

Eastern HVDC - Consultation on the project's Initial Needs Case and initial thinking on its suitability for competition

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We are consulting on our views on development of the Eastern HVDC electricity transmission project. We would like views from people with an interest in new transmission infrastructure, meeting the net zero challenge, and competition in onshore transmission networks. We particularly welcome responses from consumer groups, stakeholders impacted by the project, stakeholders with an interest in the costs of electricity transmission infrastructure and the transmission owners. We would also welcome responses from other stakeholders and the public.

This document outlines the scope, purpose and questions of the consultation and how you can get involved. Once the consultation is closed, we will consider all responses. We want to be transparent in our consultations. We will publish the non-confidential responses we receive alongside a decision on next steps on our website at [Ofgem.gov.uk/consultations](https://www.ofgem.gov.uk/consultations). If you want your response – in whole or in part – to be considered confidential, please tell us in your response and explain why. Please clearly mark the parts of your response that you consider to be confidential, and if possible, put the confidential material in separate appendices to your response.

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Executive summary

The EHVDC project and what this document covers

In October 2020 we received an Initial Needs Case (INC) submission from the three electricity transmission owners (TOs) that own and operate the transmission network in Great Britain¹ associated with the proposed 'Eastern HVDC' (EHVDC) project. EHVDC is an electricity transmission project to construct two High Voltage Direct Current (HVDC) links with capacity of 2GW each down the east coast from Scotland to the north-east of England. The need for these HVDC links is triggered by the transmission of electricity generated in Scotland down past the congested network around the border to England. At an estimated cost of £3.4bn for the two links, the EHVDC project would be the largest electricity transmission investment project in the recent history of GB.

We have been assessing the need for the proposed project under our Large Onshore Transmission Investment (LOTI) mechanism² and assessing its suitability for the competition models identified within our RIIO-2 price control arrangements.

This consultation seeks stakeholder views at the Initial Needs Case stage of the EHVDC. It is also intended to provide clarity for the TOs and wider stakeholders on our view on the progress of the project to-date and what the focus of our assessment will be at the next stage of assessment, the Final Needs Case (FNC), which is expected to commence in early 2022. It also sets out our initial thoughts on the suitability of applying a late competition model to the project.

Large Onshore Transmission Investment mechanism (LOTI) Initial Needs Case assessment

We consider that there is a clear consumer benefit in the EHVDC project progressing. We consider that a clear case has been made so far for the two proposed HVDC links that form the EHVDC project. We also note that analysis from the Electricity System Operator (ESO) has suggested that delays in delivering the links could cause consumer detriment of over £600m per year.

¹ The TOs are National Grid Electricity Transmission (NGET), Scottish Power Transmission (SPT) and Scottish Hydro Electric Transmission (SHET).

² Special Condition 3.13 of the Electricity Transmission Licence

A number of different technical options have been considered within the project-specific cost benefit analysis presented within the INC (LOTI CBA). The results of the LOTI CBA are close in terms of the most economic and efficient landing points of some of the HVDC link options. However, following consideration of wider evidence from the ESO's Network Options Assessment (NOA) process³ and a detailed assessment of the options considered, we consider that based on the evidence available, the TOs have progressed the right options so far.

We have also considered the need for the two proposed EHVDC links in the context of the Offshore Transmission Network Review (OTNR) currently being undertaken by Ofgem, Government and other key parties. Our view is that based on current evidence, there is no reason to think that future offshore network co-ordination will have a material impact on the consumer benefit case for the TOs' proposals for the two HVDC links as part of the EHVDC project. Despite this, we will consider whether there is any significant additional evidence that has come to light from the OTNR work that should be considered as part of our FNC assessment. Given the high indicative costs of delay to the project, our consideration of any impact of the OTNR work on the EHVDC proposals will need to factor in the consumer detriment of any resulting delay to delivery of EHVDC.

The TOs have informed us that they intend to continue to progress their preferred options for EHVDC further and make an FNC submission at the end of 2021. As part of the FNC process, we expect to receive an updated CBA from the TOs. At that point we would check whether the case for the proposed links remains robust relative to alternative options. Based on the information we have assessed at the INC stage, we expect our focus at the FNC stage to be on ensuring that a robust delivery plan is in place to deliver the project on time, and ensuring that any changes in technical scope, design, or cost estimates relative to the INC are fully understood and justified. Where there are any changes to the delivery dates of the proposed options, TOs can expect our FNC assessment to be more in depth.

The latest NOA report⁴ sets out that a further two HVDC links between the east coast of Scotland and England may be required by 2031 in order to accommodate the expected further increase in renewables beyond 2030. We understand that the TOs are developing

³ The NOA is an annual process undertaken by the Electricity System Operator (National Grid) to identify and recommend major National Electricity Transmission System (NETS) reinforcements projects to meet the future network requirements

⁴ [NOA Report, January 2021](#)

these two additional links to a later timescale, due to them not being needed as quickly. Our current expectation is that the TOs will submit an INC for further HVDC links down the east coast within the next 18 months. Given the later timescale for the development of those further links, we would expect the information provided within the INC for those additional links to clearly set out whether and how the links relate to outcomes from the OTNR and form part of a coordinated plan for design of the network in that region. We have also asked the TOs to provide analysis that explores the interaction with these potential additional links, as part of the FNC for EHVDC.

Assessment of suitability for late competition models

In line with our Final Determinations for the RIIO-2 period for Electricity Transmission, as EHVDC will be considered under the LOTI mechanism, we have assessed the suitability of the project for 'late model' competition⁵. Our view is that the project as a whole meets the criteria for late model competition (new, separable, and high value).

We have not reached a view on whether to apply one of the late competition models to the project. This is because it is difficult to determine at this stage when the required legislation will be introduced to finalise the Competitively Appointed Transmission Owner (CATO) model and whether this would support timely delivery of the EHVDC project.

From our assessment we do not see that there is likely to be any meaningful consumer detriment in delaying our competition decision to the FNC stage when we will have more clarity on the timing of CATO legislation.

Next steps

We welcome responses to our consultation, both generally, and in particular on the specific questions we have included in Chapters 3 and 4. If you would like to respond to this document, please send your response to: RIIOElectricityTransmission@ofgem.gov.uk. The deadline for responses is 23 June 2021. We expect to publish our final views on the Initial Needs Case for EHVDC in summer 2021.

⁵ 'late model' competition refers to the late models of competition (i.e. run for delivery once a project is sufficiently developed) identified for consideration for LOTI projects within the RIIO-2 Period (the Competitively Appointed Transmission Owner (CATO) model, the Special Purpose Vehicle (SPV) model and the Competition Proxy Model (CPM)).

1. Introduction

What are we consulting on?

1.1. This document sets out our initial view on the need for (and future regulatory treatment of) a proposed electricity transmission project to enable the bulk transfer of power from Scotland to England. The project is referred to as the 'Eastern HVDC' (EHVDC) project.

1.2. Chapter 2 summarises the Large Onshore Transmission Investment (LOTI) reopener arrangements. This is the RIIO-2 funding mechanism under which the EHVDC project will be assessed.

1.3. Chapter 3 summarises the proposed findings and proposed conclusions of our Initial Needs Case assessment.

1.4. Chapter 4 summarises our proposed position with regards to whether the project meets the criteria for late competition and when we intend to make a decision on whether it should be funded through one of the late models of competition highlighted in RIIO-2 Final Proposals.

1.5. Chapter 5 summarises our expectation for the next stages of both our assessment and the EHVDC project.

Context

1.6. The GB onshore electricity transmission network is currently planned, constructed, owned and operated by three transmission owners (TOs): National Grid Electricity Transmission (NGET) in England and Wales, SP Transmission in the south of Scotland, and Scottish Hydro Electric Transmission in the north of Scotland. We regulate these TOs through the RIIO (Revenue = Incentives + Innovation + Outputs) price control framework. For offshore transmission, we appoint offshore transmission owners (OFTOs) using competitive tenders.

1.7. The incumbent onshore TOs are currently regulated under the RIIO-T2 price control, which started on 1 April 2021 and will run for 5 years. Under this price control, we developed a mechanism for assessing the need for, and efficient cost of, large and

uncertain electricity transmission reinforcement projects. This mechanism is called 'Large Onshore Transmission Investment' (LOTI). Once the need for and costs of projects have become more certain, the TOs bring forward construction proposals and seek funding for them. As explained in Chapter 9 of our RIIO-2 Final proposals – Core document, all projects that come forward for assessment via the LOTI reopener during the RIIO-2 period will be considered for their suitability for delivery through one of the late competition models.

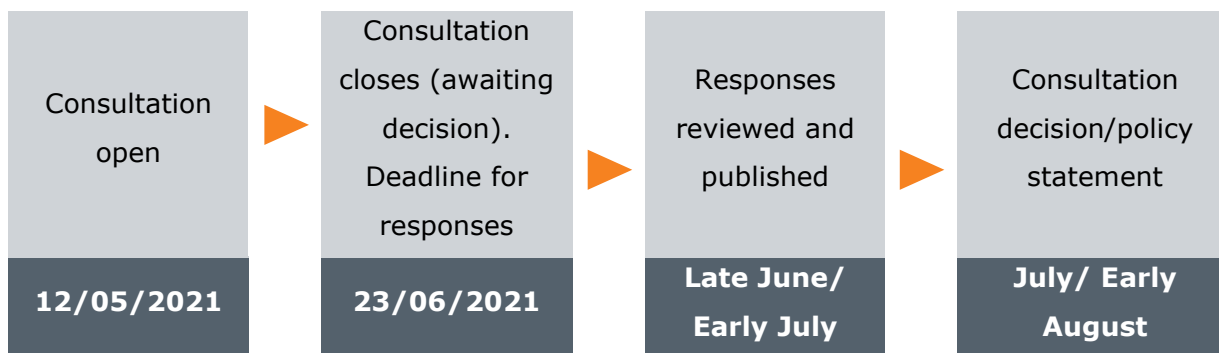
Related publications

RIIO-2 Final Determinations - Core Document: <https://www.ofgem.gov.uk/publications-and-updates/riio-2-final-determinations-transmission-and-gas-distribution-network-companies-and-electricity-system-operator>

LOTI Reopener Guidance document: <https://www.ofgem.gov.uk/publications-and-updates/large-onshore-transmission-investments-loti-re-opener-guidance>

Consultation stages

Figure 1: Consultation stages



How to respond

1.8. We want to hear from anyone interested in this consultation. Please send your response to the person or team named on this document's front page.

1.9. We've asked for your feedback in each of the questions throughout. Please respond to each one as fully as you can.

1.10. We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, data and confidentiality

1.11. You can ask us to keep your response, or parts of your response, confidential. We'll respect this, subject to obligations to disclose information, for example, under the Freedom of Information Act 2000, the Environmental Information Regulations 2004, statutory directions, court orders, government regulations or where you give us explicit permission to disclose. If you do want us to keep your response confidential, please clearly mark this on your response and explain why.

1.12. If you wish us to keep part of your response confidential, please clearly mark those parts of your response that you *do* wish to be kept confidential and those that you *do not* wish to be kept confidential. Please put the confidential material in a separate appendix to your response. If necessary, we'll get in touch with you to discuss which parts of the information in your response should be kept confidential, and which can be published. We might ask for reasons why.

1.13. If the information you give in your response contains personal data under the General Data Protection Regulation 2016/379 (GDPR) and domestic legislation on data protection, the Gas and Electricity Markets Authority will be the data controller for the purposes of GDPR. Ofgem uses the information in responses in performing its statutory functions and in accordance with section 105 of the Utilities Act 2000. Please refer to our Privacy Notice on consultations, see Appendix 4.

1.14. If you wish to respond confidentially, we'll keep your response itself confidential, but we will publish the number (but not the names) of confidential responses we receive. We won't link responses to respondents if we publish a summary of responses, and we will evaluate each response on its own merits without undermining your right to confidentiality.

General feedback

1.15. We believe that consultation is at the heart of good policy development. We welcome any comments about how we've run this consultation. We'd also like to get your answers to these questions:

1. Do you have any comments about the overall process of this consultation?
2. Do you have any comments about its tone and content?
3. Was it easy to read and understand? Or could it have been better written?
4. Were its conclusions balanced?
5. Did it make reasoned recommendations for improvement?
6. Any further comments?

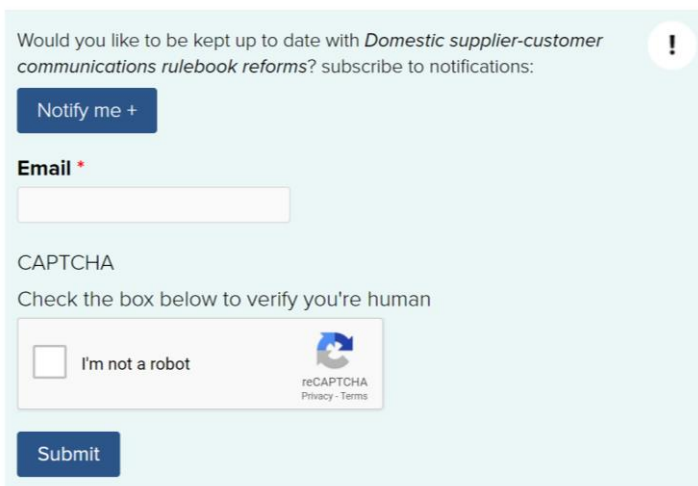
Please send any general feedback comments to stakeholders@ofgem.gov.uk

How to track the progress of the consultation

You can track the progress of a consultation from upcoming to decision status using the 'notify me' function on a consultation page when published on our website.

[Ofgem.gov.uk/consultations.](https://www.ofgem.gov.uk/consultations)

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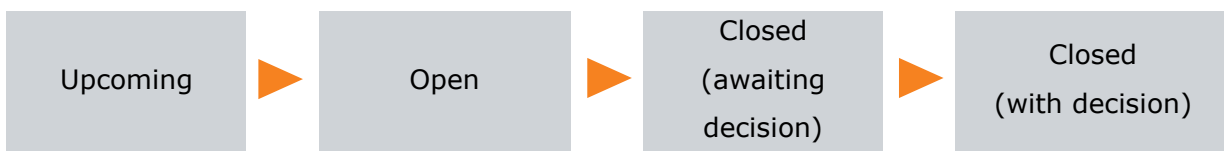
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Once subscribed to the notifications for a particular consultation, you will receive an email to notify you when it has changed status. Our consultation stages are:



2. The LOTI reopener mechanism

Section summary

This chapter sets out the regulatory framework which we use to manage Large Onshore Transmission Investment projects and our approach to assessing these projects. It also sets out our next steps for this process.

Overview of the Large Onshore Transmission Investment (LOTI) reopener mechanism

2.1. The Large Onshore Transmission Investments (LOTI) re-opener mechanism is an uncertainty mechanism we have included within the RIIO-2 price control for the electricity transmission sector. It provides TOs with a route to apply for funding for large investment projects that can be shown to deliver benefits to consumers, but that were uncertain or not sufficiently developed at the time we set costs and outputs for the RIIO-2 price control period. The LOTI mechanism provides us with a robust assessment process through which we can ensure that TO proposals represent value for money for present and future consumers.

2.2. In order to qualify for the LOTI mechanism, TO proposals must meet the following criteria:

- a) are expected to cost £100m or more of capital expenditure; and
- b) are, in whole or in part, either;
 - i. load-related; or
 - ii. related to a shared-use or sole-use generator connection project.

2.3. We are satisfied that the EHVDC project meets these criteria, is eligible as a LOTI project and we are therefore assessing it in accordance with the LOTI process, which is detailed in the LOTI Guidance⁶.

⁶ [Large Onshore Transmission Investments \(LOTI\) Re-opener Guidance | Ofgem](#)

Stages of our LOTI assessment

2.4. Following the approval of eligibility, our LOTI assessment process is made up of three main stages:

1. **Initial Needs Case (INC)** – The usual focus of our assessment at this stage is to review the technical and/or economic requirement for the project, the technical options under consideration, and the TO's justification for taking forward its preferred option for further development.
2. **Final Needs Case (FNC)** – Following the securing of all material planning consents for its project (unless we specify alternative timing), the TO will then need to submit a FNC. The focus of our assessment at this stage is to confirm the need for the project, by checking that there have been no material changes in technical and/or economic drivers that were established at INC.
3. **Project Assessment** – If the FNC is approved, the TO will then need to apply for a Project Assessment Direction. The focus of our assessment at this stage is the assessment of the proposed costs and delivery plan that the TO has in place for the project, with a view to potentially specifying a new LOTI Output, a LOTI Delivery date, and setting the efficient cost allowances that can be recovered from consumers for delivery of the project.

2.5. The TOs submitted the INC for the EHVDC project in October 2020. Chapter 3 of this consultation covers our assessment of the INC submission for the EHVDC project and explains our initial findings.

3. Eastern HVDC Links Initial Needs Case (INC) Assessment

Section summary

This chapter sets out the key design decisions Transmission Owners (TOs) have made to date on the Eastern Links project. It also sets out our consideration of this approach and explains our initial findings.

Questions

Question 1: Do you agree that meeting the technical requirement with the two proposed HVDC links is appropriate?

Question 2: Do you agree with our initial conclusions on the cost benefit assessment and the appropriateness of the options taken forward?

Question 3: Do you agree that on the balance evidence including CBA, recent FES and NOA documentation, that these investments appear low regret?

Question 4 : Are there any additional factors that we should consider as part of our Initial Needs Case assessment?

Overview of the TOs' Proposal

3.1. The Initial Needs Case (INC) for Eastern HVDC project was submitted by a joint project team from the three GB onshore Transmission Owners (TOs); namely, Scottish Hydro Electric Transmission (SHET), SP Transmission (SPT) and National Grid Electricity Transmission (NGET) on the 8 October 2020. It is supported by a cost benefit analysis (LOTI CBA) carried out by the Electricity System Operator (ESO) as well as recommendations from the annual Network Options Assessment (NOA) process and report.

3.2. The TOs' proposal is to progress the development of two subsea HVDC links with capacity of 2GW each (see figure 4 later in this chapter):

1. One from Torness in Scotland to a connection point on the existing network at Hawthorn Pit in the North-East of England; and

2. One from Peterhead in North East Scotland to a connection point on the existing network at Drax in North Yorkshire.

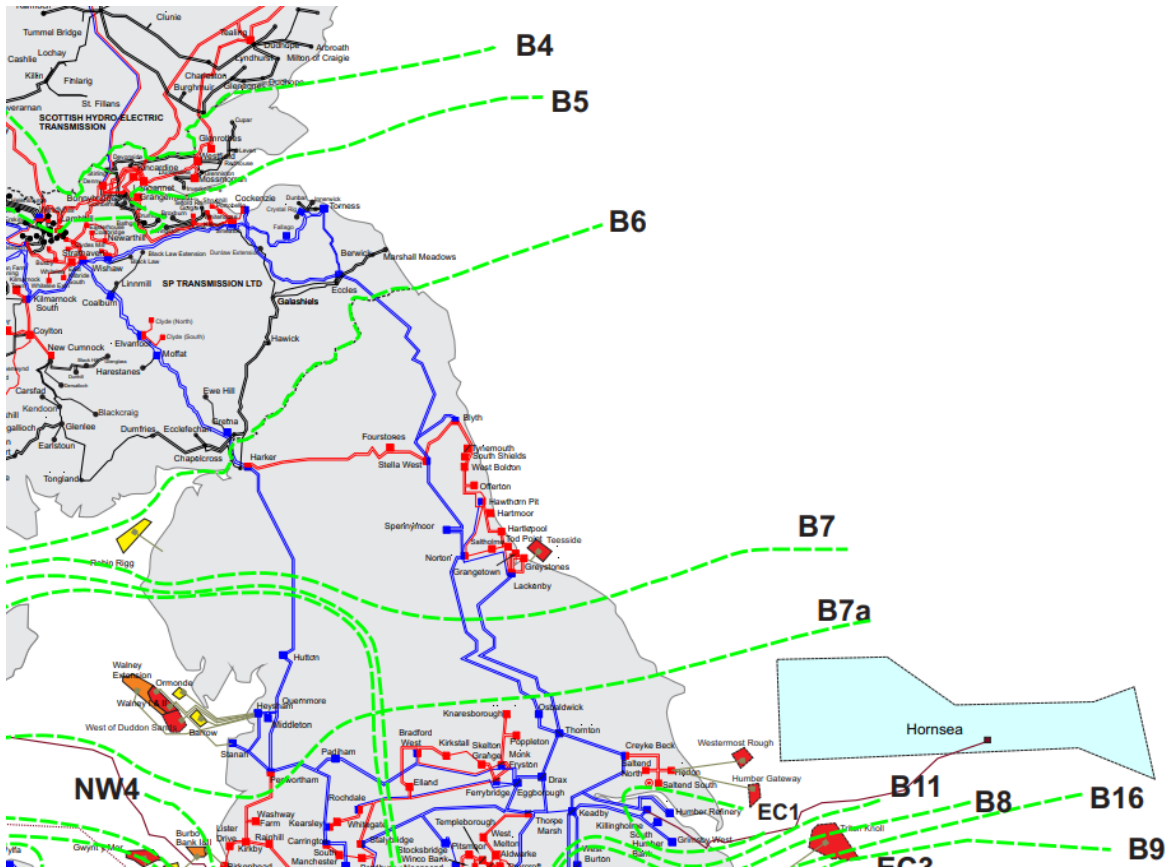
3.3. The TOs have started carrying out survey work in order to refine the exact route corridors of their proposed subsea cable solutions. They are refining their plans for the onshore works ahead of seeking planning approval in early 2022. They expect to engage further with interested suppliers and contractors this summer ahead of starting a full procurement process in 2022.

Why the project has been brought forward

3.4. A significant growth in renewable and low carbon electricity, including an expansion in offshore wind, in line with net zero targets, is expected in Scotland and along the North-East coast of England. Analysis from the ESO forecasts that unless the electricity transmission network is upgraded, this will lead to constraints across the network, and in particular across the Scottish – English border throughout the next decade. Constraints on the network would lead to the ESO making constraint payments to generators that need to be switched off. The cost of this would ultimately feed into consumer bills.

3.5. The ESO's annual Network Options Assessment (NOA) process, has consistently shown the need for investment across multiple northern transmission boundaries of the GB network. Specifically, this analysis shows that the current capability of network boundaries B6, B7, B7a and B8 are unlikely to be sufficient to accommodate the future network requirements as forecasted by the ESO. As can be seen in Figure 2 below, Boundary B6 runs along the England Scotland border which delineates the NGET area from the SPT area to the north of it. Boundary B4 delineates the SPT area from the SHET area.

Figure 2: GB Transmission System Boundaries B4 – B9 (from ETYS 2020)⁷



3.6. To relieve these constraints on the effected boundaries, and reduce consequential constraint costs, the TOs put forward potential solutions to be compared within the ESO’s NOA process, which is designed to give an indicative view of necessary investments across the network. The NOA compares investment options through a cost benefit analysis and makes recommendations on options to progress further, to pause, or to stop. In the case of those proposed investments that qualify for the LOTI mechanism, these projects are subject to further comparative CBA by the ESO that is used to support the TO LOTI submission to us. The LOTI CBA is able to consider options in a greater level of detail, including in terms of route location and timing, and local and wider supply and demand forecasts and trends.

⁷ The ESO’s Electricity Ten Year Statement outlines the present capability and future requirements of the transmission system’s boundaries: <https://www.nationalgrideso.com/document/181711/download>

How the TOs selected which link options to compare in the LOTI CBA

3.7. As outlined in the LOTI guidance, we will assess the INC to determine whether the TO(s) has evaluated an appropriate range of options to meet the technical requirement of the project. The next few paragraphs describe this process for the EHVDC project.

3.8. The TOs explain that they have considered a range of options to address the system requirements set out above. They started with an initial list of 210 conceptual options by selecting 'start' and 'end' points⁸ which would provide opportunities to provide an increase in boundary transfer capabilities over B6, B7, B7a and B8. These options consisted of both:

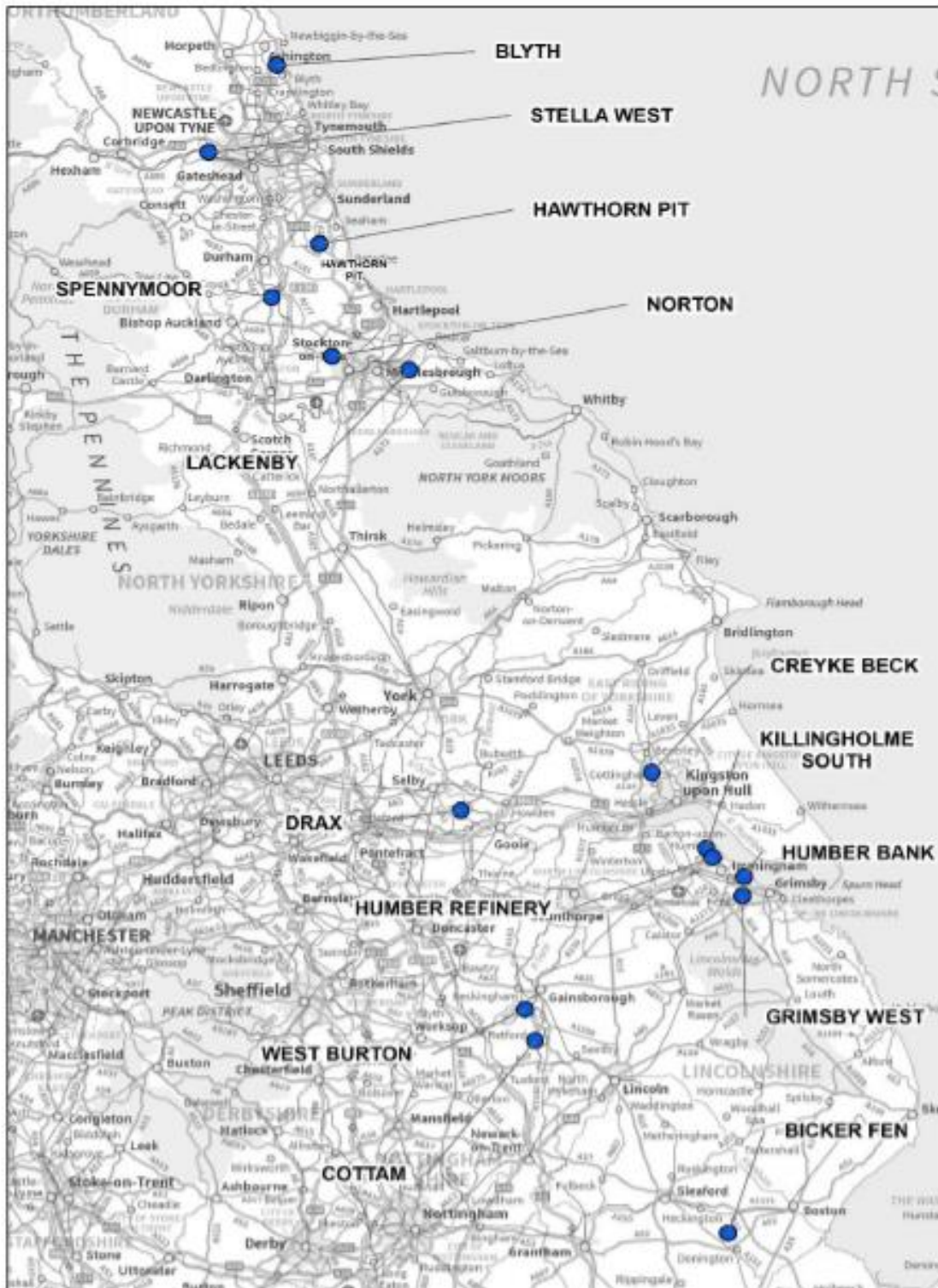
1. Conventional onshore reinforcements, via overhead lines (OHL) and/or underground cables, which typically use High Voltage Alternating Current (HVAC) technology; and alternatively
2. Offshore reinforcements, via High Voltage Direct Current (HVDC) subsea cable technology and converter stations.

3.9. The TOs then identified a shortlist of 32 options for further scoping and progression to determine which should be considered via cost-benefit analysis to determine the most optimal economic combination of reinforcements. The shortlist of options comprised:

1. Six OHL options from Torness to 'end' points in the North East of England as far south as boundary B7;
2. Thirteen Subsea Links from Torness to 'end' points along the east coast as far south as boundary B9; and
3. Thirteen Subsea Links from Peterhead to 'end' points along the east coast as far south as boundary B9.

⁸ For the 'start' points in the Scottish TO's licence areas, SHET and SPT undertook studies and identified Peterhead (for SHET) and Torness (for SPT) as their preferred options.

Figure 3: Shortlist of 'End' Points



3.10. Offshore HVDC options can be more expensive to construct than onshore OHL options. However, HVDC options become more economic over longer distances and therefore can be more effective than onshore AC options at addressing the requirement for increased

capability across a large geographical area. In addition, the TOs deem offshore options typically reduce planning consent risk and delivery timescales; relative to onshore options involving new transmission circuits.

3.11. The additional time taken to meet the Earliest In Service Date (EISD)⁹ of the onshore overhead options can result in higher constraints costs, offsetting the benefit of these options typically being cheaper to deliver than an offshore option. In the case of the EHVDC project, the onshore options were found to be unable to match the capability of the offshore equivalent. The TOs determined that Torness-Lackenby AC OHL (TLNO), the best performing onshore OHL option, should be the only onshore options to be included in the INC CBA alongside six 2GW capacity offshore HVDC options. The other onshore OHL options were not included in the CBA on the basis that:

1. onshore alternatives will deliver later than their offshore equivalents; and
2. a number of the possible options offer limited (or zero) boundary uplift over the B6 and/or B7 boundaries.

3.12. The TOs consider the inclusion of TLNO in the CBA as the best performing onshore alternative means that the TLNO acts as a proxy for other onshore options. Table 1 shows the options the TOs considered within the INC CBA:

Table 1: Options considered within INC CBA

NOA Code	Option	Onshore/Offshore
E2DC	Torness to Hawthorn Pit	Offshore
E2D2	Torness to Cottam	Offshore
E2D3	Torness to Drax	Offshore
E4DC	Peterhead to Hawthorn Pit	Offshore
E4D2	Peterhead to Cottam	Offshore
E4D3	Peterhead to Drax	Offshore
TLNO	Torness to Lackenby	Onshore

⁹ The EISD is used to show the year at which a network reinforcement option can be feasibly delivered.

CBA process

3.13. Starting in early 2018, the TOs and ESO began developing the EHVDC LOTI CBA, a cost benefit analysis used to identify the optimal reinforcement pathway for the Scotland and the North of England region. The TOs provided the ESO with a set of inputs, for the CBA, that included:

1. option descriptions,
2. base boundary capability,
3. option combinations,
4. boundary capability uplifts,
5. cost profiles and
6. earliest in service dates (EISDs), i.e. the earliest date a project can be operational.

3.14. The LOTI CBA compares the likely benefits (in terms of reductions in future constraints costs) versus the costs of the shortlisted investment options (in terms of estimated capital costs to build these options) across a range of future scenarios for supply and demand. In line with the NOA analysis, the LOTI CBA uses the ESO's Future Energy Scenarios (FES) to determine the benefits of each option across a range of future scenarios.

3.15. The FES scenarios are updated annually each summer. This allows the most up to date FES to be used for the following NOA, which is published each January. The scenarios used in the EHVDC LOTI CBA were the four FES scenarios from 2017. This was because the work on the CBA was started by the TOs in early 2018, at which point the FES from 2017 was the most up-to-date version available. Each shortlisted option was considered on its own, as well as in combination with other options. The options were combined with a range of smaller enabling works that will be completed before the proposed EHVDC links are built but were not finalised at the time the CBA was carried out by the ESO.

LOTI CBA results

3.16. The LOTI CBA results clearly demonstrate that transmission reinforcement works between Scotland and the North of England region would result in significantly reduced

constraints costs, bringing large savings to GB consumers. The CBA show that there is a clear and significant benefit from delivering two HVDC links on the east coast between Scotland and north-east England. Within the context of such a large project, the results suggest that the selection of the optimum landing points for HVDC links is relatively finely balanced. Within the LOTI CBA, the anticipated impact of each option on forecast constraint savings is calculated for each of the scenarios. A regret value is calculated for each option in each scenario. This regret value is calculated as the difference between the outcome of a specific option relative to the best performing option under that scenario (meaning that the best performing option in each scenario has a regret of zero). The worst level of regret across the scenarios for each option are then compared, with the lowest value indicating the highest ranking option.

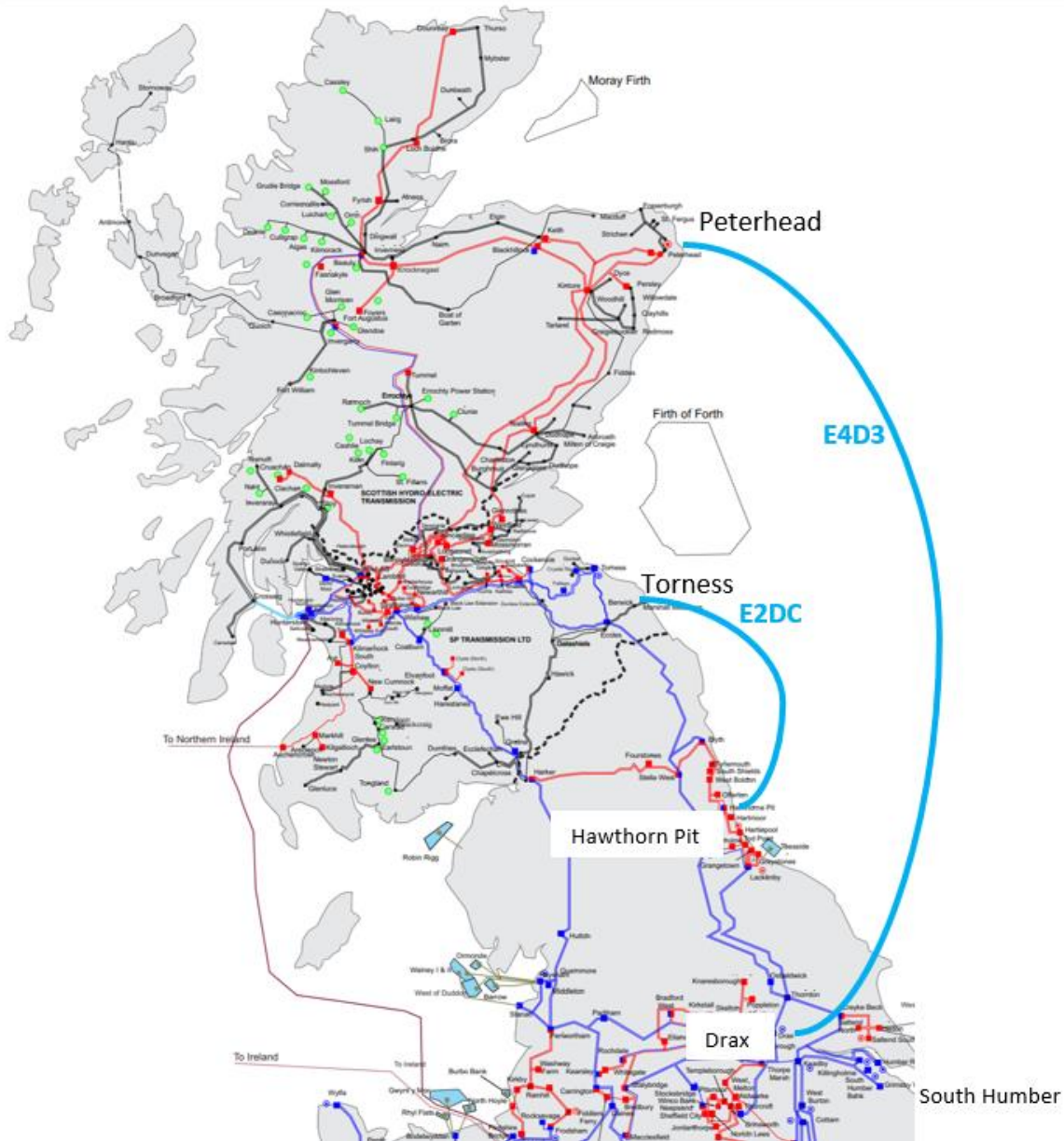
3.17. Table 2 below shows a summary of CBA results for the top 5 performing options and Appendix 2 contains a more detailed summary table of the CBA results for the best performing shortlisted option combinations.

Table 2: Summary CBA results

Option	CBA ranking	Benefit gap (£m)
Peterhead - Hawthorn Pit (E4DC) and Torness - Drax (E2D3)	1	
Peterhead - Drax (E4D3) and Torness - Hawthorn Pit (E2DC)	2	-68
Peterhead - Hawthorn Pit (E4DC) and Torness - Cottam (E2D2)	3	-102
Peterhead - Cottam (E4D2) and Torness - Hawthorn Pit (E2DC)	4	-152
Peterhead - Cottam (E4D2) and Hawthorn Pit (E2DC)	5	-527

3.18. As part of its economic analysis, the ESO assessed the impact of a one-year delay to this transmission investment. For a single year delay of one HVDC link, it estimated that £330m of additional constraint cost could be incurred. If both HVDC links are delayed by one year, the ESO indicated that £665m of additional constraint cost could be incurred.

Figure 4: Indication of TO preferred schemes



3.19. The TOs’ preferred option is the progression of two HVDC links through the LOTI process as the EHVDC project:

1. a c£1.3bn subsea link of 2GW capacity from Torness to a connection point on the existing network at Hawthorn Pit (E2DC), to be delivered by 2027; and
2. a c£2.1bn subsea link of 2GW capacity from Peterhead to a connection point on the existing network at Drax (E4D3), to be delivered by 2029.

Justification for TOs' preferred option

3.20. The TOs argue that the ESO analysis shows that difference between the best ranked option combinations at the time of the CBA was marginal, demonstrating that, against an uncertain future, the financial regret of not selecting the optimal combination would be significantly outweighed by any cost associated with project delay. They also highlight that all subsequent NOA reports since the LOTI CBA was started have indicated that the TO proposed options (ie E4D3 and E2DC) should be prioritised. They have emphasised that any delay in confirming their proposed solution could lead to delays that, as referenced in paragraph 3.18, would be costly to the consumer.

3.21. They add that the analysis undertaken at this stage of the development of the links clearly demonstrates progressing with two links to their EISDs is vital to optimise the range of benefits these projects will bring to customers.

Our views on the TO proposals

Our views on why the project has been brought forward

3.22. All combinations of options considered within the LOTI CBA, under all future demand/supply scenarios modelled, deliver a positive net present value (NPV) for consumers relative to the counterfactual of not investing. This indicates that investment is needed across relevant system boundaries. The greatest benefits are found in the CBA combinations that include two HVDC links, with these all having a net benefit of over £10bn. For this reason, we agree that there is a need for at least two links.

3.23. We note that a third and fourth link are included in the latest NOA recommended investments (also see Figure 5). We have asked the TOs to provide analysis that explores the interaction with these potential additional links, as part of the FNC for EHVDC. However, these additional projects are being developed to a later timescale and are ultimately outside of the scope of the EHVDC LOTI assessment process.

Our views on how the TOs selected which options to include in the LOTI CBA

3.24. The TOs' initial INC submission provided limited narrative on how options were selected and/or excluded from the LOTI CBA, with a lack of critical justification for EISDs and narrowing down of options excluded before the CBA. Through our engagement with the TOs over the course of our assessment process, we have been able to gain access to additional evidence. We have been able to review the assessment process that was followed by the TOs

to narrow down the options that were included in the CBA. This appears to have been done in a logical manner and we did not find that any options had been inappropriately excluded from the CBA.

3.25. Being able to understand which options were considered initially, and the process followed to narrow these down to those options included in the CBA is a fundamental aspect of our INC assessment under LOTI. The exclusion of this information from the original submission contributed to a longer assessment process than was necessary for this project. It is critical that TOs include all relevant evidence upfront in their LOTI submission to allow for as streamlined an assessment as possible.

Our views on the CBA process and results

3.26. Our view is that the TOs' LOTI CBA does not, on its own, appear to contain sufficient information to rule out all alternative routing options to the TOs' preferred options (E2DC and E4D3). This is due to the combination of two factors.

3.27. First, the INC submission uses future supply and demand scenarios based on FES 2017. FES 2017 represents an out of date view of what supply/demand and power flows the electricity transmission network might need to accommodate in the future. The last three FES projections for FES 2018- FES 2020 represent a significant increase in the levels of low carbon generation in particular that will come forward in order to meet the net zero challenge by 2050. An up-to-date CBA based on FES 2020 (or even FES 2019) would have provided a more robust evidence base on which to assess the Initial Needs Case.

3.28. Second, a strict reading of the LOTI CBA shows that the optimal location of landing points for the two HVDC links is relatively finely balanced. As shown in table 2, the optimum solutions in the LOTI CBA appear to be one HVDC link from Peterhead to Hawthorn Pit and one from Torness to Drax. Given that the TOs' proposed solution was not actually the best performing option in the CBA, we consider that the initial submission did not sufficiently explain why other options, such as the options that performed best in the LOTI CBA, had been discounted.

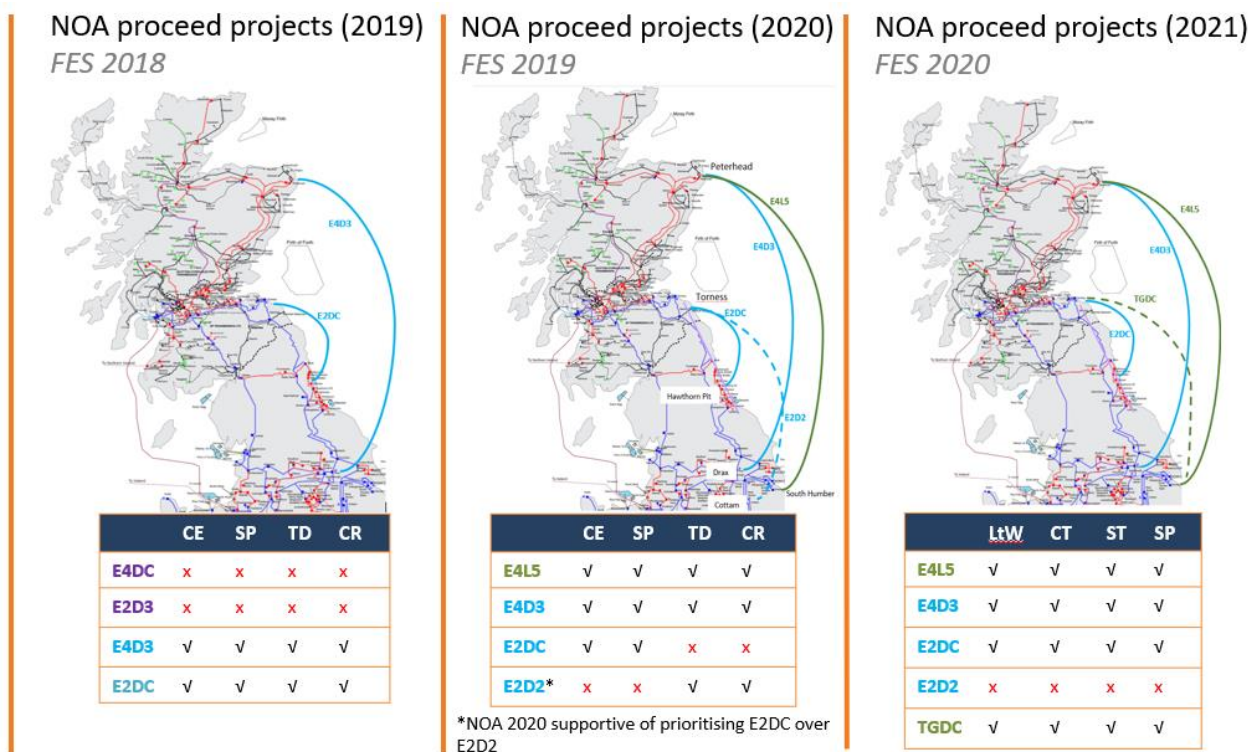
3.29. In the case of the use of FES 2017, we discussed this in detail with the TOs ahead of INC submission. Our understanding from the TOs is that a full update of the analysis (to use FES 2019 or FES 2020) would have taken close to a year for the ESO to complete, given the complexity of the analysis and the interaction with other projects in the same area of the network. The potential delay would likely have delayed the INC submission significantly

and ultimately could have put at risk the EISDs for the project. We accepted the submission using the FES 2017 on this basis, but would like to emphasise the importance of more efficient planning in future to provide submissions that are based on up-to-date analysis.

3.30. Because of the use of FES 2017 in the original submission, we have had to validate and rely on additional evidence from the NOA process to support our assessment of the INC submission. This has added time to our assessment, and risked us not being able to reach a conclusion that would allow the project to progress as needed. TOs should avoid this situation in future in order to ensure that our assessment is able to proceed as smoothly and as quickly as possible.

3.31. In terms of the rankings of the options in the LOTI CBA, a key consideration is that the subsequent NOA publications in 2019 and 2020, which maintained the same inputs and methodology as the LOTI CBA, but used more up-to-date FES projections, favoured the TOs’ preferred options (E2DC and E4D3). This indicates that the options progressed by the TOs are the likely to be the optimum options to take forward.

Figure 5: showing the evolving NOA recommendations



Changes to EISDs

3.32. The EISDs for a number of shortlisted options have moved back since the LOTI CBA was carried out. The TOs state that is primarily a result of not progressing the

development of options that did not receive a proceed signal under NOA, ie it would now take longer to build those options than originally estimated.

3.33. A key consideration for the EHVDC project is the trade-off between the benefits of links landing further south on the network, versus the consumer detriment of delays. As the FES has evolved since 2017, the NOA has reflected an assumed year-on-year increase in the level of renewable generation within Scotland and increased levels of offshore wind generation along the east coast of England. This shift has strengthened the relative benefit case for a longer HVDC route heading to a more southernly landing point. An example of this is the route considered from Torness to Cottam. This option is more expensive than the TO proposed route from Torness to Hawthorn Pit due to its longer length but could reduce constraints by a greater extent due to more power avoiding the congested parts of the onshore network. This is reflected in the 2020 NOA, where the Torness to Cottam option was initially given a proceed signal in two of the four FES scenarios¹⁰. However, as shown in table 3 the EISD (2028) for Torness to Cottam that was used in the 2020 NOA is no longer achievable, and the revised EISD is now 2031. When this updated EISD was included within the 2021 NOA, the Torness to Cottam option does not outperform the TOs' preferred options. This indicates that if the route from Torness to Cottam can only be delivered by 2031, this option is likely to remain inferior to the TOs' preferred options.

3.34. In follow up engagements with the TOs it has come to light that the EISD for some of the discounted options, in particular options going to Cottam, appear to have been based on an accelerated delivery programme that did not fully capture the route-specific consenting challenges presented. Further review of the proposals by the TOs identified that the route would take longer to deliver due to the need to either cross the Humber estuary, or break land further South and then cross an Area of Outstanding Natural Beauty (AONB). Having reviewed the evidence presented, we recognise that this option was appropriately discounted by the TOs.

¹⁰ The 2020 NOA identified both the Torness - Hawthorn Pit and Torness - Cottam options as options to proceed, but recommended that the Torness - Hawthorn Pit option should be prioritised.

Table 3: comparing EISDs in the ESOs CBA and TO INC submission

Option	EISD (CBA)	EISD (as per INC)
Peterhead - Hawthorn Pit (E4DC)	2028	2029
Peterhead - Cottam (E4D2)	2029	2031
Torness - Drax (E2D3)	2028	2029
Torness - Cottam (E2D2)	2028	2030

3.35. The impact of these dates on the results of the LOTI CBA and NOA analysis highlights the critical impact that timely delivery has on consumer benefits.

3.36. Overall, across all evidence available we consider that the TOs’ preferred options are therefore likely to represent the best approach, and the case for them is only likely to strengthen over time due to the later EISD of alternative options.

Interactions with the Offshore Transmission Network Review

3.37. In light of the Government’s offshore wind target of 40GW by 2030, and the expectation of more offshore wind beyond that to deliver net-zero by 2050, constructing individual point to point connections for each offshore wind farm may not provide the most efficient approach and could become a barrier to delivery. In July 2020, the Government launched the Offshore Transmission Network Review (OTNR)¹¹, a BEIS-led cross-industry project in which we provide leadership on specific areas. The OTNR may result in significant change to how infrastructure connecting offshore wind to shore is delivered. These changes could impact upon projects like EHVDC.

3.38. The Pathway to 2030 workstream of the OTNR seeks to develop a more coordinated model for delivery of offshore transmission infrastructure. It will include a model for central offshore network planning and central delivery of offshore transmission infrastructure. Implementing this will require changes to the current regulatory framework for offshore connections. This workstream is therefore expected to have an impact on exactly where offshore generation connects to the wider network. This has the potential to impact on future power flows on the network and therefore may in some specific locations, have an impact on the design of the onshore network.

¹¹ [Offshore transmission network review - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/consultations/offshore-transmission-network-review)

3.39. The future impact of a more co-ordinated offshore network was not a consideration within the early design and development of the EHVDC options, as offshore co-ordination was not a key consideration of the onshore electricity transmission planning process. In the last two years the NOA has started to consider theoretical offshore links between a number of known locations of future offshore wind development. This work has not altered the proceed signal in the NOA that has continued to be given to the TOs' preferred options for EHVDC. In addition, the latest NOA has signalled that an additional two links along the east coast crossing between Scotland and England, are likely to be required. Based on current evidence, there is therefore no reason to think that future offshore network co-ordination will have a material impact on the consumer benefit case for the TOs' preferred first two links for EHVDC.

3.40. Having said this, we think it is important that all relevant factors are considered where possible at the FNC assessment for EHVDC. We will therefore monitor the continuing work of the OTNR project and at FNC consider whether any significant additional evidence has come to light that should be considered when making our decision. We would need to consider any additional benefits from changing the route or timing of the two EHVDC links in order to align with the OTNR against the costs to consumers of any associated delay to delivery of EHVDC.

3.41. Finally, we will also expect the TOs to carefully consider any interactions with the OTNR as part of any development of the two further east coast links recommended in this year's NOA. Given the later timescale for the development of those further links, we would expect the information provided within the INC for those additional links to clearly set out whether and how the links relate to outcomes from the OTNR and form part of a coordinated plan for design of the network in that region.

4. Delivery model considerations

Section summary

This Chapter summarises our assessment of whether the EHVDC project meets the criteria for competition and explains our proposal to make a final decision on whether to apply a late competition model to EHVDC once we have received the Final Needs Case.

Questions

Question 1: Do you agree with our proposal to make a final decision on delivery model at the FNC?

Question 2: Do you consider there is likely to be any quantifiable consumer detriment if we defer our decision on competition until the FNC?

Background

4.1. Competition in the design and delivery of energy networks is a central aspect of our RIIO-2 price controls. Competition has a key role to play in driving innovative solutions and efficient delivery that can help us meet our decarbonisation targets at the lowest cost to consumers. We set out in our Final Determinations for RIIO-2 that during the RIIO-2 period all projects that meet the criteria for competition and are brought forward under an uncertainty mechanism will be considered for potential delivery through a late competition model. As explained in Chapter 2, EHVDC is being brought forward for assessment under the LOTI mechanism, which is an uncertainty mechanism within RIIO-2.

4.2. The remainder of this chapter considers the extent to which EHVDC meets the criteria for competition, and our view on whether it should be delivered via one of our late models for competition.

Whether EHVDC meets the criteria for competition

4.3. The criteria for late model competition are as follows:

1. New
2. Separable
3. High-value: projects of £100m or greater expected capital expenditure.

4.4. We consider that the EHVDC project as proposed meets the “new” criterion. It involves the construction of new subsea HVDC links and associated other new electrical infrastructure (eg converter stations) along new route corridors.

4.5. We also consider that the EHVDC project as proposed meets the “separable” criterion. Whilst the proposed subsea HVDC links are expected to play an integral part in releasing constraints at various points on the network, and interact with a range of other proposed investments, the proposed links will only physically interface with the rest of the transmission network relatively close to the northern and southern landing points. This means that the links are electrically separable and can be built with minimal interaction with the rest of the network. As the design of the EHVDC project progresses, we would need to consider further ownership boundaries and interfaces at the points where the new links connect to the existing onshore electricity transmission network. However, any such interfaces only represent a very small proportion of the overall EHVDC project.

4.6. We consider that EHVDC will also meet the “high-value” criterion. The indicative costs for EHVDC provided by the TOs is greater than £3bn. This is significantly higher than the £100m threshold.

4.7. Overall, we conclude that the EHVDC project meets the criteria for late model competition.

Delivery model considerations

4.8. Since we consider that the EHVDC project meets the criteria for late model competition, we have also considered whether it is the interest of consumers for it to be delivered through a late model of competition, rather than via the prevailing LOTI mechanism under the RIIO-2 arrangements.

Relevant consideration of models

4.9. The late competition models that are available for consideration for the EHVDC project are:

1. CATO Model
2. SPV Model

3. Competition Proxy Model (CPM)

4.10. Below we set out details of each of these models, and our initial views on how applicable each might be to the EHVDC project.

CATO model

4.11. CATO stands for Competitively Appointed Transmission Owner. Under the CATO model a competitive tender would be run for the financing, construction, and operation of the proposed assets that make up the EHVDC project, with a transmission licence provided to the winning bidder setting out the outputs, obligations and incentives associated with delivering the project. The CATO model requires legislative changes to allow for new parties to be able to be awarded a transmission licence following a competition.

4.12. The high-level delivery plan for EHVDC presented by the TOs in their submission indicates an expectation that construction on the two proposed links will need to commence in early 2024 in order to meet the required delivery dates. The government has set out its intention to introduce the required legislation¹² but it is currently difficult to determine when the required legislation will be in place and whether this would support timely delivery of the EHVDC project by a CATO.

4.13. As set out earlier, analysis from the ESO's LOTI CBA included within the INC submission indicates that a one year delay to both EHVDC links would cost, on average £665m across the FES scenarios. For this reason, we consider that any delay resulting from the application of the CATO model on EHVDC would not be in the interests of consumers. Having said this, we do not consider that it is appropriate at this point in time to rule out the use of the CATO model for the EHVDC project.

SPV Model

4.14. Under the Special Purpose Vehicle (SPV) model, the incumbent network licensee would run a tender to appoint an SPV to finance, deliver and operate a new, separable and high value project on the licensee's behalf through a contract in effect for a specified revenue period. The allowed revenue for delivering the project would be set over the period of its

¹² Page 77, [Energy White Paper \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/92522/energy-white-paper-2020.pdf) (Powering our Net Zero Future, December 2020)

construction and a long-term operational period (currently expected to be 25 years). The SPV model was originally developed for consideration for projects where the CATO model had been discounted due to a clear expectation that underpinning legislation would not be in place in time to allow the delivery of specific projects. The model was considered in detail during the RIIO-1 period, but we recognise that there would be significant work needed to finalise that model for the EHVDC project. Given that we are not ruling out the CATO model at this point, and given the indication from Government that it intends to bring forward the legislation required for the CATO model, we do not consider that it is proportionate to progress the work required to allow the SPV model to be applied to the EHVDC project in a manner that delivers benefits to consumers without impacting on the delivery dates of the links.

CPM

4.15. The CPM involves setting a largely project-specific set of regulatory arrangements to cover the construction period and a 25-year operational period for an asset (in contrast with setting arrangements for a portfolio of assets under a price control settlement). It is intended to replicate the efficient project finance structure that tends to be used in competitive tender bids for the delivery and operation of infrastructure projects.

4.16. Importantly, the project would remain delivered by the TOs under CPM. This means that there is not the requirement to allow for the running of a full tender for delivery of the project in the same way as the CATO or SPV models, and the CPM assessment stages follow the same process as the LOTI mechanism. This means that there is sufficient time to make a decision on whether to apply CPM to the EHVDC project at the FNC assessment stage, without risking delay to delivery of the links. We consider that it is beneficial for consumers and the TOs to make this decision at the FNC stage as we will have a better understanding of the likely counterfactual financing costs under future RIIO price controls at that point in time.

Timing of decision

4.17. The LOTI Guidance explains that, wherever possible, we intend to decide whether to apply a late competition model to a project at the Initial Needs Case stage of our assessment. It also explains that we may, at the Initial Needs Case stage, give an initial view before confirming our view at the Final Needs Case stage of our assessment.

4.18. The approach explained in the LOTI Guidance reflects our recognition that making a decision to apply a competition model as early as possible is the best way to ensure that the consumer benefits associated with competition can be achieved without compromising on

the timely delivery of key infrastructure that is expected to be critical in the meeting of our net zero targets.

4.19. In the case of the EHVDC project, the TOs expect to submit the Final Needs Case at the end of 2021. This comes ahead of the decision on major planning consents for EHVDC, which is expected to take place by the end of 2022. We would then expect to make our Final Needs Case decision soon after. Based on the delivery plan that has been provided by the TOs, we do not consider that any evidence has been provided by the TOs to demonstrate that there is likely to be any consumer detriment that would result from reaching a final decision on competition during the FNC stage.

4.20. We recognise that it is likely to be beneficial to provide the TOs with certainty of the delivery model ahead of the Invitation to tender (ITT) stage of the EHVDC procurement process in order to provide certainty to the market and minimise unnecessary costs incurred by the TOs ahead of any decision to apply the CATO model. For this reason, once we have sight of the FNC submission, we will, if necessary prioritise our assessment of whether to apply a model of late competition in order to make our decision ahead of the ITT stage of the EHVDC procurement process.

5. Next Steps

Section summary

This chapter sets out the next steps in our assessment of this project under the LOTI mechanism. In particular, it sets out the specific areas of focus for the FNC.

5.1. Our consultation on the positions set out within this document will close on 23 June. Following the consultation, we expect to publish our final views on the Initial Needs Case for EHVDC in summer 2021.

5.2. The next stage of our assessment is the FNC, which we expect will be submitted at the end of 2021. Normally we expect to only receive a FNC submission once planning consent is in place, but in the case of such a strategically important project, we are comfortable that it is in the interests of consumers to allow flexibility to the LOTI process to help the project meet its required delivery dates. For the avoidance of doubt, although we are happy in this instance to receive the FNC submission before the decision on major planning consents, we do not intend to publish our decision on the FNC until after the planning consent decision.

5.3. As part of the FNC submission we expect to receive an updated CBA from the TOs, based on up to date information. During the FNC stage we will check whether the case for the proposed links remains robust relative to alternative options, particularly in light of any relevant emerging views from the BEIS-led OTNR work at this time, or any further developments of the two additional eastern bootstraps recommended by the latest NOA. Having said this, we expect to focus our FNC assessment on ensuring that a robust delivery plan is in place to deliver the project on time, and ensuring that any changes in technical scope, design, relative to the INC are fully understood and justified. As part of our FNC we will also carry out a more detailed assessment of the cost assumptions of the TO proposed options.

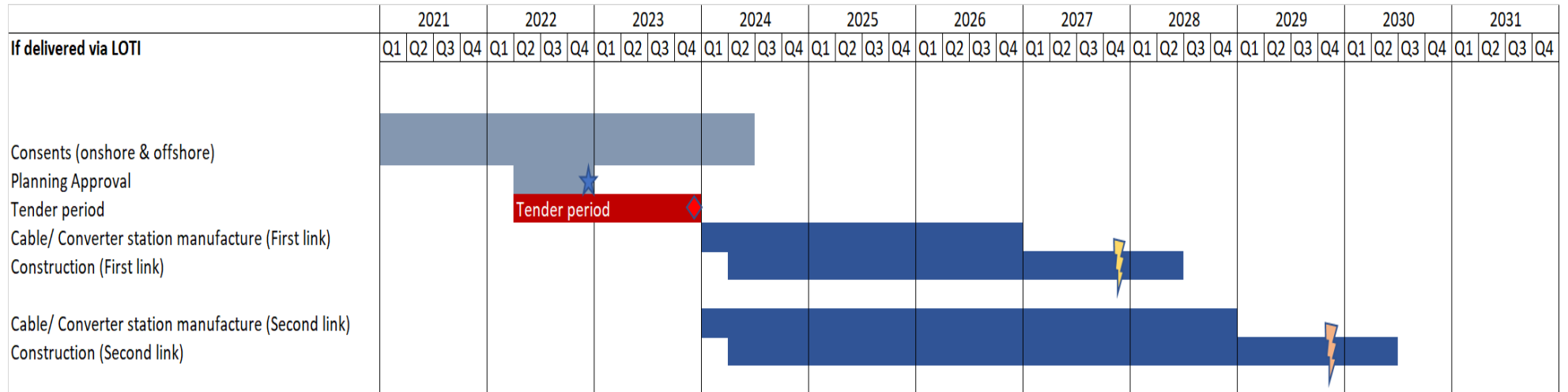
5.4. In terms of delivery plan, we will look to be assured that any relevant lessons from the Western HVDC (WHVDC) project have been appropriately learned and captured within the delivery plan for EHVDC. As referenced in chapter 4, we also propose that the FNC will be a suitable point at which to make a final decision on whether to apply a late model of competition to EHVDC.

Appendices

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Appendix 1 – Indicative delivery plan for the TO proposed solution



Appendix 2 – Summary of key CBA results

NOA Code	Option ¹³	INC CBA results (FES 2017 Scenarios)					Worst Regret (Gap to best ranked option) £m	Ranking	NOA recommendation	
		CP	SP	TD	SP1	TSP2			2019/20	2020/21
E4DC+E2D2	Peterhead to Hawthorn Pit + Torness to Drax	0	0	0	215	0	215	1		
E4D3+E2DC	Peterhead to Drax + Torness to Hawthorn Pit	19	43	191	283	208	283 (-68)	2	Proceed	Proceed
E4DC+E2D2	Peterhead to Hawthorn Pit + Torness to Cottam	115	124	385	342	114	385 (-170)	3		
E4D2+E2DC	Peterhead to Cottam + Torness to Hawthorn Pit	127	141	537	402	328	537 (-322)	4		
E4D2+E2D3	Peterhead to Cottam + Torness to Drax	636	665	760	1,064	1,032	1,064 (-849)	5		
E4D3+E2D2	Peterhead to Drax + Torness to Cottam	646	675	741	1,073	1,040	1,073 (-858)	6	Proceed ¹⁴	
E4DC+ TLNO	Peterhead to Hawthorn Pit + Torness to Lackenby	199	45	1,887	0	90	1,887 (-1672)	7		

¹³ This includes supporting onshore reinforcements that are not part of the EHVDC project. These additional works are required to improve the current transmission network and thus are seen as 'enablers' of the Eastern HVDC links.

¹⁴ As the two Torness options (E2DC and E2D2) are mutually exclusive in delivery, NOA 2019/20 recommended prioritising the delivery of E2DC to maintain its EISD as it delivers more near-term benefits and produces a higher regret of being delayed.

E4D2+ TLNO	Peterhead to Cottam + Torness to Lackenby	1,091	1,011	2,283	908	1,056	2,283 (-2068)	8		
E4D3+ TLNO	Peterhead to Drax + Torness to Lackenby	918	830	2,422	719	863	2,422 (-2207)	9	Proceed ¹⁵	
E4DC+ TLNO	Peterhead to Hawthorn Pit + Torness to Lackenby	1,239	2,123	3,380	351	3,689	3,689 (-3474)	10		

¹⁵ The NOA 2019/20 proceed also included an HVDC link from the Torness area, so a total of three large reinforcements across boundary B6 were recommended in this year

Appendix 3 – Privacy notice on consultations

Personal data

The following explains your rights and gives you the information you are entitled to under the General Data Protection Regulation (GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the controller and contact details of our Data Protection Officer

The Gas and Electricity Markets Authority is the controller, (for ease of reference, "Ofgem"). The Data Protection Officer can be contacted at dpo@ofgem.gov.uk

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

As a public authority, the GDPR makes provision for Ofgem to process personal data as necessary for the effective performance of a task carried out in the public interest. i.e. a consultation.

3. With whom we will be sharing your personal data

(Include here all organisations outside Ofgem who will be given all or some of the data. There is no need to include organisations that will only receive anonymised data. If different organisations see different set of data then make this clear. Be a specific as possible.)

4. For how long we will keep your personal data, or criteria used to determine the retention period.

Your personal data will be held for ***(be as clear as possible but allow room for changes to programmes or policy. It is acceptable to give a relative time e.g. 'six months after the project is closed')***

5. Your rights

The data we are collecting is your personal data, and you have considerable say over what happens to it. You have the right to:

- know how we use your personal data
- access your personal data
- have personal data corrected if it is inaccurate or incomplete
- ask us to delete personal data when we no longer need it
- ask us to restrict how we process your data
- get your data from us and re-use it across other services
- object to certain ways we use your data
- be safeguarded against risks where decisions based on your data are taken entirely automatically
- tell us if we can share your information with 3rd parties
- tell us your preferred frequency, content and format of our communications with you
- to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at <https://ico.org.uk/>, or telephone 0303 123 1113.

6. Your personal data will not be sent overseas (Note that this cannot be claimed if using Survey Monkey for the consultation as their servers are in the US. In that case use “the Data you provide directly will be stored by Survey Monkey on their servers in the United States. We have taken all necessary precautions to ensure that your rights in term of data protection will not be compromised by this”.

7. Your personal data will not be used for any automated decision making.

8. Your personal data will be stored in a secure government IT system. (If using a third party system such as Survey Monkey to gather the data, you will need to state clearly at which point the data will be moved from there to our internal systems.)

9. More information For more information on how Ofgem processes your data, click on the link to our “[Ofgem privacy promise](#)”.