GSR027:

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

SQSS Panel

27th April 2020

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SQSS Review Requirements

E3C final report:

Action 5: The ESO, in consultation with industry, should undertake a review of the SQSS requirements for holding reserve, response and system inertia. This review should consider:

- the explicit impacts of distributed generation on the required level of security;
- whether it is appropriate to provide flexibility in the requirements for securing against risk events with a very low likelihood, for example on a cost/risk basis; and
- the costs and benefits of requiring the availability of additional reserves to secure against the risk of simultaneous loss events.

Timing: The ESO should put forward modification proposals to the SQSS by April 2020.

Ofgem final report:

5.7. *Action (1):* The ESO, in consultation with the industry, should undertake a review of the SQSS requirements for holding reserve, response and system inertia.

5.7.1. This review should consider:

- the explicit impacts of distributed generation on the required level of security
- whether it is appropriate to provide flexibility in the requirements for securing against risk events with a very low likelihood, for example on a cost/risk basis
- the costs and benefits of requiring the availability of additional reserves to secure against the risk of simultaneous loss events

5.7.2. The ESO, as the party required to operate to the standard, should carry out this review and raise modification proposals to the SQSS Panel by April 2020. This would provide the appropriate channels for industry scrutiny and transparency, and for an ultimate Ofgem decision on any required changes to the standard

Aims

Engagement:

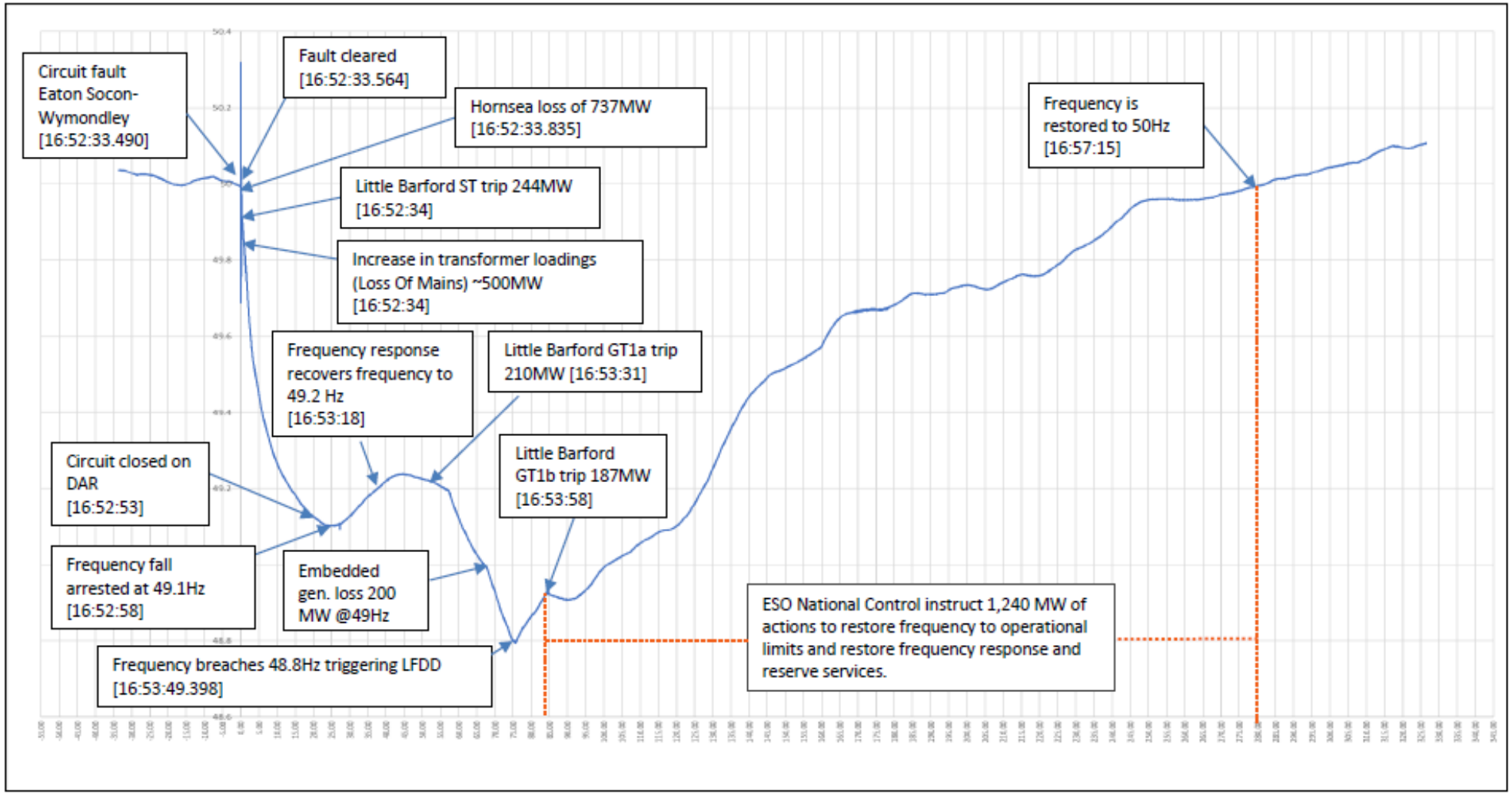
- The SQSS criteria for frequency performance were implemented to provide a defined level of security with an expected level of cost. Changing the SQSS to reflect additional risks will impact that balance. In raising any modification that balance must be considered with a wider audience to ensure the right outcomes for industry and the consumer.
- Presented draft proposals at meetings of Grid Code, SQSS and BSC Panels plus March Grid Code Development Forum

Challenges:

- The modification must be explicit in its treatment of Distributed energy resources (DER) and simultaneous losses
- The current SQSS framework is specific and optimisation is carried out by the ESO in a broader context: any modification must also improve transparency
- The conventional way of changing the SQSS relies on a single Cost Benefit Analysis for future implementation. Known changes that we need to take account of are;
    - o Decreasing system inertia countered by ESO stability pathfinder delivery;
    - o Faster acting response products changing the operating envelope;
    - o Reduction in the potential size of DER losses as the Accelerated Loss of Mains Change Programme delivers
- In a changing environment it would be preferable to be able to adjust the parameters or process needed to achieve the desired balance of cost and risk with greater agility than the code modification process allows.

9th Aug background - Frequency trace

Figure 2 – Annotated Frequency Trace of the Event



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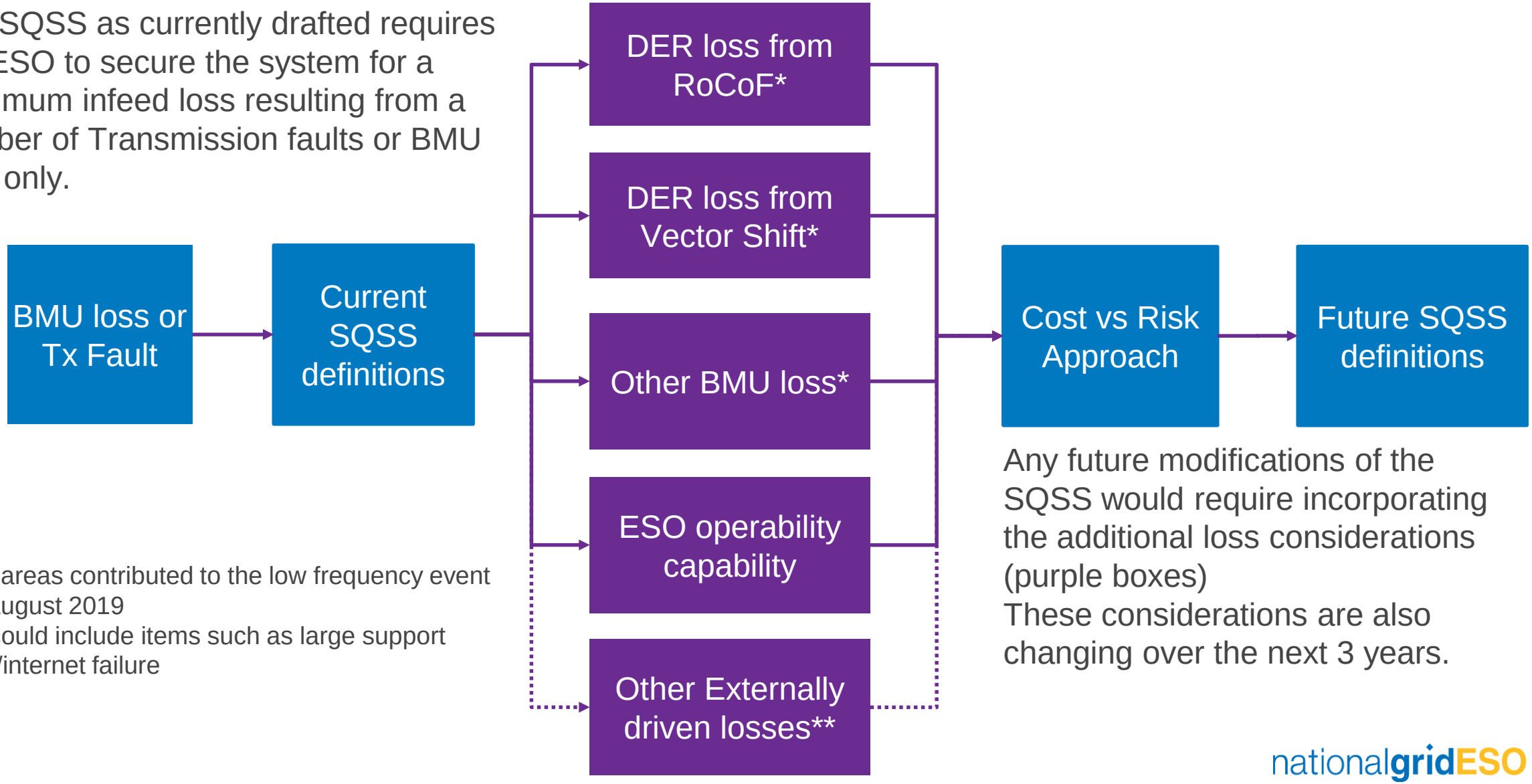
9th Aug background - Total infeed losses

Generation Unit	Infeed Loss	Cumulative Infeed Loss
Little Barford ST1C	244 MW	244 MW
Hornsea Offshore Windfarm	737 MW	981 MW
Estimated, Embedded generation infeed loss due to Vector Shift Loss of Mains Protection	150 MW	1,131 MW
Estimated, Embedded generation infeed loss due to RoCoF Loss of Mains Protection	350 MW	1,481 MW
Little Barford GT1A	210 MW	1,691 MW
Little Barford GT1B	187 MW	1,878 MW

Table 2 – Table of cumulative infeed losses

Factors Affecting Infeed Loss

The SQSS as currently drafted requires the ESO to secure the system for a maximum infeed loss resulting from a number of Transmission faults or BMU trips only.



Any future modifications of the SQSS would require incorporating the additional loss considerations (purple boxes)
These considerations are also changing over the next 3 years.

* These areas contributed to the low frequency event on 9th August 2019
** This could include items such as large support network/internet failure

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Potential Approach - Options

Option	Approach	Proposed Implementation	Framework	ESO Role
1. Deterministic	Expand the current SQSS definitions to include LoM risks in *infeed loss* consideration.	As per todays implementation	As per todays framework, would require a number of changes as the operating environment varies.	Feed into the proposed wording of the changes
2. Mixed	SQSS refers to a methodology where an agreed set of risks are considered and a recommendation of which to secure/not secure is proposed	SQSS will in an addendum list all of the risks which the ESO is required to secure	Similar approach to the Electricity Capacity Report and C16 process for governance	Create a transparent and consulted methodology. Create a transparent and consulted recommendation Cost and Volume optimise the recommendation, transparently, in real-time
3. Probabilistic	SQSS refers to a methodology where an agreed set of risks are considered together with probabilities to create a cost curve with a recommendation	The ESO will secure a loss size of x during period y. Where x and y are decided through the methodology	Similar approach to the Electricity Capacity Report and C16 process for governance	Create a transparent and consulted methodology. Create a transparent and consulted recommendation Cost optimise the recommendation, transparently, in real-time

Proposed Solution

1) The development of a methodology framework, in accordance with an agreed process and which is regularly reviewed and updated by consultation, that:

a. describes the method and parameters used to determine the circumstances for which unacceptable frequency conditions should not occur; and

b. clearly states what these conditions are;

2) The implementation of a regular process, led by the ESO, which is described in the methodology, and has an output which is appropriately transparent and agreed through a defined process (eg by a specifically convened committee or by a body such as the Authority); and

3) Change to the SQSS provisions to define or supplement the process and address any inconsistencies.

Possible Approaches to Methodology - detail

	Approach	Method	Output
A	A single set of limits and conditions	• Set background and sensitivities • Evaluate cost and value (the avoided impact and likelihood) of securing contingencies in the following steps ○ Assess how often the system is likely to experience imbalances of different sizes ○ Calculate the cost of preventing different size imbalances causing "unacceptable frequency conditions" including the size and duration of the frequency deviation ○ Combine the first two steps together to assess the balance of the two key objectives accordance with	Broad categories of contingencies and secure everything that could fall in that category, with no consideration of cost or probability for individual contingencies within each category
B	A specific list of contingencies and conditions		Specify contingencies to be secured and recommended method
C	A single contingency (a reference incident) and conditions.		Specify a reference loss size and minimum inertia to be secured at all times

Option A is most closely linked to the current approach hence should be well understood but leaves some scope for interpretation of how the limits should be applied in practice. Option B has the potential to be very transparent and clear but is potentially complex and burdensome. Option C could be very clear, transparent and simple but needs to be carefully designed to ensure that the reference incident is not excessively onerous.

Further work is required to determine the most appropriate approach which could be taken forward in the development of an initial methodology and process. This will be done in parallel with and as part of the development of the SQSS modification.

Provisional Timeline for GSR027

Milestone	Date	Milestone	Date
Workgroup Nominations (15 working days)	28 April 2020 to 20 May 2020 (13 May 2020 if 10 working days)	Code Administrator Consultation (15 Working Days)	*5 October 2020 to 26 October 2020*
Workgroups 1, 2 and 3	28 May 2020, w/c 22 June 2020, w/c 13 July 2020	Draft Final Modification Report (DFMR) issued to Panel	November 2020
Workgroup Consultation (20 working days)	20 July 2020 to 18 August 2020	Panel undertake DFMR recommendation vote	November 2020
Workgroup 4 - Assess Workgroup Consultation Responses	w/c 31 August 2020	Final Modification Report issued to Panel to check votes recorded correctly	1 December 2020
Workgroup 5 – Workgroup Vote	w/c 14 September 2020	Final Modification Report issued to Ofgem	9 December 2020
Workgroup report issued to Panel	September 2020	Ofgem decision	TBC
Panel sign off that Workgroup Report has met its Terms of Reference “Special Panel”	September 2020	Implementation Date	TBC