FRCR Webinar Questions 8th March 2021

Scope

Question	ESO response
There's a "how do all the initiatives fit together" piece - Freq control & constraints & stability pathfinders etc; as nested solutions exist	The Frequency Risk and Control Report is looking specifically at frequency; wider operability challenges are addressed in the Operability Strategy Report and the System Operability Framework.
Does the bmu infeed loss risk include the prospect of a much larger sized DSR BMUs in future (noting tech standards for demand don't exist)?	We have assessed the current connections and new connections, both infeed (generation) and outfeed (demand) expected in 2021; new connections and changing system conditions will be considered in future editions.
Should these risks be viewed through a FES lens?	This edition of the FRCR is focusing on system operation in 2021; new connections and changing system conditions will be considered in future editions.
Aug 9th, 2019 event you classify as a 1 in 240 years event?	The disruption caused by the 9th August 2019 event[1] was caused by the simultaneous loss of multiple generators. As per the Methodology, and as noted by Ofgem in their decision on approving SQSS modification GSR027, simultaneous events have not been assessed in this edition. Simultaneous events will be one of the key considerations in the next edition.
How are you assessing risk of repeated faults over a short time-period (e.g. 10min)? Is this different to a single 'one-off' event?	Simultaneous events, meaning where a number of events contribute to a situation, will be one of the key considerations in the next edition.
As frequency and rocof differs across the grid, e.g. Scotland and England, do you expect a different inertia floor per region going forward?	This will be considered by the Stability Pathfinder programme.
The section 13 on further consideration reads much like a tip of a larger iceberg. pls note local f measurement difference, F&V &other SOF topics discussed.	We are focused on establishing the process and identifying quick wins in this first edition; we have introduced this flexible framework to allow us to grow and evolve the FRCR in-

[1] https://www.nationalgrideso.com/document/152346/download

	step with changes in the power system and markets.

Dynamic Containment

What do you base your anticipated DC pipeline on? (e.g. 900 MW in July)	Our account managers are working with the current and potential providers of this service to understand their intent and progress. We have used the current best-view in the analysis.
How do you factor in the upcoming DC HF regarding 50.5 hz risk?	We have not factored in DC-high at the moment; future editions will look at this.
Why is the CM cost of dynamic not included as DC is used exclusively for ESO and is a real cost to consumers	The future considerations include whether the wider, non-BSUoS costs associated with services should be considered.
If the DC low pipeline increased to 2GW would there still be benefit to the ESO?	Over the next few years, we expected to see larger infeed loss risks connecting to the system, along with also further decreases in inertia as we move to a zero-carbon system. These new, larger infeed loss risks will overtake the current Loss of Mains risk. This means that there is a continuing need for Dynamic Containment. The detailed requirements for the service are outlined in our Response Market Information Report
When ALOMP is 100% complete will DC still be required at about 1GW?	See above
ESO wants to buy lots of costly DC to manage the freq drop risk due to lower inertia but sure what ESO should be buying is more inertia to manage Freq risk?	Proposal 1 and Proposal 3 look specifically at the relative value of holding more inertia and more response, respectively. Currently, increasing minimum inertia does not represent value for money. We are looking at the procurement of inertia as part of the Stability Pathfinder, for periods when the market alone does not provide enough inertia to meet the minimum requirement We also expect that competition in the Dynamic Containment market will result in lower prices over time. There will be a balance of whether risks are best managed with faster response or more

	inertia as these new stability markets are developed.
The report justified the ESO current approach wrt DC is there going to be an independent technical review?	The purpose of the consultation is to invite responses from all.
How will the ESO ensure the DC state of charge is always good and where is the cost of this dealt with?	The service terms for Dynamic Containment set out the technical specification for the service and performance monitoring rules applied to ensure delivery of the service in line with the contract terms.

Cost vs. risk

The report indicates a 1 in 270-year risk of an LFDD event with the proposals implemented. What is the calculated risk level with the current policies?	LFDD events (frequency below 48.8 Hz) have happened on two occasions in the last ~30 years since privatisation, once in 2008 and once in 2019. This level of risk is broadly in line with historic expectations but does represent an improvement in reliability. We welcome views on the appropriate balance of cost and risk through the consultation.
Are you serious about not tolerating a dip below 49.2 Hz, even of very short duration, except once in 22 years? This seems to happen quite frequently now.	See above
Significant Voltage Control / LFDD events have occurred on 27.5.2008, 11.2.2012 & 9.8.2019. Three major events not two. How does the 3rd event change outlook?	See above. The 2012 event was an instructed demand control event and not a frequency event (i.e. frequency stayed within normal operational limits) nor an activation of LFDD, and so is not in scope of the Frequency Risk and Control Report.
Major ESO Voltage Control or LFDD events on 27 May 2008, 11 Feb 2012 and 9 Aug 2019. Not just two as the ESO keep stating. Is there collective amnesia at ESO?	See above.

Transparency

Do you have any predictions about how often you'll have to take action to stay above the minimum inertia level? (i.e. How expensive this approach might be.)	The cost of inertia is part of the system-wide costs. The cost of increasing inertia is set out in proposal 1. We will look to add more information in the final version of the report.

Can you quantify the "reduction in the scale of intervention ...in market dispatch"	We'll look to quantify this in the final version of the report.
Will the ESO be publishing inertia costs (£/gva or £/mwh) so that the mkt can invest to provide it including a-sync. Plant?	The Stability Pathfinders provide the market signal for investment in inertia and other related services.

Future considerations

Reports internationally highlight Freq, dfdt & over voltage risk within convertor C&P; GC0141 provides ESO more info-suggest future post-implementation review	GC0141 is a Grid Code change that looks at Compliance Processes and Modelling amendments following the 9th August 2019 Power Disruption. It is being progressed by an industry workgroup and we will feed in relevant outputs to future editions of the report.
How are grid forming inverters accounted for in the minimum inertia limit?	The specification for grid forming inverters is being developed through Grid Code modification GC0137. It is being progressed by an industry workgroup and we will feed in relevant outputs to future editions of the report.
Did you look at decreasing minimum inertia policy to 120GVA.s?	The methodology for this first version included assessing increasing the inertia. Future editions will consider the options for decreasing inertia.
Securing to 49.2 rather than 49.5Hz suggests that the system could be secure at lower levels of inertia - will the minimum inertia level change from 140GVA.s?	See above
The probabilities are good but what about a comparison showing the impact of the event (£s) when it happens versus the cost to secure?	This edition of the FRCR has used total cost and how often each impact is expected to occur as the two metrics for assessing cost vs risk. A third metric looking at the value per avoided event was proposed in the methodology, but there were no consultation responses suggesting how to overcome the limitation of using existing Value of Loss Load figures, and so it was not used in this edition. We welcome feedback and suggestions on how this could be developed in future.

Are the probabilities used for event risk adjusted to account for extreme climate effects that may become more regular?	This edition of the FRCR is focusing on system operation in 2021; the impact of weather conditions is part of the Future Considerations.

Clarifications

Offshore co-ordination has highlighted normal infeed limit offshore should be reviewed- worth mentioning in section 13 also?	FRCR is focused on the Operational chapters of the SQSS, rather than the design criteria. Any change to the design criteria will be factored into future editions of the FRCR.
Please clarify what is meant by "IP risk" in section 13?	“Internet Protocol” i.e., the communication and control systems for market participants’ assets
Would largest infeed loss be still optimised to keep rocof risk below .125 Hz/second?	We would allow the RoCoF (or df/dt) to exceed 0.125Hz/s and cause a RoCoF loss following a BMU-only event, if we could contain the total frequency deviation to 49.2Hz
Please could you explain a little more about what a BMU only event is compared to a vector shift event	BMU-only are the transmission-connected infeed (generation) and outfeed (demand) loss risks and are caused by faults within those assets. Vector Shift events are caused by faults on the transmission system (National Electricity Transmission System), where the event could disconnect both the transmission-connected infeed/outfeed and result in the loss of Distributed Energy Resources with Vector Shift Loss of Mains protection.
Can you explain the difference between the BMU only event and the BMU+VS intact event?	See above
It would be useful to see price assumptions behind cost estimates. Eg, are products stacked with existing markets? Not all tech can provide all services	As described in the methodology: Costs for inertia (including footroom) and BMU loss size have been benchmarked against the typical prices achieved through the Balancing Mechanism and trading. The quantity and price of the different frequency response services have been benchmarked against the results of previous tenders or auctions.

How does a minimum inertia limit mitigate the risk of vector shift trips (which arise from sudden voltage angle change e.g., due to MITS circuit tripping)?	The successful first year of the Accelerated Loss of Mains Change Programme means that the largest Vector Shift only risk is now below 700MW. This means that the VS-only risk is now small enough that the minimum inertia limit of 140 GVA.s will always prevent it from causing a RoCoF loss, and therefore prevent a frequency deviation below 49.5Hz.
Report uses current inertia holding costs- SOF data suggests scale of future intervention growth- how are baseline assumptions sustained? annually review?	The FRCR is designed to be a regular process, produced at least once per year. The assumption and data will be regularly updated to reflect changing system and market conditions.
Report caveats that DG loss for other reasons not included; do we know that- e.g., FRT event wouldn't have DG loss? is there stability pathfinder o/p baked in?	We have covered the known DG losses risks (i.e. RoCoF and Vector Shift); if any new mechanisms became known, then we can use the FRCR to address them. Any feedback to the consultation to highlight any new/novel risks is strongly encouraged.
How will the proposals affect the relationship between the rocof limit and the level of synchronous generation on the system? How much less generation required?	We are proposing to keep the same minimum inertia level at 140GVA.s, so no change in the level of minimum synchronous generation required.
The BMU+RoFoC+VS (Outage) leading to LDFF would seem quite plausible, why is this not to be covered?	These are the BMU+VS risks: RoCoF is considered as part of the event (likewise, BMU-only considers consequential RoCoF losses).