

WRITTEN REPRESENTATION
OFFSHORE TRANSMISSION NETWORK
Deadline 1: 20th FEBRUARY 2023
Norfolk Parishes Movement for an OTN

Summary

The Holistic Network Design (HND) which was published by National Grid in July 2022 is the flawed output from the Offshore Transmission Network Review (OTNR) started by BEIS and Ofgem in 2020. The HND covers all of the UK with the exception of the very large offshore wind farms around the East Anglian Coast. We set out below why this approach is not efficient, economic or coordinated, increases costs for consumers, and introduces a further delay of up to ten years whilst the proposed pylon routes are built.

There is clear logic (as set out in our other Written Representation) to connecting the SEP and DEP projects at Walpole. However, if the Ørsted Hornsea Three and Vattenfall Norfolk Vanguard and Boreas projects, which are most suitable for connection to an integrated Offshore Transmission Network (OTN), are moved entirely offshore this would free up space at Norwich Main although any connection would be subject to a trade-off of the onshore impacts.

We believe it is owed to the whole country that a proper review of the options to bring ashore offshore wind energy from the North Sea be carried out, including the option of a *fully* integrated offshore transmission network. We believe that this exercise can be completed rapidly while the current planned Ørsted Hornsea Three and Vattenfall Vanguard and Boreas projects are suspended. The potential cost savings, added to the significantly reduced impact on communities and the environment, make this imperative.

Madam Chair, on behalf of the Norfolk Parishes Movement for an Offshore Transmission Network (OTN) we would like to set out for the ExA our rationale for an OTN.

The Rule 8 letter issued by the ExA on 27th January 2023, question Q1.2.3, seeks responses from the Applicant and National Grid to the possibility of an OTN and the connection of SEP and DEP. We would like to make some points which we believe are key to this issue.

Background

The benefits of an OTN have been highlighted by various reports to the government since at least 2007. Following the (belated) launch of the Offshore Transmission Network Review (OTNR) by Ofgem, National Grid estimated as recently as December 2020 the potential for savings of £6bn capital expenditure from integrating offshore windfarm connections¹.

However, we would like to specifically draw the attention of the ExA to an earlier report. The IOTP (East) feasibility study² of August 2015 was produced by National Grid and the offshore wind industry in compliance with the existing legal, technical and regulatory framework. Figure 1 illustrates the type of grid connection scheme developed in the report for the East Coast offshore

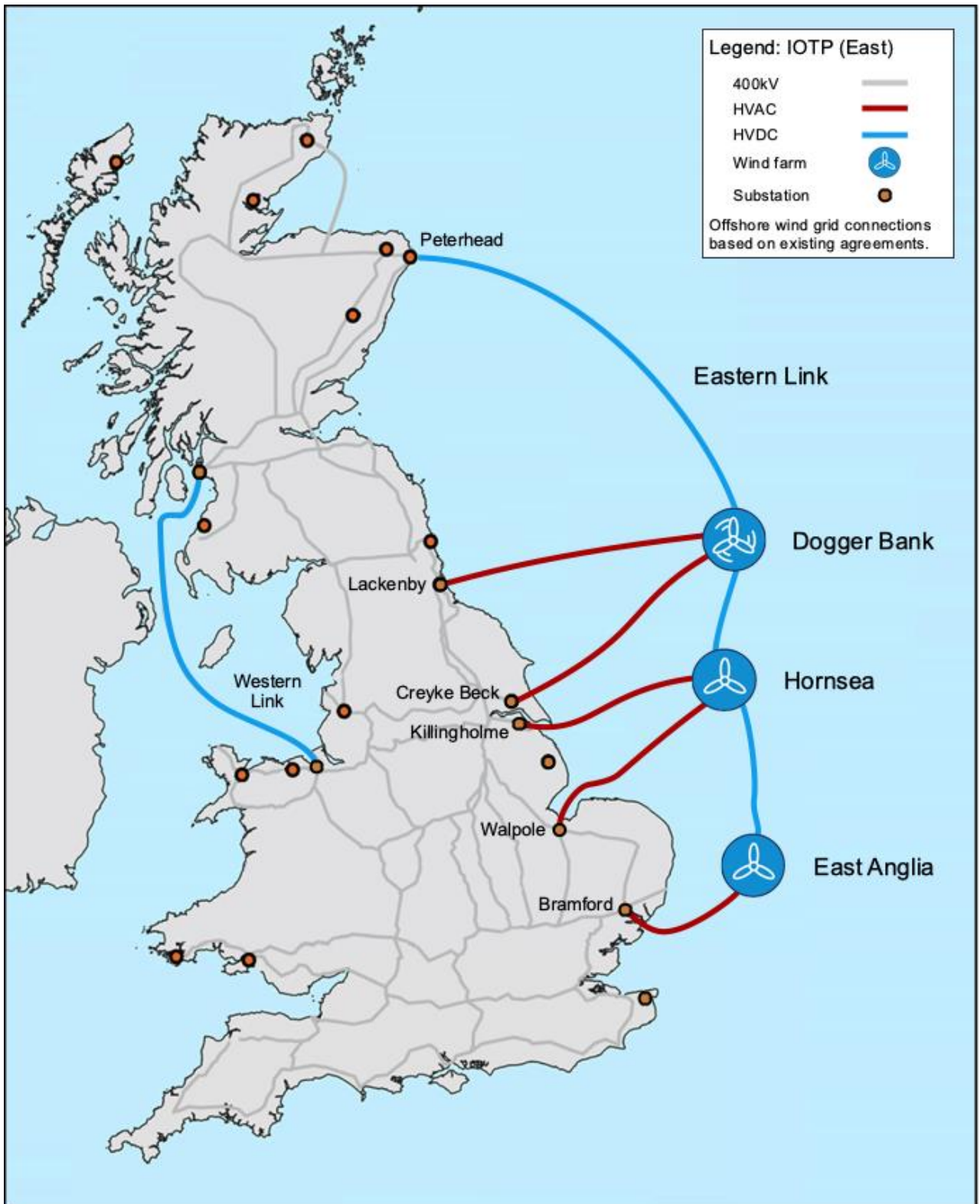


Figure 1: The East Coast offshore wind zones in the IOTP (East) feasibility study of August 2015

wind zones. The report demonstrated potential savings for consumers of up to £5bn and maximum efficiency for any level of East Coast offshore wind generated electricity above 10.0GW.

The design fully satisfies the requirements of the Electricity Act 1989 for an outcome that is efficient, economic and coordinated and minimises environmental impact. It was based on existing grid connection agreements in place at that time. The advantages arise from the fact that different offshore wind zones produce their peak output at different times. This is due to weather patterns and the prevailing wind direction, which is from the west. For example, when there is no wind in the East Coast offshore wind zones, power is carried to London and the South-East from renewable generation in Scotland. This enables sharing of infrastructure and reduces intermittency of renewable generation without the need for storage batteries at every onshore substation to smooth out the peaks and troughs.

These advantages were set aside, apparently by Ofgem, in the belief that no more than 10.0GW of East Coast offshore wind capacity would ever be constructed. However, the Ørsted Hornsea Three project, followed almost at once by Vattenfall Norfolk Vanguard and Boreas, took the expected total of East Coast offshore wind projects from 9.8GW to 15.8GW – above the 10.0GW threshold identified in the IOTP (East) feasibility study of August 2015.

Despite this, grid connections in rural Norfolk were offered to Hornsea Three and Norfolk Vanguard in July 2016, and to Norfolk Boreas in November 2016, for a total of 6.0GW. This is about twenty times more than the total net demand for electricity in and around Norwich. National Grid documents issued at that time³ show that the onward transmission capacity from Norwich towards London is unable to carry the output from these large projects. Unless offshore-generated electricity can be dispatched to where it is needed (London and the South-East) it cannot make a proper contribution to net carbon zero.

Offshore Transmission Network Review

Norfolk MPs campaigned for an Offshore Ring Main throughout 2019 and initiated a government review. This review was formally launched in 2020 with the objective to deliver a Holistic Network Design (HND) *“that ensures an economic, efficient, operable, sustainable and coordinated National Electricity Transmission System (NETS) (including onshore and offshore assets required to connect offshore wind) to present options, and a recommended HND for offshore connections works”*⁴.

However, Figure 2 shows the output from the OTNR based on the new infrastructure proposals contained in the Holistic Network Design (HND) published by National Grid in July 2022⁵. The HND covers all of the UK with the glaring omission of the very large offshore wind farms around the East Anglian Coast which are left with radial connections. This is a consequence of a misguided National Grid excluding the Crown Estate Leasing Round 3 projects from the “holistic” design. This gross error results in an approach that is not efficient, economic or coordinated, that increases costs for consumers, and introduces a further delay of up to ten years whilst the proposed pylon routes are built.

East Anglia Green Energy Enablement (GREEN)

This project involves the construction of a new 180 km, 400 kV overhead power line from Norwich Main substation to Tilbury substation. The current plan is to drive part of the project through the Dedham Vale AONB using underground cables.

National Grid claims this is essential reinforcement of the onshore grid needed to connect new offshore windfarms⁶. Specific reference is made to the connection of two new windfarms, *“Equinor*

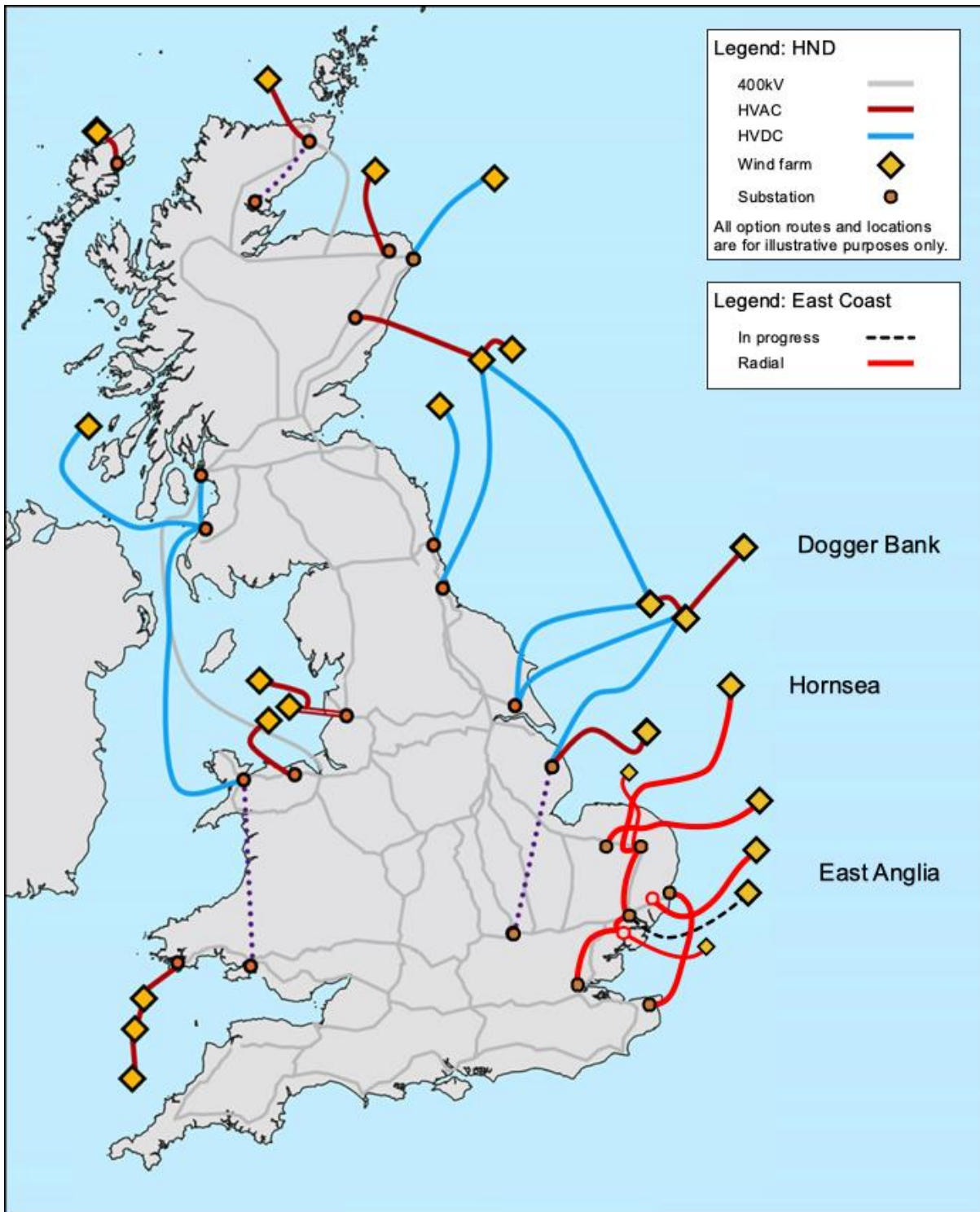


Figure 2: New infrastructure proposals contained in the National Grid Holistic Network Design (HND) and showing the radial connections set to come ashore in East Anglia

and Hornsea”, into Norwich Main. It is currently in the non-statutory consultation phase of planning. However, a fully integrated OTN, as proposed below, would obviate the need for East Anglia GREEN.

The three consented offshore wind projects (Hornsea Three, Norfolk Vanguard and Norfolk Boreas) have a combined output of 6.0GW. The total electricity demand in and around Norwich, which is supplied from Dunston, is unlikely to exceed 0.4GW⁷, whilst the existing pylon route from Dunston to Bramford in Suffolk consists of two circuits of only 1.5GW each – with the possibility of either circuit being out of action at any time due to faults or maintenance. With the current limited capacity to export electricity from Norwich Main, the decision to approve these windfarm projects seems to have been remarkably ill-judged and will almost certainly lead to higher levels of curtailment.

We are concerned that the then SoS for BEIS, in taking the decision to overrule his own Planning Inspectorate recommendations in respect of the DCO applications for Hornsea Three and Vanguard and Boreas, may have been misled due to a failure to recognise the need for adequate grid capacity, and the diminished benefits available in its absence, when determining the planning balance. We also note that the ExA did not conclude at all on the balance of adverse impacts and benefits for Hornsea Three. This would, in our view, be one of several reasons that the current SoS could choose to retrospectively review the approval of the onshore part of these projects.

A Fully Integrated East Coast Alternative

Figure 3 shows the HND corrected to include an efficient and economical solution for the East Coast. This covers most of the renewable energy coming online in the near future. The linking of the three zones in the East Coast region (Dogger Bank, Hornsea and East Anglia) enables more efficient use of the electricity generated. It minimises curtailment of renewable energy, reduces costs for consumers, avoids the need to wait for new pylon routes to be completed, and speeds up Net Zero.

For radial connection of offshore windfarms, the design target would be to accommodate 100% of the nominal output of each project. However, since nominal offshore windfarm outputs are rarely reached in all zones simultaneously, an integrated OTN enables the design target to accommodate the total ‘dispatchable’ output of the relevant projects in each zone, which it is usual to assign as 70% of the total nominal output. The total landing point capacity required is further reduced by the statistical correlation of wind energy output across the three offshore wind zones. The geographical separation of the three zones in the East Coast region enables sharing of infrastructure based on well understood wind patterns along this offshore region. The correlation factors were set out in the IOTP (East) feasibility study referred to earlier.

The reduction in the number and overall capacity of the landing points for a fully integrated OTN leads to capital expenditure cost savings. It is generally acknowledged that offshore construction offers shorter timescales and reduced planning risks compared to onshore grid reinforcements, such as new onshore pylon routes, and our calculations suggest that capital cost savings of between £3.9bn to £6.1bn can still be achieved whilst also reducing offshore wind curtailment and constraint costs.

In total, the cost to consumers due to wind curtailments across 2020 and 2021 has been estimated at £806m⁸, with an increase of 70% from 2020 to 2021 due to the higher costs of turning up other generation to compensate. Despite the fact that these figures are from two “abnormal” years (reduced electricity demand in 2020 because of Covid, and unusually low wind levels in 2021), the costs are significant and more “normal” years would only have made the payments higher. The ExA may be aware that according to a report by LCP consultants⁹, curtailment volumes for renewable

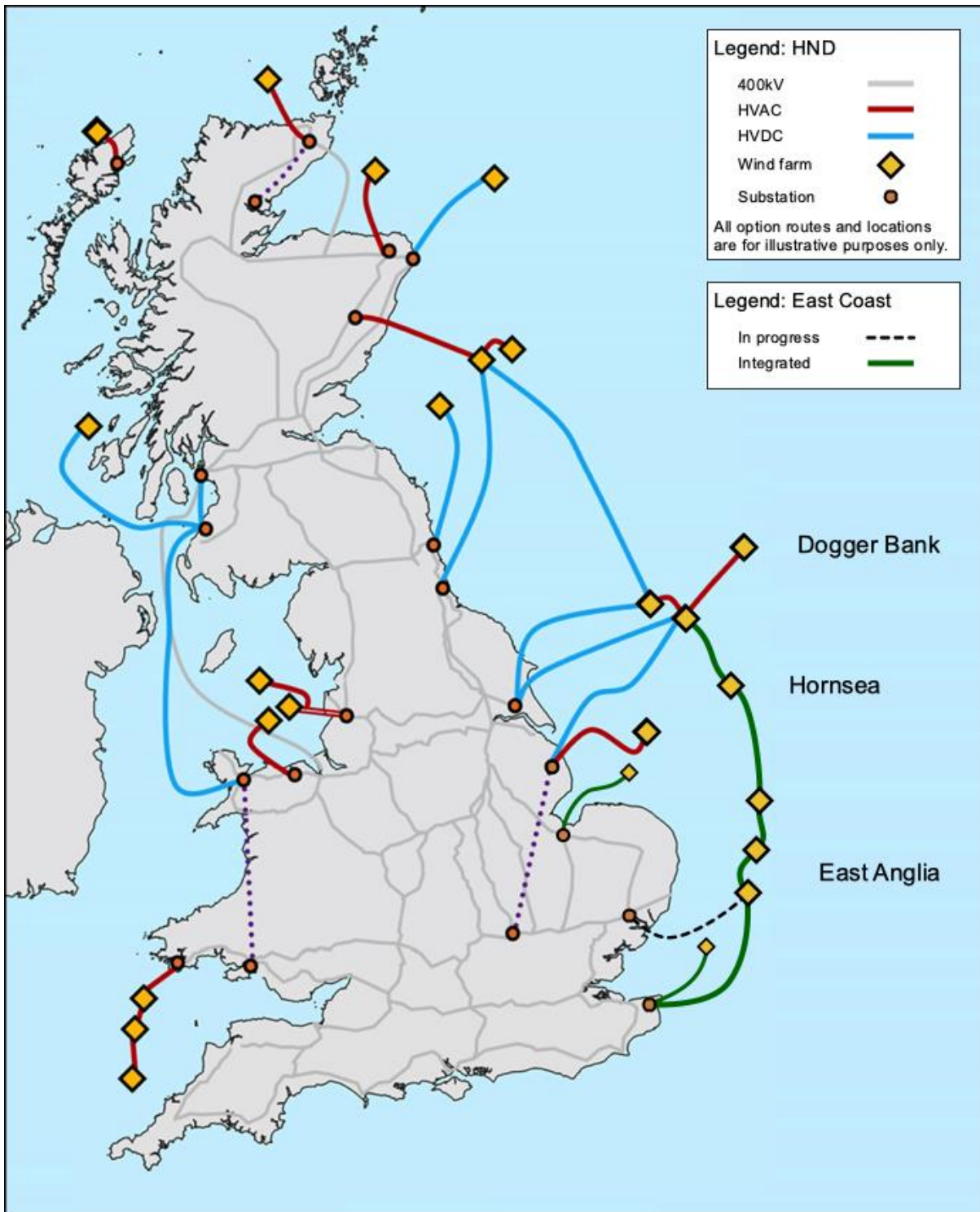


Figure 3: A schematic showing a fully integrated OTN for the East Coast of Britain

energy are set to reach 30 GW on some days by 2030. This is a staggering waste of resource in the context of the government target of harvesting 50 GW of electricity from offshore wind by 2030. Bringing electricity onshore in Norfolk where the ability to send it South to London and the South-East is already severely limited simply adds to the losses.

Furthermore, according to our estimates, offshore integration has the additional benefit of providing reinforcement of the onshore grid, adding as much as 3.47 GW of extra electricity capacity along the main north-to-south route. Currently, National Grid ESO is spending about £450m a year on constraint payments across all of the UK but an LCP forecast¹⁰ suggests that by 2025 the ESO will be spending almost £1bn a year across just the transmission boundary between Scotland and England. Thus, substantial constraint payment savings are likely to arise, on top of the other benefits, from the speedy implementation of a fully integrated OTN. Indeed, in the Initial Needs Case for the Eastern Link, Ofgem sought to justify its rapid offshore construction by pointing to savings in constraint payments¹¹.

Evidence to Support the Fully Integrated East Coast Alternative

Offshore wind availability reached a new record level of 17.6GW in the evening of 5th October 2022¹². Unfortunately, due to onshore grid constraints, only 14.1GW of this could be used, and 3.50GW was switched off, or curtailed. On 6th October a further 4.56GW of offshore wind was curtailed leading to higher greenhouse gas emissions and total network constraint costs of £27m over the course of just one week. An integrated OTN would help to reduce these costs.

In 2022, Ofgem consulted on the use of shared offshore transmission infrastructure and has now confirmed its policy position. With specific reference to the CfD process, Ofgem has said: “BEIS will retain rules around anti-competitive behaviour, even when projects are sharing infrastructure, under the common understanding that they are required to cooperate on the transmission element of the project, without sharing unnecessary information about generation and eventual bid formation¹³”.

This statement seems to confirm that there is not, and never has been, any significant technical, legislative or regulatory barrier to the use of shared offshore transmission infrastructure other than policies adopted by BEIS, Ofgem and National Grid ESO to facilitate a system of subsidies.

The unintended consequence of these policies seems to have been to compel the offshore wind industry to adopt the most expensive and least efficient scheme of radial grid connections, leading to increased environmental impacts, greater energy curtailment, and higher costs for consumers.

The Implications of a New Approach

We recognise the difficulties in changing direction and halting the onshore part of the Round 3 projects. However, the benefits of considerable cost savings and more rapid implementation of a fully integrated OTN, coupled with the protection of communities and the environment make a detailed assessment of this option essential. We consider that it is completely unacceptable that BEIS has not insisted upon a proper cost benefit analysis being carried out comparing the current radial connection “solution” versus a fully integrated OTN of the sort envisioned and carried out by National Grid’s own IOTP (East) report² from 2015.

In a recent letter from Graham Stuart MP, Minister of State for Energy and Climate¹⁴ he makes reference to offshore wind developers already having connection contracts in place with National Grid Electricity System Operator (ESO) and claims the Government will not, and cannot, force changes to these contracts because any attempt to mandate changes to connection contracts at this stage would be open to legal challenge by developers. In fact, we believe that Schedule 6 of the

Planning Act 2008 does permit the Secretary of State to change or revoke orders granting development consent. Further, it is not certain that the affected developers would resort to legal challenge, but it is of course entirely likely too that should the government persist with the exclusion of East Anglia from the HND they will face Judicial Review after Judicial Review. Furthermore it seems that grid connection agreements can be changed by National Grid at any time, as described in the Graham Stein (NGESO) letter of 27th September 2021¹⁵.

The issue of compensation for developers might not be as burdensome as feared because large commercial contracts are normally written with plenty of allowances for changes, variations or termination by either party. This is done to avoid expensive legal disputes. Furthermore, any contracts already placed by Ørsted or Vattenfall would most likely be written “subject to Final Investment Decision (FID)” to avoid having to pay out if they delay or cancel that decision. We believe that neither Ørsted nor Vattenfall have yet reached the FID milestone.

We also understand that a DCO consent does not oblige the applicant to proceed with any part of the work. Vattenfall’s Vanguard and Boreas each have 5 years from their DCO approval dates to start work. Ørsted Hornsea Three has 7 years from their DCO approval date of 31st December 2020 to start work. A delay while a proper review of the OTN option is undertaken would not therefore be unduly onerous on developers. Contract for Difference awards do not, as far as we know, impose an obligation to proceed with construction. They may however impose conditions which, if not met, would prevent that CfD from taking effect but there would be an opportunity to apply again for the next annual round.

Offshore Coordination Support Scheme

As evidenced by the recently published Offshore Coordination Support Scheme¹⁶, the new Secretary of State (SoS) for Business, Energy and Industrial Strategy (BEIS), who has only recently taken up the post, may not have been correctly briefed on the urgency and vital importance to the country of action to deliver a fully integrated OTN down the entire East coast of the UK. The document falls well short of what is required and thus fails the nation by ignoring the opportunity to achieve substantial cost savings from reduced curtailment and constraint payments, reduced capital expenditure costs and reduced impact on communities and the environment. Most importantly, the path to net zero carbon is likely to be extended by the current approach.

Ofgem has previously requested offshore windfarm developers to coordinate their projects on a voluntary basis¹⁷. This approach has repeatedly failed and we are dismayed that the lesson has not been learnt. Although it is acknowledged that the Offshore Coordination Support Scheme offers a financial incentive to coordinate, the money on offer could be better targeted elsewhere as it will never produce the fully integrated network that the UK actually needs. Now is the time for a radical approach based on rationalised coordination, sound technical principles and financial savings which will also deliver protection of local communities and the environment.

Conclusion

The Norfolk Parishes Movement for an OTN believes that the onshore part of the Round 3 projects should be placed immediately on hold until a proper analysis has been carried out, using Green Book criteria, of the fully integrated East coast OTN. We are confident that such an analysis will demonstrate the clear benefits and provide a compelling case for the fully integrated approach.

We believe it is owed to the whole country that a proper review of the options to bring ashore offshore wind energy from the North Sea be carried out, including the option of a *fully* integrated

offshore transmission network. We believe that this exercise can be completed rapidly while the current planned Ørsted Hornsea Three and Vattenfall Vanguard and Boreas projects are suspended. The potential cost savings, added to the significantly reduced impact on communities and the environment, make this imperative. We respectfully request that the ExA draws this paper to the attention of the Secretary of State for the new Department for Energy Security and Net-Zero with the strongest possible endorsement.

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