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Consultation

Yorkshire GREEN – Consultation on the project's Initial Needs Case and initial thinking on its suitability for competition

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Response deadline:	1st November 2021	**Email:**	RIIOElectricityTransmission@ofgem.gov.uk

We are consulting on our views on the development of National Grid Electricity Transmission Plc's Yorkshire Green Energy Enablement ("Yorkshire GREEN") 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 interested in the costs of electricity transmission infrastructure and the electricity 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**. 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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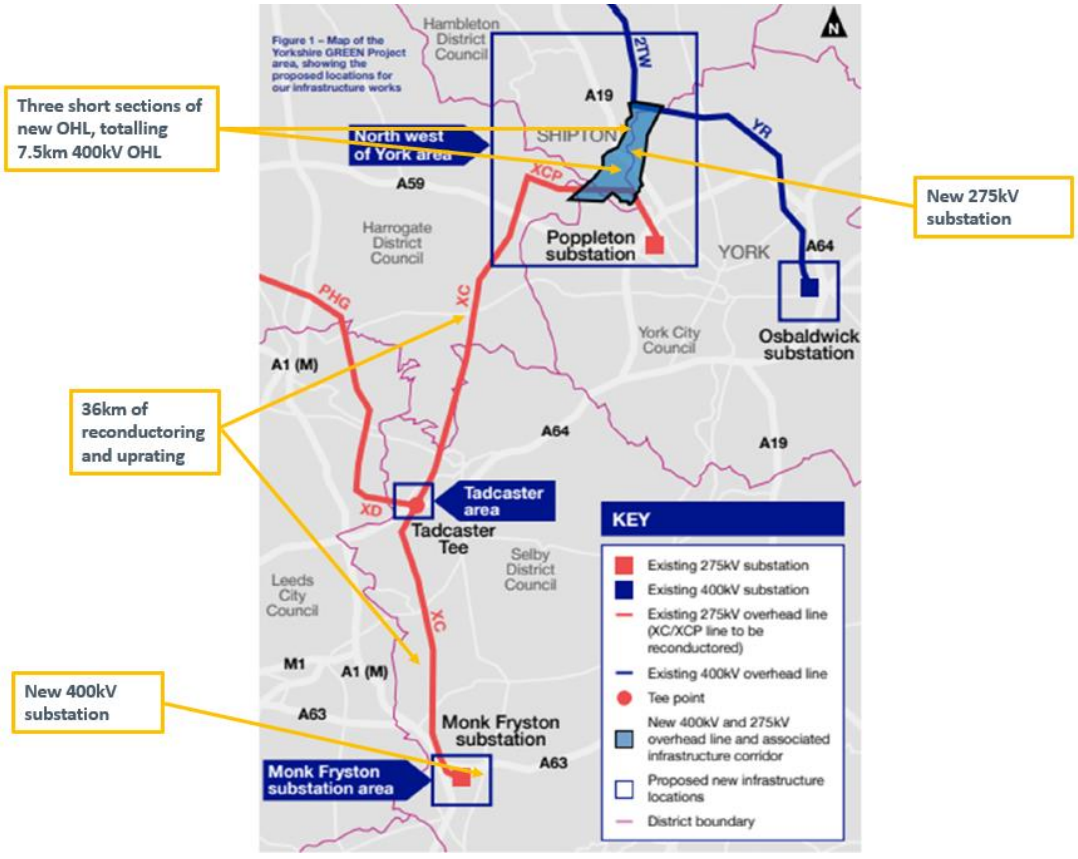
Executive summary

Yorkshire GREEN and what this document covers

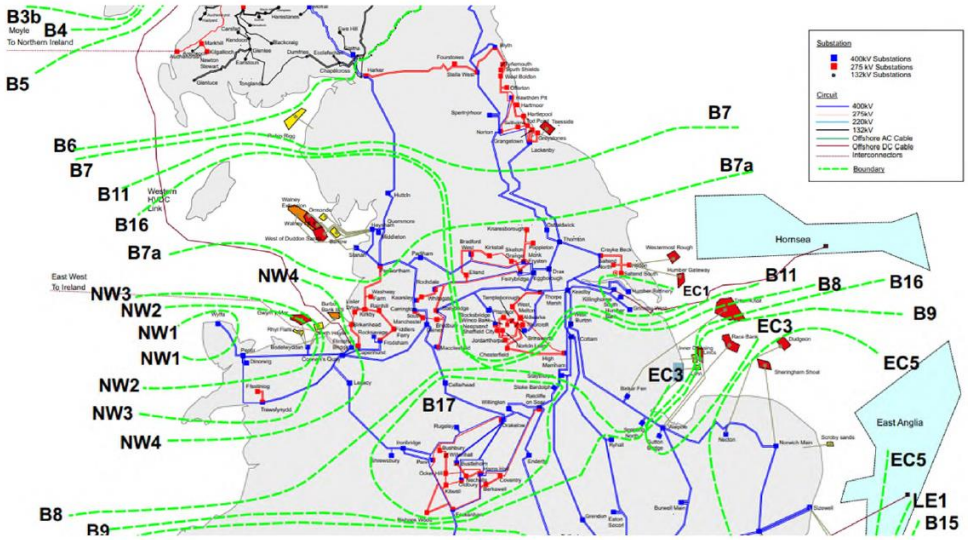
In June 2021 we received an Initial Needs Case (INC) submission from National Grid Electricity Transmission Plc (NGET), who own and operate the transmission network in England and Wales, regarding the proposed 'Yorkshire Green Energy Enablement' (Yorkshire GREEN) project. Yorkshire GREEN is an electricity transmission project to construct a new c.7.5km 400kV double circuit overhead line teeing off from the existing Norton to Osbaldwick line, a new 400kV substation in Monk Fryston, a new 275kV substation in York North, and various upgrades to existing 275kV infrastructure. The project is triggered by the need to increase the capability of major boundaries within NGET's network in the North of England region (B7a and B8), to manage increasing power flows from North of England to the South. NGET estimates that the project will cost £392m, and that it will provide an estimated 1.7GW uplift on boundary B7a and 394MW across boundary B8.

Figure 1: Scope of preferred option for Yorkshire GREEN[1] (OPN2)



[1] Figure provided by NGET as part of INC submission

Figure 2: Boundaries B7a and B8 (ETYS 2020[2])



In accordance with our RIIO-2 price control arrangements, we have been assessing the need for the proposed project under our Large Onshore Transmission Investment (LOTI) re-opener mechanism[3] and its suitability for the competition models.

This consultation seeks stakeholder views at the INC stage of the Yorkshire GREEN project. The INC stage is intended to provide clarity for NGET 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 2023. It also sets out our initial thoughts on the suitability of applying a late competition model to the project.

LOTI Initial Needs Case Assessment

We consider that there is sufficient evidence of a clear needs case for the project. This includes the necessary capability uplift to the relevant boundaries within the context of plausible future generation and demand scenarios, and the project's criticality for realising the full benefits of the first Eastern HVDC Link[4] (E2DC), which is a separate LOTI project that we are also currently considering. We consider that the cost benefit analysis undertaken by NGET as part of the INC submission (LOTI CBA) is robust and supports the need for the project.

[2] Electricity Ten Year Statement 2020 - https://www.nationalgrideso.com/research-publications/etys-2020
[3] Special Condition 3.13 of the Electricity Transmission Licence
[4] https://www.ofgem.gov.uk/publications/eastern-hvdc-consultation-projects-initial-needs-case-and-initial-thinking-its-suitability-competition

We are satisfied that the LOTI CBA results show that Yorkshire GREEN is the optimal technical option in comparison to the other technical options considered. We note that this is, at least in part, due to the earliest delivery date of Yorkshire GREEN being sooner than the various alternative options, which shows that the benefits of an earlier delivery date outweigh the potentially lower cost alternatives for reinforcement of the boundaries. We therefore expect NGET to continue to progress the Yorkshire GREEN project in a timely manner basis to ensure that these benefits can be realised.

Assessment of suitability for late competition models

In line with our Final Determinations for the RIIO-2 period, as Yorkshire GREEN is being considered under the LOTI mechanism, we have assessed the suitability of the project for 'late model' competition[5]. Our view is that the project, as a whole and as currently scoped, would not meet the criteria for late model competition[6]. However, a significant majority of the project elements do meet the criteria for competition and could therefore be separated out from the other elements in a 'repackaged' project that could be considered for late model competition. This is in line with the ESO's view, as published in the Network Options Assessment ("NOA") 2021[7] .

Given the uncertainty in the timing of the legislation required to support the late competition model and potential impact on timely delivery of the Yorkshire GREEN project, we propose to defer our competition decision, to the FNC stage at latest.

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 1st November 2021. We expect to publish our final views on the INC for Yorkshire GREEN in late 2021 or early 2022.

[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))
[6] These criteria are: new, separable and high value (£100m or above)
[7] NOA 2021, Page 42 https://www.nationalgrideso.com/document/185881/download

1. Introduction

What are we consulting on?

1.1. This document sets out our initial view on the need (and future regulatory treatment of) a proposed electricity transmission project to manage increasing power flows through reinforcement of the B7a and B8 system boundaries in the North of England, between the Scottish border and North Midlands. The project is referred to as Yorkshire GREEN.

1.2. Chapter 2 summarises the LOTI reopener arrangements. This is the RIIO-2 funding mechanism under which the Yorkshire GREEN project is being assessed.

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

1.4. Chapter 4 summarises our proposed position regarding whether the project meets the criteria for late competition and when we intend to decide whether it should be delivered through one of the late models of competition set out in RIIO-2 Final Determinations.

1.5. Chapter 5 summarises our expectation for the next stages for our assessment and for the Yorkshire GREEN 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, Scottish Power Transmission (SPT) in the south of Scotland, and Scottish Hydro Electric Transmission (SHET) in the North of Scotland. We regulate these TOs through the RIIO 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-2 price control, which started on 1 April 2021 and will run for 5 years. Under this price control, we developed a reopener mechanism for assessing the need for, and efficient cost of, large and uncertain electricity transmission reinforcement projects: the 'Large Onshore Transmission Investments' (LOTI) reopener. 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.

1.8. Network investment is informed by the Future Energy Scenarios (FES), and the NOA, which are developed and published annually by the Electricity System Operator (ESO)[8]. A key focus of the FES 2020 is the inclusion of the legally binding[9] UK Government Net Zero targets, to be achieved by 2050. The transition to a Net Zero economy will see increased demand on transmission boundary capability, which need to be facilitated by critical network reinforcements.

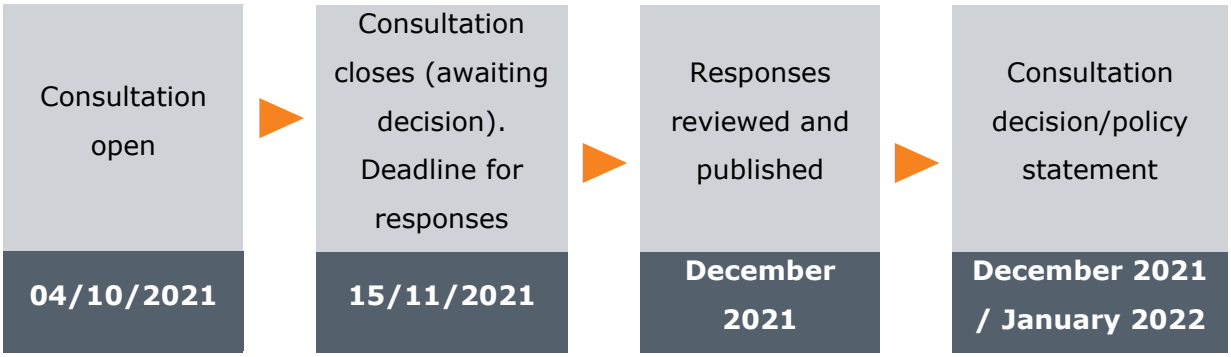
Related publications

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

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

Consultation stages

Figure 3: Consultation stages



How to respond

[8] In April 2019 National Grid ESO became a legally separate business within National Grid PLC.
[9] https://www.legislation.gov.uk/uksi/2019/1056/contents/made

1.9. 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.

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

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

Your response, data and confidentiality

1.12. 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.

1.13. 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.

1.14. If the information you give in your response contains personal data under the General Data Protection Regulation (Regulation (EU) 2016/679) as retained in domestic law following the UK's withdrawal from the European Union ("UK GDPR"), 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.

1.15. 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

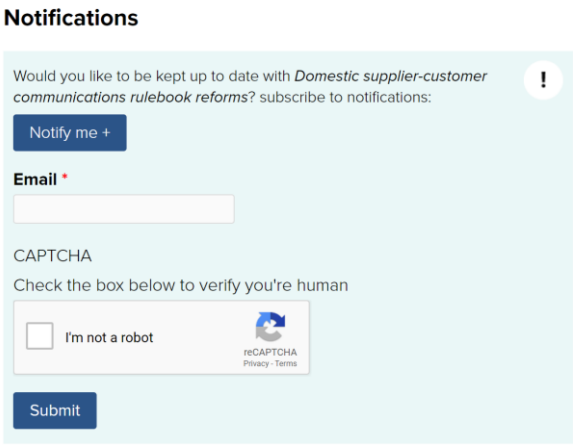
1.16. We believe that consultation is at the heart of good policy development. We welcome any comments about how we've run this consultation. We'd also like to get your answers to these questions:

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.



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 LOTI projects and our approach to assessing these projects. It also sets out our next steps for this process.

Overview of the Large Onshore Transmission Investments (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. 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.[10]

2.3. We are satisfied that the Yorkshire GREEN project meets these criteria and is therefore eligible as a LOTI project. We are therefore assessing the project in accordance with the LOTI process, as detailed in the LOTI Guidance[11].

[10] As a result of a licence modification, which came into effect on 24 July 2021, the part of the criteria relating to "shared-use or sole-use generator connection project" no longer applies. However, this does not impact the Yorkshire GREEN project as this is a load-related project. https://www.ofgem.gov.uk/publications/decision-proposed-modifications-riio-2-transmission-gas-distribution-and-electricity-system-operator-licence-conditions
[11] Large Onshore Transmission Investments Reopener Guidance (ofgem.gov.uk)

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. NGET submitted the INC for the Yorkshire GREEN project in June 2021. Chapter 3 of this consultation covers our assessment of the INC submission for the project and explains our initial findings.

3. Yorkshire GREEN Initial Needs Case (INC) Assessment

Section summary

This chapter sets out the key design choices NGET has made to date on the Yorkshire GREEN project and the cost benefit assessment underpinning the need for, and design of, the project. It then sets out our initial views on the consideration of technical options by NGET to reach the preferred solution.

Questions

Question 1: Do you agree with the technical need for investment on the transmission network in Yorkshire across the B7a and B8 boundaries?

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

Question 3: Are there any additional factors that we should consider as part of our Initial Needs Case assessment?

Overview of the TO's Proposal

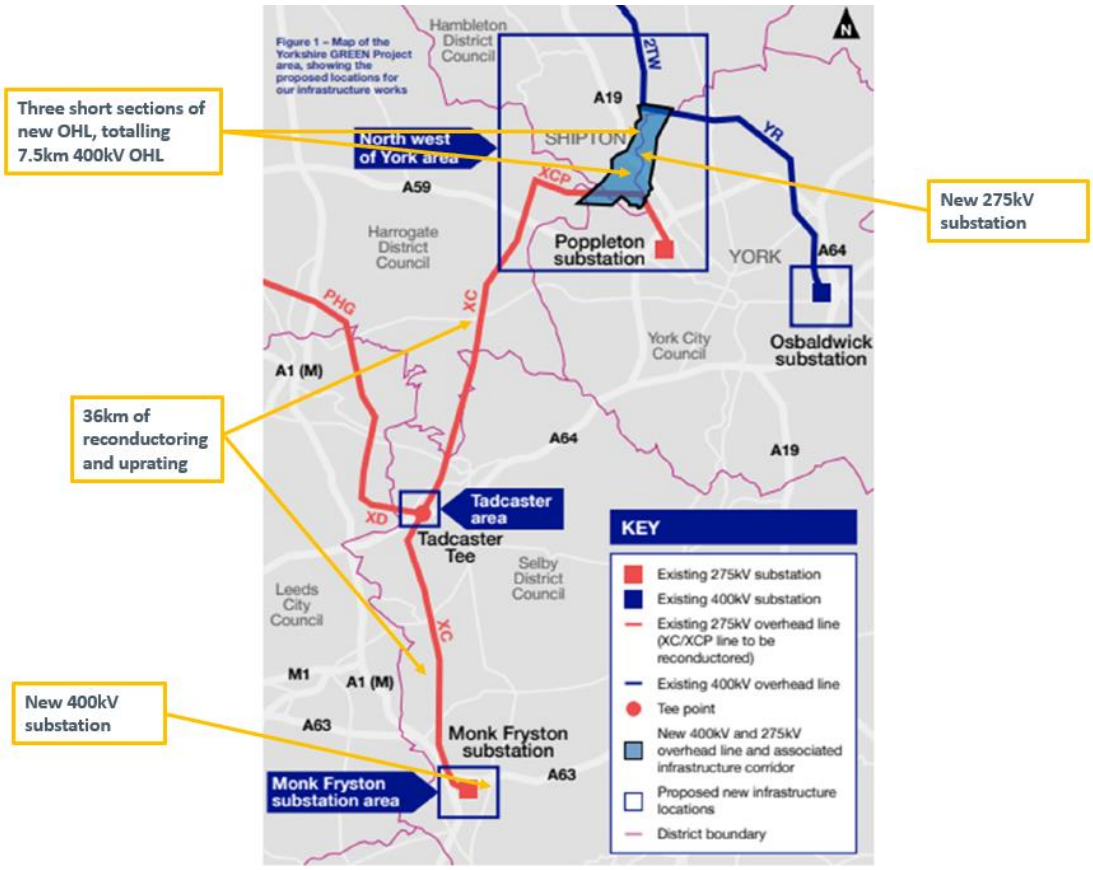
3.1. The Initial Needs Case (INC) for the Yorkshire GREEN project was submitted by NGET on 3 June 2021. It is supported by a Cost Benefit Analysis (CBA) carried out by the ESO, as well as recommendations to proceed from the annual NOA process and report. The NOA code for the preferred option for the project is OPN2.

3.2. NGET's proposal seeks to reinforce the B7a and B8 boundaries in the North of England to facilitate anticipated increases in North to South power transfers of anticipated renewable generation in Scotland and the North Sea. Additionally, the project seeks to further optimise the benefits of the Eastern HVDC Link (E2DC) project (see Appendix 3) and connect local customers (see paragraph 3.10). The scope of the project consists of:

1. Construction of a total of c.7.5km of new 400kV double circuit teeing off of the existing Norton to Osbaldwick line.
2. A new 275kV substation at York North, and rationalisation of existing network around it.

3. A new 400kV substation at Monk Fryston, adjacent to the existing 275kV substation.
4. Reconductoring and uprating 36km of the existing 275kV double circuit overhead line between the new York North and Monk Fryston Substations.

Figure 4: Scope of preferred option for Yorkshire GREEN[12] (OPN2)



Why the project has been brought forward

3.3. In line with Net Zero targets, an expansion in the growth of renewable generation, particularly offshore wind, is expected in the North of England and Scotland over the next decade. Without reinforcement, the transmission network in the North of England region can become strained, requiring constraint action[13] from the ESO to maintain secure and safe

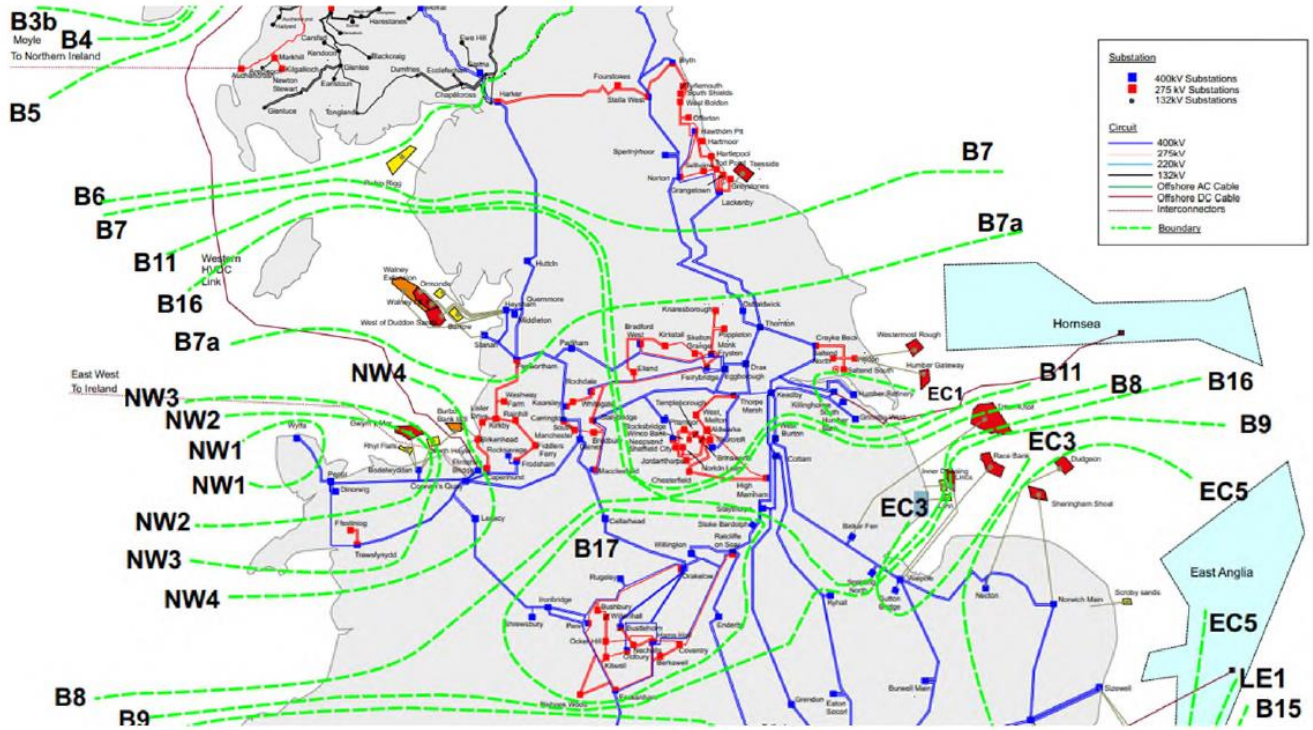
[12] Figure provided by NGET as part of INC submission
[13] When transmission capability is insufficient to support required electricity flow this is known as a constraint. The ESO manages these constraints by taking actions - by paying generators (or demand) in different locations to change their output (or consumption), thus changing the flow on the network. The amount the ESO pays network users to manage constraints in this way is known as the constraint cost.

system operation. Such action from the ESO would result in costs (constraint costs) which ultimately feed into consumer bills.

3.4. These constraints costs are expected to increase over time, as renewable generation increases, further impacting consumer bills.

3.5. The ESO's Electricity Ten Year Statement[14] (ETYS) has shown the need for investment across multiple northern transmission boundaries of the GB network. Specifically relevant to Yorkshire GREEN, this analysis shows that the current capability of network boundaries B7a and B8 are unlikely to be sufficient to accommodate the future network requirements. This is illustrated in **Figures 6 & 7** below, which are copied from the ESO's System Requirements Form (SRF) 2020[15], published as part of the ETYS. **Figure 5** shows the major boundaries within NGET's network in the north of England.

Figure 5: Boundaries B7a and B8 (ETYS 2020[16])



[14] The ETYS presents the ESO's annual view of what the transmission requirements and capability of Great Britain's NETS are over the next decade.
[15] https://www.nationalgrideso.com/document/171956/download
[16] Electricity Ten Year Statement 2020 - https://www.nationalgrideso.com/research-publications/etys-2020

Figure 6: Boundary capability and transfer requirements for Boundary B7a

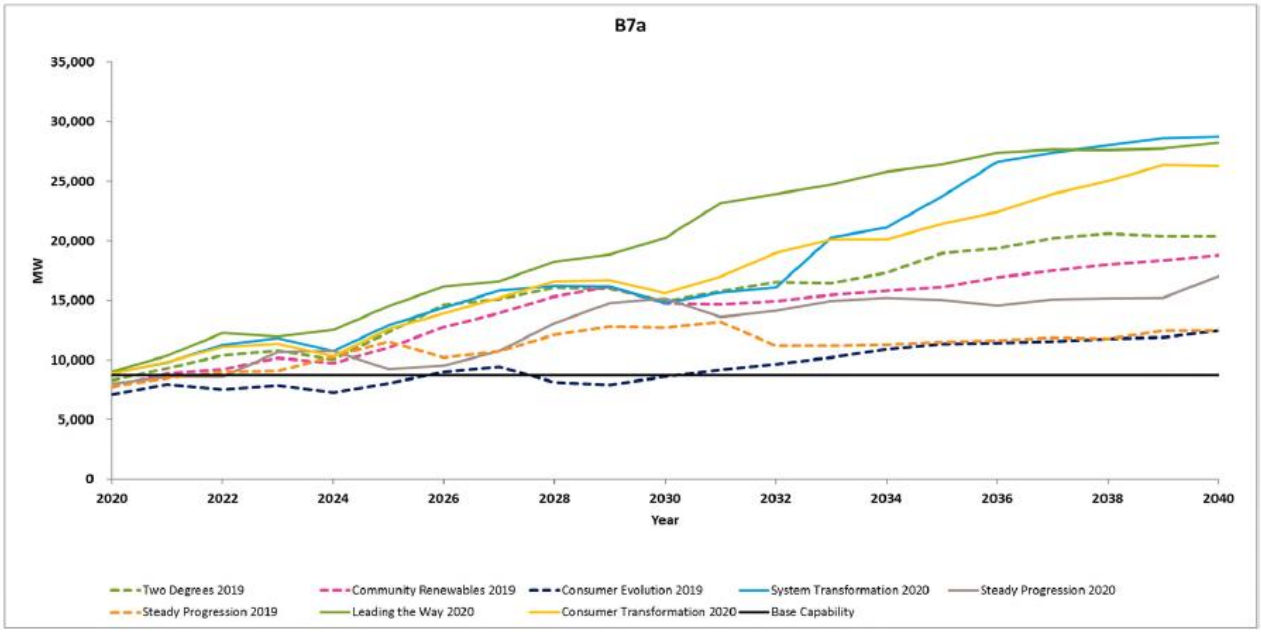
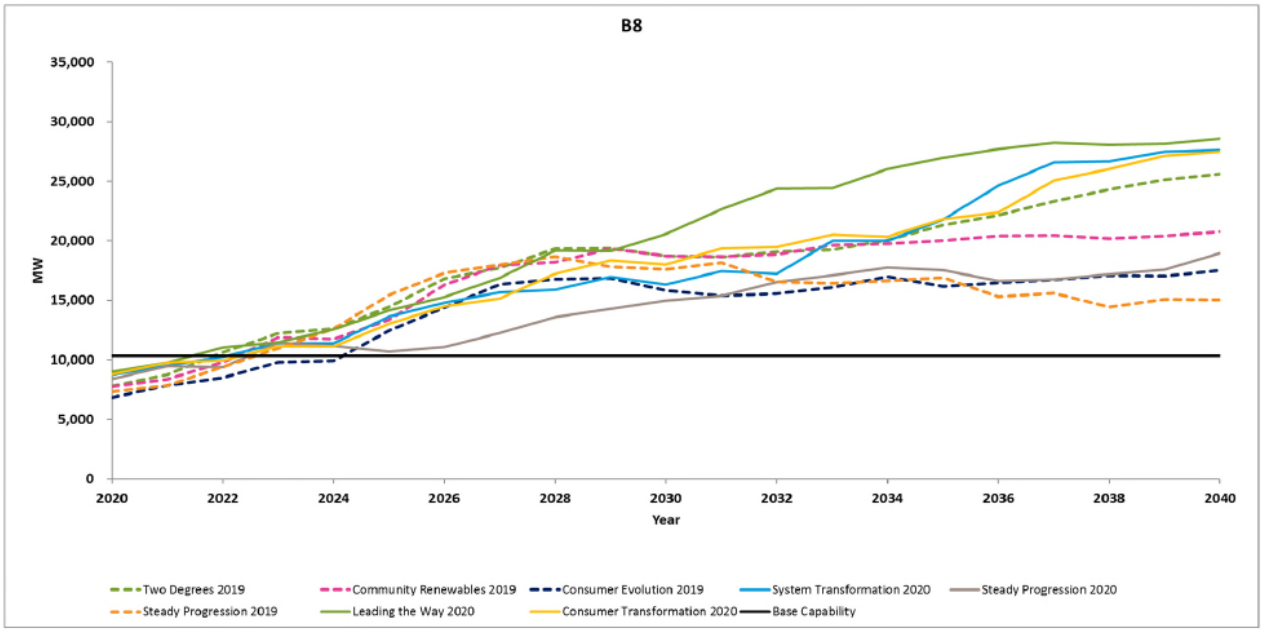


Figure 7: Boundary capability and Transfer requirements for boundary B8



3.6. In three of the FES 2020 scenarios, System Transformation, Consumer Transformation and Leading the Way, the required boundary transfers are well above the current boundary capability by the mid-2020s, and in the fourth scenario, Steady Progression, by the late 2020s.

3.7. To relieve these constraints on the affected boundaries, and reduce consequential constraint costs, NGET put forward potential solutions to be compared within the ESO's NOA

process. The NOA assesses investment options through a CBA 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 a further comparative LOTI CBA by the ESO that is used to support the LOTI submission made to us. The LOTI CBA considers options in a greater level of detail, including in terms of route location, delivery timing, and local and wider supply and demand forecasts and trends.

3.8. NGET put the Yorkshire GREEN project proposal forward as an option in the NOA to reinforce the transmission network in the North England region, specifically the restricted capability boundaries B7a and B8, in order to reduce the need for constraint actions and subsequent costs to the system.

3.9. The Eastern HVDC project, a separate LOTI project currently under consideration by Ofgem[17], has close interactions with Yorkshire GREEN. The full boundary benefits of Eastern HVDC will be realised when Yorkshire GREEN is delivered. The most updated constraint cost analysis from the ESO indicates that, if Eastern HVDC is delivered in 2027, the cost of a single year delay to Yorkshire GREEN ranges from £119m to £392m across the FES.

3.10. Another factor influencing the technical option selected for the Yorkshire GREEN project, though not essential to the underlying needs case, is the potential connections of the three future offshore wind and interconnector projects listed below, which currently have 2027 contracted connection dates. However, it is important to note that the FES assume later expected connection dates for these projects based on the extent of progress on each project to date. Those later connection dates have therefore been used in the options analysis carried out in the NOA and LOTI CBA referred to later in this chapter (although a sensitivity analysis has been run using the 2027 connection dates, as referred to in Table 3). The three future offshore wind and interconnector projects are:

i. Hornsea P4 – 1.5GW offshore wind;

ii. Continental Link – 1.8GW Interconnector between England and Norway; and

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

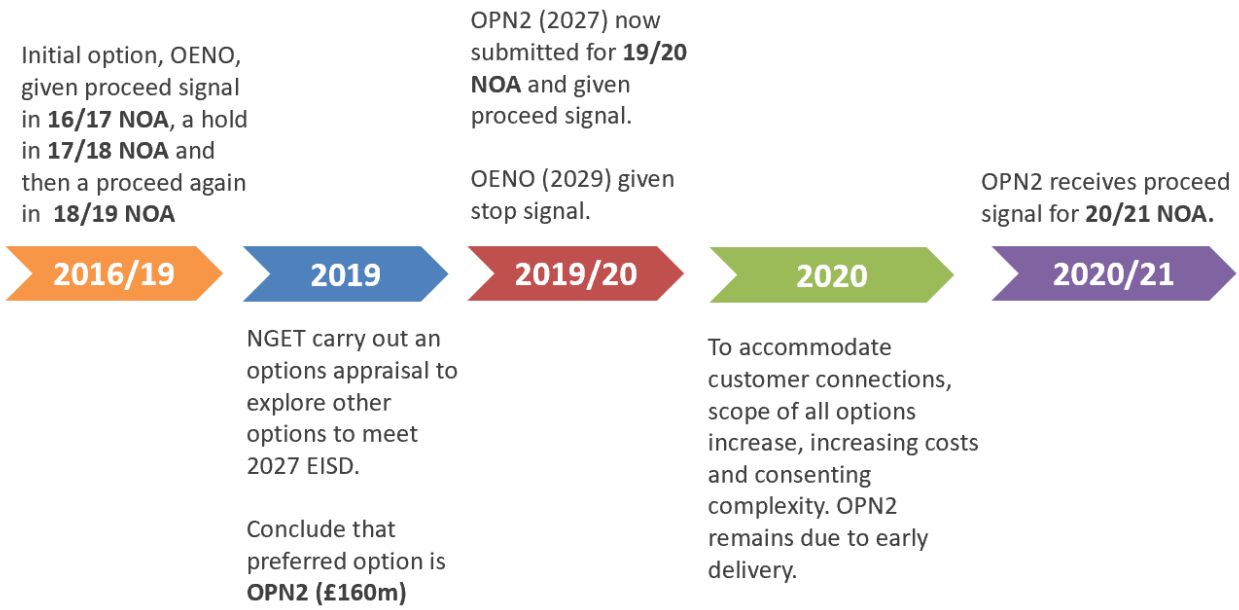
iii. the Superconnection - 1GW Interconnector from Iceland to England.

How NGET arrived at the preferred option for reinforcement

3.11. In line with the LOTI guidance, we have assessed the INC to determine whether NGET has evaluated an appropriate range of options to meet the technical requirement of the project. The next few paragraphs describe this process in which the option proposed by NGET, coded in NOA as OPN2, was determined as the preferred option for the Yorkshire GREEN project.

3.12. **Figure 8** below outlines the stages of NGET's development for OPN2.

Figure 8: Stages of development leading to preferred option



3.13. The initial preferred option for NGET to reinforce the B7a and B8 boundaries was the 'OENO' Central Yorkshire Reinforcement, involving the construction of a new c.28km 400kV double circuit overhead line and 400kV substations in central Yorkshire. This option received a NOA Proceed Signal in NOA 2016/17, a 'hold' in 2017/18 NOA and a NOA Proceed Signal again in the 2018/19 NOA.

3.14. Following the NOA Proceed Signal for the OENO option in the NOA 2018/19, alternative technical solutions were investigated to relieve the same boundary constraints. The outcome of this process stage was the identification of a longlist of 379 strategic options. Filtering of these options carried out by NGET based on costs, distinct benefits, compliance with the

Security and Quality of Supply Standards[18] (SQSS) criteria and route length[19], reduced the number of strategic options to 105

3.15. The original assessment resulted in the identification of earlier version OPN2 instead of OENO as the preferred solution at the end of 2019. This earlier version of OPN2 cost approximately £160m at the time. Subsequently, this option was submitted in the 2019/20 NOA, receiving a proceed signal while OENO received a stop signal.

3.16. Following the proceed signal for OPN2 in the 2019/20 NOA, the potential need to facilitate additional customer connections previously not accounted for arose, and consequently, the scope of the OPN2 project increased, at an increased cost (now £392m).

3.17. The additional elements to accommodate the customer connections were deemed necessary to achieve a required rating of 1500MVA for the proposed transmission line between Osbaldwick and Monk Fryston and associated infrastructure, where previously the rating required was 1100 MVA. The elements added to the scope include:

i. Construction of additional substation infrastructure (400kV substation at Monk Fryston and 275kV substation at York North)
ii. Additional 275 kV underground cables
iii. Additional Power Control System infrastructure
iv. Additional 1.5km overhead line (OHL) route length
v. Additional OHL reconductoring
vi. Additional cable sealing ends
vii. Additional Super Grid Transformers

3.18. Following the identification of an increased scope and costs for OPN2, the earlier 105 options mentioned were further explored. The result of the process was several shortlisted options now cheaper than increased cost of OPN2 (options shown below 'OENO' in **Table 1**). However, these cheaper options had later delivery dates and longer route lengths, and therefore OPN2 remained a better overall option in cost benefit terms regardless of its increased cost.

[18] https://www.nationalgrideso.com/industry-information/codes/security-and-quality-supply-standards
[19] NGET considered that minimisation of route lengths would reduce the environmental and social receptors impacted by the project. Longer route options presented increased consenting related delay risks, cost increases as a result of visual mitigation or risk of Development Consent Order (DCO) refusals.

3.19. OPN2 itself was then developed into several variants for further consideration (the other 'OPN' options in **Table 1**). OPN2 still remained NGET's preferred option after review against its variants mainly due to delivery time and route lengths. NGET's indicative delivery programme for Yorkshire GREEN is set out in Appendix 1.

LOTI CBA process

3.20. The LOTI CBA for Yorkshire GREEN compares the likely benefits (in terms of reductions in future constraint costs) across the ESO's FES 2020 scenarios versus the costs (in terms of estimated capital costs) of the shortlisted investment options.

3.21. The options tested in the CBA, as highlighted in **Table 1**, are:

i. Yorkshire GREEN (OPN2)
ii. Options tested in NOA 2020/21 (OENO and the 'OPN' variants)
iii. Options that were less costly than Yorkshire GREEN which all involved more OHL along differing routes (Options below 'OENO' in Table 1)

Table 1: Options considered for the LOTI CBA

NOA code/option	Start Point	End Point	Costs (2020/21 prices £m; capex only)	EISD	Estimated boundary uplift B7A (MW)[2]	Estimated boundary uplift B7A in combination with E2DC (MW)[2]
OPN1	Norton - Osbaldwick circuits	Poppleton (And Monk Fryston)	644.4	2028	1835	2017
OPN2 (Yorkshire GREEN)	Norton - Osbaldwick circuits	York North substation	392.00	2027	1676	2000
OPN4	Norton - Osbaldwick circuits	York North substation	513.51	2026	1676	2000
OPN5	Norton - Osbaldwick circuits	York North substation	414.19	2027	1676	2000
OENO	Osbaldwick	Eggborough	556.32	2029	1823	2005
4ZR-OSB / THO-4VJ-DRA/EGG-OAC	Thornton – Osbaldwick circuits	Drax – Eggborough circuits	280.00	2029	1823 *(as OENO)*	2005
4ZR-OSB / THO-4YS-MON/EGG-OAC	Thornton – Osbaldwick circuits	Monk Fryston – Eggborough circuits	292.20	2029	1835 *(as OPN1)*	2017
OSB-4VJ-DRA/EGG-OAC	Osbaldwick	Drax – Eggborough circuits	312.67	2029	1823 *(as OENO)*	2005
OSB-4YS-MON/EGG-OAC	Osbaldwick	Monk Fryston – Eggborough circuits	316.15	2029	1835 *(as OPN1)*	2017
4ZR-OSB / THO-MON-OAC	Osbaldwick – Thornton circuits	Monk Fryston	319.26	2029	1835 *(as OPN1)*	2017
THO-4VJ-DRA/EGG-OAC	Thornton	Drax – Eggborough circuits	334.75	2029	1823 *(as OENO)*	2005

LOTI CBA results

3.22. All the options tested in the LOTI CBA displayed high Net Present Values (NPVs), i.e. all the options deliver benefits for consumers (in terms of estimated avoided constraint costs) significantly higher than their estimated capital costs. With the NPV ranging between £350.51m to £2.02bn across the FES scenarios, OPN2 produces the highest NPV in each scenario, and is consequently the Least Worst Regret[20] (LWR) option.

3.23. **Table 2** below shows the LOTI CBA results for all options.

Table 2: Main LOTI CBA results

Regret (£m)	CT	LW	SP	ST	Worst Regret	Rank
OENO	304.69	326.74	268.32	249.44	326.74	12
OPN1	270.22	316.18	247.72	279.97	316.18	11
OPN2	0.00	0.00	0.00	0.00	0.00	1
OPN4	119.92	119.92	119.92	119.92	119.92	5
OPN5	19.65	19.65	19.65	19.65	19.65	2
BCR1: 4ZR-OSB/THO-4VJ-DRA/EGG-OAC	78.95	101.01	42.58	23.70	101.01	3
BCR2: 4ZR-OSB/THO-4YS-MON/EGG-OAC	82.58	105.38	52.49	32.80	105.38	4
BCR3: OSB-4VJ-DRA/EGG-OAC	105.97	128.03	69.61	50.72	128.03	8
BCR4: OSB-4YS-MON/EGG-OAC	102.30	125.10	72.21	52.52	125.10	6
BCR5: 4ZR-OSB/THO-MON-OAC	104.85	127.66	74.76	55.07	127.66	7
BCR6: THO-4VJ-DRA/EGG-OAC	124.15	146.20	87.78	68.90	146.20	9
BCR7: THO-4YS-MON/EGG-OAC	134.81	157.62	104.72	85.04	157.62	10

3.24. In addition to the LOTI CBA referred to above, various sensitivity analyses were carried out by the ESO. The summary of the results are highlighted in **Table 3** below and the full results can be found in **Appendix 2**.

Table 3: LOTI CBA sensitivity analysis summary

Sensitivity	Result
Delay to options: Each option was tested with	When OPN2 is delayed by one year, the LWR option is OPN5. However, as OPN5 is a variation on OPN2, it could not be

[20] LWR is a decision making tool that makes recommendations based on which options/strategy produce the least 'regret' across all of the scenarios analysed. We are aware of some limitations of the LWR analysis in practice. LWR results are determined by the balance between the least and most onerous case for development, which could lead to spurious investment recommendations if scenarios are not 'credible'. To minimise this risk, NOA results are reviewed by the NOA committee who use latest market intelligence to test the plausibility of the results, and additional sensitivity analysis is undertaken to look at how robust recommendations are to a change in a scenario.

delays of 1, 2 and 3 years to the EISD and the impact of delay to OPN2 only was also tested.	delivered on its EISD if OPN2 would be delayed (as it would be subject to the same delay as OPN2). The next two options are BCR 1 and 2 (ranked 3 and 4), which would have marginally lower regrets than OPN2 if OPN2 was delayed by a year.
Interaction with Eastern Link 1 (E2DC): What if E2DC is late? What does this mean for OPN2? Modelling to show the impact of delay of E2DC by 1 and 2 years.	If E2DC was delayed by one year but OPN2 energises in 2027, due to this loss of transmission capacity from B6 into B7a, the regret would be £220m (in *Leading the Way*). This increases to £430m if E2DC is delayed by 2 years. Analysis suggests that, when compared to a scenario with OPN2 delivered on time but E2DC delivering a year later, it would theoretically be marginally better to delay both projects by one year.
Capex tested with variance of +/- 10%	Varying capex changes by +/- 10% for all the options simultaneously does not alter the least worst regret rankings for the options against the FES scenarios, with OPN2 remaining the optimal option.
Capex is added to the top four options (OPN2, OPN5, BCR1 and BCR2) in £25m increments, to test the sensitivity of the results to additional costs.	Either OPN2 (or the OPN5 variant) remain the optimal option versus the lower cost alternatives even after OPN2's costs increased by £100m. Conversely, similar increases to the lower cost options would make them even less preferable than OPN2.
Constraint costs tested with variance of +/- 10%	Varying constraint costs by +/- 10% for all the options simultaneously does not alter the least worst regret rankings for the options against the FES scenarios, with OPN2 remaining the optimal option.
Local generation tested with assumption that customer connections connect in 2027 rather than FES dates.	BCR2 is the LWR option for this sensitivity. OPN2 being delivered in 2027 also ranks marginally worse than OPN2 with one- or two-year delay. The ESO considers that this sensitivity is not as robust as the others considered within the CBA, as the underlying energy scenarios for this sensitivity are not self-consistent.

Our views on Yorkshire GREEN

Our view on why the project has been brought forward

3.25. We agree that all options considered within the LOTI CBA, under all FES scenarios modelled, deliver a positive Net Present Value (NPV) for consumers, indicating that investment is needed on this part of the network. Analysis from the ESO's System Requirements Form (SRF) also supports this, as it shows transmission requirements exceeding boundary capabilities, within the relevant boundaries, over the coming decades.

3.26. We agree with the need for reinforcement on the relevant boundaries to ensure that the electricity generated by anticipated new renewable energy to achieve Net Zero,

particularly in Scotland and North of England, can be transferred efficiently to where it is needed without being constrained off.

3.27. We are therefore confident in the technical needs case driving the project.

Our view on NGET's optioneering and development of preferred option

3.28. We are satisfied with the considerations made to arrive at the preferred option for OPN2. Specifically, we consider NGET has made rational judgements on the impact that alternative options with longer cable lengths could have on routing and consents, as well as the loss of constraint savings in pursuing cheaper options (with later EISDs) that were shortlisted.

3.29. NGET has provided a clear account of the options considered initially, and the process followed to select the preferred option. We are comfortable that NGET responded to NOA signals in a reasonable way to ensure that appropriate options could be assessed in a timely manner, including in relation to their most realistic delivery dates, which is a very important factor for this project.

3.30. We accept the principle that there was a need to increase the scope, and consequently the costs, of OPN2 in order to factor in customer connection agreements, which were not factored in initially. However, we have yet to receive a detailed technical report, from which we can form a clear judgement as to the extent to which the scope and costs needed to be increased. We expect to receive a technical report in due course to further inform our views.

3.31. Despite our satisfaction with the technical option, the INC submission has provided limited narrative on how the estimated cost of the options was determined. Although a list of the elements contributing to the unit cost were provided, the proportion of each element was not provided, therefore, we do not have sufficient information required to benchmark with other network costs. Furthermore, costs allocated for Development Consent Orders (DCO) were presented with no breakdown of the specific activities constituting the total cost. As with the technical options, we require more detailed data to inform our views as to how economic and efficient the costs are. We expect to receive this during the consultation period. Nonetheless, we are comfortable that the results of the CBA wouldn't change materially as a result of the lack of granularity on the cost information. It is critical that TOs include all relevant evidence upfront in their LOTI submission to allow for as streamlined an assessment as possible.

3.32. We note that NGET selected a broad range of options to be tested in the LOTI CBA. This included the initial option progressed to address the need, OENO, as well as variants of the preferred option of OPN2 and shortlisted lower capital cost options. We are satisfied that the options chosen are sufficiently varied to allow for that analysis to be captured.

Our view on the LOTI CBA results

3.33. Our view is that the LOTI CBA supports the needs case for investment on this part of the network and justifies NGET's progression of OPN2 as the preferred option for the reinforcement of the B7a and B8 boundaries. OPN2 displays the highest NPV across each FES scenario and is clearly the LWR option in the main LOTI CBA results.

3.34. We consider that the LOTI CBA demonstrates that OPN2 is the most efficient option overall, when compared robustly against a suitably wide range of alternative options. As much of the relative benefit of OPN2 is driven by its earlier EISD compared to the other options, we have examined and are satisfied that the differences in EISDs across the options have been justified reasonably, particular by reference to the characteristics of the different route options. As such, we are satisfied that although OPN2 isn't the lowest capital cost option, it represents the most economically advantageous option for consumers overall due to the greater overall constraint cost savings than the other options. Given the material impact of EISDs, we expect NGET to continue to progress the Yorkshire GREEN project on a timely basis to ensure that the benefits of the project can be realised.

3.35. Finally, we are also comfortable that OPN2 remains the most appropriate option under a reasonable range of sensitivities (that consider delays or cost changes). More specifically, with regards the sensitivity on local generation, we agree with the ESO that this sensitivity is not as robust as the others considered within the CBA, as the underlying energy scenarios for this sensitivity are not self-consistent because *"the level and make up of generation within each scenario is underpinned by detailed modelling methods and assumptions. Adding extra generation to the scenarios in a specific region represents a material change to the underlying supply-demand balance and can produce unexpected results by stretching the scenarios too far"*. We are also comfortable that the connection dates assumed within the FES for the three local generation projects are more reasonable assumptions to use for the basis of the LOTI CBA than the currently contracted 2027 connection dates.

4. Delivery model considerations

Section summary

This Chapter summarises our assessment of whether the Yorkshire GREEN project meets the criteria for competition and explains our proposal to defer the decision on whether to apply a late competition model to Yorkshire GREEN, to no later than the Final Needs Case stage.

Questions

Question 4: Do you agree with our views regarding the assessment of Yorkshire GREEN against the New, Separable and High Value criteria?

Question 5: Do you consider there is likely to be any consumer detriment if we defer our decision on competition until the FNC stage at latest? If so, do you have views on how such detriment could be quantified?

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 meet the 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.

4.2. This chapter considers the extent to which Yorkshire GREEN meets the criteria for competition, and our view on whether it should be delivered via one of our late models for competition.

Does Yorkshire GREEN meet the criteria for competition?

4.3. Our criteria for a project to qualify for late model competition[21] are as follows:

[21] https://www.ofgem.gov.uk/publications/guidance-criteria-competition

i. New

ii. Separable

iii. High-value: projects of £100m or greater expected capital expenditure.

4.4. Yorkshire GREEN broadly meets the competition criteria though approximately 27% (in cost terms) of the project does not meet the criteria. These elements are as follows:

i. Reconductoring of the XC line - these works involve the placing of new conductors on existing structures. The works would therefore not meet the 'new' criterion as the updated line would not represent a *"completely new transmission asset or a complete replacement of an existing transmission asset".* For similar reasons these works would not meet the 'separable' criterion as it would not be easily possible to clearly delineate ownership.

ii. Other works (OHL Line Entry Mods; Steelwork Replacement; Circuit Breaker x 2; Isolator x 1) - these works are either at existing sites, steelwork on XC line or temporary diversions. These works don't meet the new and separable criteria for the same reasons given above.

4.5. We consider that there is scope to apply competition to the rest of the project elements that do meet the criteria. This would involve the project being repackaged, with the part for competitive tendering purposes to exclude the works that aren't new or separable. This approach would align with our principles for 'project packaging' as set out in previous decisions on competition policy.

Delivery model considerations

4.6. Since we consider that a majority of Yorkshire GREEN project meets the criteria for late model competition, we have also considered whether it is the interest of consumers for any repackaged part of the project 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

4.7. The late competition models that are available for consideration for the Yorkshire GREEN project are:

1. Competitively Appointed Transmission Owner (CATO) Model

2. Special Purpose Vehicle (SPV) Model

3. Competition Proxy Model (CPM)

4.8. Below we set out details of each of these models, and our initial views on how applicable each might be to any repackaged Yorkshire GREEN project.

CATO model

4.9. Under the CATO model a competitive tender would be run for the financing, construction, and operation of the proposed assets that make up any repackaged Yorkshire GREEN 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.

4.10. The high-level delivery plan for Yorkshire GREEN presented by NGET in its submission indicates an expectation that construction will need to commence in early 2025 to meet the required delivery dates. The government has set out its intention to introduce the required legislation[22] but it is currently uncertain when that will be in place and whether this would support timely delivery of any repackaged part of the Yorkshire GREEN project by a CATO.

4.11. As set out earlier, analysis from the ESO's LOTI CBA included within the INC submission indicates that a one-year delay to Yorkshire GREEN would cost between £119m-£392m across the FES. For this reason, we consider that any material delay resulting from the application of the CATO model on Yorkshire GREEN would not be in the interests of consumers. At this stage, we do not consider that it is appropriate to rule out the use of the CATO model for any repackaged part of the Yorkshire GREEN project.

SPV model

[22] Page 77, Energy White Paper (publishing.service.gov.uk) (Powering our Net Zero Future, December 2020)

4.12. Under the 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 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 Yorkshire GREEN project.

4.13. 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 Yorkshire GREEN project in a manner that delivers benefits to consumers without impacting on the delivery dates of the project.

CPM

4.14. 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.

4.15. Importantly, the project would remain delivered by NGET 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 decide whether to apply CPM to the Yorkshire GREEN project at the FNC stage, without risking delay to delivery. We consider that it is beneficial for consumers and NGET to make this decision at the FNC stage as we will have a better understanding of the likely financing costs (for CPM and for the counterfactual under future RIIO price controls) at that point in time.

Timing of the decision

4.16. The LOTI Guidance explains that, wherever possible, we intend to decide whether to apply a late competition model to a project at the INC stage of our assessment. It also

explains that we may, at the INC stage, give an initial view before confirming our view at the FNC stage of our assessment.

4.17. The approach explained in the LOTI Guidance reflects our recognition that deciding 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 Net Zero targets.

4.18. In the case of the Yorkshire GREEN project, NGET expect to submit the FNC at the beginning of 2023, as soon as planning consent scope is established. This comes ahead of the decision on major planning consents for the Yorkshire GREEN project, which is expected to take place by the beginning of 2024. We would expect to make our decision on competition no later than during the FNC stage. Based on the delivery plan that has been provided by NGET, we do not consider that any evidence has been provided by NGET to demonstrate that there is likely to be any consumer detriment that would result from reaching a final decision on competition no later than the FNC stage.

5. Next Steps

Section summary

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

5.1. Our consultation on the positions set out within this document will close on 1st November 2021. Following the consultation, we expect to publish our final views on the INC for the Yorkshire GREEN project in late 2021 or early 2022.

5.2. The next stage of our assessment will be the FNC, which we expect will be submitted at the beginning of 2023. Normally we expect to only receive a FNC submission once planning consent is in place, but in the case of the Yorkshire GREEN 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 open 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 as that decision is critical to the design of the project.

5.3. As part of the FNC submission we expect to receive an updated CBA from NGET, based on up-to-date information. 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 material changes in technical scope, design or cost, relative to the INC are fully understood and justified. As part of the FNC stage we will also carry out a more detailed assessment of the cost assumptions of NGET's proposed option.

5.4. As set out in Chapter 4, we propose to defer the decision on whether to apply a late model of competition to Yorkshire GREEN to no later than the FNC stage.

Appendices

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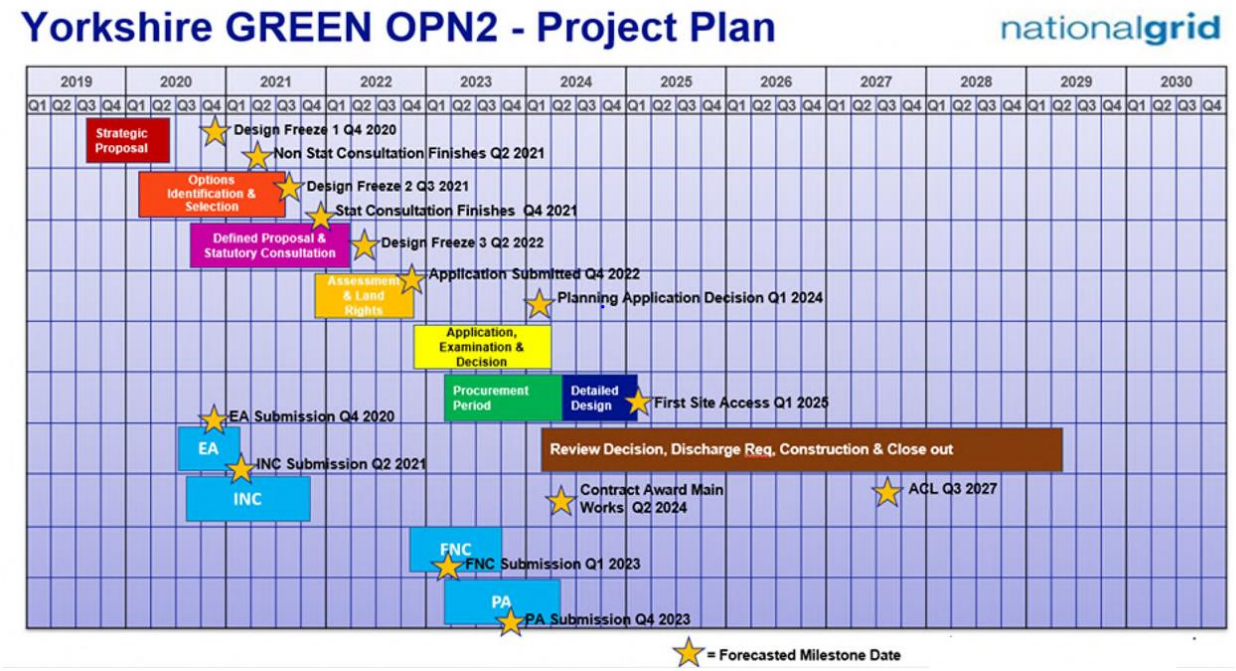
Appendix 1 – NGET's indicative delivery programme for Yorkshire GREEN



Milestone	Milestone Start Date*	Milestone End Date*
Backcheck Review / Strategic Optioneering	Q4 2019	Q3 2020
Corridor, Preliminary Route and Siting	Q3 2020	Q3 2021
Statutory Consultation	Q4 2021	Q1 2022
Assessment & Land Rights	Q4 2021	Q4 2022
DCO Submission	Q4 2022	Q4 2022
DCO Examination & Evaluation	Q4 2022	Q1 2024
Requirements / Procurement	Q1 2023	Q2 2024
Construction	Q1 2025	Q3 2027
Connection Works	Q3 2027	Q3 2027

Appendix 2 – Summary of LOTI CBA Sensitivity analysis

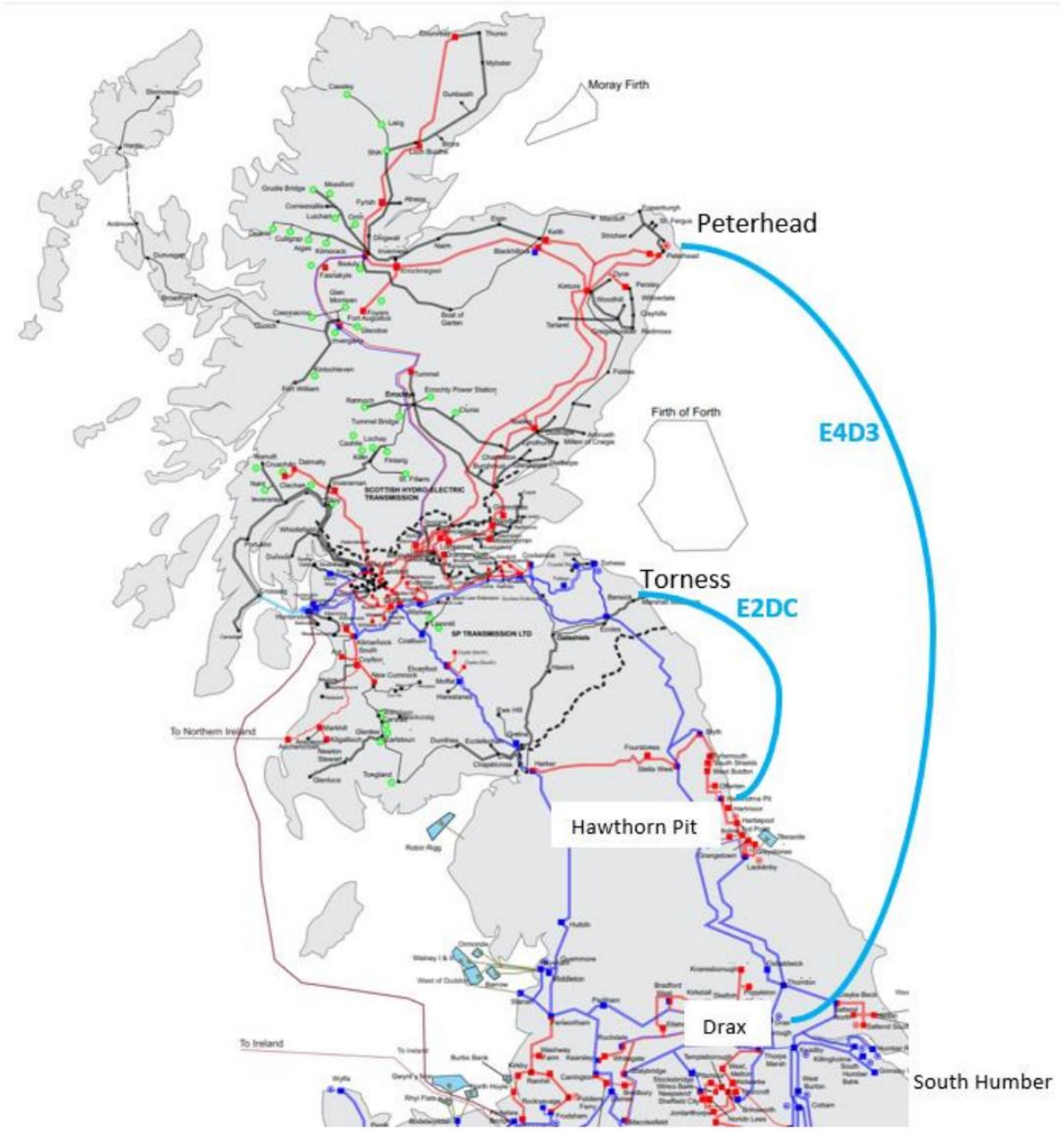
Sensitivity analysis summary

	Main options	CAPEX 110%	CAPEX 90%	Contraints 110%	Contraints 90%	Local Generation
OENO	12	12	12	12	12	11
OPN1	11	11	11	11	11	12
OPN2	1	1	1	1	1	8
OPN4	5	8	3	3	8	10
OPN5	2	2	2	2	2	9
BCR1: 4ZR-OSB/THO-4VJ-DRA/EGG-OAC	3	3	4	4	3	2
BCR2: 4ZR-OSB/THO-4YS-MON/EGG-OAC	4	4	5	5	4	1
BCR3: OSB-4VJ-DRA/EGG-OAC	8	6	8	8	6	5
BCR4: OSB-4YS-MON/EGG-OAC	6	5	6	6	5	3
BCR5: 4ZR-OSB/THO-MON-OAC	7	7	7	7	7	4
BCR6: THO-4VJ-DRA/EGG-OAC	9	9	9	9	9	7
BCR7: THO-4YS-MON/EGG-OAC	10	10	10	10	10	6

Delay Sensitivities

Regret (£m)	CT	LW	SP	ST	Worst Regret	Rank
OENO	304.69	326.74	268.32	249.44	326.74	17
OPN1	270.22	316.18	247.72	279.97	316.18	16
OPN2	0.00	0.00	0.00	0.00	0.00	1
OPN4	119.92	119.92	119.92	119.92	119.92	6
OPN5	19.65	19.65	19.65	19.65	19.65	2
BCR1: 4ZR-OSB/THO-4VJ-DRA/EGG-OAC	78.95	101.01	42.58	23.70	101.01	3
BCR2: 4ZR-OSB/THO-4YS-MON/EGG-OAC	82.58	105.38	52.49	32.80	105.38	4
BCR3: OSB-4VJ-DRA/EGG-OAC	105.97	128.03	69.61	50.72	128.03	9
BCR4: OSB-4YS-MON/EGG-OAC	102.30	125.10	72.21	52.52	125.10	7
BCR5: 4ZR-OSB/THO-MON-OAC	104.85	127.66	74.76	55.07	127.66	8
BCR6: THO-4VJ-DRA/EGG-OAC	124.15	146.20	87.78	68.90	146.20	10
BCR7: THO-4YS-MON/EGG-OAC	134.81	157.62	104.72	85.04	157.62	11
OPN2 1 year delay	60.54	106.04	29.16	62.49	106.04	5
OPN2 2 year delay	167.96	190.39	129.00	110.43	190.39	12
OPN2 3 year delay	248.29	247.45	171.92	167.20	248.29	14
OPN2 with E2DC one year delay	234.04	220.05	104.20	41.19	234.04	13
OPN2 with E2DC two year delay	467.92	429.92	278.97	30.49	467.92	18
OPN2 1 year delay & E2DC 1 year delay	224.37	213.99	97.94	258.00	258.00	15
OPN2 2 year delay & E2DC 2 year delay	448.51	415.81	264.72	491.12	491.12	19

Appendix 3 – TOs' preferred scheme for Eastern HVDC



The TOs' preferred option for the Eastern HVDC project is the progression of two HVDC links:

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.

Appendix 4 – 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

N/A

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 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.

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.

9. More information For more information on how Ofgem processes your data, click on the link to our "Ofgem privacy promise".