

Early Competition Plan

Appendix 4 – System Needs and Technical Specification

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1 Overview

As part of our existing annual Electricity Ten Year Statement (“ETYS”) and Network Options Assessment (“NOA”) planning processes, we analyse system needs across our major transmission system boundaries. We then identify and recommend major National Electricity Transmission System (“NETS”) reinforcement projects to meet the future network requirements. Following our NOA assessment process, we apply the criteria for early competition to identify projects suitable for competition. Projects that meet the early competition criteria would begin the competitive process prior to the preliminary works stage of project development. In this year’s NOA we have identified projects which are likely to meet Ofgem’s criteria for onshore competition.

In line with our obligations to develop an efficient, coordinated and economic transmission network, the early competition process is seeking solutions designs from the market that fulfil the needs identified utilising suitable technology.

This document summarises the needs and technical specification to support the early competition pre-tender activities and Invitation to Tender (“ITT”) stages 1 and 2. It should be viewed as indicative and still under development. It is not a final framework for how we will identify projects or assess bidders’ solutions. This is an area that will require a lot of further work during the implementation stage of early competition¹.

Figure 1 below summaries the key information provided this document.

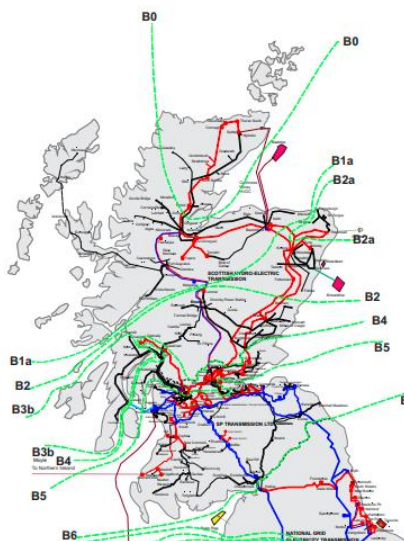
Figure 1: Key information provided



2 System Need(s) for Boundary Transfer Capability

In order to assess existing and future transmission requirements on the NETS, we use the concept of system boundaries. A boundary splits the system into two parts, crossing critical circuit paths that carry power between areas where power flow limitations may be encountered. All the solutions we assess as part of our NOA provide boundary transfer capability across different NETS system boundaries and it is important to understand what we mean by boundary transfer capability.

Figure 2: Example of Transmission Boundaries



¹ <https://www.nationalgrideso.com/document/185881/download>

2.1 Definition - Boundary Transfer Capability

For each boundary, we define the boundary transfer capability as the maximum power flow (MW) that can be transferred across a boundary while maintaining compliance with all relevant criteria specified within the National Electricity Transmission System Security and Quality of Supply Standard (“NETS SQSS”).

There are several factors that determine the boundary transfer capability provided by solutions and these include their sizing, location and behaviour when faults are applied.

2.2 Minimum Criteria for Provision of Boundary Transfer Capability

Projects suitable for the early competition tender will be initially identified through our annual NOA process. The purpose of our Invitation to Tender is to provide an opportunity for the market to deliver solutions that provide the boundary transfer capability benefits similar to the ‘reference design’ solutions identified through the NOA process.

All proposed solution(s) must:

- Have the same sizing as the reference design. This could be in (MW) or (MVA) as appropriate
- Provide boundary transfer capability with 24/7 year-round availability
- Be delivered no later than the specified Earliest In Service Date (“EISD”)
- Connect in the indicated geographical location.
- Provide boundary transfer capability similar to the reference design across all the indicated boundaries when assessed by the ESO.

2.3 System Needs - Projects Identified for Competition

Our latest system requirements for bulk power transfer are published in our ETYS². The table below provides an illustrative example of how the system needs would be specified for some example projects eligible for onshore competition in the latest 2020/21 NOA.

Table 1: System Needs Specification for example projects

Project Name	Year Required (EISD)	Geographical Location	Solution Sizing / capacity
Eastern Scotland to England link: Peterhead to Drax offshore HVDC (E4D3)	2029	From Peterhead to Drax	2000MW
Eastern Scotland to England 3rd link: Peterhead to the south Humber offshore HVDC (E4L5)	2031	From Peterhead to South Humber	2000MW
Beaulieu to Blackhillock 400kV double circuit addition (BBNC)	2030	From Beaulieu to Blackhillock	2780MVA Winter post-fault rating per circuit
Beaulieu to Loch Buidhe 275kV Reinforcement (BLN2)	2030	Beaulieu to Loch Buidhe	967MVA Winter post-fault rating per circuit

² <https://www.nationalgrideso.com/research-publications/etys-2020>

3 Evaluation Criteria

We will apply the evaluation criteria as described in our early competition proposals (subject to Ofgem Review).

3.1 ITT Stage 1

The key technical criteria that we propose to assess at this stage are:

- **Meeting the Need:** Bidders will need to demonstrate that they can meet the need(s) specified in this document by the date required and in the correct geographical location. In order to fulfil the 'meeting the need' criteria, all proposed solutions must demonstrate that they meet the minimum criteria for boundary transfer capability specified in Section 2.2 above.
- **Risk to network reliability**
 - **Technology Readiness:** Bidders will need to demonstrate that their proposed solutions have a technology readiness level of 8 or above³. If technology readiness levels are not available, then we may use a similar approach used in NOA Pathfinders for voltage or stability. For voltage we have a defined list of technologies with established definitions of that technology. For stability, bidders are required to undertake a feasibility study to demonstrate that their solution can provide the stability support required
 - **Impact to existing network:** Bidders will need to demonstrate that their solution does not compromise the security of the existing network and the quality of supply as required by the existing codes and standards. Bidders will need to demonstrate how their solution addresses or mitigates any TO identified issues so that the overall network reliability is maintained. The Procurement Body will commission feasibility studies from the relevant TOs, the scope of which will include, fault level assessments, power flows and voltage assessments including voltage step changes for each proposed solution. These assessments would be equivalent to those which would usually be conducted as part of the optional pre-application submission stage of the connections process (i.e. STCP17- 1).
 - **Deliverability:** Bidders will need to demonstrate that their solutions will meet the specified EISD. We propose to assess whether there are any deliverability issues with the concept design which could undermine the EISD, capacity or location provided by the bidder
 - **Environmental and social impact:** We will assess any environmental and social impact in accordance with the criteria we expect to be set by BEIS, Ofgem and the Procurement Body.

3.2 ITT Stage 2

This is the final assessment stage of the tender process for early competition. It aims to select a single preferred bidder to progress to preferred bidder stage. With regards to the technical design of solutions:

- Our minimum expectations are that bidders will demonstrate evidence that they have progressed to outline design and they will have developed an approach to consenting and/or planning applications (but these may not have been submitted)
- We expect bidders to demonstrate that they have undertaken some level of feasibility studies, but we will take into account that at this stage there may be more detailed land and ground surveys and studies which may require changes to the design
- Bidders are expected to have developed and provided us with robust implementation plans.

4 Required Technical Data

All tender participants must submit the following information to support the ESO technical review stage. We require the following information to be submitted in the proforma provided separately as part of the tender pack.

³ https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-q-trl_en.pdf

4.1 ITT Stage 1

We require the following information:

- The name of the proposed solution
- A list of the specific boundary(s) being addressed by the solution(s)
- Indicate the status of the solution, whether it is a new solution or has been proposed before
- Indicate the stage the solution is at using the descriptions listed in the NOA methodology⁴. These are 'project not started', 'scoping', 'optioneering and consenting', 'started design/development and consenting', 'planning/consenting', 'consents approved'
- A description of the physical nature of the solution such as what assets are involved, the technology, voltage, sizing (MW or MVA as appropriate), connection points, proposed route, and any required connection works
- Provide the earliest-in-service date that the proposed solution will meet
- Provide enough information to allow the ESO to model the proposed solution(s). If bidders have already developed system models of their proposed solutions, they can provide the ESO with the models with any accompanying technical guidance to allow the ESO to assess the proposed solutions. All provided models and study cases should be solvable, not containing any non-convergence issues. The ESO may accept a DIGSILENT Power Factory Model V15 and above provided this is an open model
- Provide single-line diagram(s) before and after the solution to illustrate how the configuration will look including circuits and substation layouts
- Provide all requested Data Registration Code ("DRC") data to allow the relevant TO/DNO to run a connections feasibility study. This study would be equivalent to the optional feasibility study under the connections process (i.e. STCP17- 1). The scope of studies relates to connecting to and using the system and will include, for example, fault level assessments, power flows and voltage assessments including voltage step changes for each proposed solution(s)
- Provide an overview of any environmental impacts of the proposed solution(s)
- Describe provisions for operation and maintenance of the solution(s)
- Provide an indication of outage requirements
- Provide bidder contact details in case of any queries.

4.2 ITT Stage 2

- Bidders should provide evidence that they have progressed their solution(s) to outline design
- Bidders should provide evidence to demonstrate that they have undertaken some level of feasibility studies, but we will consider that at this stage there may be more detailed land and ground surveys and studies which may require changes to the design at a later point
- Bidders should provide evidence of how their options mitigate all impacts identified by the relevant TO/DNO
- Bidders should provide details of their approach to consenting and/or planning applications (but these may not have been submitted)
- Bidders should provide us with robust implementation plans.

5 Technical Design Criteria and Standards

All proposed solutions should be designed to fully comply with all applicable standards and criteria including but not limited to:

⁴ <https://www.nationalgrideso.com/document/174231/download>

- **NETS SQSS:** This sets out a coordinated set of criteria and methodologies to be used in the planning and operation of the national electricity transmission system of Great Britain
- **The Grid Code:** Proposed solutions should fully comply with the applicable requirements of the Grid Code including but not limited to the Planning Code (“PC”), Connection Condition (“CCs”) or European Connection Condition (“ECCs”), Compliance Processes (“CPs”) or European Compliance Processes (“ECPs”), Operating Codes, Balancing Codes and Data Registration Code (“DRC”)
- **The System Operator Transmission Owner Code (“STC”):** STC defines the relationship between the transmission system owners and the system operator.
- **Relevant Engineering Recommendations** such as:
 - ER G5/4: Planning Levels for Harmonic Voltage Distortion and the Connection of Non-Linear Loads to Transmission Systems and Public Electricity Supply Systems in the United Kingdom
 - ER P29: Planning Limits for Voltage Unbalance in the United Kingdom
 - Relevant Electrical Standards (“RES”): these define the relevant technical specifications, policies and procedures that shall be complied with by all users connected to or seeking connection to GB transmission owner networks⁵.

6 Technical Feasibility Assessment (ESO/TO/DNO)

In order to allow us to assess the technical feasibility of proposed solutions, bidders must submit fully completed proforma documents by the dates specified in the tender timelines. We will assess the technical feasibility of solution(s) based on the following two key assessments:

- A connection feasibility study from the relevant TO/DNO
- A desktop technical review by the ESO.

6.1 TO/DNO Connection Feasibility Study

The Procurement Body will coordinate with the ESO and relevant TO/DNO(s) to request a connection feasibility study for the requested connection points. As part of this assessment, the TO/DNO(s) will identify any works required to accommodate the proposed solution(s), provide indicative site availability dates and connection costs.

6.2 ESO Technical Assessment

The ESO will undertake a desktop technical assessment of all submitted solutions to assess whether they meet the specified system needs. The ESO will model the proposed solutions based on the data provided by bidders, or utilise any models provided by bidders. The ESO will undertake desktop power system studies to assess whether the solutions provide boundary transfer capability similar to that provided by the relevant reference solutions indicated in the system needs description. The ESO assessments will be undertaken in line with the latest ETYS/NOA study guidelines. We will communicate the assessment process and subsequent study results with the relevant bidders.

7 Confidentiality

The information submitted as part of this tender will be confidential to the ESO. Where required, as part of tender transparency, the ESO will share any relevant information with all participants in an anonymised and generalised way.

⁵ <https://www.nationalgrideso.com/industry-information/codes/security-and-quality-supply-standards/code-documents>



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