface points have not yet been determined for SeaLink.

5. Technological and power flow design considerations

26. What voltage are the new offshore high voltage direct current (HVDC) cables expected to be operated at? Is the ESO confident that they can operate HVDC driven offshore network without HVDC circuit breakers in place? How many coordinated connections offshore are envisaged to be on a single hub given the current development of HVDC circuit breakers?

Direct Current (DC) = 525 kV

Alternating Current (AC) = 275 kV

We have conducted operability assessments, particularly for the East Coast Region which is most complex. We looked at dynamic performance, aligning the settings with latest Grid Code requirements although it was necessary to make some assumptions and simplifications.

We tested a range of onerous operating conditions that could reasonably be expected to ensure the system stayed stable and operational parameters stayed within acceptable National Electricity Transmission System (NETS) Security and Quality of Supply Standards (SQSS) limits. The testing has found some challenges such as offshore voltage control and short-term overload conditions, but we are confident that these can be resolved with future planned solutions.

The analysis suggests that the offshore designs are operable considering dynamic studies, but care will need to be taken during the detailed design stage and procurement to ensure that the control and protection settings are coordinated and specified correctly. Extensive further study and development will be required through the detailed design up to delivery.

The Holistic Network Design (HND) does not include DC circuit breakers as these are not expected to be commercially available in the timescales being considered.

27. If DC circuit breakers become commercially available will this change the way the offshore windfarms are connected?

DC breakers are not currently commercially available and are not expected to be commercially available before 2030. For this reason, they have not been included in scope for the HND.

DC breakers may feature in future network development processes that look beyond 2030.

28. Will any of the existing Transmission Owner (TO) planned HVDC links coordinate and connect to offshore hubs?

The existing HVDC links which have been in the Network Options Assessment (NOA) for some years will not coordinate and connect to offshore hubs.

29. This HND assumes offshore bipole design network for offshore wind projects. Has ESO considered the Technology Readiness Level (TRL) status of this technology for this application?

Yes, the technology readiness of the HVDC bipoles has been considered in line with the Offshore Transmission Network Review (OTNR) *Phase 1 Final Report*¹¹. We are confident it is sufficiently advanced to be used in the design.

30. Can you please explain the power flows that you have considered when calculating the ratings of the links in the East Coast Region system - particularly the SW E1a to R4 1 link?

We used the scenario background from the 2021 *"Leading the Way" Future Energy Scenario* (FES), slightly modified to include the in scope offshore wind generation.

Power flows have been considered up to the full rating of the circuits. Through the design development, different configurations and ratings have been assessed up to the maximum rating we determined feasible for 2030.

31. Has the limit on how much power can be transmitted on a circuit been increased from 1320 MW to 2000 MW to allow ScotWind W1 to connect?

There has been review of both the technology and the power infeed limitations. The SW_W1 connection has been proposed as an HVDC bipole with metallic return so that loss of both poles is not feasible. This makes the infeed loss risk 1000 MW.

32. If many offshore cables can be run together in one corridor, are there any limits on total MW or separation distance in order to limit the worst-case power loss in the event of an "anchor drag" event?

There is no simple answer to how much power can be run in close proximity as the risk varies by location. Mitigation can be designed in, by considering burial depths and protection systems.

33. Has DC Bipole been limited to 2000 MW?

Based on our discussions with the supply chain and considering deliverability by 2030, we established the technology limitation to utilise within the HND development process was 2 GW at 525 kV. This was established in the HND design rules following the Phase 1 work and prior to the commencement of options development.

34. To what extent is a) upgrading of all existing onshore transmission infrastructure and b) the cap of 400 kV on transmission being looked at? You get power lines of 800 kV plus elsewhere. Why can't the rules be changed, and existing infrastructure upgraded to 800 kV plus?

¹¹<https://www.nationalgrideso.com/document/183031/download>

In the NOA there are significant proposals for upgrading existing onshore transmission infrastructure to ensure that we get the best use out of current assets before exploring new ones.

Including voltages of 800 kV would be a significant change to how the GB network is built and operated. None of the reinforcement options proposed by the onshore transmission owners for the HND make use of voltage of higher than 400 kV on AC circuits therefore it was not possible to recommend these.

6. Feasibility and deliverability of the design

35. Will the spatial data used to inform the Holistic Network Design (HND) methodology be made available?

Information on the environment and community constraints considered are within the regional sections of the Holistic Network Design Report. Appendix A of the same document sets out the environment and community appraisal process. It is not appropriate to share further detail such as shape files as we have not recommended specific cable routes. This will be an activity carried out in the Detailed Network Design (DND) phase.

36. Seeing as offshore is considerably more expensive and difficult to repair and maintain should there not be more onshore infrastructure?

We considered the costs of operation and maintenance, as well as capital costs, deliverability, and environmental and community impact, when putting together the HND.

37. Considering this is a 'holistic' network design, the feasibility of delivering these plans in the proposed timescales doesn't seem to be addressed in any detail. When will this be addressed? A holistic design is a nice plan but means little if there is no delivery plan.

We have sought to provide a holistic design without overly constraining the ability of the parties delivering the DND to make decisions as part of the consenting process. Our view is that the recommended offshore network design is ambitious but realistic, being based on known and well understood technology. The Government has committed to a number of actions to accelerate the speed of delivery of the onshore and offshore networks in their British Energy Security Strategy¹² (BESS) and Electricity Networks Strategic Framework¹³.

38. Is it fair to consider that Round 4 and part of ScotWind capacity will be feasible to connect by 2030 considering the earliest in service date (EISD) of onshore network upgrade?

We expect that the in scope offshore wind farms should be able to connect by 2030.

Timely delivery of onshore reinforcements is critical to enabling the connection of offshore wind and we look forward to the delivery of the BESS commitments to facilitate this.

39. Are the cost and carbon savings annual figures?

The £billion numbers are total, the bill saving (£2.18) is annual.

For carbon, the 2 million tonnes figure is between 2030 and 2032.

¹² <https://www.gov.uk/government/publications/british-energy-security-strategy>

¹³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1096283/electricity-networks-strategic-framework.pdf

40. With some developers announcing increased intended installed capacities to the ScotWind leasing award process, how does the ESO account for this in their network planning in a fair and controlled manner? Can other developers simply feel free to increase their project intended installed capacity? Where will the line be drawn?

We are currently finalising the scope for the HND follow up process and the change control arrangements and queries such as this are under consideration. The ESO does however have an obligation to provide connection offers to all parties who apply for a connection.

41. Projects with coordinated connections would appear inadvertently disadvantaged in upcoming Contract for Difference (CfD) rounds due to the development period needed in defining ownership, charging, liabilities etc.

The Offshore Transmission Network Review (OTNR) was established to support the coordination of offshore transmission infrastructure. The review covers all aspects of the existing regime, including CfD, and how these influence the design and delivery of transmission infrastructure. We do not expect coordinated projects to be disadvantaged in CfD rounds. The draft energy National Policy Statements (NPS) support coordinated transmission. BEIS is working closely with Ofgem and the ESO to ensure that appropriate changes to regulatory frameworks are implemented and that industry codes & standards are updated to support coordinating projects. We will continue to work with industry so that developers can be confident in progressing their projects and bidding into CfD rounds.

42. How has the HND been future proofed for beyond Round 4?

The HND network design has been optimised for the in scope projects and the approach taken to the ScotWind generation has allowed us to think strategically about the connections for the remainder of the ScotWind projects that will be in the HND follow up exercise.

It is not known what additional projects may appear in the future so significant anticipatory capacity has not been built into the design. We also took deliverability into account, with additional infrastructure potentially raising the risk of meeting the Government's 2030 ambitions. Use has been made of the largest feasible offshore circuits in the 2030 HND network design. More circuits will be needed for additional capacity beyond Round 4, as the circuits in the HND design cannot be made larger.

43. Is the network design that been illustrated in the HND now fixed and a 'blueprint'?

The HND is a recommendation. The DND phase will now be taken forward by the parties appointed by Ofgem.

44. Have the ESO considered how the coordinated approaches involving multiple Nationally Significant Infrastructure Projects (NSIPs) for arrays utilising one transmission asset NSIP will work in practice as there is a risk of a) stranded assets and b) salami slicing of assessments during consent which will be considered in silo by several separate examining authorities. Also, how will timelines align for NSIP consents?

BEIS and project partners are aware of a number of possible configurations of applications arising from recommendations for coordinated transmission. These will include: generation with associated coordinated transmission consent applications; as well as separate generation and coordinated transmission consent applications. The choice of approach would also depend on the relative timings of projects. In England and Wales project developers have the option of requesting that NSIP DCO applications are 'twin-tracked' which would help align the timings of Examination recommendations. The risk remains that an application for one part of a coordinated project can be rejected (and potentially resolved later) or that one part is otherwise delayed. In such cases Ofgem's proposed process for assessing Anticipatory Investment is likely to help project developers manage these risks.

45. The ESO seems to be producing a network plan that it has no intention to take any responsibility on the implementation. If ESO was responsible for delivering these assets and coordinating designs, would they really be proposing such an approach!? Is it fair to create this plan and expect the developers are expected to just sort all of this out somehow?

The HND was developed to support the UK meeting the target of 50GW of offshore wind by 2030 while minimising costs to consumers and impacts on communities and the environment. In developing the HND, we have balanced the four objectives equally. Our view is that the recommended offshore network design is ambitious but realistic, being based on known and well understood technology.

46. How accurate are the geospatial data sources that were used to inform the assessment on community impact in East Anglia?

In line with the Terms of Reference (ToR) for the HND, only connections for in scope wind farms have been considered. No in scope wind farms are located in East Anglia.

7. Celtic Sea design

47. The Celtic Sea connection appears to be radial as opposed to what the Holistic Network Design (HND) is specifically aiming for (ring mains)?

The HND is intended to recommend the network solution that best balances the four objectives of cost to consumers, deliverability and operability and the impact on the environment and consumers. Some recommended connections are coordinated, and some are radial, dependent on which best met the objectives.

The Crown Estate have not concluded the leasing of the seabed in the Celtic Sea, and as such we have used notional projects in the HND. This will be reconsidered as part of the HND follow up process and when more is known about the leasing round outcome in the Celtic Sea and the full anticipated 4 GW capacity in that region is included.

The three notional wind farms included in the HND have a proposed coordinated design as they are electrically connected with one cable connecting to the onshore network, rather than each connecting individually via three separate cables.

48. Do you think that 1 GW for the Celtic Sea is in retrospect, not ambitious enough?

This was based on expectations for 2030 at the time the HND scope was set. These are only notional wind farms as the Celtic Sea leasing round is yet to take place. 4 GW of Celtic Sea generation will be included in the HND follow up process, based on the latest available information.

49. Considering that Celtic Sea leasing will not launch until mid-2023, is it appropriate to include them in this HND scoping with consideration for 2030 connection when other projects already have secured lease and are not included in scope of the HND?

These are only notional projects; they will be overwritten with projects with aligned connection agreement and lease options when we have more certainty of Celtic Sea leasing round design and outcomes.

50. In the Celtic Sea concept were links to Isle of Man and/or Ireland considered or was the design just for wind farms?

The focus of the design was on wind farms. However, for the North West Region (rather than Celtic Sea) there is the potential to integrate the LirIC interconnector (to Ireland) into the T-point. Further technical and economic analysis is being carried out to determine how feasible and beneficial this would be. It would increase complexity at the T-point but there is the potential for environmental, economic and community benefit due to there being one fewer landing point and converter station.

A link to the Isle of Man was not considered as part of design as it is not part of GB.

8. Follow up process

51. How will the Holistic Network Design (HND) process manage the increase to 4 GW for the announced Celtic Sea leasing round?

The full Celtic Sea capacity, as expected in the upcoming Crown Estate leasing process, will be included in the HND follow up process.

52. Whilst there is a clear move towards coordination, this report only addresses some offshore wind. There is a huge amount of other background generation/non-scope projects wanting to connect so who is going to play the role strategically to ensure the huge amounts of onshore infrastructure is coordinated e.g. at the Lincs Connection Node?

On 8 July Ofgem published a minded to decision¹⁴ that the Future System Operator (FSO) should lead delivery of a new planning output - a Centralised Strategic Network Plan (CSNP). This plan will cover all future load related investments in the transmission system. Subject to the consultation on its minded to decision, Ofgem expects to consult on further levels of detail later in the summer.

53. Considering the north east of Scotland has several other projects that will be developed in the area and that could benefit from coordination with the two projects currently considered, how could this be taken into account in this assessment or in future ones?

The HND network design was optimised for the projects in scope at the time. Coordination between the proposed HND and additional ScotWind projects in the north east may be explored during the HND follow-up process but will only be recommended if they provide clear net benefit.

54. What impact do you expect the remaining 14 GW of ScotWind capacity to have on the HND, including in the eastern region where there are about another 8 GW of projects that have yet to be considered?

We are currently finalising the scope of the HND follow-up process which will consider the remaining ScotWind generation. Coordination between the proposed HND and additional ScotWind projects in the north east may be explored during the HND follow-up process but will only be recommended if it provides a clear net benefit.

55. Why is Phase 2 of the HND scheduled for Q1 2023? Some projects are ready to begin development activities, and the wait is causing delays. Could these timescales be accelerated?

We're proposing a challenging, but achievable timeline under the HND follow-up process for providing design recommendations to in scope developers by end of Q1 2023. That timescale is based on seeking to allow timely and efficient connection of a large volume of additional new generation, whilst allowing sufficient time for robust analysis to ensure an efficient and coordinated network that delivers better outcomes for consumers.

The details of the HND follow up process, including confirmation of scope, a more detailed timeline and other key aspects, such as the methodology to be used for the process, will be communicated in the summer.

¹⁴ <https://www.ofgem.gov.uk/publications/consultation-our-minded-decisions-initial-findings-our-electricity-transmission-network-planning-review>

56. Can ESO elaborate how the follow up process with involved parties especially developers will look like so developer's comments on practicality and feasibility of the proposed designs can be taken into consideration? e.g., practicality on lifting 1.8 GW offshore platforms.

We're currently finalising the scope and arrangements for the HND follow-up process, which will include engagement with involved parties, including project developers. We will communicate our engagement plans to developers in the summer.

57. Will the HND follow up process fall under the Enduring Regime or Pathway to 2030?

The HND follow up process will fall under the Pathway to 2030 workstream.

58. Is it correct that the HND doesn't yet accommodate the full 24 GW of the ScotWind leasing round? How important will be the findings of the Network-DC Strategic Innovation Fund (SIF) project to realising the design?

In line with the Terms of Reference (ToR) for the HND, 11 GW of ScotWind projects were included.

The HND is not reliant on direct current (DC) circuit breakers as we could not guarantee these would be available for 2030. However, innovative technology resulting from the SIF project may enable an even greater level of integration in future network plans.

59. East Coast: Can an apparently radial design in Tranche 1, become coordinated with Tranche 2 generation considered in the future?

The scope and ToR for the HND follow up process will be published later in the summer. Coordination between the proposed HND and additional ScotWind projects in the east may be explored during the HND follow-up process but will only be recommended if it provides a clear net benefit.

9. Codes, standards, and licence requirements

60. How will Transmission Network Use of System (TNUoS) charge for wind farm connections consider the cost of additional functionality/capacity needed to provide onshore network reinforcement?

This is one of the eight network charging related challenges we highlight in our *Industry Code, Standard and Licence Recommendation Report*.

We are considering options for addressing this with industry over the summer. It is likely a code modification will be required to clarify how the costs associated with this will be apportioned and to what extent they are targeted at others, instead of or as well as the offshore wind farms connected to non-radial offshore transmission system.

61. Can you confirm National Grid (NG) cannot own assets of an offshore wind power plant?

National Grid Electricity Transmission (NGET) and the ESO cannot own offshore generation assets. National Grid Ventures (NGV) cannot own offshore generation in the UK, but they are permitted to own it in the US.

62. What requirements does NG enforce on offshore wind and interconnector developers?

A connection contract is required to connect to and use the transmission system, and this ensures compliance with the requirements of the connection site and wider transmission system. Offshore wind and interconnector developers are also required to comply with the Connection and Use of System Code (CUSC) and Grid Code. These requirements are enforced through compliance processes.

63. There is common awareness of excessive amounts of codes and regulations to comply with to develop energy assets. Is NG active in simplifications?

This isn't something being looked at as part of the offshore coordination project. We are actively involved in and supportive of energy code reform though. However, this isn't likely to be progressed enough in the timescales required to allow the changes in relation to offshore coordination to benefit from this work. Code modifications in relation to offshore coordination will likely be progressed through open governance.

64. As offshore becomes increasingly meshed, System Operator Transmission Owner Code (STC) may need to allow Offshore Transmission Owners (OFTOs) to recover the cost of general background evolution, not just from a Connection, Affected Transmission Owner Construction Offer (ATOCO)?

We generally agree and this is part of what we flagged in our recommendation report in relation to whether a coordinated OFTO requires additional obligations through licence and/or code in relation to facilitating network development and connections when compared to some of the traditional radial OFTOs.

65. When will electrical standardisation for coordination be available?

This will affect design decisions and supply chain interfacing. This will be covered in the code and standard technical workshops we are running over the summer.

66. Would extending or adapting the Main Interconnected Transmission System (MITS) concept help with the offshore / onshore description challenge?

The MITS is primarily for the purpose of how both charging, and the Security and Quality of Supply Standards (SQSS) apply to the asset rather than in relation to what the asset is from a legal and engineering perspective. However, we will take this away to consider in our analysis of whether changes to codes and standards are required in respect of offshore MITS.

10. Network Options Assessment (NOA)

67. How much capacity can be connected by 2030 if the earliest in service dates (EISDs) cannot be accelerated under the Business Energy Security Strategy (BESS)?

The design is consistent with meeting the government's ambition of 50 GW of offshore wind by 2030. It is designed as a whole to meet that target.

Eleven network developments have been recommended to be accelerated to meet the 2030 target. Some of these options are essential to ensure a secure and compliant network for the wind farms to connect.

Many reinforcements rely on the previous or next reinforcement to provide full network capability. Therefore, we must consider the network design as a whole and thus it is not possible to say what the impact would be if a single scheme cannot be delivered by 2030.

68. Do you have the timescale for each of those reinforcement works?

The Holistic Network Design (HND) recommendations found in appendix 115 provides required delivery dates. This date is either the date it is required for network compliance, or if it has been found to provide significant consumer benefit through earlier delivery, via the *NOA 2021/22 Refresh*.

An EISD is also listed in the NOA. This provides the Transmission Owners (TOs') current and best view of the earliest delivery date.

All reinforcements recommended by the HND are required by 2030 at the latest to deliver the 50 GW of offshore wind by 2030. Some schemes are required for 2030 but are currently estimated to be delivered later than this date; this is indicated through their EISD being beyond 2030. These 11 options have been identified for acceleration. Accelerating these schemes would be reliant on the commitments outlined in the BESS.

Further to this, the TOs will need to develop detailed and coordinated network delivery plans to meet the overall delivery target for 2030. As this plan matures it is likely that the optimal delivery dates of some reinforcement may change as access to the system and other considerations are factored in in more detail.

69. How does ESO's work on the offshore transmission system in the HND link up with Ofgem's work on the onshore transmission system in the Centralised Strategic Network Plan (CSNP)?

The CSNP will be a new way of planning the Electricity Transmission network, including strategic and anticipatory investment, designed to help Great Britain to achieve net zero targets.

Ofgem published their minded-to decision¹⁶ on 8 July 2022, which envisages a central role for the Future System Operator (FSO) in this, building on the ESO's existing roles in network development and this HND process.

The HND suite of publications is the first step towards a CSNP. It forms the transitional centralised strategic network plan version 1.

The HND follow-up process, and the extension and development of our existing network development processes – the NOA and the Electricity Ten Year Statement (ETYS) – will form a further transitional plan, ahead of a move towards a new regime and a CSNP in the coming years.

70. Can you tell us more about the LRN4 option, and the options discounted and why?

In the economic analysis for the NOA 7 Refresh we found LRN4 North Lincolnshire to Hertfordshire to be the most economical solution, and we have recommended that National Grid Electricity Transmission (NGET) take forward this option.

As part of the HND, we considered three alternatives developed by NGET. Each of these options have different capital costs, and a level of electrical benefit they provide to the system individually and in combination.

Overall, at this stage, the initial analysis showed that LRN4 was the preferred option. NGET will need to take forward detailed design, costings and assessment of the suitable alternative options before they make a final proposal.

71. Will there be a NOA 2022/23 in January 2023 and how will this align with the HND follow up process also in Q1 2023?

Following the publication of the HND, and Ofgem's publication of their minded-to decision on the Electricity Transmission Network Planning Review¹⁷, we are working closely with Ofgem, BEIS and other industry parties to understand and sequence the HND follow-up process and other network planning activities including ETYS and NOA. We expect to have further clarity in the autumn.

¹⁶ <https://www.ofgem.gov.uk/publications/consultation-our-minded-decisions-initial-findings-our-electricity-transmission-network-planning-review>

¹⁷ <https://www.ofgem.gov.uk/publications/consultation-our-minded-decisions-initial-findings-our-electricity-transmission-network-planning-review>

72. I note the inclusion of LRN4 400kV OHL from South Lincs to Hertfordshire and the absence of SCD2 in the NOA refresh - I assume latter replaces the former to some extent?

LRN4 works well in combination with TWNC and together these options provide network capability that ultimately replaces the need for SCD2. It should be noted that the LRN4 proposal is in the earliest stage of development and decisions on technology and routing have not yet been made.

73. For the North to South Wales link, please can you explain why this has now changed from the earlier view as being offshore, to now being shown as possibly onshore?

The dotted purple line shown on the map, represents a need that the ESO has identified for requiring reinforcement between point A (North Wales) and point B (South Wales). It does not represent any planned route corridor between the two points. The specific route and technology chosen for the reinforcement will be decided as part of the next stage which we refer to as the Detailed Network Design (DND). The parties responsible for delivering the DND will be identified through the regulatory process and will consult with all relevant stakeholders, including local communities, on their proposals.

74. Please can you publish a full list of all the sources of supply in North Wales that need transmission to South Wales.

Due to the commercially sensitive nature of this data we are unable to share the names and capacities of generators assumed within the scenario used to form our study background. However, there is a publicly available Transmission Entry Capacity (TEC) register lists all projects that hold contracts for TEC with the ESO, these include existing and future connection projects and projects that can be directly connected to the National Electricity Transmission System (NETS) or make use of it. While the TEC register represents a contracted background view which would be the most onerous scenario that could occur; in reality not all projects on the list will end up connecting to the transmission system and that is why we use our future energy scenarios for network planning.

11. Asset classification

75. Multi-Purpose Interconnectors (MPIs) between offshore hubs, who will be responsible? The developers, the Transmission Owners (TOs) or a third party? Who will coordinate the interface?

The asset classification process referred to by Ofgem will determine who is responsible for each part of the network. More detail can be found in Ofgem's Minded-to Decision and further consultation on pathway to 2030¹⁸.

76. Ofgem's classification of which Holistic Network Design (HND) assets are onshore assets and which are offshore assets. How will this impact charging?

Non-radial offshore transmission is subject to Ofgem's Minded-To position where there is a preference for a very late competition developer led model. This is where developers will be responsible for delivering any non-radial offshore transmission system, prior to a competition and the transfer of those assets to an Offshore Transmission Owner (OFTO).

Currently the onshore and offshore methodology for network charging is different. At a high level, if an asset is classified as onshore transmission, then the onshore charging methodology applies and if the asset is classified as offshore transmission, then the offshore charging methodology applies. However, once the asset classification process concludes we will consider the impact on network charging in further detail. Further

¹⁸ <https://www.ofgem.gov.uk/publications/minded-decision-and-further-consultation-pathway-2030>

information can be found within our *Industry Code, Standard and Licence Recommendation Report*¹⁹ in respect of non-radial offshore transmission.

77. Can National Grid Electricity Transmission (NGET) (and other TO's) own "offshore assets" if Ofgem deem them as being onshore assets?

Yes.

78. How are primary generators identified, and will subsequent generator connections be possible from the Tranche 2 (follow-on) allocation?

We expect that this will be further considered in the asset classification discussions between Ofgem, the ESO and developers over the summer. This clarification will likely be required to progress with code modifications and connection contract updates.

79. Could an onshore transmission asset in the sea be classified as a Competitively Appointed Transmission Owner (CATO) too?

An asset in the sea which is classified as onshore transmission could be subject to the onshore competition regime. This is however subject to the in force onshore competition arrangements, any Ofgem decision related to those arrangements, the competition statement in the British Energy Security Strategy (BESS) in respect of strategic works within the HND, and the details outlined in the Electricity Networks Strategic Framework.

80. North West Region. When will offshore and onshore networks be allocated? It still seems to be uncertain at the moment for the T-point design.

We expect that this will be covered in the Ofgem asset classification work this summer.

81. Onshore v offshore classification - could simplify some of the work that has been discussed. Could ESO say more about this perhaps with examples from HND.

From a code, standard and connection perspective, a radial offshore transmission connection is likely simpler, as it has fewer new aspects to consider when compared to a non-radial offshore transmission connection. Onshore transmission is also likely simpler than non-radial offshore transmission for the same reason. However, we need to be mindful that asset classification has a legal and engineering dimension to it and the simpler solution may not necessarily be the correct or overall preferred solution. We therefore need to await further information from Ofgem in respect of asset classification in the context of the HND recommendations.

82. What is the timeline for the classification of Asset for non-radial design?

Ofgem is expecting to confirm asset classification in relation to the HND in Autumn 2022 and this is a priority for the Pathway to 2030 workstream.

12. British Energy Security Strategy (BESS)

83. The BESS sets out the need to accelerate approvals of onshore reinforcement (this is also highlighted in the *Networks Option Assessment 2021/22 Refresh (NOA Refresh)* in the form of required in service dates (RISD)) - does Ofgem have an update on this? Onshore reinforcements are held up by consenting but also the regulatory approvals process.

Ofgem is exploring how their regulatory processes could be sped up given the pace of development needed to achieve the 2030 ambitions. They are aiming to publish a consultation on this matter later this month.

¹⁹ <https://www.nationalgrideso.com/document/262691/download>

13. Supply Chain

84. The high voltage direct current (HVDC) supply chain is experiencing unprecedented global demand and demand from European Transmission System Operators (TSOs). Do you think the supply chain can meet the aspirations of the Holistic Network Design (HND) by 2030?

The design is ambitious yet realistic. It does not include technology which is not yet commercially available (e.g., direct current (DC) circuit breakers) but the design was not overly limited by the supply chain. This could be a challenge, but by communicating the requirement the supply chain has time to step up to deliver the infrastructure required.

14. Cross Government

85. It seems very short-sighted to be thinking about bringing all this wind back to UK - surely, the ESO should be coordinating with our neighbours to be developing a North Sea Grid?

The Terms of Reference (ToR) clearly refer to the UK Government target of 40 GW by 2030, which further increased to an ambition for 50 GW as part of the British Energy Security Strategy (BESS). The focus currently through the British Energy Security is on sourcing electricity from within the UK.

15. Community impacts

86. Are the jobs all network related jobs or do they include the generators?

As part of the Holistic Network Design (HND) publication the ESO commissioned an independent consultancy to explore the potential economic benefits associated with the delivery of the 23 GW of windfarms in scope of the HND. The potential jobs identified relate to generation, network and supply chains.

87. Can you tell us more about the community benefits package?

In the British Energy Security Strategy (BESS), BEIS committed to consult on how local communities can benefit from development of strategic onshore network infrastructure in their area. BEIS is currently developing proposals as to how community benefits could be realised.

88. In the new fast-track Nationally Significant Infrastructure Project (NSIP) process, what about the resourcing of the host communities to respond? If this is not addressed there will be a democratic deficit.

The fast track consenting route for NSIPs where specific quality standards are met, is being developed as part of a holistic NSIP reform programme led by the Department for Levelling Up, Housing and Communities (DLUHC). DLUHC has engaged widely and received evidence from communities and people consulted on NSIPs. DLUHC is planning to consult on proposals to reform the NSIP process, including on proposals for a fast track consenting route, so there will be an opportunity for people to respond on how we propose to support community engagement.

89. Who is going to take the lead on explaining the level of construction impact in some of these areas e.g., Lincolnshire, and who will address this from a cumulative perspective? In the current regime the Transmission Owner (TO) and each individual developer will be taking their own scheme forward with limited coordination and cumulative assessment issue will be hard to address. Who will be responsible for piecing the jigsaw together, BEIS, Ofgem, local councils?

Construction impacts and cumulative effects are required to be considered as part of the Environmental Impact Assessment (EIA) of projects brought forward for consent as NSIPs under the Planning Act 2008. The requirements to minimise construction impacts and assess cumulative effects are also set out in the energy

National Policy Statements (NPS)²⁰, including in EN-1 Overarching National Policy Statement for Energy, which are used to determine consent. Project promoters follow the consultation requirements for their projects (set out in the Planning Act 2008 and in Environmental Impact Assessment regulations) and typically consult on their preliminary construction planning proposals as part of the consultation undertaken for their projects. They subsequently set out details in a draft Code of Construction Practice. More details on these processes are available in Planning Inspectorate Advice Notes, including Advice Note 17 on Cumulative Effects Assessment²¹

90. One of your objectives is to minimise the impact on communities, but by running numerous cables onshore and building a pylon network, this will have an enormous impact on Norfolk and all in the name of providing extra power that we do not require here.

The Terms of Reference for the HND²² set out the in scope wind farms, this does not include any coming on shore in Norfolk.

16. Engagement

91. Why were the regional MPs for East Anglia apparently never even told that the major projects in East Anglia had been entirely scoped out of the Holistic Network Design (HND)? These MPs have been working systematically and in good faith on the issues being addressed by the Offshore Transmission Network Review (OTNR) ever since its inception in 2020.

The Terms of Reference (ToR) for the HND are available on the Government website²³ and have been highlighted to stakeholders throughout the process.

92. The ToR for the HND specifically requires the HND to take account of input from various stakeholders. How has the Central Design Group (CDG) fulfilled its obligations regarding consultation with community stakeholders? It is noted that 104 meetings were held with Transmission Owners (TOs), 117 meetings with developers and absolutely no meetings with community representatives. Where is the evidence that any attempt has been made to consult with the UK public?

Throughout the HND process the ESO has met with multiple stakeholder groups, including community representatives such as district and county councils and MPs.

17. Environmental impacts

93. Does the Holistic Network Design (HND) reduce the impact on the offshore seabed? If not, why not?

The HND reduces impact on the seabed by avoiding features of importance and environmental designations where possible. It also reduces the number of cables to shore by up to 30% through the use of High Voltage Direct Current (HVDC) technology which take up less space than High Voltage Alternating Current (HVAC) technology of the same capacity.

²⁰<https://www.gov.uk/government/consultations/planning-for-new-energy-infrastructure-review-of-energy-national-policy-statements>

²¹ <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/>

²²https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1059676/otnr-central-design-group-network-design-tor.pdf

²³https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1059676/otnr-central-design-group-network-design-tor.pdf

While the HND has 4% more cable length than the purely radial alternative, this is not a like for like comparison.

The HND provides significantly more overall transmission system capacity for a slight increase in infrastructure.

This greater capacity will reduce additional future requirements for north to south transmission and further offshore links.

94. Considering this is a holistic approach what consideration has been given to the environmental and social impacts of overhead cables? Will the onshore network be entirely underground, or will there be overhead cables?

The HND makes recommendations on the design at a high level. The final technology decision will be identified within the detailed network design stage and with regard for the National Policy Statements (NPS) and other obligations placed on the organisation taking it forward.

95. Have the environmental benefits been quantified as impacts of cables coming to shore has been reduced but total length of cable corridors is higher?

Cable length is 4% more in the recommended design when compared to the optimised radial design. However, the number of cables to shore is reduced by up to a third.

96. Has there been or will there be a project level Habitats Regulations Assessment (HRA) for this HND? If it's been done, what were the conclusions, if not done, when might we expect it for consultation?

No, the HND is a network design therefore it has not been subject to HRA. Where required, Environmental Impact Assessments (EIA) and HRA will be part of the Detailed Network Design (DND), which is the next stage.

That was set out in the scope of the HND at the outset, which can be seen in the scope in the methodology report.

97. Have National Grid considered how adverse impacts on designated sites will be addressed as a result of this plan/design?

At this stage we have avoided impacts on designated sites as far as possible, but the nature of the impacts and the mitigation required will be determined by the DND.

The ambition for strategic compensation measures set out in the British Energy Security Strategy (BESS) and the Department for Environment, Food and Rural Affairs (Defra's) consultation on marine Biodiversity Net Gain (BNG)²⁴ may play a role in the relevant jurisdictions.

98. Will the HRA or Strategic Environmental Assessment (SEA) processes be followed for the HND v2?

We're currently finalising the scope and arrangements for the HND follow-up process – this includes consideration of whether it would be appropriate, feasible and efficient to formally incorporate SEA and/or plan level HRA processes. The details of the HND follow up process, including confirmation of scope, a more detailed timeline and other key aspects, such as the methodology to be used for the process, will be communicated in the summer.

²⁴ www.gov.uk/government/consultations/consultation-on-biodiversity-net-gain-regulations-and-implementation

18. Connections

99. When will the decisions in the Holistic Network Design (HND) make it through into the Transmission Entry Capacity (TEC) Register as connection offers?

We are currently working on a connection contract update programme with the aim to provide updated connection contracts to in scope developers in Autumn 2022, and to commence tripartite discussions with those developers and the TOs in Summer 2022. These timescales are subject to further clarity being provided on certain pre-requisites, such as which party is to deliver which component of the offshore transmission system. As these timescales are subject to further clarity being provided this may result in connection contract updates extending beyond Autumn 2022. The TEC register would be updated following acceptance of connection contract updates by customers, and we expect there to be an acceptance period of three months.

100. How does the overall HND impact the current connection queue? Is there an indicative connection year (firm/non-firm) for each individual project as an output? / Is there a risk of any delays on already offered connections?

As above, there will be an exercise by the ESO and the TOs to update connection contracts to align with the outcomes of the HND and this will include the provision of connection dates for individual projects. In line with the ambitions of the OTNR and the British Energy Security Strategy (BESS), there could be opportunities to bring forward connection dates.

It may also be appropriate to review proposed connection agreements, programmes and dates to align them to the outcomes of the HND. In the event it becomes apparent any already offered connections are impacted we will identify this and engage with developers as we update connection contracts with in-scope developers.

101. At what point will ESO be prepared to make a grid connection offer based on earliest in service dates (EISDs) or required in service dates (RISDs)?

We are working with Ofgem and the TOs to understand the implications of the commitments in the BESS on the EISDs. This information will then feed into updated connection contracts that we will be working on with the TOs and developers. Further information on EISDs and RISDs can also be found within the recent Ofgem consultation on accelerating onshore electricity transmission investment²⁵.

102. How will you be sequencing the 94 onshore reinforcements that need to be operational by 2030? Will the programme of works be determined on the basis of existing grid connection offer dates?

TOs will need to develop a detailed plan of how to schedule and deliver the required onshore transmission works. It may be appropriate to bring forward some works to de-risk their delivery, and to avoid outage clashes for example.

TOs will need to be cognisant of existing and updated connection contracts, works and dates in their detailed planning.

103. How will access rights (AR) work with respect to N-1 if all of the projects within a non-radial design are not ready at the same time?

It is possible that there will be interim access rights for some projects before all connections/works are completed. This will be explored and confirmed to relevant developers via the connection contract update programme.

²⁵www.ofgem.gov.uk/publications/consultation-accelerating-onshore-electricity-transmission-investment

104. Are you saying that Connections and Infrastructure Options Note (CION) is already replaced by the HND?

For projects in scope for the HND, yes. For future projects, including in the context of the HND follow up process, this remains a point under consideration. For projects prior to those in scope for the HND, the CION process remains the applicable process. This includes any projects in scope for the Early Opportunities workstream.

105. Does the CION process include a procedure for re-opening grid connections?

The CION process is re-opened via a “Modification Application” which can be raised by either the connecting developer, the TO or the ESO, as defined in the Connection and Use of System Code (CUSC) and STCP 18-1 (System operator Transmission Owner Code). The CION process can be re-opened if there is a “material trigger”, examples of these are published on the ESO’s website in the *CION Process Guidance Note V4.0 Issue 004 – November 2018* and include:

- Changes in SO assumptions – such as significant changes in the Construction Planning Assumptions (CPA) or generation background.
- Changes in TO assumptions – such as changes in generation background that impact on TO investments and affects the Construction Planning Assumptions that form the basis for the TO Construction offer to NGESO.
- Changes to the developer assumptions – such as changes in TEC, changes in offshore technology, etc.
- Planning decisions
- Changes to the electricity regulatory framework.
- Changes to key fundamental economics inputs for the cost-benefit analysis (CBA)

106. For in-flight projects, surely current connection agreements can be changed by mutual consent?

Changes can be made to connection agreements by mutual consent. These changes are however limited by the codes, standards and licence requirements that govern such agreements. To facilitate coordinated connections, changes are required to these industry wide codes and standards.

19. Office of Gas and Electricity Markets (Ofgem)

107. How, and how quickly, can we change the barriers to investing in shared assets? i.e., financial investment decision (FID) ahead of others' commitment?

Ofgem recognises that there are challenges where projects are at different stages of development. However, they expect that developers can reach commercial agreement as to the timing of shared infrastructure especially as the Holistic Network Design (HND) provides guidance as to the high level of infrastructure to be developed. Ofgem is also considering whether anticipatory investment policy changes as they apply to the Early Opportunities workstream could have a role in Pathway to 2030 (PT2030).

108. What are the envisaged ownership models for delivery and operation of the HND infrastructure?

Ofgem published it’s minded-to decision²⁶ and further consultation on PT2030 in May 2022.

²⁶ <https://www.ofgem.gov.uk/publications/minded-decision-and-further-consultation-pathway-2030>

This document sets out Ofgem's minded-to decision to apply a 'very late competition - generator build' model to non-radial offshore transmission in scope of the PT2030 workstream of the Offshore Transmission Network Review (OTNR).

Within Ofgem's minded-to decision and further consultation on PT2030 Ofgem also confirms its consultation position that radial offshore transmission should be delivered through one of the existing models.

109. Is the Offshore Transmission Network Owner (OFTO) regime compatible with a coordinated offshore transmission system?

Yes – however, Ofgem's minded-to decision and further consultation on PT2030 considers what changes might be necessary to the OFTO regime given the changes that are coming as a result of the HND and more broadly in the OTNR.

Broadly they see that it is compatible and the feedback that they have had from stakeholders is that there is an appetite for larger offshore transmission assets which will have a higher transaction value.

The consultation considers whether there are any consequential arrangements that may be required to implement the 'very late competition - generator build' model, for non-radial offshore transmission.

They noted that if construction timelines and transaction timelines are extended by virtue of the more complicated nature of these assets, they are talking to BEIS about what that might mean for the Generator Commissioning Clause (GCC).

They are live to the issues which may need addressed and are obviously very keen to ensure that the changes to a more coordinated offshore infrastructure do not in any way de-stabilise the investor market, which has delivered so much under the existing regime.

110. How will the very late competition model deliver offshore high voltage direct current (HVDC) links between offshore wind farms (OSWF)?

Now that the HND has been published, Ofgem is working through the asset classification exercise which will determine which assets will be classed as offshore infrastructure and which as onshore infrastructure. As indicated by their last publication, this will be determined by use rather than location. In terms of who will deliver assets, this will flow from the asset classification.

111. Developer build model for non-radial connections - but which developer (amongst all the ones who will use it) will design & build it? If developers are to design and build non-radial assets, how do you decide which of potentially several different developers are selected to do the design and build of each asset? (e.g., the Celtic Sea design in the HND where three developers share cables to shore).

Based on stakeholder feedback, proposals in PT2030 and Early Opportunities, Ofgem believes there is evidence developers will coordinate to develop coordinated infrastructure or reach commercial agreements with regard to delivery. Through stakeholder engagement sessions to date, developers have raised some of the challenges associated with collaboration on delivery and they will consider these concerns as they move to their final decision on delivery models.

Ofgem will set the regulatory framework under which assets will be delivered. They do not however intend to allocate responsibilities to individual developers. Developers have indicated a willingness to coordinate to deliver developer-led infrastructure and there is evidence of this happening already.

112. What is the difference between a very late-stage developer build and the existing OFTO regime where to date every project has opted for developer build?

Broadly they are similar, however, there will need to be some consequential changes to the OFTO regime to facilitate more complex assets. In proposing a very late state developer build model, Ofgem noted that every project to date had opted for a developer build to date.

113. How can one developer make an investment decision to build additional assets now for a future development that has yet to reach FID? Has Ofgem missed the point? None of this can happen without 'anticipatory' investment (AI) by someone. Private sector cannot take that risk. That means a policy change so that risk is taken by government/regulator (on behalf of electricity customers).

Ofgem recently consulted on a minded to position for dealing with AI for early opportunities. To the extent that AI applies to PT2030 they expect to look to extend those same principles.

In terms of what that means practically, they talked in Early Opportunities about developers needing to demonstrate why the AI was needed. With PT2030 projects, if delivery of assets is in compliance with the HND that would indicate that the AI is necessary and then they would be considering this in terms of economic efficient spend. This is part of the package of policy changes that will need to be translated into formal changes to the industry codes and regulatory processes – and that's something on which Ofgem is working with ESO on.

114. What is the rationale for not retaining OFTO build in the Ofgem minded to position on coordination (but retaining for radial). Closing down options seems incredibly risky.

Ofgem acknowledges this point. This was considered, however OFTO build hasn't been done to date. Ofgem has been told loud and clear that delivering this infrastructure to meet 2030 targets is very challenging. They also make reference to the point made during the presentation, that increasing interface points across the transaction was seen to increase risk and we wanted to minimise that risk to delivery timeframes. However, Ofgem will fully consider all consultation responses and take view on the most appropriate model to take forward.

115. The British Energy Security Strategy (BESS) sets out the need to accelerate approvals of onshore reinforcement (this is also highlighted in the *Networks Option Assessment Refresh (NOA Refresh)* in the form of required in service dates (RISD)) - does Ofgem have an update on this? Onshore reinforcements are held up by consenting but also the regulatory approvals process.

Ofgem is exploring how their regulatory processes could be sped up given the pace of challenge to 2030 and has recently published a consultation²⁷ on accelerating onshore electricity transmission investment, which includes proposals to streamline the current regulatory approval process for large electricity transmission projects as well as proposed measures to protect consumers against additional risks that changing the process brings. Deadline for response to this consultation is the 6th of September 2022.

116. If the coordinated offshore design includes elements of relieving onshore constraints, then the OFTO availability mechanism will probably need amending to ensure it remains fit for purpose.

Ofgem's minded-to decision and further consultation on pathway to 2030 considered consequential changes. As part of this they are looking at whether this mechanism needs to change or be amended to reflect the changing nature of assets.

117. Given the reservations of questions coming from the generators i.e. questions into this forum should late build be reconsidered?

The P2030 consultation has now closed and Ofgem will review all stakeholder feedback before reaching their final decision.

²⁷ <https://www.ofgem.gov.uk/publications/consultation-accelerating-onshore-electricity-transmission-investment>

118. Have you considered the cashflow impact of one developer building an OFTO they will not use for their project; this could be over £1.5 billion which could be better allocated to progressing their pipeline and projects (plus financing /board approval for this will not be easy)?

Ofgem is mindful of the deliverability of coordinated solutions including the cashflow impact on developers and will consider the feedback on their PT2030 consultation.

119. The OFTO regime is state backed, post construction asset refinancing. Developers take construction risk. If it were really 'a success' or had ever saved customers any money other countries would have copied it.

The current OFTO regime has resulted in the issue of 23 OFTO licences, with a further 5 offshore transmission systems currently being tendered. These have all been radial solutions. The OFTO regime has been highly successful at securing the timely connection of offshore generators to the transmission system at a low cost of capital, with combined savings from Tender Rounds 1,2 and 3 estimated being between £628 million and £1.149 billion. The OFTO regime continues to be robust, attracting low cost capital and is well understood by all parties including bidders and developers.

120. Who will develop, consent, and build the two direct current (DC) links that are shown as connecting into 'Creyke Beck'? Is there a risk that these DC links may ultimately connect to a different substation/location, other than Creyke Beck?

Who will build it depends on the outcome of Ofgem's asset classification process. The current expectation is that they will connect to Creyke Beck.

121. The BESS outlined there may be a need to exempt some infrastructure from competition - how does Ofgem intend to identify which infrastructure/reinforcements this applies to? Will this be the 'HND essential' reinforcements identified in the NOA Refresh or will this assessment be based on something else? When will this be known?

Ofgem has recently published its consultation on 'Accelerating onshore electricity transmission investment'. Within this consultation Ofgem explain that the criteria for projects to be eligible for consideration for its proposed accelerating onshore transmission investment is as follows:

- Meets the criteria set out in the licence for submission under the RIIO-2 Large Onshore Transmission Investments (LOTI) re-opener process (over £100m)
- Needs to be operational by 2030 to meet the Government's ambition to connect 50GW of offshore wind generation; and
- There is clear evidence that the expected benefits of applying the accelerated delivery framework to the project exceeds the expected consumer detriment.

Ofgem's initial analysis narrowed the list down to 26 projects. Of these, as explained in Chapter 4 of the consultation, there are 10 projects that Ofgem think should be exempt from competition because they are unlikely to meet the criteria for competition or are unlikely to be able to be delivered without leading to a delay. There are a further 10 projects that the ESO thinks need to be delivered earlier than their current earliest in service date (EISD). Subject to confirmation that each is in the interest of consumer to exempt from competition, Ofgem propose to do so. With regards to the remaining 6 projects, Ofgem's consultation signals that further evidence is needed before it can determine whether or not they should be exempt from competition.

20. Business, Energy, and Industrial Strategy (BEIS)

122. What work has BEIS undertaken to check that current supply chains have sufficient bandwidth to support and meet 50 GW of offshore wind by 2030?

BEIS has taken a number of actions to support development of supply chains including through the Offshore Wind Manufacturing Investment Scheme (OWMIS) and Floating Offshore Wind Manufacturing Investment Scheme (FLOWMIS) initiatives.

Through the £160 million Offshore Wind Manufacturing Investment Support Scheme, they have been able to announce more than £1 billion of investment in their offshore wind sector in the last year in major port and manufacturing infrastructure, creating, and safeguarding thousands of jobs by 2030. For example, offshore wind cabling manufacturer JDR Cable Systems Ltd is receiving funding from the scheme which, together with private investment from the company, will see £130 million invested in facilities that will develop and build high voltage alternative current (HVAC) cables for next generation wind turbines, with more than 440 jobs being created and safeguarded.

Government has additionally announced up to £160 million in further funding to be put towards developing new large-scale floating offshore wind ports and factories in the UK. This funding, boosted by private sector investment, will help to develop port infrastructure capable of mass-producing floating offshore wind turbines and installing them out at sea, creating thousands of new jobs in the UK's industrial heartlands, whilst reducing the need to import from overseas. This is alongside a further £31 million of UK Government funding, to be matched by industry funding, for research and development in floating offshore wind projects.

The Prime Minister has announced that up to £160 million will be made available for investment in port and manufacturing developments that bring us closer to scaled-up deployment of floating offshore wind to meet our deployment ambition and wider net zero objectives.

The Holistic Network Design (HND) recommendations for required transmission infrastructure will act as a strong demand signal for investments in the supply chain.

123. Is any work being undertaken with other parts of government to make the onshore planning process or process for obtaining consents easier and quicker?

BEIS is working across government including with Department for Levelling Up, Housing and Communities (DLUHC) and the Department for Environment, Food and Rural Affairs (DEFRA) to deliver commitments announced in the British Energy Security Strategy (BESS) to accelerate consenting including:

- Establishing a fast track consenting route for priority cases where quality standards are met.
- Strengthening the Renewable National Policy Statements to reflect the importance of energy security and net zero.
- Introducing strategic compensation environmental measures including for projects already in the system to offset environmental effects and reduce delays to projects.
- Reviewing the way in which the Habitats Regulations Assessments (HRAs) are carried out for all projects making applications from late 2023 to maintain valued protection for wildlife, whilst reducing reams of paperwork.
- Working with the Offshore Wind Acceleration Task Force; a group of industry experts brought together to work with government, Ofgem and the ESO on further cutting the timeline.

124. Do you think the UK has enough skills, expertise, and resource capacity to complete 94 reinforcements by 2030?

The design is deliverable and operable and provides the opportunity for wind farms to be able to connect by 2030. The ESO has applied a deliverability assessment framework that considered a range of factors including supply chain of technologies, construction timeframes, and consenting challenges.

The timings and required works for each connection will be determined as part of the connection contract update programme

125. Can you elaborate on accelerating consenting - what are the key changes envisaged, when will they happen?

The new fast track consenting route will be up and running in the second half of 2023.

A cross-government nationally significant infrastructure project (NSIP) reform package, which includes main reform measures and how we intend to manage key delivery challenges, is intended to be published to coincide with the introduction of DLUHC's NSIP related amendments at Committee stage of the Levelling Up and Regeneration Bill (LURB) before summer recess.

Some of the measures currently underway - such as updating the National Policy Statements (NPS) and some of their work on strategic compensation – will have an impact sooner than this, helping to de-risk the pipeline and protect the environment.

126. Will the revised NPSs provide policy support for areas that have been strategically identified geographically e.g., Lincolnshire Connection Node. Without policy support developers (and the Transmission Owners (TOs)) have no guarantee that the connecting infrastructure could be consented without policy support for need cases.

The NPSs are still subject to final Government approvals but the current drafts will recognise the work of the HND and other strategic network planning exercises in identifying the needs case for this infrastructure. Consideration is being given as to whether the NPS can recognise that the HND identifies the proposed onshore connection points.

127. What is the BEIS timeline for Transmission Network Acceleration, and how will this impact Ofgem's competition model?

A number of announcements were made in the BESS to support the acceleration of transmission networks. These include recognising strategic network blueprints in the NPS, ensuring Ofgem expedites its approvals process, appointing an Electricity Networks Commissioner to advise on accelerating networks and reducing the timeline for delivering strategic onshore transmission infrastructure by around three years. The details on all of the BESS commitments will be provided in due course. The government recently announced the appointment of the Electricity Networks Commissioner. Government has introduced legislation to enable onshore competition. To avoid delays to projects as competition is introduced and in its transition period to being part of normal network regulation, Ofgem will shortly publish a consultation on which projects to exempt from competition. This will ensure swift delivery of transmission infrastructure to support increased domestic energy production towards our ambition of delivering 50 GW of offshore wind by 2030.

128. Based on the responses regarding supply chains, it sounds like there isn't any guarantees that there will be enough bandwidth to meet the 2030 target. How will progress to the 2030 target be monitored over the coming years? Does ownership of the target being met sit with BEIS?

BEIS encourages developers to raise any specific supply chain concerns they are already experiencing or expect to face in the lifetime of the projects. This will enable BEIS and other Offshore Transmission Network Review (OTNR) partners to assess whether there is scope for appropriate action to overcome these challenges.

All OTNR partners are committed to the 50 GW by 2030 ambition.

129. Will the additional risk and cost to developers not just add to the levelised cost of electricity (LCOE) of projects? This will surely impact on the bill payer and the perceived efficiencies are simply just moving the additional costs onto developers.

Ofgem and the ESO are working together to address barriers to coordination opportunities including through potential changes to anticipatory investment (AI) to mitigate additional risks and costs to developers.

Whilst the recommended design does incur additional capital costs, which impacts the LCOE of certain projects, these costs are outweighed by reduced constraint costs as a result of grid reinforcements recommended through the HND. The recommended approach provides an overall net saving to consumers compared with the existing radial approach.

130. Are the consenting recommendations being made for the whole of the UK or only England and Wales?

The commitments in the BESS on NSIP Reforms and Fast Track consenting relate specifically to England & Wales since planning is a devolved activity in Scotland and in some cases for Wales.

BEIS is liaising with colleagues in the Devolved Administrations to explore how consenting can be accelerated across Great Britain.

131. As planning is devolved in Scotland, and a significant amount of the HND is based in Scotland, are Scottish government also looking to speed up planning?

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132. As planning is devolved in Scotland, and a significant amount of the HND is based in Scotland, are Scottish govt also looking to speed up planning?

BEIS is working with the Scottish Government to identify what is required to improve the planning process to accelerate project development and achieve the 50 GW by 2030 ambition.

133. The Transmission review was supposed to look equally at environmental and community impact and cost & deliverability. I have heard nothing about environmental and community impact of the business as usual radial approach in East Anglia. Surely this is a failure of the review?

There are separate terms of reference for the Offshore Transmission Network Review and the Holistic Network Design. The stated objective of the OTNR, included in the [Terms of Reference](#), is to ensure that the transmission connections for offshore wind generation are delivered in the most appropriate way, considering the increased ambition for offshore wind to achieve net zero. This will be done with a view to finding the appropriate balance between environmental, social and economic costs.

In balancing environmental, social and economic costs, the review must consider the most appropriate interventions for each set of projects, depending on how advanced the project is.

Projects in East Anglia are not included within the HND as these projects are well-advanced and already have contractual arrangements in place for their connections and infrastructure. Mandating changes would risk causing major commercial impacts and delays and consequently could put at risk the delivery of the Government's ambition for 50GW of offshore wind by 2030.

Despite the challenges in making changes to projects at later stages of development, Government recognises the impact on the region of hosting significant volumes of offshore wind and interconnectors. Instead, BEIS is encouraging developers to voluntarily opt in to developing more coordinated connections.

134. Why is the ESO trying to show compliance with the OTNR terms of reference, when that duty falls to BEIS/Ofgem, and not the ESO?

The ToR for the Central Design Group (CDG) and Pathway to 2030 Network Design governs how the HND should be developed in consultation with the CDG and includes details of the purpose, objectives, inputs, outputs and logistics of the HND process, and membership of the CDG. Ahead of the publication of the HND, the OTNR governance, which includes BEIS and Ofgem, confirmed that the HND was developed in compliance with the ToR.

135. The Offshore Transmission Coordination Project (OTCP) presented its conclusions on 1st March 2012. It aimed to reduce carbon emissions by 80% by 2050, identified savings of up to £3.5 billion and identified the anticipatory investment issues. Ten years has gone by and nothing has been done.

The original approach to designing and building offshore transmission was developed when offshore wind was a nascent sector and industry expectations were just 10 GW by 2030. This approach has contributed to the maturing of the sector and significant cost reductions in offshore wind energy.

However, in the context of increasingly ambitious targets for offshore wind, in July 2020 Minister Kwarteng launched the OTNR to ensure that future connections for offshore wind are delivered in the most appropriate way through finding the appropriate balance between environment, social and economic costs.

Since launching, the OTNR has delivered a series of reviews, consultations, and engagements to seek the input of interested stakeholders to develop the enabling policy and regulatory framework. The OTNR is now transitioning from Reviewing to Reforming, as BEIS publish decisions and begin to implement the regulatory and planning changes necessary to deliver a coordinated transmission network across all temporal workstreams.

This includes (but is not limited to):

- Ofgem's consultation on Minded-to Decision to enable changes to facilitate anticipatory investment for early opportunity projects.
- Announcement of the Offshore Coordination Support Scheme within the BESS. The UK Government is committing £100 million to support developers in scope of the early opportunities workstream. This scheme is under development, and further details will be published in Q3 2022.
- The publication of the HND and the associated suite of documents.
- BEIS Consultation Response and Decision²⁸ on future multi-purpose interconnector (MPI) licensing arrangements. The response outlines BEIS intention to strengthen legal and regulatory clarity over the licensing of future MPIs and associated legislation is being introduced through the Energy Bill.

BEIS will continue to seek views and engage with stakeholders as we move towards the long-term enduring regime for the deployment and connection of offshore wind to the transmission network.

136. Why are developers being provided with 'additional resource' to help improve the quality of their applications, yet local communities are not being provided with the same level of resource to support their responses?

Developers are not being provided directly with additional resource.

Marine environmental issues have led to delays in consenting for many offshore wind projects. Consideration is being given as to how such issues can be better addressed at the pre-application stage before applications for Development Consent Orders (DCOs) are submitted. . Proposals to address these issues form part of the DEFRA-led Offshore Wind Environmental Improvement Package (OWIEP) announced in the BESS. As part of the OWIEP, government and the Statutory Nature Conservation Bodies will work actively with developers to achieve better environmental outcomes. This does not include directly funding developers.

The role of local communities in the planning process is an important consideration as part of the Department for Levelling Up, Housing and Communities' National Infrastructure Planning Reform programme. This includes consideration as to how it could be made easier for communities to participate in the DCO process including non-statutory and statutory consultations.

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1072801/otnr-multi-purpose-interconnectors-government-response.pdf

137. When making changes to the NPS, have you considered that the policy should be evaluated using the mandatory HM Treasury Green Book? This would include the evaluation of natural capital which would include for valuation of unspoilt landscapes and property devaluation.

BEIS is seeking to revise the energy National Policy Statements (NPS) to identify and strengthen the need for coordination of transmission for Nationally Significant Infrastructure Projects. This will mean projects with radial routes to shore will be more by exception. Within the draft NPS consulted on in September 2021, the Government has proposed that biodiversity enhancements, such as reconnecting habitats via green corridors and biodiversity stepping zones, are recognized in proposed projects, with electricity network infrastructure allowing excellent opportunities for such schemes.

138. Is there a target date for the revision of NPS EN-5 as BEIS seem unable, or unwilling, to say?

The NPS is currently being revised and the commitment within the BESS to further strengthen parts of the energy NPS is being treated as a matter of urgency. Revisions will include recognising the HND. Government is seeking to designate the NPS as soon as feasible.

139. Vattenfall have experience in projects like this abroad but have been allowed to take the easy option of radial connection for Boreas and Vanguard which does not help to optimise either costs, efficiency or future-proofing of a UK HND. As no construction onshore has been started for Vanguard or Boreas projects, why can't they be connected to the HND? Surely, it's not too late for these, and other East Anglia windfarm projects which have not started construction eg SEP and DEP, to be included as pathfinder projects for a HND that includes East Anglia? The delay from including East Anglia in the HND would not be significant with regards to the long-term government strategy and would only delay the start of wind farm electricity generation. Why has national long-term efficiency been compromised by excluding East Anglia from the HND?

The projects in the East Anglia area are well advanced and already have contractual arrangements in place for their connections and associated infrastructure, and some have entered or completed the consenting process. Mandating changes at this stage could have resulted in major commercial impacts and delays that could put at risk the delivery of the government's ambition for offshore wind.

140. Can BEIS comment on how wind farms were granted DCOs when the grid did not have the capacity to carry the power? EN-1 is very clear that such projects should be considered together, and the lack of grid capacity should have been a material consideration.

Each application for development consent is dealt with in accordance with the Planning Act and projects are fully examined and a decision made based on the facts of each case.

141. The whole East Anglia Green (EAG) project is invalid in planning terms - it should always have been presented for consideration by the SoS at the time of the DCO process for all the currently consented projects coming through Norfolk. EAG is a cumulative impact of them all. Yes - these projects' consents may well have to be unpicked in terms of their grid connections but if not, EAG will be challenged at judicial review, again and again.

The East Anglia Green project will be brought forward as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. The Development Consent Order application for that project will need to include an Environmental Impact Assessment on the effects of the project which will have regard to the possible cumulative effects. Government is unable to comment on individual projects going through the planning process given the quasi-judicial role of government and the Secretary of State as the decision maker.

21. National Grid Electricity Transmission

142. Have you considered the effects of rising temperatures on the transmission system? If so where is the modelling?

National Grid Electricity Transmission (NGET) does consider and monitor the impacts of climate change on our network. You can find out more in our Climate Change Adaption Report²⁹ which we published last year.

143. In the case of North Wales, how would you propose to get through the Snowdonia National Park, given that pylons are currently being removed there?

The Network Options Assessment (NOA) refresh which was recently published by the Electricity System Operator (ESO) as part of the 'Pathway to 2030' work identified the need for new network reinforcement between from North to South Wales. Following this report, NGET will undertake an exercise to appraise initial options to meet this need and then present and refine these options externally through numerous rounds of consultation. These options will be identified based on guidelines set out through Government and regulatory policies and will factor cost, technology, timing and environment. When developing proposals, careful consideration is always given to designated areas, such as National Parks. The draft Energy National Policy Statements (NPS), which UK Government is in the process of reviewing, set out a starting presumption that underground cables would be the preferred technology choice if transmission network was developed within National Parks or Areas of Outstanding Natural Beauty (AONB).

144. What is the point of your consultation process when projects are already too far forward to be changed?

Following the ESO identification of a need to reinforce specific elements of the electricity network, NGET consults initial infrastructure proposals, working closely with local authorities and the potentially impacted communities, to develop these proposals through non-statutory and statutory consultation phases. These consultations, which are delivered in the projects formative stage, are designed purposely to hear the views from local communities on our proposed route corridor. Following each of the consultations, we will review all responses and use these to inform the development of the project and utilise the feedback to look at opportunities for mitigation. NGET will also summarise all of the feedback received, which is published and submitted to the Planning Inspectorate, to support the application for a Development Consent Order (DCO) for the project.

145. Why doesn't National Grid simply do a proper costing of an offshore grid versus onshore so we can see?

Technology options are driven by the clear direction set through Government policy, for example the Energy National Policy Statements (NPS) which Government is currently reviewing, and regulatory frameworks. In relation to East Anglia GREEN, NGET considered further offshore options however concluded these would not comply with our obligations to be economic and efficient and therefore, would not be supported under the current regulatory framework when consentable lower cost onshore alternatives were available. This process also considered alternative onshore options, which when considered were also ruled out at this stage of the project development process.

Following feedback from local communities, NGET are reviewing the information published on East Anglia GREEN to date and have committed to providing more detail on subsea alternatives and why they ruled out a subsea option. NGET are not seeking to defend their position or to predetermine any future decision-making process. The information published will provide a more detailed explanation of the costs and technical aspects associated with a subsea solution to enable a clearer comparison with the onshore solution being proposed.

146. During the recent debate at Westminster Hall, we were told about a meeting last Monday between National Grid Electricity System Operator (NGESO), National Grid Electricity Transmission

²⁹ <https://www.nationalgrid.com/electricity-transmission/document/143211/download>

(NGET), Office of Gas and Electricity Markets (Ofgem), and the Offshore Electricity Grid Taskforce (OffSET) group of MPs. The MPs were told very clearly by OFGEM that the current regulatory framework does NOT prevent the development of shared infrastructure. Please will NG comment further on this fact?

As we scope our projects, we consider numerous technology solutions to deliver the required network reinforcement that is necessary to connect new green sources of energy. Solutions are designed to meet these network requirements and are shaped by Government policy whilst complying with the obligations set out under our licence and by Ofgem to be economic and efficient. In relation to East Anglia GREEN, NGET considered further offshore options however concluded these would not comply with our obligations to be economic and efficient and therefore, would not be supported under the current regulatory framework when consentable lower cost onshore alternatives were available.

147. What detailed analysis has been done on offshore transmission options? Has this detailed engineering work been published? If so, where?

In relation to East Anglia GREEN, this is a proposal by NGET to reinforce the high voltage power network in East Anglia between the existing substations at Norwich Main in Norfolk, Bramford in Suffolk and Tilbury in Essex, as well as connect new offshore wind generation. Following feedback from local communities and elected representatives, we are now reviewing the information we have published to date and have committed to providing more detail on subsea alternatives for East Anglia GREEN which will be published later this summer.

22. Location / project specific design queries

148. Why are you proposing the only connection point for the south west wind farms being at Pembroke which is in a National Park and which has a lot of environmentally protected areas in the coastal area? Surely a location that is less environmentally sensitive could be chosen.

The design for the South West Region is only indicative, this will be redone when we have more certainty of Celtic Sea wind farm locations.

All four network design objectives were considered equally. However, from a system perspective, Pembroke is one of the strongest nodes in the South West Region providing an ideal location to connect all three wind farms with the locations assumed at this stage.

The coordinated option reduces the number of landfalls and the amount of assets that are required to be built to facilitate all three wind farms.

The Holistic Network Design (HND) connects all three wind farms to shore with one pair of cables. Even though Pembroke was one of the most environmentally sensitive and constrained connection points in the region, on balance it was considered that connecting two cables here was feasible and a better option than another location further away.

149. Could the link from Lincs Node to Wymondley be an onshore underground high voltage direct current (HVDC)?

National Grid Electricity Transmission (NGET) will need to work on the specific routing and technology of the Lincolnshire Connection Node to Hertfordshire circuit (LRN4).

150. Please can you explain how the design dependencies are communicated in the documentation e.g., which elements of the design (both offshore and onshore reinforcements) are required for a given project to be able to export power? Is the East Coast offshore coordinated network needed in order to enable the North of Scotland projects to connect?

We're working through this as part of the process of updating connection contracts for each offshore wind project. This will define enabling and wider works for each project.

151. Why has the previously mooted "North Wales to South Wales" (Wylfa-Pembroke) offshore HVDC cable been replaced with an onshore dotted line? Has the ESO decided to switch from offshore cable to overhead line? If so, why?

The dotted purple line shown on the map represents a need that the ESO has identified for requiring reinforcement between point A (North Wales) and point B (South Wales). It does not represent any planned route corridor between the two points. The specific route and technology chosen for the reinforcement will be decided as part of the next stage which we refer to as the Detailed Network Design (DND). The parties responsible for delivering the DND will be identified through the regulatory process and will consult with all relevant stakeholders, including local communities, on their proposals.

152. Is the Fetteresso connection an export connection?

Fetteresso is a bi-directional connection.

153. How would your design connecting into Pentir be impacted by new build nuclear at Wylfa?

The HND has been produced using a modified Future Energy Scenario (FES) Leading the Way background this accounts for potential build out of additional onshore generation in North Wales, including nuclear.

154. What is preventing the ESO from including in the HND an offshore transmission cable from Peterhead in Scotland through Dogger Bank, Hornsea and the East Anglia Zone to Tilbury, Grain or Canterbury in the south?

The ESO has designed offshore transmission cables to be used to transport electricity over significant distances, in some cases connected to windfarms. No windfarms in East Anglia were in scope of the HND, so they could not be connected to the offshore network design.

155. Have you considered connecting East Anglian windfarms further south than would otherwise have been considered through the usual connection approach so that network constraints are reduced, and the power taken directly to demand centres closer to London?

Within the HND, there were no wind farms which were in scope that could feasibly be considered to connect south of East Anglia due to the significant distance it would take to circumnavigate around the region offshore.

BEIS is looking at how voluntary coordination could be increased in more developed projects – including those with grid connection offers connecting ahead of 2030. This includes projects in East Anglia which are well-advanced and already have contractual arrangements in place for their connections and infrastructure and some have entered the consenting process. Mandating changes to these projects risks major commercial impacts and delays and could put at risk the delivery of the government's ambition for offshore wind.

In the absence of policy and regulatory levers to mandate coordination for these well-advanced projects, BEIS has been incentivising projects to voluntarily opt-in to become 'Pathfinder Projects'. BEIS will also be utilising changes in the National Policy Statements that place new obligations on projects to consider coordination. BEIS are working with Ofgem on enabling regulatory changes and are exploring the use of funding through an Offshore Coordination Support Scheme, announced in the British Energy Security Strategy (BESS).

156. Why is this event presented by the ESO and not by BEIS? Why is there no BEIS hosted event?

BEIS, in leading the overall Offshore Transmission Network Review, has hosted several webinars that bring together the different organisations involved in the Review to provide updates. As this event was predominately focused on the publication of the Holistic Network Design, an ESO-led deliverable, the ESO hosted this webinar. However, it we felt it would be helpful to also include an update on the Pathfinder Projects which are being coordinated through BEIS.

157. Sealink, North Falls, Five Estuaries potential developments has implications for other projects. Is there a timescale for those discussions?

Discussions are ongoing with developers about what coordination may be possible. The trade body RenewableUK has been leading this phase of work and remains actively engaged with all the projects.

158. What specific features of Equinor's proposals require OTNR (Offshore Transmission Network Review) changes?

Equinor's proposal requires the sharing of a connection of two wind farms to shore. This sharing of the connection to shore requires changes to the charging, Contracts for Difference and Offshore Transmission Owner arrangements, which are being progressed by the ESO and OTNR partners.

159. List of Orsted Early Opportunities projects

Hornsea Three Boudica battery storage; Gigastack hydrogen electrolyser utilising power from Hornsea 2 offshore wind farm³⁰

160. List of East Anglia Early Opportunities projects

National Grid Electricity Transmission (NGET (Sea Link)), National Grid Ventures (NGV (EuroLink and Nautilus)), North Falls and Five Estuaries.

161. Regarding Friston, is there a way developers can be given extensions to join the Pathfinder Projects?

The concept of a Pathfinder was created for projects that are voluntarily leading the way in utilising the enabling regulatory and policy changes being developed by the OTNR, to deliver real world change as soon as possible and provide important learnings for the Review. The OTNR is still considering projects and where they opt in – and fit the criteria, would be eligible to become Pathfinder projects. Projects that do not yet have a connection agreement are required to adhere to the HND.

162. In the Irish Sea, the earlier draft clearly showed an offshore link, and yet Awel y Môr and Mona are both proceeding with radial connections into Bodelwyddan! As both Mona and Morgan are in the formative planning stages, surely it is not too late to propose an offshore connection into Deeside substation?

The Awel Y Mor project is more advanced in its development and therefore not included in the HND. However, there could be opportunities for R4_4 (Mona) to work with Awel Y Mor to share a cable corridor and reduce the environmental and community impact. R4_6 (Morgan) is already sharing a cable route corridor with R4_5 within the HND.

³⁰ <https://orsted.co.uk/energy-solutions/offshore-wind/our-wind-farms>