SQSS Workgroup Consultation Response Proforma

GSR027: Review of the NETS SQSS Criteria for Frequency Control that drive reserve, response and inertia holding on the GB electricity system

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses to box.sqss@nationalgrideso.com by **5pm on 30 September 2020**. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

If you have any queries on the content of this consultation please contact Paul Mullen paul.j.mullen@nationalgrideso.com or box.sqss@nationalgrideso.com.

Respondent details	Please enter your details
Respondent name:	Keith Bell and Marcel Nedd
Company name:	University of Strathclyde
Email address:	Keith.bell@strath.ac.uk
Phone number:	Click or tap here to enter text.

For reference the SQSS objectives for GSR027 are:

i. *facilitate the planning, development and maintenance of an efficient, coordinated and economical system of electricity transmission, and the operation of that system in an efficient, economic and coordinated manner;*

ii. *ensure an appropriate level of security and quality of supply and safe operation of the National Electricity Transmission System;*

iii. *facilitate effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the distribution of electricity; and*

iv. *facilitate electricity Transmission Licensees to comply with their obligations under EU law.*

Please express your views regarding the Workgroup Consultation in the right-hand side of the table below, including your rationale.

GSR027

Standard Workgroup Consultation questions GSR027		
1	Do you believe that the GSR027 Original solution better facilitates the SQSS Objectives? Please explain your rationale.	To an extent, the SQSS already permits some modification/adaptation of the set of secured events – see paras. 5.5 and 5.6 (which concern tightening of security rather than relaxation). The proposal to allow some adaptation of the set of secured events relating to frequency limits is, we believe, good in principle. It is the kind of thing that the GARPUR project advocated, founded on the quantification of system risk as the product of the probability of an unplanned event and its impact, summed over all possible events, and the understanding that risk can be reduced by appropriate balancing actions but that these actions incur a cost. However, transparency and consistency are needed on how decisions are made to tighten or relax standards. In order to gain the full support of informed stakeholders, we believe that the ESO's proposal needs to be put in the context of how the full set of secured events and prohibited impacts relate to risk. Is there a clear understanding of the framing of all events specified by the SQSS and the management of risk? That is, how common are the different events and how bad would each of the prohibited outcomes be? Does the ESO have good data on the probabilities of different events under different circumstances? In our opinion, in order both that the ESO can make informed decisions about which events to secure against and when, and that all stakeholders can have confidence in the ESO's oversight of system security, statistics on the occurrence of the different types of unplanned event and the restoration times of outaged items of plant should be published annually.
2	Do you support the proposed implementation approach?	Click or tap here to enter text.
3	Do you have any other comments?	While optimality in the management of risk is indeed likely to suggest an adaptation of the set of

		secured events to changing circumstances, to do that the following are needed: 1. A clear conceptual framework for management of risk; 2. Adequate data to allow the assessment of risk; 3. Sufficient modelling capability. The framework should include the way of comparing costs and benefits, in particular how to put a value on interruptions to electricity supply to end users. In this, it must take account of the fact that, if a transmission originated event leads to loss of supply, it is likely to affect a large number of users at the same time. If the system or a region of it experiences frequency or voltage instability, an extremely large number of users in the same region or across the country will be affected simultaneously, affecting their ability to mitigate the impact of loss of supply. Moreover, restoration of supply following a frequency or voltage instability is likely to take many hours, perhaps days. If this happens, for example, at a time when demand for heating – not just direct electric heating but other forms of heating that depend on electric pumps and valves – is high, the impact can be very grave. Conventional assessments of 'value of lost load' do not take account of such large, simultaneous events with long recovery times. For further discussion, see: • https://ukerc.ac.uk/news/august-9-investigations/ • https://strathprints.strath.ac.uk/63556/ • https://pureportal.strath.ac.uk/en/publications/risk-and-reliability-assessment-of-future-power-systems • https://www.sintef.no/projectweb/garpur/
4	Do you wish to raise a Workgroup Consultation Alternative Request for the Workgroup to consider?	Click or tap here to enter text.
Specific GSR027 Workgroup Consultation questions		
5	Do you agree with the proposed SQSS legal text? Please provide the rationale for your response.	A clear rationale should be provided for why it is proposed to drop the requirement for any system frequency below 49.5 Hz to be restored in 60 seconds or less. Although paragraph 4.3.2 of Annex 7 mentions a lower bound of 49.2 Hz that

		the ESO has, in practice, applied when managing system frequency when assessing the impact of secured events, why has the opportunity not been taken to specify a lowest permitted frequency nadir in the SQSS? Specifications of limits to system frequency and the acceptable duration of breaches should be clear, unambiguous and consistent between the SQSS and any accompanying documents.
6	Do you agree with the proposed Governance framework? Please provide the rationale for your response.	A viable new, flexible system security assessment and management process should include a requirement to assess the impacts of a full set of events, so that the ESO is allowed not to secure against any of them if certain, clearly defined conditions are met. For example, although an adverse impact might arise from an event, the impact does not exceed a certain threshold, the probability of the event is below a certain threshold, and the cost of securing against it is above a certain threshold. However, this approach relies on good data and modelling to achieve its potential. We are surprised that the ESO has not taken the chance to spell things out that, according to our understanding, some people claimed were not clear in relation to the response of distributed generation to secured events on the transmission system. In particular it could be clarified that, as part of the assessment of the impact of a secured event, all control responses that might reasonably be expected to occur should be modelled and assessed regardless of where on the (whole) system they would occur. There should be no “decision” on “which control measures will be assessed”. All control responses that a competent professional engineer would judge to be likely to be occur should be part of the assessment. To have confidence in what the control responses would be, of network control and protection equipment and of equipment owned by users of the whole electricity system, there needs to be confidence that users’ equipment complies with the Grid Code and relevant Engineering Recommendations. These standards form an important part of industry governance. Who is enforcing compliance with them?

7	The vast majority of the Workgroup believe that the Governance framework should be housed within an annex or appendix to the SQSS. The Workgroup have also considered other options, namely Transmission Licence conditions or the Grid Code. Do you agree with the Workgroup's conclusions? Please provide the rationale for your response.	Where there is flexibility in which events to secure against and when, it will be important for stakeholders to understand the process that the ESO will use in assessing which events to secure against. It will also be important for the ESO in order to be able to show that it is complying with its licence requirements. We believe that, analogous to the procedural guidance given in Appendix G on assessment of the economics of proposed network reinforcements, the SQSS should include the process and clear guidance on decision making in enlarging or reducing the set of secured events. Text included in the SQSS, whether in the main body or in an Appendix, forms part of the electricity transmission network licensees' licence obligations. Although the application of the SQSS may depend on professional engineering judgement, the text should be written in such a way as to allow stakeholders to test whether the licensee has complied with its requirements with respect to security of supply and, where it has, the licensee to show that it has. What has been proposed for a new Appendix H does not allow a stakeholder to test whether the ESO has taken appropriate decisions in securing the system. It simply describes an administrative process. As such, we do not believe that it is a useful drafting that better meets the objectives of the SQSS.
8	The ESO's illustrative FRCR methodology articulates the risks and impacts to be assessed in version 1 of the FRCR. Section 8 sets out what could be considered in future versions. Do you agree with the ESO's conclusions on what will covered in version 1 and future versions? Please provide the rationale for your response.	We assume that the "Illustrative FRCR methodology" refers to the Interim Methodology provided in the consultation pack. The "Interim Methodology" document provides a fair amount of background to the proposed changes to the SQSS. This is useful but is perhaps not appropriate for a document that will, in effect, be a licence condition. It makes the document very long and hinders clear sighting of the key requirements on the ESO. Power systems engineering and our understanding of the background to the SQSS suggest to us that the rules in it are set in order, finally, to limit the probability of occurrence of the following:

		• disconnections of transmission connected demand; • frequency or voltage instability; • cascades of events would occur that could lead to frequency or voltage instability. Limits to the acceptable range of frequency variations must be seen in that context. However, it may also be recognised that defence measures do exist, not least Low Frequency Demand Disconnection (LFDD) (and other defence measures might be put in place in future). How much confidence can there be that LFDD would succeed in preventing a frequency instability and how often would it be acceptable to trigger LFDD? How well suited is LFDD to the nature of today's whole power system? It should be clarified that new connections and generators are being designed that will involve single BMU outages of up to 1600 MW, or network faults that could disconnect up to 1800 MW. These will have a significant bearing on loss of infeed risk, the probability of certain size of loss, its impact and the cost of reducing its impact. We would welcome discussion of this. .
9	Section 10 of the illustrative FRCR Methodology sets out the input data the ESO believe is required to produce the FRCR. Do you agree that this is suitable? Do you have any thoughts on how the data to remove ESO's working assumptions may be gathered?	Sources of data for assertions such as "one or twice per millennium for the shortest double circuit overhead line routes" should be provided as evidence supporting the decision making that the ESO proposes to undertake. The ESO should publish statistics annually on the occurrence of both secured and unsecured events and restoration times for items of plant that have suffered unplanned outages. We would be very surprised if the ESO does not have access to or has not been recording such data as we would regard it as forming a core part of the monitoring of system risk and assurance of system security as required by the ESO's licence obligations towards "development, maintenance and operation of an efficient, economical and co-ordinated system of electricity transmission" and "protection of the security and quality of supply and safe operation of the national electricity transmission system".

		Where is the evidence that demand changes by 2.5% per Hz?
10	The Workgroup have proposed 2 options for which body the 'FRCR Approver' could be. Do you agree and which is your preference? Please provide the rationale for your response.	Click or tap here to enter text.