Public

Frequency Risk and Control Report (FRCR) 2025 Update to SQSS Panel

06 May 2025

Frequency Risk and Modelling, Markets

NESO

Contents

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1. Introduction and Recap of FRCR Recommendations

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Introduction

- FRCR aims to set out the right balance between risk and cost most beneficial to the GB consumers.
- This is reviewed and updated annually.
- We consulted on the 2025 version of FRCR between **3 March 2025** and **7 April 2025 (extended)**.
- We received 7 responses, from National HVDC Centre, EDF, Sygensys, SHETL, SSE Generation, Northern Powergrid and Dr Cullen (individual).

FRCR Recommendations

The 2025 edition of the FRCR assesses the minimum inertia requirement and the benefits of holding additional response.

Policy recommendation in FRCR 2025:

- Reduce the minimum inertia requirement from **120 GVA.s** to **102 GVA.s**.
- Secure all BMU-only risks as baseline. Do not apply additional controls to secure all BMU+VS and simultaneous events.
- Additional **200 MW** DC-Low requirement to further reduce residual risks.

2. Consultation Timeline and Questions

Consultation Timeline

Milestone	Date
Consultation period	3 March 2025 and 7 April 2025
Webinar during industry consultation on combined report and methodology	19 March 2025
Engagement and Accenture work	7 April 2025 and 25 April 2025
SQSS Panel meeting – decision on recommendation of FRCR	6 May 2025
Submission of FRCR to Ofgem	**16 May 2025**

We are here

Consultation Questions

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

Section Two – Overall Feedback		
7	Do you agree that the FRCR 2025 has been prepared appropriately? Please elaborate.	Click or tap here to enter text.
8	Do you believe there has been sufficient industry engagement in preparing FRCR 2025? Please specify further suggestions.	Click or tap here to enter text.
9	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?	Please use the boxes below for the bullet points

FRCR preparation and general feedback

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Section Three – Feedback on the specific recommendations in FRCR 2025		
10	Do you agree with the recommendation to: **Reduce minimum inert requirement down to 1**	Click or tap here to enter text.
11	Do you agree with the recommendation to: **Secure all BMU-only events (including consequential RoCoF)**	Click or tap here to enter text.
12	Do you agree with the recommendation to: **Procure additional DC-Low service provision by 200 MW**	Click or tap here to enter text.
13	Do you have any other comments to the recommendations?	Click or tap here to enter text.

FRCR25 Policy Proposal

Section Four – Feedback on FRCR future work *NB: Please refer to 8.1 FRCR Forward Looking for context*		
14	In your view, what should the future FRCR focus on?	Click or tap here to enter text.

Future FRCR

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Section Five – Feedback on FRCR future governance *NB: Please refer to 8.2 FRCR Future Governance for context*		
15	Do you foresee any issues that may arise from moving the obligation to produce the FRCR to a NESO Licence Condition rather than an Annex to the NETS SQSS?	Click or tap here to enter text.
16	If the obligation to produce the FRCR and the governance rules surrounding that process are moved to NESO's Licence, do you believe that the NETS SQSS Panel should continue to provide oversight?	Click or tap here to enter text.
17	If your answer to Question 16 is "Yes", to what extent should this oversight be? For example, should it include technically assessing the recommendations and approving/rejecting it, or should it be limited to confirming that the governance process and methodology has been followed correctly?	Click or tap here to enter text.

FRCR governance

3. FRCR 2025 Engagement and Accenture work

- **3 Webinars** - Methodology, Data & Policy Recommendations.
- **Webinar Attendance –** Methodology, 61 registered, 32 attended. Data, 51 registered, 34 attended. Recommendation, 43 registered and 26 attended.
- **69%** questions answered live, **100%** questions responded to, and actions agreed.
- **Bespoke SQSS Panel session** in January 2025 to go through initial recommendations.
- **OTF presentation** on system performance following 120 GVA.s minimum inertia policy implementation.
- Consultation – **5 weeks (1 week extension), 3 May – 7 April, 7 responses**.
- **Individual engagement** with all 7 consultation respondents – Discussed concerns, updated report relevant to FRCR, and agreed actions.
- Engaged **Accenture for review of FRCR**.
    - Phase 1: Review of FRCR Processes to prepare recommendations
    - Phase 2: Review of the consultation process and engagement with consultation responses.

More to come:

- OTF update to industry about FRCR 2025 progress including feedback through consultation.
- Planning Inertia Engagement Sessions with Industry this summer.

4. Summary of Responses

- Preparation and General Feedback
- Policy
- Future Work
- Governance

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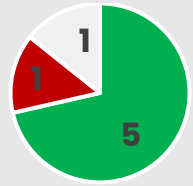
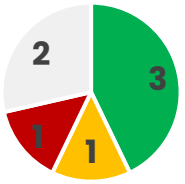
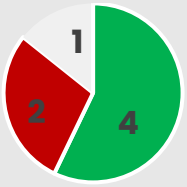
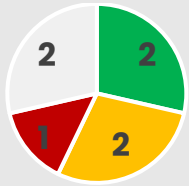
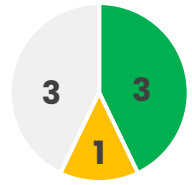
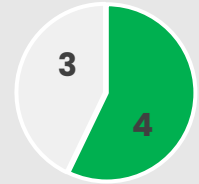
1. General feedback & Preparation

Agree Concern Disagree No comment

Questions	Response summary	RAG
Do you agree that the FRCR 2025 has been prepared appropriately? Please elaborate	**Agreement:** Several agree that the FRCR 2025 has been appropriately prepared, acknowledging the independent reviews and consultation processes positively. One response welcomes the additional resources provided, such as the Data Handbook and webinars. A few suggestions about specific aspects, such as further exploration of SSO events, lower inertia, more comprehensive reviews and validation of assumptions, methodologies, and models. **Disagreement:** One respondent disagrees with the preparation of the FRCR 2025, citing a lack of confidence in the risk analysis related to simultaneous, cascading events. **No Comment:** one left no comment	
Do you believe there has been sufficient industry engagement in preparing FRCR 2025? Please specify further suggestions	**Agreement:** One respondent agrees on sufficient engagement but notes limited interaction. Another sees improvement but suggests earlier engagement and more webinars. A third recommends enhancing transparency by publishing questions and responses. **Concerns:** One mentioned this is a complex modelling area NESO must consider the extent to which any industry party can provide effective engagement. **Disagreement:** One respondent states "No". NESO understand the reason is that the respondent suggest further engagement to be more interactive. **No Comment (Cannot Decide):** One respondent is aware of the consultation and associated webinar but cannot judge the level of engagement across the wider industry. One left no comment.	
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?	**Agreement :** Some respondents see good development in balancing cost and risk. Another agrees with the risk-reward approach but cites uncertainties and suggests considering regional inertia differences. One indicates probable agreement but highlights the complexity and need for deeper understanding. Another respondent suggests evaluating the policy against historical events to assess its robustness, implying current measures might not be sufficient (post engagement, we addressed his questions/concerns). **Disagreement:** One respondent strongly opposes the reduction of inertia, citing increasing frequency excursions, insufficient power backup, and potential security of supply issues. Another respondent states "No". **No Comment (Cannot Decide):** One respondent notes the complexity of the work and cannot comment.	

2. Policy

Agree Concern Disagree No comment

Questions	Response summary	RAG
Do you agree with the recommendation to: Reduce minimum inertia requirement down to 102 GVA.s	**Agreement:** 2 response: Some agree with suggesting a slower reduction. **Concerns:** 2 responses: 1 concern requests assessing regional RoCoF risks with industry involvement. The other concern is also around the uneven regional inertia distribution and RoCoF. **Disagreement:** 1 response: strong disagreement with the reduction by some respondents. This is understood related to wider operability issue and CP30 target. **No Comment (Cannot Decide):** 2 responses: One feel unable to decide due to the complexity and lack of understanding. One believes risk determination should be by NESO and Ofgem.	
Do you agree with the recommendation to: Secure all BMU-only events (including consequential RoCoF)	**Agreement:** 3 responses agreement with the recommendation based on risk and cost data, with a suggestion to review the risk of VS events based on regional inertia levels. One responses believes FRCR report sets out the justification. **Concerns:** 1 concern around the definition of BMU-only event (We clarified during the engagement and updated in the report) **Disagreement:** 0 responses: No direct disagreements expressed. **No Comment (Cannot Decide):** one feels unable to decide due to the complexity and lack of understanding and one left no comment	
Do you agree with the recommendation to: Procure additional DC-Low service provision by 200 MW	**Agreement:** 4 responses includes 2 requesting further analysis to validate the robustness of the 200 MW. Change to agree post engagement: **Disagreement:** 0 responses: No direct disagreements expressed. **No Comment (Cannot Decide):** 3 responses. 1 mentioned no confidence in the analysis to respond due to wider operability concerns.	
Do you have any other comments to the recommendations?	Reference to specific comments in attached documents or reports.	

3. Future work

Questions	Response summary
In your view, what should the future FRCR focus on?	The responses underscore the need for future FRCR work to focus on the broader impacts of increased renewables and inverter-based resources. There is a call for further analysis on managing simultaneous events, potentially through increased Dynamic Containment (DC) capacity as battery storage expands. Additionally, concerns about risk quantification, regional inertia, and the implications of network expansion, including new nuclear facilities and offshore hubs, highlight the importance of considering technological advancements and regional variations to enhance system reliability and resilience.

4. Governance

Question 15: Do you foresee any issues that may arise from moving the obligation to produce the FRCR to a NESO License Condition rather than an Annex to the NETS SQSS?
The majority of respondents express concerns about transferring the obligation to produce the FRCR to a NESO License Condition. While some do not foresee immediate issues, they emphasise the importance of maintaining robust scrutiny and governance. There is a general consensus is that any changes should not diminish industry oversight or the quality of recommendations.
Question 16: If the obligation to produce FRCR and the governance rules surrounding that process are moved to NESO's License, do you believe that the NETS SQSS Panel should continue to provide oversight?
Most responses support the continued oversight of the FRCR by the NETS SQSS Panel, even if the obligation moves to NESO's License.
Question 17: If you answer to Question 16 is "Yes" to what extent should this oversight be? For example, should it include technically assessing the recommendations and approving/rejecting it, or should it be limited to confirming that the governance process and methodology has been followed correctly?
Regarding the extent of oversight, the responses vary. Some suggest that oversight should include a thorough technical assessment of the recommendations, while others highlight the need for a balance between detailed technical assessments and confirming adherence to governance processes. There is a shared belief that oversight should ensure the effectiveness of the FRCR process and adapt to transitional changes in the power system.

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5. Summary of NESO Responses

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Post Consultation Activities

- We acknowledged their responses & engagement.
- We offered 1-2-1 meeting opportunities to discuss wider issues with relevant SMEs attendance. Due to the wide range of questions and topics, we addressed FRCR related questions & queries to individual parties.
- By 1 May, we had meetings with all 7 responders.
- After 1-2-1 meetings all parties agreed to publish their response, NESO responses and meeting notes.
- **We plan to publish all NESO responses along with industry responses following our submission to Ofgem.**

Summary of NESO Responses

1. Updates in FRCR 2025 Suite of Documents

Updated Document	Updates
FRCR25 Report	Updated report rewording, verb tense and typos.
	Conducted hypothetical analysis to review 2019, 2023 and 2025 simultaneous events and include them in Appendix 9.1
	Included higher granularity and extended the volumes in DC-L incremental analysis in 6.3.
	Included Engagement Summary and Updated Accenture's work in Executive Summary
	Presented Consultation summary in 7.3
	Updated the residual risk to "0 times per year" when simultaneous events are fully secured. Explained all risks are being covered in FRCR analysis in this scenario.
	Included as statement that NESO conducts review and investigations following significant events to ensure our analysis tools, data, and assumptions remain appropriate and that frequency policy remains effective, serving as a form of assurance, in Chapter 5.
	Indicated in 6.4.2 LFDD relays have a requirement to be tested under Energy Networks Association (ENA) technical specification 48-6-5 Issue 1.
FRCR Methodology v3	Clarified v3 methodology document has no material change from v2 but streamlined to reflect current analysis.
	Update BMU-only event definition to clarify there could be sit includes exceptional cases, where more than one BMU are disconnected, where the generating units are fed by a common energy source.
	Included LFSM-O consideration
FRCR Data Handbook	Explained recorded transmission events are from 3rd party data and there is similar data available in GC0151 reports.
	Corrected date of 2023 Simultaneous event to 22 December 2023
	Explained in 6.4 how does FRCR consider historic simultaneous high-frequency events.
	Update BMU-only event definition to clarify there could be sit includes exceptional cases, where more than one BMU are disconnected, where the generating units are fed by a common energy source.

2. Follow-up actions relevant to future FRCR work

Areas	Suggestions / Concerns	NESO Actions / Response
Preparation and Engagement	Early engagement and notice, e.g. when consultation was delayed due to assurance work being introduced, could help manage their workload.	NESO will explore other approaches to improve the engagement and obtain industry's feedback.
	Consider different approach to get industrial feedback out of traditional consultation process due to the complexity of this topic.	
	2026 to consider holding a face-to-face workshop with the opportunity to raise questions. This should facilitate better stakeholder engagement.	
	NESO to consider more interactive engagement with industry in future FRCRs.	
Governance	Can the SQSS Panel appoint an independent review within FRCR process?	NESO will collate all the feedback and discuss with the Panel. For future FRCR, the requirement of an independent technical review or the continuous engineering assurance will be clarified with the SQSS Panel.
	Considering an independent technical analysis of specific parts of the assessment or conducting "spot checks" across the entire FRCR model and analysis.	

2. Follow-up actions relevant to future FRCR work

Areas	Suggestions / Concerns	NESO Actions / Response
Future FRCR work	**FRCR to consider a tolerance level for LFDD,** e.g. 48.85 Hz, vs, required in GC as the worst-case scenario to minimise the system impact if a LFDD event happens.	We will consider this in future FRCR. The tolerance band needs to be carefully defined.
	FRCR forward-looking to consider future and emerging risks in the model.	While FRCR is primarily backward-looking, it does incorporate forward-looking elements to manage emerging risks, however the lack of data for new risk is challenging to be incorporated into FRCR model. New risk should be prevented through other workstreams, compliance process, as an example, instead of using FRCR to cover the risk, with more response hold.
	To consider **uncertainties and variance from data inputs**, e.g. in the simultaneous statistical analysis for a better understanding of risk sensitivity.	We will explore this new methodology in the future. This can be extended to other analysis in FRCR model, if not only in the simultaneous analysis.
	To model LFSM-U operation	We will explore the modelling of LFSM-U by reviewing historic events and also investigate LFSM-U capacities from battery storage and interconnectors.
	Extension of FRCR analysis time horizon and its strategic direction.	If a long-term time horizon is intended for FRCR to consider, the methodology will need to be revised. Operability strategy is currently set out in different publications where a longer-term view is presented. We will discuss this with the SQSS Panel and also run a separate consultation to shape the future FRCR work if needed.
	National HVDC centre suggested FRCR policy to align with the approach taken to voltage stability within the SQSS **by introducing a "Frequency containment margin".**	We recognised this is a huge piece of work which might need a separate industry mandate and would need substantially more resource and time of NESO's and from the industry. We will explore this further.

3. Work out of FRCR scope

Topic	Comments / Concerns	NESO Actions / Response
Operability	How flexible FRCR is to assess and align emerging system operability risk? FRCR methodology needs to be updated to reflect and better model the risks from fast changing power systems.	Wider system risk should be prevented through other workstreams, compliance process, as an example, instead of using FRCR to cover the risk, with more response hold. If FRCR methodology needs to be change following the review, We will consider wider industry engagement and run separate consultation.
	Wider concerns about future operability, economic running of rare used generators and reliance on renewables for meeting CP30 target.	NESO will organise a separate meeting, inviting CP30 team, to further discuss those questions.
	Does NESO have any projects using AI to enhance system performance understanding, such as analysing TO asset behaviours during system events with lower inertia levels.	Both NESO and SHETL are checking with their innovation team to see any existing project and future collaborating potentials.
	Regional RoCoF assessment, Regional inertia and system operability	We will be running an industry workshop to collate wider views and opinions about regional inertia and regional RoCoF. In the meantime, we are following system events to understand better the impact from regional inertia and regional RoCoF. Additionally, we are engaging with industry to develop GFM compliance requirement and market development.
	Suggest that stand-alone simulations estimating current connected device tolerances to the expected transient frequency and phase angle jumps under low inertia conditions are used to anticipate the limits to next stage FRCR action.	We will continue reviewing the grid following converter behaviours (including within transient time frames) following any significant system events to explore the impact from regional inertia.
	concerns about the lack of explicit requirements for vector shift fault ride-through capability.	Whilst acknowledged the concern, we clarified the risks should be managed via Grid Code modification and compliance route. The discussion on fault ride-through requirements is included in industry engagement sessions when addressing Grid Forming Technology (GFM).

3. Work out of FRCR scope

Topic	Comments / Concerns	NESO Actions / Response
LFDD	Concerns about wider system security and economic impacts following a LFDD event	NESO Restoration and Resilience to follow
	LFDD relay effectiveness – Some LFDD relays are very old from a higher inertia and lower RoCoF.	This is out of FRCR scope and is included in ENA Technical Specification 48-6-5 Issue 1 dated 2005 "ENA Protection Assessment Functional Test Requirements – Voltage and Frequency Protection" requirement on LFDD testing to be carried out every 3 years. This is referred by GC/ECC CC.A 5.4.1. This information is also included in the main report.
	Current LFDD relay tolerance setting vs. GC requirement needs to be reviewed	This is out of FRCR and shall be initiated and led by the other workstream.
Data Transparency & Engagement	One comment highlighted the importance of making NESO's ongoing work, e.g. event review and updated report, GFM development, regional inertia and RoCoF monitoring, and data more visible to the industry.	We acknowledged the comment and will continue being transparent.
	How NESO engages with industry to tackle long-term system changes and risks?	We will feedback to NESO senior management team and discuss with Ofgem

6. Recommendation to the Panel

Recommendation to the Panel

- Based on the consultation results:
  - Most of the responders agree FRCR 2025 was prepared and engaged with industry adequately and demonstrates NESO's appropriate development in managing GB frequency.
  - Concerns in the 102 GVA.s policy recommendation are understood related to regional inertia and RoCoF management. We believe they are out of FRCR's immediate scope and NESO has initiated the work with the industry, e.g. GFM expertise group, to tackle the issues in longer term.
  - We will continue monitoring and analysing regional operability issues following system events, and introduce mitigations as needed.
  - Concerns in the BMU-only event and additional 200 MW DC-L response holding are addressed following the post consultation engagement.
- As a national policy we are comfortable with our analysis, supported by Accenture's technical review hence **we recommend the SQSS Panel to approve FRCR 2025 policy.** We acknowledge that regional operability will be monitored during implementation.
  - **12 May 2025 – deadline for decisions from Panel.**

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7. Next Steps and Implementation Plan

Next Steps

- Panel's comments will be updated in the final report before submitting to Ofgem.
- Submission to Ofgem by 16 May 2025.
- Industry update on OTF following submission.
- **All industry responses, NESO responses, NESO follow-up actions and Accenture Phase 2 report will be published on NESO website.**

Implementation Plan

- **There are two responses highlighted a slower reducing in the minimum requirement when implementing.**
- Following approval from Ofgem on FRCR25, we will:
  - ✓ Monitor system conditions and implement 102 GVA.s minimum inertia policy when ready. The reduction will occur in two phases, with minimum 5 weeks interval between the phases.
  - ✓ Give industry at least 5 working days' notice before commencing of policy implementation on OTF.
  - ✓ Increase DC-Low requirement by up to 200 MW. We will communicate through the OTF and NESO usual comms mechanism.

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