

Sygensys FRCR 2025 Consultation Response

Sygensys
7th April 2025

Introduction

- Thanks to NESO for preparing FRCR 2025 and associated documents.
- I am sorry that my time available to prepare a consultation response this year is limited, in comparison to last year. I have run out of time to complete this.
- I hope the following rough notes are useful input.

Respondent details

1 Respondent name: Andrew Larkins

2 Company name: Sygensys

3 Email address:

4 Phone number:

5 Which best describes your organisation? ☐ Other (consultant & consumer)

I wish my response to be Non-Confidential (your responses will be shared with industry, the SQSS Panel and the Authority for further consideration)

With the exception of my email address and phone number

FRCR 2025 feedback

- Do you agree that the FRCR 2025 has been prepared appropriately? *No. As per my comments last year I still do not have confidence in the analysis of the risks associated with simultaneous, cascading events.*
- Do you believe there has been sufficient industry engagement in preparing FRCR 2025? *No.*
- Overall, do you agree that the FRCR 2025 represents the appropriate level of development in determining the way that the NESO will balance cost and risk in maintaining frequency security while operating the system at a reduced inertia down to 102 GVA.s? *No*
- Do you agree with the recommendation to: Reduce minimum inertia requirement down to 102 GVA.s : *Only if regional RoCoF risks are assed first and reviewed with industry.*
- Do you agree with the recommendation to: Secure all BMU-only events (including consequential RoCoF): *The term BMU only events is misleading. For example the recent multiple trip at DRAX impacted BMUs only and was not a secured event under the policy of FRCR 2024 or FRCR 2025.*
- Do you agree with the recommendation to: Procure additional DC-Low service provision by 200 MW: *I do not have sufficient confidence in the FRCR analysis to respond to this question.*
- Do you have any other comments to the recommendations? *See this presentation*
- In your view, what should the future FRCR focus on? *See this presentation*

Status against issues raised by Sygensys in FRCR 2024 consultation. See page 19 of [Post](#) | [Feed](#) | [LinkedIn](#)

FRCR 2024 Summary table

Section 3: Include naming of assets and a geographical map for the incident.

Section 4: Make public all report recommendations, as a "Call to action" for the industry.

Section 5: Describe incidents as "cascade events" where this is the case and update the 22 December 2023 report accordingly.

Define the term "simultaneous" where this is used to associate separate events with a single incident.

Section 7: Introduce aviation-style "Near Miss" reports.

Section 10: Review delivery of LFSM (including the 22 December 2023 incident).

Consider proposal for frequency-sensitive mode for flexible loads.

Section 11: Include analysis of reasons for DER tripping where this occurs.

GC0105 and GC0151 reports to include 50 samples per second data on frequency and voltage, from a selection of sites across the system.

Request plant operators to check FRT performance after significant events.

Publish results of FRT investigation from 22 December 2023 event.

Include Vector Shift FRT requirements in scope of GC0155 or future Grid Code modification.

Section 12: Publish actions relating to "Operational Visibility of DER".

Include voltage graphs in GC0105 and GC0151 reports (as above).

Investigate development of automated collection and analysis of event data from a sample of DERs across the system.

Section 6: Annual reports of cascade events (>1BMU, >750MW, <1minute)

Annual trend in lowest and highest system frequency.

Section 8: Investigation of under-delivery of response and any risks arising.

Section 9: Consideration of new risk types, such as cyber-attack to demand response.

Consideration of risks that might be more severe than a 48.8Hz event.

Statement on any review of the System Defence Plan.

Section 13: Include SSO-related risks.

Status in March 2025

There has been some improvement in OTF of naming units where the information is public for example via REMIT

NESO continue to miss the opportunity to emphasis the importance of fault ride through to avoid cascading failure eg Recent DRAX unit trip report at OTF

As above NESO do not emphasis the cascade nature of some events.

No sign of this.

LFSM is addressed in FRCR 2025

FRCR 2025 reports statistics of events, but does not look at identifying or mitigating the root cause.

Not done

Not done and apparently no automated system in NESO to automatically proactively look for FRT issues.

Can not find it if it was published?

Aspects of GC0155 has been further delayed, by starting a new mod, and scope does not include VS ride through.

There is a workstream on this.

Not done

Not done

FRCR 2025 makes some attempt at this.

Not included.

Status unclear?

FRCR is still only looking at events that have already happened to assess future risks.

FRCR 2025 make only one passing reference to nationwide blackout.

System Defence Plan not mentioned in FRCR 2025

Some mention of SSO risks in FRCR 2025

Trends

- Consider better reporting of trends vs time in future versions of FRCR
- For example see [ENTSO-e 2023 ALFC Report](#)

2022

Data item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr
The mean value	49.99963	49.99879	50.00017	49.99938	50.00001	49.99931	49.99932	49.99993	49.99971	49.99950	49.99945	49.99965	49.99957
The standard deviation	0.0665	0.0675	0.0662	0.0659	0.0659	0.0661	0.0662	0.0633	0.0643	0.0679	0.0673	0.0687	0.0663
1-percentile	49.855	49.852	49.854	49.855	49.858	49.853	49.854	49.857	49.854	49.848	49.855	49.845	49.853
5-percentile	49.892	49.891	49.893	49.894	49.895	49.893	49.892	49.897	49.893	49.888	49.889	49.885	49.892
10-percentile	49.913	49.912	49.914	49.914	49.915	49.914	49.913	49.918	49.915	49.911	49.910	49.908	49.913
90-percentile	50.085	50.086	50.084	50.083	50.083	50.083	50.083	50.080	50.080	50.085	50.086	50.086	50.084
95-percentile	50.105	50.109	50.105	50.104	50.104	50.104	50.104	50.099	50.100	50.107	50.107	50.107	50.105
99-percentile	50.142	50.150	50.146	50.142	50.145	50.143	50.144	50.136	50.137	50.149	50.145	50.145	50.144
Time(min) > 200 mHz	26	31	23	40	39	18	32	10	5	23	22	18	287
Time(min) < -200 mHz	27	28	41	36	31	50	39	32	34	61	25	62	467
Time(min) > 800 mHz	0	0	0	0	0	0	0	0	0	0	0	0	0
Time(min) < -800 mHz	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of events freq.dev > 400 and > 200 mHz within 15 min	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of events freq.dev < -400 and < -200 mHz within 15 min	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of events freq.dev > 500 mHz and > 1 min	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of events freq.dev < -500 mHz and > 1 min	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 25 GB SA Performance for year 2022

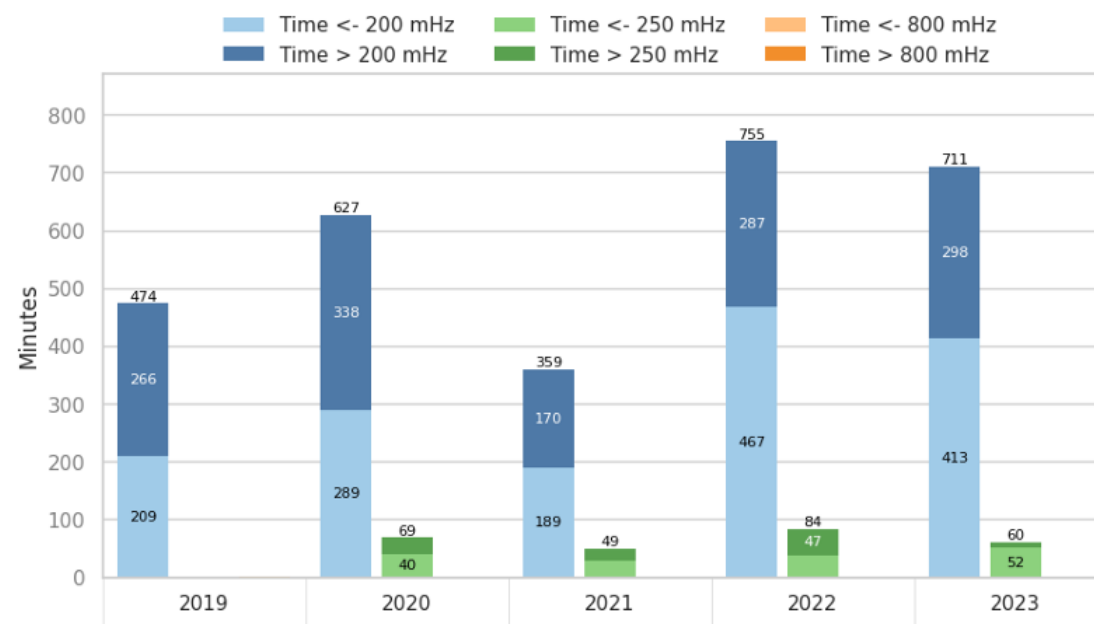


Figure 30 Annual number of minutes outside the standard ranges in Great Britain for 2019–2023

Potentially conflicting message/emphasis?

- FRCR appears to present a different emphasis to the recent [Webinar - Pre-fault frequency control modelling](#).

- Recently NESO has increased Dynamic Regulation (DR) & Dynamic Moderation (DM) requirements:

	Prior to 3 Feb 2025	From 3 Feb 2025
DR	330 MW DR-Low / High	480 MW DR-Low / High
DM	170 MW DM-Low 200 MW DM-High	300 MW DM-Low / High

- We communicated the changes on [5th February 2025 OTE](#) and via [NESO Ancillary Services Important Industry Notifications](#) page.
- The increase helps NESO managing **volatile system frequency observed in recent months** whilst we are undertaking analysis to understand the root causes and introduce future mitigations.

- A declining frequency performance trend is observed over the past 7 years.
- This could be driven by the fast-changing system conditions including less synchronising elements, more use of natural resources, and consumer behaviour.

- Will these worsening pre-fault trends have an impact on post fault period considered in FRCR?

FRCR Treats the symptom not addressing the root causes

- FRCR 2025 appears to focus on the symptom of frequency excursions and predicting likelihood.
- The mitigations are largely paid for inertia, response and reserve services.
- There is little if any consideration of the underlying causes, and potential for prevention.
- From the report it is not easy to know if
 - interconnectors the major cause of trips >500MW?
 - interconnectors are tripping more regularly in the last year than previously, if so why?
 - Is one interconnector a lot worse than the others?
 - there a risk of a fault causing sudden Interconnector reversal, doubling the potential impact?
- Most of this type of information could be extracted from publicly available data, for example via REMIT

9 Categories do not clearly differentiate between normal single BMU events and multiple BMU, potential cascade events

4.1.1 Categories of loss risks

The *FRCR* will cover the following categories of loss risks.

Table 2 – Events included in the *FRCR* assessment

BMU-only	<ul style="list-style-type: none">an event that disconnects one or more BMUs, and may or may not also cause a consequential Rate of Change of Frequency (RoCoF) loss, with no Vector Shift (VS) losscaused by a <i>Loss of Power Infeed</i> or <i>Loss of Power Outfeed</i>
----------	--

<p>Slide 11 Simultaneous event Residual risks 1-in-9999 years – Does this cover loss only 2 BMU simultaneously? Last Friday shows and early events show simultaneous events can impact 3 or more BMU.</p>	<p>The simultaneous event in <i>FRCR</i> analysis represent the additional risks that system is facing beyond single generation or transmission failure.</p> <p>Given the complexity of all the possible combinations of simultaneous events, <i>FRCR</i> analysis adopted a statistical method, in which the level of loss (MW) is determined by 2 BMUs for peak, upper quantile (75%) and median (50%). The 14th March event lost three BMUs but the level of loss is correlated to upper quantile simultaneous events in <i>FRCR</i> analysis. The total loss of 14th March event will also be used in likelihood calibration in preparation for the next <i>FRCR</i>.</p> <p>There is nothing that rules out that simultaneous event would affect 2, 3, or more units at the same time. However, as the number increases, the probability drops and the costs required to cater for it increase significantly. Recognising that the <i>FRCR</i> does not require securing 2 simultaneous BMU events, it is unlikely to require securing more than 2.</p>
---	--

Categories suggestion

- Single largest loss – This term is well understood
- Random non causal chance of subsequent loss of 2 or more BMU
- Cascading loss
 - RoCoF loss of mains protection – Reasonable well quantified in FRCR 2025
 - Vector shift protection – High level of uncertainty of installed protection
 - Fault ride through failure – Not mentioned much in FRCR 2025
 - Other – Probably the greatest emerging concern

Reporting of tripping events, especially simultaneous.

- 5.2 System events
- “After implementing the lower minimum inertia policy, there was no increasing trend observed in frequency events based on Grid Code”
- FRCR Reporting should also consider the trend of tripping events OC3.4.1 (a) (i)
 - a loss of infeed or exfeed (import or export including generation, **Demand** and interconnection) of $\geq 250\text{MW}$;
- OC3.4 should be updated to explicitly include categorisation of events which highlights simultaneous tripping of 2 or more BMU, or DER $>250\text{ MW}$
- **Simultaneous tripping is a warning sign of major frequency events.**
- **Focus should be on this and addressing the underlying causes, rather than waiting for the big event, and responding afterwards.**

Risk at 49.2 vs 48.8 Hz

- The very wide difference between the risk of 49.2 Hz and 48.8 Hz is very surprising and counterintuitive.
- **Can NESO explain the underlying mechanism that results in is such a big difference?**

6.1.1 System residual risks

Table 2 System residual risks

Scenario	140 GVA.s	120 GVA.s	110 GVA.s	102 GVA.s
49.5 Hz event	2.84 times per year	2.85 times per year	2.85 times per year	2.85 times per year
49.2 Hz event	1-in-7.40 years	1-in-7.28 years	1-in-7.25 years	1-in-7.24 years
48.8 Hz event	1-in-26.09 years	1-in-25.89 years	1-in-25.83 years	1-in-25.83 years
50.5 Hz event	1-in-78.96 years	1-in-78.99 years	1-in-79.04 years	1-in-79.06 years

Did FRCR 2024 underestimated simultaneous risk?

- Page 5
- “The residual risks have increased compared to last year’s FRCR analysis, with the likelihood of 49.2 Hz events moving from 1-in-29 years in FRCR 2024 to 1-in-23 years in FRCR 2025.”
- “The main cause of the risk change for the 49.2 Hz event is a review of simultaneous events, which shows a higher probability of these events occurring in our model.”
- I am pleased that NESO have improved the analysis of simultaneous risks, but still think further work is required. See details later in this document.

Did FRCR 2024 underestimated simultaneous risk?

- Page 16
- “It is evident from the table that the residual risks for each frequency event scenario remain consistent across all levels, despite the differences in the minimum inertia required. This implies that DC is effectively balancing the variations in inertia requirements.”
- **Lowering inertia will give higher RoCoF. The impact on risk depends on NESO assumption that loss of mains protection will only operation at or above 1Hz/s average national RoCoF. It ignores regional RoCoF effects.**
- “Comparing the residual risks to the FRCR 2024, there has been a notable change in the risk associated with the 49.2 Hz frequency event. Previously, the risk of encountering a 49.2 Hz event was estimated to be 1 in 27 years, and it has now increased to 1 in 7.3 years. Similarly, the residual risk of a 48.8 Hz event is increased from 1 in 30 years from 2024 assessment to 1 in 26 years in FRCR 2025.”
- “This shift is primarily due to a comprehensive review of simultaneous events occurring between 2019 and 2024. The probability of these simultaneous events has been recalibrated from the previous estimate of 1 in 20 years to 1 in 1.3 year for upper quantile simultaneous events.”
- “Despite the updated event probabilities, it is important to note that the FRCR policy mandates securing all BMU-only events. Consequently, the response holding remains at a similar level and is not impacted by the updated probability of simultaneous events. This means that the system's security has not been diminished compared to previous years' assessment; instead, it has been updated to reflect the most recent event data.”
- **This appears to be a circular argument justifying the current policy, rather than assessing the risk to consumers from all events, including those which are not secured.**

Extrapolation from a sparse data set

- 1 in 9999 years in the table below appears extraordinarily high!
- It is based on a statistical extrapolation from a sparse data set and making assumptions about maximum size event to derive 1 in 9999 simultaneous results.
- This gives a false impression of the risks from simultaneous events, probably due to the underlying FRCR assumption of max 2 BMUs tripping simultaneously.

Table 4 Risk and cost for different risk categories at 102 GVA.s

Event category	Response Control		
	Residual risk for 49.2 Hz event	Residual risk for 48.8 Hz event	Additional cost per year
BMU-only	1-in-7.24 years	1-in-25.83 years	£0
BMU+VS (outage)	1-in-7.25 years	1-in-25.84 years	£14k
BMU+VS (intact)	1-in-7.26 years	1-in-25.84 years	£278k
Simultaneous event	1-in-9999 years	1-in-9999 years	£20m

*minimum inertia requirement is 102 GVA.s

Extrapolation from a sparse data set

- Page 19
- “However to **fully secure BMU+VS or sim events**, due to the volatility in the event profile in some circumstances we would need up to **3 GW DC holding** which is much beyond the current market available capacity and DC price may fluctuate significantly”
- 3GW is not the maximum likely simultaneous event for 1 in 9999 years
- **This playing down of the simultaneous risks downplays the importance and urgency to maximise efforts to reduce risk of simultaneous events.**
 - For example the delays on [GC0155: Clarification of Fault Ride Through Technical Requirements | National Energy System Operator](#) should be considered a major concern.

Addressing known risks

- 4.4 Outlook to 2026/2027
- “Since FRCR 2024, FRCR study covers an extended time horizon to assess system risks for multiple years. This forward-thinking approach ensures that potential future challenges and opportunities are thoroughly evaluated. Looking ahead to 2026/2027, the outlook will delve into how the proposed policy is expected to perform beyond just the next year. “
- 2019 outage was partly due to slow speed in addressing the known issue of loss of mains protection.
- Change to grid code, and especially any required retrospective change is a very slow process. It is important FRCR becomes far more forward looking.
- **NESO documents and industry inputs have highlighted frequency risks from**
 - **Weather dependent ramps**
 - **Negative pricing causes CfD to go to zero all at same time**
 - **Impact of new large loads on FRT**
 - **Multiple interconnector trips**
 - **SSO – and system strength**
 - **Demand side response load steps and ramps**

3 BMU tripping should ring alarm bells.

- “By proactively expanding our DC holding capacity, we are not only making our system more secure but also stimulating the market to expand its capabilities prior to this increasing largest loss size. This is crucial for ensuring that we are capable of managing an 1800 MW loss size on the network in the near future.”
- A 1800 MW loss did occur with a multiple BMU trip at DRAX.
- This is the type of event that is currently unsecured.
- In the related OTF meeting NESO played down seriousness of this event
- They did not highlight it was unsecured and could have led to loss of supply
- No mention was made of the importance of FRT compliance and of considering enforcement action.

Regional inertia and RoCoF

- “In terms of wider system operability, there are interactions between reducing the minimum inertia level and other system operability areas. Our Operability Strategy Report (OSR) looks at these interactions and considers the wider impact of lower inertia levels on all operability workstreams. We are developing new operational strategies, tools and processes to ensure we have visibility and can manage these challenges in a coordinated manner. “
- Interaction between national inertia and regional inertia
- As we explained in Chapter 5, since implementing the 120 GVA.s minimum inertia policy, we have observed Sub-Synchronous Oscillation (SSO) events in the Scotland network. Our investigations found no correlation between lower overall system inertia and the initiation of these SSO events. Local inertia reduction, however, can have a negative impact on SSO events and other system operability issues such as the secondary effect of reducing the Short Circuit Level (SCL) and the inherent damping provided by synchronous generation at local levels.

Regional inertia and RoCoF

- 6.4.3 Wider system operability considerations
- When running the system at the inertia of 102 GVA.s, a largest loss of 1800 MW would result in a RoCoF of 0.5 Hz/s. The ALoMCP has significantly reduced the risk of inadvertent tripping of embedded generation where the majority of RoCoF relay settings is now at 1 Hz/s. Following the trigger of 1 Hz/s RoCoF at a system inertia of 102 GVA.s, it is expected most of the embedded generation would start to trip based on their LoM protection settings. **This would result in a national-wide power outage scenario.** However, to initiate a 1 Hz/s RoCoF event under the proposed 102 GVA.s inertia level, the system would need an infeed loss at 3.3 GW. This level is far from the current largest loss we aim to secure and is much higher than any of the historical simultaneous events that we have observed. Proposing 102 GVA.s inertia requirement and limiting the post-fault RoCoF up to 0.5 Hz/s provides a security “buffer” under current and foreseen system conditions.
- The security buffer is much less that indicated due to the regional nature of RoCoF. This should be studied urgently by NESO and the analysis should be shared with the industry.

RoCoF and LFDD

- 6.4.2 Effectiveness of low frequency demand disconnection (LFDD)
- Falling inertia will lead to high RoCoF
- Does NESO have confidence that the LFDD relays would be effective at high RoCoF?
- For example up to 2Hz/sec
- This should all probably be OK, but are some LFDD relays very old from a period of much higher inertia and lower RoCoF?

Data Handbook

- 5.2.2 Loss of Mains profile (including RoCoF and Vector Shift
- “Identify the MW at Risk associated with the inadvertent tripping of Loss of Mains (LoM) protection. The specification of up-to-date requirements on the LoM protection via Distribution Code modification DC0079, the Accelerated Loss of Mains Change Programme (ALoMCP) that aimed to achieve compliance with the new requirements reduced the risk of inadvertent tripping of embedded generation to a very low level by changes to the settings and protection type.
- However, some several thousand sites, although of very low capacity, remain non-compliant and are undergoing an Enforcement Process managed by the Distribution Network Operators (DNOs).
- Up until this risk is eliminated or reduced to a level that is immaterial, it will need to be included when producing the FRCR.”
- **ALoMCP has failed to eliminate the risk leaving enduring costs for ongoing mitigation.**
- **Issue was predicted many years before action was taken to address the issue.**
- **Key lessons: Address risks early. Retrospective change to installed base of generation is difficult.**

VS protection and ride through

- Massive size associated with VS. How can this uncertainty be reduced?

	0.125Hz/s	0.2Hz/s	0.5Hz/s	Other RoCoF	Vector Shift (VS)
Estimated total capacity remaining	54MW	20MW	100MW	4MW	371MW
Safety margins to cater for uncertainty	29MW	31MW	59MW	6MW	1048MW
Further capacity that has undergone enforcement but not formally reported	43MW	16MW	31MW	2MW	297MW
Total	126MW	67MW	190MW	12MW	1717MW

Still no plan to include clear VS ride through requirements as recommended ??? Years ago.

Data

- 6.1 BMU failure probability
- “Data for the BMU outages are from an internal database and is not publicly accessible or shareable”
- Does this match data from public REMIT on Elexon Portal, if not why not?
- “Multiple breakdowns within 24 hours is treated as one failure, as the unit is likely to be struggling to return.”
- Why was this applied. Each breakdown could lead to new frequency event as the unit is struggling to return to service.

Data

- 6.2 Transmission fault probability
- “Recorded events are from 3rd party data, e.g. from Transmission Owners (TOs) and OFTOs, hence NESO is unable to publish the raw data”
- Why would this data be different to that reported in C17 or GC0151 reports [System Performance Reports | National Energy System Operator](#)
- Should this data be made publicly available?

Statistical methods and data used

- CFD is not appropriate for low frequency potentially high impact simultaneous events.
- Some form of extreme value analysis would be more appropriate.
- Page 31
- Check of sample data shows some issues
 - Event 1 and 2 not shown on GC0105 report, below OC3 250 MW threshold, skews data analysis low?
 - Event 3 [GC0151 and GC0105 System Incidents Report March 2024.xlsx](#) shows loss of 945.47 MW?
 - Event 18 10/06/2023 note clear how 1332 MW loss derived from [GC0151 and GC0105 System Incidents Report June 2023 - Copy.xlsx](#)
 - Event 20 wrong date
 - 14/05/2024 missing – Coincident event increase in frequency
- GC0105 report do not tie up with data presented in table
- Possibly because it is not clear from the report if coincident tripping occurred

Statistical methods

- 4.2.1 Modelling Difficulties
 - “The limited occurrence of such events means there is often insufficient historical data to draw reliable conclusions. This scarcity of data makes it difficult to develop robust sophisticated models and accurately assess the risk for the occurrence.”
- 4.2.2 FRCR Approach on simultaneous event
 - “The Likelihood is calibrated against the historical occurrence of simultaneous and cascading events.”
- **Is this global best practice?**

The Methodology

- “1.3 Defined terms
- This document contains technical terms and phrases specific to National Electricity Transmission Systems (NETS) and the Electricity Supply Industry. The meaning of some terms or phrases in this document may also differ from those commonly used. For this reason, defined terms from the SQSS have been identified in the text using purple italics. A list of terms and definitions is included in Chapter 11 in this report”
- The defined terms BMU-only and simultaneous are confusing. Both include disconnection of 2 or more BMUs. See right.

4.1.1 Categories of loss risks

The *FRCR* will cover the following categories of loss risks.

Table 2 – Events included in the *FRCR* assessment

BMU-only	<ul style="list-style-type: none"> • an event that disconnects one or more BMUs, and may or may not also cause a consequential Rate of Change of Frequency (RoCoF) loss, with no Vector Shift (VS) loss • caused by a <i>Loss of Power Infeed</i> or <i>Loss of Power Outfeed</i>
BMU + VS (outage or intact)	<ul style="list-style-type: none"> • an event that disconnects one or more BMUs and causes a consequential VS loss, and may or may not also cause a consequential RoCoF loss • caused by <i>fault outages</i> of <i>primary transmission equipment</i> on the <i>NETS</i> (i.e. a single <i>transmission circuit</i>, a <i>busbar</i> or mesh corner, or a <i>double circuit overhead line</i>) • Trip rate for an event will normally be increased under an outage condition compared to that under intact network conditions. It is also considered to involve number of days of planned/unplanned outages to evaluate the severity.
Simultaneous Event	<ul style="list-style-type: none"> • an event that disconnects two BMUs at the same instant and may or may not also cause a consequential RoCoF loss. • The analysis focuses on a total loss made up of BMU-only events occurring at the same time instant as this represents the most onerous condition from a response perspective.

Scope

- 2.3 Wider considerations out of scope of the FRCR
- “The FRCR is not intended to develop the design of future controls, nor to consider other topics such as wider system operability interactions, market design, whole-system costs and interactions with other markets.”
- **This risks very siloed thinking. FRCR should at least link to other related documents and activities.**

3.2 Level of impact

- “The FRCR will assess four levels of impact to cover these considerations, and allow comparison against historic performance:”
- The table considered level of impact on Frequency. It should consider impacts from the perspective of grid Users, Generators, Consumers, TO and DNOs.
- It should include extreme events beyond 48.8 and 50.5 Hz, all the way to system collapse.

3.2 Level of impact

The **FRCR** will assess four levels of impact to cover these considerations, and allow comparison against historic performance:

Table 1 – Impacts to be assessed

#	Deviation	Duration	Relevance
H1	$50.5 \text{ Hz} < f$	Any	<ul style="list-style-type: none"> • Above current SQSS implementation • Plant performance prescribed in detail by Grid Code
L1	$49.2 \text{ Hz} \leq f < 49.5 \text{ Hz}$	60 seconds	<ul style="list-style-type: none"> • Current SQSS and System Operation Guideline (SOGL)⁵ implementation • Infrequent occurrence
L2	$48.8 \text{ Hz} < f < 49.2 \text{ Hz}$	Any	<ul style="list-style-type: none"> • Beyond current SQSS implementation and SOGL, but without triggering Low Frequency Demand Disconnection (LFDD) operation • Plant performance prescribed in detail by Grid Code
L3	$47.8 \text{ Hz} < f \leq 48.8 \text{ Hz}$	Any	<ul style="list-style-type: none"> • First stage of LFDD starts at 48.8 Hz and then subsequent stages apply in the range 48.8 Hz – 47.8 Hz. By the time all stages of the LFDD scheme has operated at 47.8 Hz over 50% of demand will have been lost.

Events considered 4.1.1

- Quote “VS-only and VS+RoCoF risks are fully mitigated post the Accelerated Loss of Main Change Program (ALoMCP).”
- This is directly contradicted by the data handbook?

	0.125Hz/s	0.2Hz/s	0.5Hz/s	Other RoCoF	Vector Shift (VS)
Estimated total capacity remaining	54MW	20MW	100MW	4MW	371MW
Safety margins to cater for uncertainty	29MW	31MW	59MW	6MW	1048MW
Further capacity that has undergone enforcement but not formally reported	43MW	16MW	31MW	2MW	297MW
Total	126MW	67MW	190MW	12MW	1717MW

“5.2 Controls options

There are four main controls for mitigating transient frequency deviations:

- holding frequency response
 - reducing BMU loss size
 - reducing Loss of Main (LoM) loss size
 - increasing inertia”
-
- **No mention of the importance of Fault Ride Through and enforcement actions**

External assurance activity

- During a presentation to the SQSS panel Accenture stated that their assurance activity
 - They did not look at technical content of FRCR, only data modelling and governance
 - Followed a testing plan provided by NESO
- Did NESO do the mathematical analysis they said they were going to do
- Not was it the correct analyses to do in the first place
- Did not identify some of the issues related to data shown in this report.
- Should have been selected and commissioned by SQSS panel for greater independence?

Accenture as “Critical Friend”?

- Please can NESO FRCR team or Engineering Assurance Team or Accenture (in their phase 2 work) explain how as shown in the above extract of [FRCR Assessment Summary](#) **NESO performance is at or above average in all cases**. This is particularly concerning in the review of the statistical analysis in FRCR.
- It reminded me of [How the Ofsted chief got his maths wrong on Sats | Education | theguardian.com](#). If the definition of “average” is based on some industry benchmark rather than NESO performance alone, as I suspect will be claimed, why was that not clearly stated in the report to NESO/SQSS panel?

Public

FRCR Assessment Summary (1/2)

Part A – Governance

Workstream	Methodology Documented	Process Review*	Evidence of Peer Reviews and Approvals	Workstream Summary
External Stakeholders	●	●	●	The webinars provided sufficient context and explanation of the methodology and assumptions used in FRCR 2025. Questions from industry have been either replied to or actioned.
Internal Stakeholders	●	●	●	Weekly cadence with FRCR team where assumptions and data sets are discussed. Use of 'Editorial board' with SME's across NESO who support with expertise. More rigour needed in record keeping.

Part B – Data Preparation

Workstream	Methodology Documented	Process Review*	Evidence of Peer Reviews and Approvals	Workstream Summary
Control Scenarios	●	●	●	Control scenarios are well-documented, with test cases and key assumptions. Weekly reviews ensure validation, consistency, and policy alignment.
BOA Price	●	●	●	Methodology for compiling the data set well documented and the data analysis processing repeated for the Accenture team. Assumptions evidence provided and approval evidence shared.
Frequency Control Price	●	●	●	The methodology for response price calculations relies on scripts rather than formal documentation, with validation through internal reviews and approvals. Process demonstrated to Accenture team.
	●	●	●	Methodology for compiling the data set well documented and the data analysis processing

Legend:

- Excellent coverage of criteria
- Good coverage of criteria
- Average coverage of criteria
- Clear gaps
- To cover in Phase 2

NESO Licence Expectations document 2025 to 26

Maintaining system frequency and voltage

1. Maintain system frequency and voltage within statutory limits (including the Security and Quality of Supply Standard (SQSS)).
 2. Demonstrably minimise any increases in the number of instances where the system frequency is outside operational limits but within statutory limits (for example, excursions beyond 0.3Hz) or transparently demonstrate why tolerating increases in these excursions strikes an appropriate balance between security and cost-efficiency.
 3. Respond swiftly to any event (expected or unexpected), on the NETS or otherwise, to secure stable frequency across the NETS.
 4. Assess existing, emerging, and potential risks (including risks materialising from distribution networks) to the maintenance of stable frequency and security of supply across the NETS. Managing those risks appropriately to minimise associated costs and occurrence of unexpected events.
- Will 2 and 4 be addressed in FRCR 2026? If not, where will these be covered?