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for energy consumers

To: All interested parties

Email: NESORegulation@ofgem.gov.uk
Date: 21 August 2025

Dear colleagues,

Review of Cost-Benefit Analysis for NESO exemption from requirement to implement an automatic Frequency Restoration Process in GB synchronous area

We[1] issue this letter to confirm that we, alongside National Energy System Operator ("NESO"),[2] have reviewed the cost-benefit analysis ("CBA") supporting our decision to exempt the implementation of an automatic Frequency Restoration Process ("aFRP") in the GB synchronous area. Article 145(2) of Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation[3] ("the SOGL") requires that the CBA underpinning any decision to exempt a Transmission System Operator ("TSO") from implementing an aFRP be reviewed at least every four years.

Four years have passed since our initial decision to grant an exemption, and therefore NESO provided us with updated analysis on the costs and benefits and we have re-assessed whether this continues to support the case for exemption from implementation of an aFRP in the GB synchronous area.

This letter sets out the outcome of our review and any necessary next steps.

Background

The SOGL defines the Frequency Restoration Process ("FRP") as "a process that aims to restore system frequency to its nominal value [50Hz in GB] and, for synchronous areas consisting of more than one Load-Frequency Control area, a process that aims at restoring

[1] The terms "we", "us", "our", "Ofgem" and "the Authority" are used interchangeably in this document and refer to the Gas and Electricity Markets Authority (GEMA). Ofgem is the office of the Authority.
[2] NESO is GB's independent energy system operator – a publicly owned body established in 2024. It replaced National Grid Electricity System Operator (previously part of National Grid plc) as part of reforms under the UK's Energy Act 2023.
[3] Adopted into UK law and amended via SI 2019 No. 533.

power balance to the scheduled value".[4] An aFRP refers specifically to the activation of Frequency Restoration Reserves ("FRR") by an automatic control device. It is an automated control system that continuously adjusts generation or demand to correct imbalances, as opposed to manual operator-initiated adjustments that exist as a manual Frequency Restoration Process ("mFRP").

Under Article 145(1) of the SOGL, each TSO in each Load-Frequency Control area is required to implement both an aFRP and a mFRP. However, Article 145(2) makes provision for the TSO of the GB synchronous area to request exemption from implementing an aFRP, if supported by a CBA demonstrating that an aFRP's costs would outweigh its benefits. National Grid Electricity System Operator originally conducted this CBA, and we issued an exemption in 2021, with the system operator instead relying on a combination of existing balancing tools (mainly Balancing Mechanism Bid-Offer Acceptances and dynamic response services) to manage frequency deviations.

Article 145(2) of the SOGL stipulates that the CBA underpinning an exemption decision must be re-evaluated at least every four years. We set out in our 2021 decision letter the key frequency metrics we expected NESO to monitor over the 4-year period. Specifically, we asked for ongoing assessment of frequency performance against the SOGL limits and the impact of increasing renewable generation on frequency deviations. Since 2021, the GB power system has continued to evolve, with an increasing contribution from variable renewable generation and lower system inertia. NESO has developed fast-acting dynamic response services and invested in system stability initiatives to help manage frequency in a lower inertia network.

NESO has updated the original CBA, proposing that continuing an exemption from implementing an aFRP remains justified.

Our rationale

We have reviewed the updated CBA submitted to us in line with the requirements of the SOGL Regulation. We have also engaged with NESO to clarify our understanding of its submission.

When assessing NESO's request to not implement an aFRP, and supporting CBA, we considered the following aspects:

[4] GB is a synchronous area consisting of a single Load Frequency Control area.

- **NESO's system frequency performance for the period 2014-2024 compared to the limits stated in Annex III of the SOGL Regulation**
  NESO provided us with frequency data over the period 2014-2024 and we assessed this for trends in frequency quality. In this report we consider frequency quality to be the time in which frequency is kept within the standard frequency range,[5] with more time in the standard frequency range indicating better frequency quality.

  NESO's analysis showed that GB system frequency complied with statutory requirements for time within the standard frequency range over the last 4 years[6,7] and that NESO was always able to restore frequency to the frequency restoration range within the statutory timeframes. From the frequency data provided, we concur that the existing suite of services has kept NESO well within the SOGL limits.

  However, we identified a notable increase in the number of frequency excursions (ie, occasions where frequency deviates outside of the standard frequency range of 49.8 to 50.2Hz) since 2021, particularly for low frequency excursions which have more than doubled in occurrence over the previous seven-year average. In line with the expectation in our original decision, NESO assessed the impact of increased variable renewable generation on frequency quality – while this showed that there is some correlation between the penetration of variable renewable generation and the number of frequency excursions, it is not conclusive of causation. Additionally, analysis shows that frequency excursions over this period are more common but also of lesser duration, resulting in no overall trend for the time spent outside of the standard frequency range.

  NESO proposes that increasing the procurement volumes of its dynamic response services should continue to enable performance in line with historic levels. We looked at whether increased procurement of service volumes is possible. We consider it is likely that additional procurement can be achieved based on market growth projections, extant liquidity levels, and development of NESO co-optimised service procurement. Based on calculations conducted by NESO, we are confident that frequency quality can be maintained and improved in this way if increased procurement is achieved.

[5] Defined, per Annex III of the SOGL, as a range of ±0.2Hz around 50.0Hz.
[6] In fact, the only exemption to this within the entire dataset (2014-2024) is the 9 August 2019 event, after which NESO implemented, *inter alia*, the Frequency Risk and Control Report. Our 2021 decision on aFRP exemption accounted for this event.
[7] For example, in the worst performing year (2022) in this dataset, NESO was outside of the operational limits for a total of 754.93 minutes against a maximum allowable 15,000 minutes.

From the perspective of maintaining the frequency within the standard frequency range, we consider low potential benefits of implementing an aFRP. Despite the more difficult circumstances NESO has faced in recent years, pre-fault frequency performance has been well within the limits of frequency quality and we expect that NESO will be able to continue this management of frequency with existing services.

- **Impact of aFRP on larger (post-fault) frequency deviations**
  We agree with NESO's analysis that an aFRP would have little or no effect on frequency in post-fault situations. aFRP could help ensure that pre-fault frequency minimises the magnitude of post-fault frequency deviations, but we consider that NESO already manages pre-fault frequency effectively through existing balancing tools and there is therefore no need to additionally provide aFRR through an aFRP.[8]

  Additionally, we consider that evidence supports NESO having better managed large frequency events in recent years, chiefly due to the implementation of the Dynamic Containment service. This reduces the requirement for aFRP to 'over-control'[9] pre-fault frequency, which could be costly without providing value for money.

- **Economic considerations and costs to implement aFRP in GB**
  NESO provided an estimate of the costs to implement aFRP to between £26m and £46.5m.[10] This included changes to NESO's IT systems, installing control points for each provider, and the communication infrastructure between NESO and provider sites. This cost would need to be recovered through improved efficiency of aFRP over existing services and / or improving post-fault risk through pre-fault frequency conditions – as stated above, we consider this unlikely based on the historic frequency data.

  NESO also provided analysis on the cost of meeting its slow pre-fault frequency response volumes[11] through procurement of its existing frequency response services versus procurement of aFRR over the period of June 2024 – May 2025.[12] NESO calculated that the utilisation cost of aFRR delivered through an aFRP over that

[8] This statement is based on the current Frequency Risk and Control Report policy as of the date of this letter. We note that NESO has proposed changes to this policy, which are currently with Ofgem for decision: we are currently consulting for further views on those proposed changes. The statements in this letter does not fetter our discretion with respect to our decision on any changes to the Frequency Risk and Control Report policy.
[9] That is, managing pre-fault frequency fluctuations beyond that required to achieve the appropriate post-fault risk level and therefore being uneconomic or causing potential operational issues.
[10] On the basis of 30 aFRR providers. NESO has based this on the number of existing approved providers in other NESO Replacement Reserve markets at the time of the report.
[11] That is, volumes of its Dynamic Regulation and Mandatory Frequency Response.
[12] NESO compared the cost of its actual Dynamic Regulation and Mandatory Frequency Response procurement to the cost of procuring equivalent aFRR volumes based on prices seen in the European Internal Energy Market (IEM). NESO further noted that the IEM likely has greater aFRR liquidity than the GB market, limiting downward pressure on prices were it implemented.

period would have cost approximately £16.4m more than the actual cost incurred for existing services. NESO analysis also indicated that the higher range of prices seen in its existing markets is low compared to the lower range of aFRR prices. This suggests that complementary provision of frequency response volumes (ie, running aFRP alongside existing NESO services) is also unlikely to present savings.[13]

Given NESO evidenced that aFRP is likely to present a more expensive method of managing pre-fault frequency than existing balancing tools, the significant upfront cost associated with implementation of an aFRP is unlikely to be recoverable.

Therefore, we agree with NESO's assessment that an aFRP at this point in time would likely be expensive to implement and more expensive to operate than existing frequency services.

Taking into account the above, we believe that NESO can manage frequency adequately with expansion (increased procurement volumes) of its existing services, and that this expansion of volumes is both possible and economic. Therefore, it would not be in the consumer interest to introduce aFRP at this time based on the outcome of this assessment.

Our decision

We therefore conclude the review of the CBA and continue to consider that it is not in consumers' interest for aFRP to be implemented in the GB synchronous system at this time and we hereby:

- Continue to exempt NESO from the requirement to implement an automatic Frequency Restoration Process in the GB synchronous area, in accordance with Article 145 of the SOGL Regulation.

Next steps

We consider that it is important to monitor the needs case for aFRP going forward. Article 145(2) of the SOGL Regulation requires this decision to be reviewed at least every four years. However, we have agreed with NESO that it may be sensible to review the assumptions of this CBA sooner than four years, to account for the pace of change and to gain greater assurance of NESO's mitigating actions. In particular, we consider the following as important to revisit:

[13] However we do consider that, as NESO procures Dynamic Regulation capacity in a pay-as-clear manner but aFRR balancing energy might be paid in a pay-as-bid manner, NESO should remain aware of the different impacts of procuring capacity versus energy on the cost-effectiveness of maintaining frequency if response volume requirements continue to increase.

1. whether NESO is continuing to manage frequency quality through expansion of its existing dynamic frequency services,
2. any impact of increase in variable renewable generation on the occurrence of system frequency deviations, and
3. the costs of controlling frequency, particularly any sharp rises in balancing costs spend associated with managing system frequency.

If you have any questions about the contents of this letter, please contact Zong Yan (Zong.Yan@ofgem.gov.uk) or James Hill (James.Hill@ofgem.gov.uk).

Yours sincerely,

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