Scottish & Southern Electricity Networks

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Sent to: box.OffshoreCoord@nationalgridESO.com
28 October 2020

Dear Alice

SHET response to ESO Phase 1 Consultation on Offshore Coordination

SHE Transmission (SHET) is pleased to enclose our response to National Grid ESO's Phase 1 Consultation on Offshore Coordination. SHET appreciates the steps the ESO has taken to date to engage and inform stakeholders around its policy thinking.

Introduction

The offshore network and the framework under which it is progressed is intrinsically linked with the current onshore regime. A move towards an integrated whole system approach will represent the most fundamental development in the industry in modern times and will have a profound impact on the north of Scotland transmission network.

We support the renewed focus on assessing benefits of offshore integration and recognition of the associated need for a comprehensive framework to enable this. We welcome the move by BEIS and Ofgem to give attention to increasing the level of coordination in offshore electricity infrastructure and the publication of ESO's Phase 1 consultation.

Key points

Please refer to Annex 1 for our full response, and a summary of our key points below:

- **Solutions are required now to address process issues and we encourage the ESO to broaden the scope of its connection review to unlock barriers to coordination**

  We welcome the focus on creating more opportunity for coordination of offshore connection however we stress that solutions are required now to support delivery of the UK and Scottish Government's net zero and offshore wind targets. The ScotWind leasing round is underway, with active developer interest, and envisages around 8 GW of offshore wind in Scottish waters by the end of the decade. We are confident there is opportunity to address current issues and create earlier gains in coordination than is currently proposed in a way that complements the longer-term review.

- **We have identified a number of shortcomings with the counterfactual scenario which make it unreflective of the status quo**

For example, the technical report states that less power will flow through the onshore network in the integrated option; however, the counterfactual assumption does not include the 1st and 2nd Eastern HVDC link from SHET's area. This analysis therefore incorrectly assumes onshore reinforcement is limited to 'onshore' only. The CBA therefore does not present a valid counterfactual against which to compare an integrated option.

- **We encourage the ESO to explore an integrated onshore solution as this may offer additional benefits when compared to an integrated offshore solution**

These may include system resilience, reduced technology/operational risk, as well as mitigating the risk for individual developers from being one of a small number of projects connecting to an OFTO. If this securities risk were to be socialised so that the consumer is liable for the costs should a project not proceed, there is more risk of stranded assets with an OFTO as capacity is available only for wind farms in a small geographic region, compared to investment in the onshore network where the capacity could be utilised by projects over a broader geography and range of technologies

- **We would like to see additional scenarios considered within the CBA and an increased focus on regional factors**

Consideration should be given to the assessment of additional scenarios as the two considered represent the extremes. The eventual outcome will sit somewhere in between and therefore including, for example, the three other FES scenarios would provide a better range of outcomes to be tested. More detailed scenario testing should focus on regional factors and we suggest the ENA's Whole System CBA might be useful in undertaking additional analyses.

- **As part of this review, we encourage the ESO to consider how to address disparities in locational charging across GB**

Concerns continue to be raised by our customers regarding disparities in grid costs across GB. In the north of Scotland and remote islands grid costs are higher than other parts of GB, which we are concerned risks discouraging investment in a region necessary to achieve Net Zero targets. We encourage the ESO to consider this issue in Phase 2.

We look forward to continued engagement on this topic and would be happy to discuss any of the points in this response in more detail.

Yours sincerely

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Annex 1: SHET response to ESO Phase 1 Consultation on Offshore Coordination

Holistic Approach to Offshore Transmission Planning Report

Q1. Do you agree with our assessment of the key technology and system risk barriers coming from the Holistic Approach to Offshore Transmission Planning Report?

One important risk that was highlighted for integrated networks was multi-vendor systems, particularly for initial projects where the report recommends a single vendor for the whole system. A similar risk is that of multiple meshed transmission network owners closely coupled within a small geographic region. Multiple interfaces between meshed transmission networks with power electronic interfaces increases the complexity of design and construction, and the operational risk of interaction, compared to a single owner model. This could be achieved by extending the license of TOs to include offshore assets.

The report suggests that two 1.8GW cables together in a bi-pole configuration will allow connections of 3.6GW, however in reality this isn't true. The ESO, when looking at an offshore connection in the SHE Transmission area that was greater than 1800MW, did not consider a bi-pole configuration as a suitable option to adhere to the infrequent infeed loss risk of 1800MW - stating that two fully separate monopole links (i.e. with no common point of electrical coupling and little to no risk of both cables being taken out by an anchor) would be required. Hence two separate monopole HVDC links of 1.8GW capacity would be needed to connect 3.6GW. Does the offshore integrated approach account for this and for the 'normal infeed loss risk'?

Q2. Do you have any proposals on how to most effectively bring the technology to market for when needed?

No comment

Q3. Do you have any additional evidence to inform the assessment we have made?

On technology availability, the study assumes that individual cables with a capacity of 1.8GW are available by 2040, stating that the current highest individual HVDC cable capacity that is widely available is 1.4GW. The 1st and 2nd Eastern HVDC link proposals from the SHET area are 2GW total in a bi-pole configuration (therefore two 1GW cables) for delivery in 2029 and 2031.

Q4. Do you have any further feedback on the report?

Designs are conceptual and only based on one future energy scenario - Leading the Way (LtW). The CBA is therefore not robust enough. The benefit of an integrated approach needs to be assessed against a credible counterfactual, and all future energy scenarios as well as scenario sensitivities (like the current SWW approach) on the key offshore wind farm schemes (i.e. in or out), with Least Worst Regret (LWR) analysis carried out (which considers, for example, the non-Net Zero Steady Progression scenario), as per NOA/SWW methodology.

The ESO mentions the 'current individual, radial approach' but this is something that is not currently done and is not credible. The offshore developer works may be radial, but the current investment planning approach does not generally allow for shared use transmission infrastructure to be developed based on only 1 generator connection. Currently, any transmission infrastructure developed by the TOs already needs to be efficient, coordinated and integrated to receive economic justification, and LWR analysis ensures that transmission infrastructure based on 1 generator connection (which will appear in some and possibly not all scenarios, and at different times) is unlikely to get an economic signal unless there is high confidence that the generator will connect.

The ESO analysis suggests that the integrated approach offshore has the potential to save consumers ~£6bn or 18% in CAPEX and OPEX between now and 2050. This cost figure however is highly dependent on their baseline counterfactual assumption which is not credible.

The ESO states that 'savings are greatest (up to 30 per cent) where high levels of offshore wind need to be connected to parts of the onshore network already nearing operational limits, or where wind farms are located far from shore'. We agree that savings can be found for offshore wind located far from shore (relating primarily to savings in offshore developer works), however this point does not fully address the role or otherwise of the established CION process which ensures that offshore wind is connected at the optimal location onshore, thereby avoiding areas close to operational limits unless the cost of the works to resolve those issues are comparatively low and/or provide significant wider system boundary benefit which is economic. The definition of the CION process in the 'Offshore Connections Review Report' outlines this: 'The CION process evaluates a range of transmission options to lead to the identification and development of the overall efficient, coordinated and economical connection point for offshore connections, onshore connection design and, where applicable, offshore transmission system / interconnector design to develop and maintain an efficient, coordinated and economical system of the electricity transmission network.'

The ESO states that the number of onshore and offshore assets, cables and onshore landing points could be reduced by ~50%, and states however that some of these assets would be somewhat larger. Is this therefore a benefit?

The conceptual designs assume that all NOA recommended reinforcements from NOA5 are included in the base onshore counterfactual up to and including 2028. Therefore, both the 1st and 2nd Eastern HVDC links from the SHET area (recommended in NOA5) have not been included. The integrated approach includes a solution which looks very similar to the 1st Eastern HVDC link from Peterhead to Drax.

NOA6 may potentially include further recommendations for 'onshore' reinforcement (for FES 2020 which includes significant levels of offshore wind) based on a more robust NOA CBA, than is considered in the base case here. The counterfactual may therefore be out of date by the end of January. In addition, many options within the NOA are for delivery after 2030 and include offshore assets such as subsea cables.

It should be noted that the majority of the proposals in the integrated offshore approach could be delivered by the TO's i.e. Meshed HVDC substation (onshore), HVDC multi-terminal (onshore), HVDC

island switching station. As such, TO options and costs should be fully considered in any CBA in addition to, or in combination with (where integration is possible), OFTO or 3rd party solutions.

The report mentions the integration of wind connections into new multi-purpose interconnectors, together with integration into existing interconnectors - this may require further onshore reinforcement to cater for any change in interconnector dispatch, as the addition of offshore wind will lead to increased interconnector imports. Further, this would require the generator to participate in international electricity markets.

The report states that less power will flow through the onshore network in the integrated option (15-20% less in 2030, and 35-60% less depending on the region in 2050), however the base counterfactual assumption does not include the 1st and 2nd Eastern HVDC link proposal from the SHET area (as explained above). Further, onshore reinforcement can include many of the options delivered in the integrated offshore approach (also explained above). This is very crude analysis that assumes onshore reinforcement is limited to 'onshore' only, which is not the case today. In addition, any boundary benefit associated with any integrated offshore network should be appropriately assessed. If the offshore network connects to the mainland GB system north and south of the boundary, then the offshore network is determined as crossing the boundary and the associated planned/fault outage of the offshore assets would need to be considered as per the NETS SQSS criteria for design of the main interconnected transmission system or operation of the onshore transmission system.

We would also highlight that the risk of technology readiness might need further exploration in respect of technical availability and cable failure rates. While there can be high confidence in AC solutions onshore, there is a risk associated with offshore HVDC (e.g. DC circuit breakers, sufficient choice of HVDC cable at the required voltages and HVDC schemes proven at the proposed capacities) which are yet to be mitigated and it is not clear how these risks have been, or will be, accounted for in the CBA. We would encourage the ESO to review this element in the CBA.

Cost-benefit Analysis Report

Q1. Do you agree with our assessment of the costs and benefits?

We welcome the publication of this first step in assessing the costs, benefits and impacts of different coordination options; however, we do not agree with some elements of the assessment and would therefore encourage further work is undertaken to strengthen the CBA. In response to Q2 we have recommended several areas where the ESO could develop the CBA to increase the accuracy of its output.

In particular, we note that in some cases the input data for the counterfactual scenario does not reflect our view of planned works and in the case of the integrated scenario some of the works proposed – which are used to illustrate the benefits case of that scenario – are already being progress by SHET. To remedy this and strengthen the CBA, we would encourage the ESO to coordinate more closely with TOs to ensure data inputs are as accurate as possible.

Q2. Do you have any other evidence to support or challenge the assessment made?

We do not agree with the ESO's assessment of costs and benefits. We recommend several areas of the CBA are developed further to produce a more accurate assessment of the outcomes.

Inaccuracies within the proposed counterfactual scenario

- The counterfactual scenario, which is intended to represent the current connection process, is not an accurate reflection of the current process and should be strengthened to enable a more accurate – and realistic – comparison of scenarios.

- The counterfactual in the north of Scotland is extreme even under current processes, and surprising that the difference in CAPEX is only 18% compared to the integrated approach. For example, the counterfactual has multiple wind farms around the coast of Orkney, each connected with a dedicated HVDC link. This would not get through the current investment planning process as it would not be economic or coordinated. Instead, for example, generators could likely connect into Orkney and share a link to the mainland.

- The counterfactual scenario assumes nothing changes in approach between today and 2050 in regard to planning or processes. This view is not reflective of how the system would be designed based on current practices. We recommend that more detail is used to inform the counterfactual scenario to strengthen the validity of the CBA output.

- The report states the integrated option delivers greater benefits in terms of reduced capex and that this is applicable to the Eastern Regions, East Scotland and North Scotland, however this is based on the status quo not including the 1st and 2nd Eastern HVDC links from SHET's area (recommended in NOA5). Both of these projects would be considered as an 'integrated' solution based on this report which includes a reinforcement that looks very similar to the 1st Eastern HVDC link from Peterhead to Drax (to be delivered 2029) in the integrated solution.

Opportunities to strengthen the assessment of options

- Consideration should be given to the assessment of additional scenarios as the two considered represent the extremes. The eventual outcome will sit somewhere in between and therefore including, for example, the three other FES scenarios would provide a better range of outcomes to be tested. More detailed scenario testing beyond the FES that focusses on regional factors should also be considered.

- The application of a least worse regrets approach is recommended given the number of potential development pathways. This should include the evaluation of such pathways, i.e. the assessment of trigger points for anticipatory investment through time when the need arises.

- The report states that a benefit of the integrated approach is in 'avoiding consequential boundary reinforcements, which otherwise are needed in the status quo option'. This is not accurate. Planned or fault outage of the offshore assets would need to be considered in the boundary assessment as per the NETS SQSS criteria for design of the main interconnected transmission system or operation of the onshore transmission system. The CBA should be adjusted to reflect this.

- We note that TOs are able to deliver much of the integrated approach already. The only elements of the Integrated Approach that TOs can't currently develop are offshore platforms (to establish offshore meshed substations and offshore multi-terminals), offshore interlinks to tie together offshore developments, and HVDC multi-purpose interconnectors. We acknowledge that this might have a significant impact on lowering the costs of offshore connection, however these elements can be delivered by the OFTO in combination with TO solutions. For example, TOs could engage with the developers directly, where interlinks are a good economic approach, to encourage the developers to build an interlink to 'fit in' to the wider TO solution.

- The CBA assumes the only option for an integrated approach is an offs`11hore network and does not consider the possibility of an integrated network onshore. This network could be designed with the same cost optimisation that has been included in the integrated offshore solution, to make a fair comparison of onshore vs offshore. The optimal solution is likely to be a balance between both, with investment in offshore and onshore assets. This should be determined by comparing all options side by side in a NOA process, particularly where offshore assets provide boundary capability enhancement for which there are alternative onshore options.

- Further consideration should be given to the assumptions on application of new, untested technologies to ensure these are realistic e.g. installed wind capacity being located within a distance of the HVDC collector hub that does not require intermediate HVAC step up transformers could result in large impact on CAPEX for the integrated approach; similarly, a change in underlying assumptions on Carbon Capture and Storage (CCS) will have a significant impact on market simulation results.

- The report notes a level of integration is assumed to have taken place from 2025-30, but this is not detailed. We recommend assumptions concerning future integration should consider both onshore and offshore network developments to allow a more comprehensive whole system assessment.

Q3. What do you see as the potential impact on the environment of these proposals, particularly the reduction in the number of assets and landing points?

It is encouraging to see the inclusion of environmental impact considerations in the CBA methodology. The methodology notes that the environmental impacts are qualitatively compared based on the number of landing points and the total length of lines and cables.

As local environmental impacts are inherently location specific, it is important to document and explain how regional environmental data has been used in this assessment. Wider environmental impact considerations such as marine biodiversity and marine protected areas may also be beneficial to include in the CBA assessment.

It is also positive to see the inclusion of CO2 and grid losses KPIs as broader environmental impact areas. However, it was not clear in the methodology whether these local and wider environmental impact KPIs are treated equally or whether any weighting factors are being applied in the CBA assessment.

We would welcome clarity from the ESO around how KPIs are weighted and whether it intends to strengthen its assessment to better understand regional impacts. As stated in response to Q4, we would encourage the ESO to consider making use of the Whole System CBA being developed by ENA Workstream 4.

Q4. Do you have any further evidence on the potential social and community impacts of these proposals? We would particularly welcome responses from local authorities on this question.

It is encouraging to see the inclusion of social and community considerations in the CBA methodology. These impacts have been qualitatively compared based on the number of landing points and the total length of lines and cables whereby the construction phase is seen as the most disruptive for local communities. Following a review of the methodology we note the following feedback:

- We are supportive of the inclusion of an environment impact KPI, however there appears to be little supporting data for this overarching assessment.
- The report seems to suggest that job and skills development have been considered with little description of the methodology applied for this assessment.
- It was not clear in the methodology whether local social factors are treated equally or whether any weighting factors are applied in comparison to the other economic KPIs.
- Broader socio-economic assessments such as Gross value added (GVA) may also be beneficial for the CBA

We would welcome clarity from the ESO where there are gaps in information to better enable stakeholders to conduct a more thorough critique of the CBA. To close some of these gaps and to strengthen some of the assessment e.g. regional impacts, we would encourage the ESO to consider making use of the Whole System CBA being developed by ENA Workstream 4. We have provided some supporting information below.

ENA Workstream 4 – Whole System CBA

The Energy Networks Association (ENA) has recently appointed Baringa Partners to develop a common Whole System (WS) CBA methodology and model to enable effective whole system decision making. This is enabling the consideration of whether a solution is the optimal outcome on a whole system basis rather than based on the fairly narrow parameters used in CBAs to date.

This activity is supported by all network companies and is intended to provide a means by which multiple network options across different network owners can be assessed under a range of scenarios. The model is also being designed to show the flow costs and benefits to different actors in the whole energy system.

It is expected that the WS CBA model will be complete by the end of this year and we would encourage NG ESO to consider its application in assessing the coordinated offshore network. For example, it could be used to assess regional impacts of the scenarios being assessed. This could help strengthen the evidence base for either approach.

Q5. Where do you see value for further work to build on and test these findings? Either from the proposed list or beyond?

As we have detailed in response to Q2, we believe there are several areas that could be built upon by the ESO to increase the accuracy of this CBA and to strengthen the evidence base upon which policy decisions may be made.

In particular, we encourage the ESO to ensure that offshore network costs are compared against a more realistic counterfactual that represents a viable onshore alternative. Preferably, this assessment would consider a range of options and/or combinations of options, with different proportions of offshore/onshore components.

We believe an integrated onshore solution warrants exploration by the ESO as this could offer additional benefits when compared to an integrated offshore. Possible benefits could include system resilience, reduced technology/operational risk, as well as mitigating the risk for individual developers from being one of a small number of projects connecting to an OFTO. If this securities risk were to be socialised so that the consumer is liable for the costs should a project not proceed, there is more risk of stranded assets with an OFTO as capacity is available only for wind farms in a small geographic region, compared to investment in the onshore network where the capacity could be utilised by projects over a broader geography and range of technologies.

Offshore Connections Review Report

Q1. Do you think that if the areas we are highlighting were improved, that the ability to coordinate projects would be significantly increased?

SHET agrees that the current industry framework for connecting offshore windfarms is not fit for purpose and that significant policy change is necessary if we are to achieve Net Zero ambitions by 2050. We agree with the efforts to embed greater efficiency, co-ordination, collaboration, clarification and joined-up policy making within the offshore connections space in order to facilitate our common decarbonisation ambitions. We agree that the ESO should focus on a review of the CION process and believe such a review is overdue.

While we support the general direction of travel, we also believe the proposed programme of work is missing an essential workstream. This coordination project creates a valuable opportunity to address present-day issues, inefficiencies, and barriers to coordination. We suggest the ESO consider a process that facilitates improved offshore coordination today, while providing sufficient flexibility in the process to accommodate the wider changes proposed for later in 2030 and beyond.

To assist the ESO's identification of issues for improvement and next steps in each of the proposals, we have provided our observations below. We have also set out the challenges we are faced with today in our BAU operations.

Immediate to short term proposals

- We acknowledge that the proposal around regional CIONs could be beneficial in providing visibility to developers of pre-defined areas of connection and capacity. However, we envisage there would be challenges in implementing this and look forward to working closely with the ESO to fully consider the risks and benefits of any such change.
- Separate individual CIONs always choose the best connection options for each subsequent connection, but the sum of these connections may be less economic that an overall solution.
- For example, taking two separate offshore windfarms, the most economically efficient connection solution from individual CION CBA's may be at points A and C. However, the overall best solution may be to connect at point B. Therefore, It would seem sensible to aggregate the CBAs during the CION process as part of a regional approach. The current CION approach did foresee the benefits of studying projects together within the CION Guidance Note).

The ESO notes that it is currently considering the mechanisms for how the changes above – in addition other changes such as CBA aggregation or re-opening the CION process in response to customer driven changes – could be implemented. We would encourage the ESO to engage the TOs thoroughly in the consideration of issues and risks.

Medium to long term proposals

<u>Package or connection offers with other processes e.g. seabed leasing</u>

- Packaging or co-ordinating connection application offers with sea bed leasing rounds on the surface seems an efficient intervention. This should assist in filtering out those projects that

will not progress and avoid TO's spending time and resource in dealing unnecessarily with those applications. We look forward to working with the ESO as it starts to scope out such a proposal and are keen to understand how, if at all, these changes might affect the current ScotWind leasing round.

Consider formalising role of developer in STC

- In terms of the roles of developers within the STC and 'shadow TOs', we are concerned that such a proposal could distort the relationship between NGESO and TO .
- It is unclear from the material shared how developers could accede in practice to the CUSC-Transmission licence. We therefore encourage the ESO to clarify its thinking on this matter, in particular we are keen to understand the ESO's vision in respect of what wider powers developers would have to amend the STC if they accede.
- To consider proposals in respect to CMP192, we require the ESO to make clear to what extent and for what reasons developers are disproportionality negatively impacted by the current process.

Codification of the CION process

- The ESO has suggested codification of the CION process. To be able to provide more detailed feedback, we would welcome clarification around the ESOs vision as to what provisions within the STC would need to be changed to accommodate proposed amendments to the CUSC.
- We require more information on these proposals but do recognise issues in this space. The protracted nature of the CION process – which has no guaranteed timescales – creates a difficult customer journey around which all parties struggle to operate efficiently.

The need for immediate action to improve CION process

Background

It is expected the ScotWind leasing round[1] could deliver up to 10GW of new offshore wind capacity in Scotland's waters by the end of the decade. Since the launch of the ScotWind leasing round, we experienced a significant interest in pre-application engagement, and thereafter connection applications, from potential participants in the leasing cycle. We welcome early and collaborative engagement so that all parties can work together to develop and deliver cost effective and timely grid infrastructure. This is a window of opportunity that, as a nation, we can ill afford not to capitalise on. Without addressing present day process issues, we risk jeopardising progression towards the UK target of 40GW of offshore wind generation by 2030.

[1] In June 2020, Crown Estate Scotland launched the first cycle of ScotWind Leasing that will grant property rights for seabed in Scottish waters for new offshore wind generators. A total seabed area of up to 8,600 km^2 is available, capable of delivering up to 10 GW of generating capacity. It is anticipated that options will be granted in mid-2021, with first energy before the end of the decade.

While our work to date on ScotWind connections has been constructive, we are growing increasingly concerned that the industry framework has institutional barriers to the achievement of timely and cost-effective connections. We therefore encourage the ESO to consider bringing into scope the need to address present-day issues, inefficiencies, and barriers to coordination.

Consideration of present-day barriers to coordination

To assist the ESO's thinking in this regard, we have set out the challenges we are faced with in our BAU operations:

- Multiple parties seeking connection for same seabed leasing site where, under industry codes, we are obliged to treat each as a separate and distinct development and, hence, create a 'queue'. Given that only one party can ever be awarded the lease option, this might result in misleading connection offers for the parties that are not first to apply.
- The CION can take in excess of a year to produce an offer and considers each application in isolation from others. Industry codes oblige an offer to be made within three calendar months, resulting in an initial offer constrained by those obligations and typically significantly modified following the CION.
- Application fees, charges (see later section on charging in north of Scotland) and securities requirements in the north of Scotland are all high and a potential barrier to entry, particularly for new technologies.
- The focus is currently on the making of offers, however to achieve the timeline for connection there is a growing urgent need to progress the associated design and pre-consenting works for both onshore and offshore grid infrastructure. Co-ordination and collaboration will be critical to optimise the available cable corridors and landing points, taking account of the views of local stakeholders.
- When there are multiple parties looking for a connection for the same site and they join the queue SHET will treat them as being 'interactive'. Ultimately, only one of those projects will successfully secure the connection for that particular site. Our system planners then need to assess reinforcement options for the next project(s) in the queue which are seeking a connection. In the process of developing these new reinforcement options, connection dates are pushed further and further back.

Q2. Do you think we have missed anything in our offshore connections review that would add value and increase coordination?

Similarities to NOA and an improved, expanded CION

We appreciate the proposals here are in their infancy. In due course, we would like to better understand the ESO's vision and how some of the suggestions to improve analysis cannot be addressed in an improved, expanded CION (which looks at multiple offshore connections) and the NOA. Options from the OFTO, ESO, TO and any 3rd party can be submitted in the current NOA process with further scenario sensitivities considered.

The Offshore Connections Review Report outlines a series of improvements to the CION process which would enable coordination of multiple offshore connection projects. The suggestions are that previous CIONs can be reopened, or regional CIONs created (to look at a group of connections), to encourage coordination, and for developers to take an active role in the CION process (through formalising their roles in the STC). This overhaul of the CION would lead to a CBA which considers TO and OFTO solutions (and solutions which are a combination).

These improvements to the CION along with the associated consideration of offshore wind in FES and NOA, where the associated CION options (plus further alternative options) can continually be assessed on an annual basis, should lead to an efficient coordinated solution (comprising of TO or OFTO solutions) for connecting offshore wind. The resulting overall solution across the GB system might be a mixture of the so-called 'current radial approach' and 'integrated approach' in this report - an overall solution which is not considered in this analysis.

Do you have any other feedback, if so please add below.

Addressing disparities in the charging framework

As a facilitator in the connection of generation projects we support calls from our customers to create a level cost playing field for Scottish renewable projects to reduce competitive disadvantage in the CfD process and maximise the wealth of renewable resource that Scotland has to offer in meeting net zero targets. We continue to engage Ofgem on this issue and stress the need for an extensive review of wider locational TNUoS. We encourage the ESO to consider this issue in the context of its wider assessment of offshore network integration options. We have provided some supporting information below and would be happy to share further analysis.

Concerns raised by our customers

Concerns have been raised by our customers regarding disparities in costs, which we are concerned are creating barriers to enabling connections in Scotland to be as economical as those elsewhere in GB. This issue is particularly acute in the north of Scotland and remote islands where grid costs are higher than other parts of the country.

Feedback from our generation customers highlights that access and charging are two major barriers in project delivery. In particular, Transmission Network Use of System (TNUoS) charges present a significant barrier, with costs being volatile and unpredictable and expected to continue to increase in the coming years. It is essential that the electricity market and associated charging enables, not discourages, investments in the areas with the greatest resources of renewable electricity generation.

Our initial exploratory analysis which we intend to expand on with industry experts shows that whilst there are several variables which make up the calculation of the wider TNUoS tariff, based on what is being loaded onto the network annually, it is forecasted to be 90% more expensive per MW in the North of Scotland versus England and Wales. Please refer to Figure 1 below.

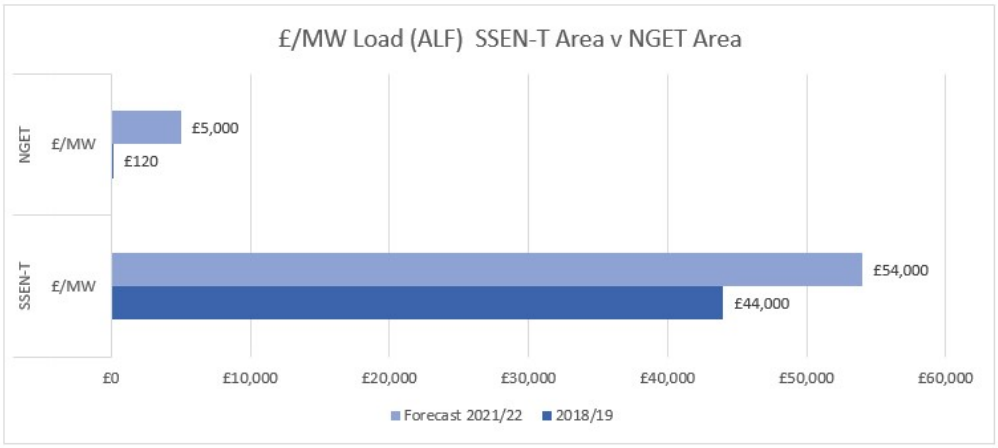

Figure 1: Cost per MW based on Annual Load Factor (ALF) of North of Scotland projects vs. England and Wales

Furthermore, despite our allowed revenue to maintain, operate and develop our network being relatively stable, the wider TNUoS tariff is forecasted to see a significant increase from 2018/19 to 2021/22. Please refer to Figure 2 below.

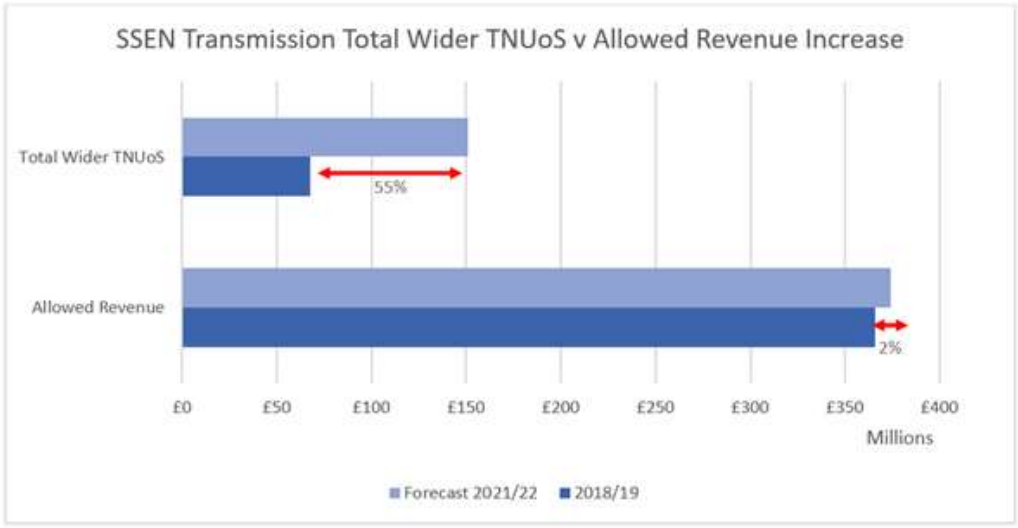

Figure 2: Allowed revenue vs. wider TNUoS costs 2018/19 – 2021/22