

# NETS SQSS Review Consultation

## 1. Executive Summary

National Grid Electricity System Operator (NGESO) aims to review some key areas of the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS) in RIIO-2 period, so it enables a decarbonised energy system. This document is a pivotal step to trigger the NETS SQSS enhancement considering the inputs of both the internal and external discussions, covering a wide range of arising technoeconomic challenges.

The document represents the proposed key areas for evaluation, assessing the benefits of the potential changes to confirm their value before taking them forward through the NETS SQSS modification process. These include reviewing the limit to loss of power infeed risk of offshore DC converters, revising the design criteria in Section 4 with Network Options Assessment (NOA)<sup>1</sup> interaction as well as aligning demand connection criteria with the Engineering Recommendation P2/7<sup>2</sup>. The proposed review topics cover a variety of NETS SQSS sections and affect different aspects of the industry and stakeholders. NGESO is committed to ensure we are engaging with the industry on the direction of this work as set out in our RIIO-2 Business Plan.

The document emphasises the main areas that would benefit from a review. These were identified by NGESO with input from stakeholders. Whilst some topics are prioritised to be addressed relatively soon in 2022/23, other areas will require further discussions and studies as illustrated throughout the document.

Interested parties are invited to provide view on the proposed NETS SQSS review plan, advise any additional topics that may need to be addressed in this process, and share information to help us understand your priorities.

## 2. Introduction

The NETS SQSS sets the standards that both the TOs and the ESO must apply to develop and maintain the transmission system and operate that system respectively. The electricity industry has changed significantly since the NETS SQSS was firstly introduced, as there is a big and confident move towards the net-zero carbon energy system. Hence, the relevant codes and standards should adapt to this significant change. The ESO RIIO-2 business plan proposes a targeted review of the NETS SQSS to enhance some areas, where a few issues have been raised constantly by stakeholders. The 2021/22 deliverable of the five-year period is to engage stakeholders and publish a prioritised list of issues with the identification of the quick wins to be achieved in 2022/23.

The document represents a list of potential issues that can be addressed over the RIIO-2 period. This list is based on known issues in the relevant process and feedback from stakeholders. The ESO has collected the initial thoughts of some stakeholders such as TOs, DNOs, Generators and academia representatives and presented this plan in various forums including NETS SQSS Review Panel<sup>3</sup>, Grid Code Development Forum<sup>4</sup> and Open Networks WS1B meeting<sup>5</sup>. The industry experts have provided positive feedback and agreed that these topics represent the key areas where changes can be applied in line with the interests of industry and the

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<sup>1</sup> Network Options Assessment

<https://www.nationalgrideso.com/research-publications/network-options-assessment-noa>

<sup>2</sup> EREC P2/7

[http://www.dcode.org.uk/assets/files/Qualifying%20Standards/ENA\\_EREC\\_P2\\_Issue%207\\_\(2019\).pdf](http://www.dcode.org.uk/assets/files/Qualifying%20Standards/ENA_EREC_P2_Issue%207_(2019).pdf)

<sup>3</sup> NETS SQSS Review Panel

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

<sup>4</sup> Grid Code Development Forum

<https://www.nationalgrideso.com/industry-information/codes/grid-code/development-forum-and-documents>

<sup>5</sup> Open Networks Project

<https://www.energynetworks.org/creating-tomorrows-networks/open-networks/whole-electricity-system-planning>

foreseen changes. However, it has been also highlighted that the number of proposed changes is significant, and the efficiency of delivery is critically dependent on focused Terms of References and engaged workgroups.

This consultation covers different sections of the NETS SQSS as well as Competitively Appointed Transmission Owner (CATO)<sup>6</sup> that can affect multiple sections and the Governance process. It also explores the necessary support from stakeholders to formulate the workgroups on quick win topics in 2022/23. The planned review will prioritise the NETS SQSS topics as follows:

1. Section 7 - Offshore Transmission system
  - a. Limits to Loss of power infeed risk for DC Converters
  - b. Facilitation of offshore coordination work
2. Section 2 - Generation Connection Requirements
  - a. Limits to loss of power outfeed risk
  - b. Interconnector and storage
3. Section 3 - Demand Connection Criteria – Alignment with EREC P2/7
4. Section 4 - Main Interconnected Transmission System
  - a. Review of Security and Economy Backgrounds
  - b. Interactions between NETS SQSS Section 4 and NOA
  - c. Operational measures and commercial services as compliance
5. Section 5 - Operational Standards in England and Wales
6. Introduction of CATO
7. Governance

### 3. NETS SQSS Review Topics

This section provides an overview on the main areas that can be addressed within the review process.

#### 3.1 Offshore Transmission System

With the drive to connect a significant capacity of offshore wind, it is necessary to ensure that network design is coordinated, economic and efficient. To achieve this, two issues may need to be addressed in Section 7 of the NETS SQSS.

- The standard restricts the capacity of any single offshore DC converter to the normal loss of infeed risk (1320 MW). This restriction, which was originally imposed due to the lack of the reliability data for DC converters of capacity exceeding that value, limits the consumers' exposure to events where frequency drops below 49.5 Hz. However, it could result in additional, potentially sub-optimal, investment being required to meet such criteria. It could also result in unintended environmental impacts due to the increase in the numbers of cables and landing points required.
- The standard currently requires that offshore connections are radial connections with some limited redundancy. It means that, although the NETS SQSS does not prevent a degree of coordination on the offshore network, it is unlikely that it would drive that degree of coordination on its own. With the industry currently developing coordination technologies of offshore networks<sup>7</sup> and exploring the potential benefits, it may be necessary in the future to revise the requirements to ensure that the NETS SQSS drives the development of a coordinated offshore network.

We propose a review of the restriction on the loss of infeed risk to check whether it is appropriate to increase it, potentially to 1800 MW, and the implications of this increase both on the number of frequency excursions below

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<sup>6</sup> CATO  
<https://www.ofgem.gov.uk/publications/quick-guide-cato-regime-november-2016>

<sup>7</sup> Holistic Network Design  
<https://www.nationalgrideso.com/future-energy/projects/offshore-coordination-project/latest-news>

49.5 Hz and the cost of frequency response that the System Operator is required to hold to manage the system frequency in accordance with Section 5 of the NETS SQSS.

We also propose to keep monitoring the progress of the ongoing offshore coordination work and incorporate the necessary recommendations in the NETS SQSS. The urgency of this work would depend on what the developments of the offshore coordination work are and whether the current NETS SQSS could restrict the implementation of these recommendations or not.

### 3.2 Demand Connection Criteria

The DNO demand connection standard Engineering Recommendation (EREC P2/7) has already undergone some revisions and further revisions are planned. Hence, there are three main discrepancies between Section 3 of the NETS SQSS and EREC P2/7:

- The NETS SQSS defines the size of a demand group based on the net transmission system demand. EREC P2/7, on the other hand, defines that size based on the total gross demand. This means that the level of the demand security that a DNO is required to provide could exceed what the transmission system is designed to provide, particularly in groups with a significant capacity of embedded small power stations.
- In providing demand security, EREC P2/7 allows the DNOs to rely on commercial contracts with distributed energy resources and on contributions from embedded small power stations. However, NETS SQSS Section 3 does not allow the use of commercial contracts and only takes the output of embedded small power stations to the extent that it reduces the group demand. This could lead to a discrepancy between the transmission network capacity and the distribution network capacity.
- The assumptions on the contribution from embedded large power stations towards demand security is different between the NETS SQSS Section 3 and that used in EREC P2/7 with the later referring to the Guidance on the Application of the Engineering Recommendation P2 (EREP 130)<sup>8</sup>.

These discrepancies could undermine the ability of both TOs and DNOs to ensure that investment on their networks is coordinated, economic, and efficient. It could also have the unintended effect of significantly delaying the connection of embedded storage – a risk that was raised by stakeholders on many occasions. Thereupon, it is proposed to revise the NETS SQSS demand connection criteria to ensure coordinated and consistent investment at the point of interface between the transmission and distribution systems.

### 3.3 Generation Connection Requirements

NETS SQSS Section 2 defines the rules that need to be met when connecting generation plants to the transmission system. This includes both the loss of infeed risk criteria and the minimum transmission connection capacity requirements. Both sets of criteria would complement each other to drive the volume of investment that provides adequate level of transmission system access and guarantees an operable transmission system.

The same rules applied to connect generation have been historically applied to connect interconnectors and storage plants. For the loss of infeed risk criteria, interconnectors were treated as generation. For transmission connection capacity requirements, additional scenarios were considered to allow interconnectors and storage plants to import full power from the transmission system.

This practice, however, has not been explicitly specified in the NETS SQSS. It also does not consider any restrictions on the limit to loss of power outfeed risk. To address this, Section 2 of the NETS SQSS can be revised to explicitly refer to interconnectors, considering the loss of infeed risk and the capacity requirements, to mirror the requirements applicable to storage and interconnectors to cover their operation in both directions, i.e., generation and demand modes, and to specify any appropriate restriction on the loss of outfeed risk.

This work will complement other tools and enhancements that are being developed by Transmission Licensees to facilitate storage connections. This includes:

- An ongoing and continuous review undertaken by Transmission Licensees for what constitutes “conditions to be reasonably expected to arise” when assessing the connection for a specific site to take into account the operational patterns for new technologies; and

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<sup>8</sup> EREP130

[http://www.dcode.org.uk/assets/files/Qualifying%20Standards/ENA\\_EREP\\_130\\_Issue%203\\_\(2019\).pdf](http://www.dcode.org.uk/assets/files/Qualifying%20Standards/ENA_EREP_130_Issue%203_(2019).pdf)

- Focused pre-application discussions with Users to understand how they intend to operate their plants and whether this allows them to benefit from the flexibility available under design variation rules.

### 3.4 Main Interconnected Transmission System

As the generation mix continues to evolve and the processes of managing the uncertainty around which generation connections are going to materialise, it is necessary to ensure that the design criteria applicable to the main interconnected transmission system are kept up to date. This would necessitate a review to Section 4 of the NETS SQSS and the corresponding appendices to cover both the security and economy background assumptions including:

- Revising the scaling factors of existing generation technologies,
- Exploration of how to treat solar generation,
- Assessment of whether energy storage systems should be treated differently based on their MWh capacity,
- Looking at the interactions between NOA process, which is an economic assessment that looks at various future scenarios, and NETS SQSS Section 4, which is essentially a pseudo economic assessment that considers only one scenario. This will cover situations when the recommendations are not aligned.
- Consideration of how transmission capacity is to be calculated and if it is appropriate to extend that concept to include any flexibility that could be delivered by commercial services and operational measures in addition to what is delivered by physical network assets.

### 3.5 Operational Standards

This point is mainly related to Section 5 of the NETS SQSS, and it will investigate the pros and cons of relaxing the operational standard in England and Wales (currently N-D) to match that in Scotland: N-1 under normal operating conditions provided that there is no widespread disturbance. This may produce short to medium term savings on balancing costs. However, such savings could be offset on longer term as the requirements to reinforce the affected boundaries will diminish and the constraint cost will increase. Hence, the impact of changes on customers, risks NGET's plant and interactions with NOA should be carefully evaluated.

The proposal for this change was driven by some discussions which foresee benefits to relax the operational standards in E&W especially at specific boundaries. It is worth noting that if the criteria were to be relaxed, certain boundaries would still have to comply to NETS SQSS clause 5.3 and the benefits of removing clause 5.4 will not extend to these boundaries. Therefore, the benefit case needs to be established first before pursuing this proposed change further.

### 3.6 Introduction of CATO

The Competitive Appointed Transmission Owner (CATO) regime aims to drive competition and consumer value through the introduction of competition to build, own and operate transmission assets. This new regime means the traditional transmission areas will not be monopolies in their defined region and certain transmission assets will go through competitive process to determine ownership. As this is the new concept being introduced in the system, it is not captured by NETS SQSS as it stands now. It could be as simple as changing one or two definitions but could expand to a significant piece of work.

The initial proposal is to change the definition of different transmission areas to include CATO. For example, when referring to traditionally NGET's transmission system, CATO's transmission system will be added adjacent to the term to become "NGET's transmission system and CATO's transmission system". This will lead to consistency between existing TOs and CATOs, as they will be designed according to the same NETS SQSS requirements.

### 3.7 Governance

Currently the governance process for NETS SQSS modifications is complicated and requires modifications to Transmission Licences every time the NETS SQSS is amended. As the industry landscape changes more rapidly, it could be important to make the NETS SQSS more dynamic and allow addressing issues as they arise.

It is not necessarily a NETS SQSS change and could be addressed by other methods. In addition, the Energy Code Reform work is being conducted by BEIS and this will impact how NETS SQSS is governed in the future.

#### 4. NETS SQSS Review Plan

The initial plan to develop and apply changes to the NETS SQSS is displayed in Figure 1. The plan categorises the aimed changes into two main stages according to the planned time to achieve.

Stage 1 consists of the potential solution of the three quick win topics to be achieved in 2022/23. The review team aims to reach agreement among the workgroup members of the corresponding NETS SQSS modifications. The first two modifications to be initiated will be Topic [1a] Assessment of the Loss of Infeed Risk for Offshore DC Converters and Topic [3] Alignment of NETS SQSS Section 3 with EREC P2/7. The workgroup oriented to Topic [2] Review of the Generation Connection Criteria will commence upon the conclusion of [1a].

The common attribute of the quick win topics is that they have a significant impact on network designs and relevant processes and relatively less complications than the broader topics and can be delivered efficiently. Topic [1a] dictates a critical assumption of the latest offshore network design; Topic [2] clarifies how interconnectors and storage are treated and the Limitation of Loss of Outfeed Risk will have a direct impact of high-frequency event management; Topic [3] will establish consistency between DNO and TO network planning at interface points.

Meanwhile, the review process will also scope the work on the broader and more comprehensive Topic [4] NETS SQSS Section 4 and NOA Interaction in 2022/23, which will be conducted as the top priority in 2023/24 as this has been a long-standing topic for a few well-known problems that affect the network design and investment.

The remaining topics are prioritised based on the current available information. Following Topic [4], the review team will carry out [1b] Additional Offshore Changes, [5] Operational Standards in E&W, [6] CATO, and [7] Governance in the next three years. Additional offshore changes may be foreseen when the offshore coordination work completes. Operational standards in E&W will need careful assessment to define the benefit case. And CATO and Governance will be clarified depending on the feedback and instructions from the relevant governing bodies. Thereupon, the review process will be flexible when prioritising the tasks according to the developing changes during the review process to optimise the efforts and acknowledge the industry needs.

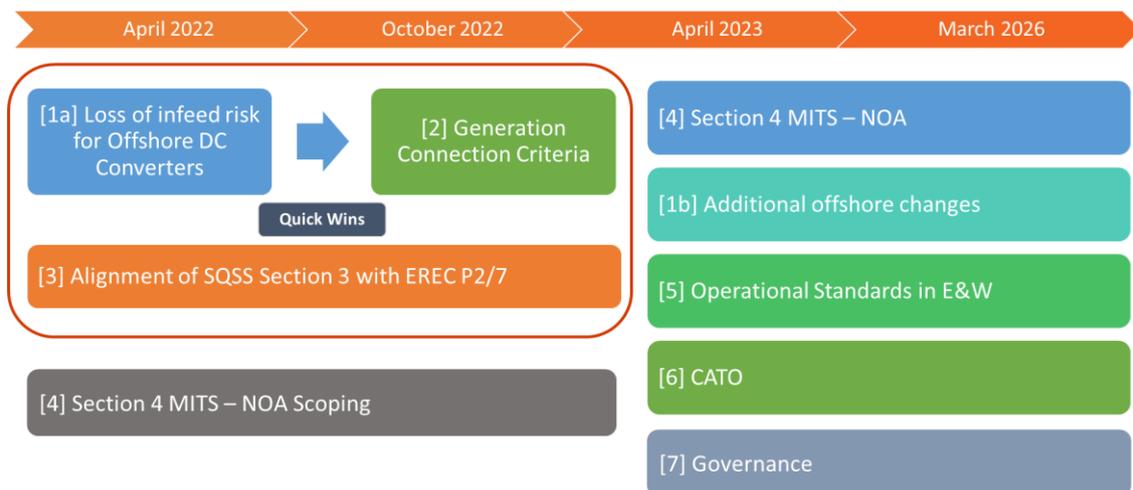


Figure 1. Timeline for the proposed NETS SQSS review and changes.