TRANSPOWER

Trial increase of national Multiple Frequency Keeping band to 50MW

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IMPORTANT

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Contact Details

Address:	Transpower New Zealand Ltd 22 Boulcott Street PO Box 1021 Wellington New Zealand
Telephone:	+64 4 590 7000
Email:	system.operator@transpower.co.nz
Website:	www.transpower.co.nz

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Executive Summary

The System Operator, in consultation with the Electricity Authority (the Authority), has decided to complete a time-limited trial to increase the national Multiple Frequency Keeping (MFK) band from 30 MW to 50 MW during defined daytime and peak periods. The trial responds to increasing frequency variability associated with higher intermittent generation (IG), demand growth, and changing operating conditions, which are placing greater demand on current frequency keeping (FK) arrangements.

The trial will run from 1 September to 30 November 2026, with the 50 MW national band applying between 05:00 and 21:00 and the current 30 MW setting retained outside those hours. Two single-island test periods are also planned to assess procurement of the full 50 MW band within one island. These tests will inform the operational feasibility of national FK selection and whether it could support more efficient FK procurement.

The trial will assess whether the wider band improves frequency quality in a way that is proportionate to incremental procurement costs, while monitoring operational impacts, market outcomes, provider participation, and interactions with constraints or HVDC operation. Cost, market behaviour, operational, and data quality triggers will determine whether the trial continues, is adjusted, shortened, or suspended.

Following the trial, the System Operator will publish a summary report assessing outcomes against the trial objectives and decision criteria, including whether an enduring increase to the MFK band is justified and any required next steps.

1 Background

This document sets out the System Operator's decision to complete a time-limited trial to increase the national MFK band from 30 MW to 50 MW during defined daytime and peak periods. The purpose of the trial is to assess whether additional FK headroom can improve frequency quality in a way that is proportionate to the associated cost, operational, and market impacts before any enduring change is considered.

New Zealand's power system is changing rapidly as more IG, particularly wind and solar, is deployed to meet growing electricity demand driven by electrification. This is increasing intra-dispatch variability and uncertainty in the supply-demand balance, with flow-on effects for frequency quality, constraints, and reserve needs. Engineering studies indicate two main drivers including sustained frequency bias caused by off-dispatch operation, and faster short-term variability from IG intermittency, both of which place greater demand on the MFK ancillary service.

The existing frequency-related Principal Performance Obligations (PPOs) in Part 7 of the Code require the System Operator to maintain system frequency by procuring and deploying ancillary services. MFK is one of these ancillary services, and the System Operator has flexibility to procure and deploy MFK, including by adjusting the band size and refining provider performance expectations through contracts and tests.

The Authority recently tasked the System Operator with investigating how the MFK service could be used to manage intra-dispatch frequency variations. The MFK review phase 1 report, published by the Authority on 24 July 2026, confirms that MFK remains a critical tool for managing intra-dispatch frequency deviations, and that its role in the frequency management regime is becoming increasingly important as system frequency variability increases.

This trial focuses on the near-term recommendation in the phase 1 report to increase the MFK band, while related actions on national frequency keeping, Battery Energy Storage System (BESS) participation, frequency management strategy, and dispatch compliance monitoring are progressed in parallel. The proposed trial design, objectives, monitoring approach, and decision criteria are set out in the following sections.

2 Trial increase of MFK band

2.1 Maintaining frequency within the normal band

Maintaining system frequency within the normal band is critical to the secure and efficient operation of the power system, as it reflects the real-time balance between generation and demand. Operating close to 50 Hz helps keep assets and equipment within design limits, maintains synchronism across the power system, and reduces the risk of wider system instability during an event.

Dispatch instructions issued by the System Operator, typically at five-minute intervals, are intended to maintain system frequency by matching forecast load with offered generation. However, within each dispatch interval, actual load and generation may differ from forecast or dispatched levels, resulting in intra-dispatch deviations from nominal frequency. In practice, intra-dispatch deviations are unavoidable because load and IG vary continuously and even dispatch-compliant generators cannot hold perfectly flat output between dispatch instructions. Governors and frequency control systems provide the primary frequency response to the deviation, but FK ancillary service is employed to restore frequency to 50 Hz following the primary frequency response.

The FK service regulates system frequency within the normal band using MFK, a standalone control tool operating on the System Operator's SCADA platform. The MFK controller receives frequency error as an input, calculates the active power response required to correct it, and sends a control signal to multiple designated providers. Under current settings, the signal is limited to ±15 MW per island. Providers adjust generator output in response, allowing other governors to return to their operating set points while maintaining stable system frequency.

Selection for this ancillary service is performed within the System Operator's Market Systems. The selection process considers the lowest offer price together with calculated constrained-on costs to minimise overall frequency keeping costs. In a well-functioning market, efficient dispatch and effective frequency control reinforce each other, keeping prices close to true supply costs with minimal uplift. Consumers benefit through lower average prices, reduced volatility, and reliable supply. By contrast, greater variability and persistent intra-dispatch deviations requiring frequent redispatches raise system costs that are ultimately socialised to consumers. Maintaining efficient dispatch and robust frequency management is therefore critical to long-term affordability and price stability.

2.2 Why the increase

Since early 2015, after the HVDC Frequency Keeping Control (FKC) function was introduced, an aggregate national MFK band of 30 MW has been the default in real-time operations. At that time, frequency deviations were largely driven by rapid load changes, while grid-connected IG installed capacity (predominantly wind) was about 0.7 GW and remained unchanged until 2020.[1] Since late 2023, system frequency variability (quantified by its standard deviation) has increased noticeably (Figure 1).

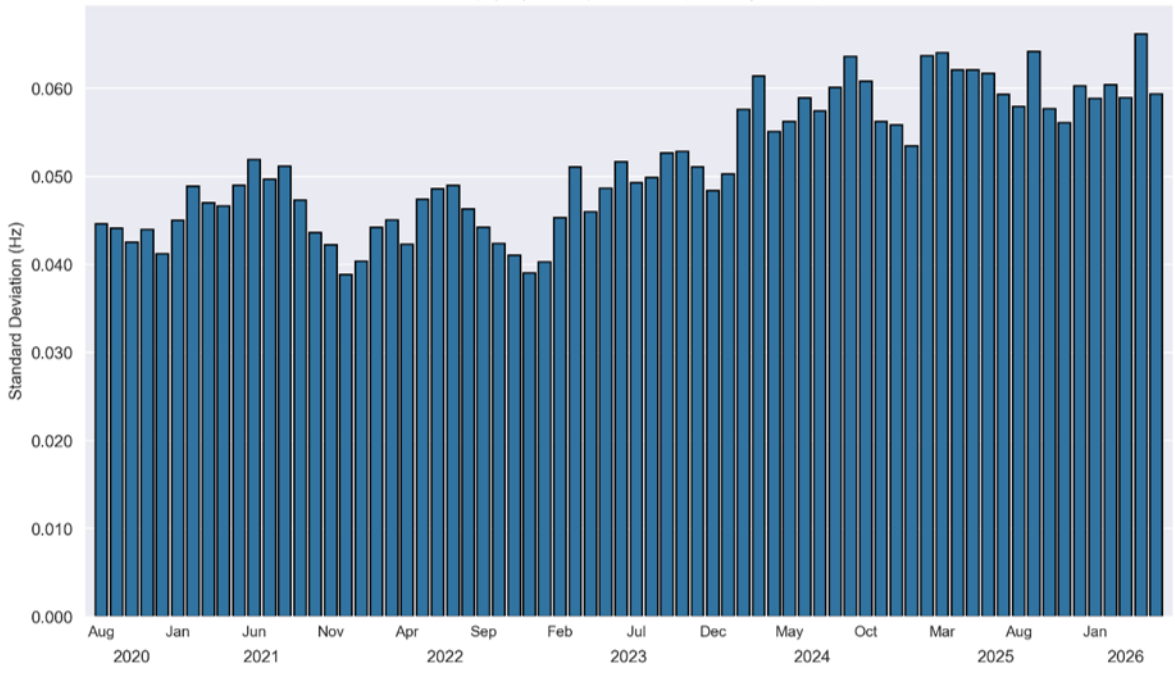

Figure 1 Increase in system frequency standard deviation over the years.

As of early 2026, installed wind and solar capacities are about 1.3 GW and 0.3 GW respectively, with solar expected to reach 1 GW by the end of the year. Peak load has also increased, with demand

[1] Weekly Market Summary - 16 Aug 2020.pdf

exceeding 7.1 GW,[2] [3] and every winter has seen multiple new entries in the top 10 peak-demand records, clustering around 6.8–7.1 GW.[4] [5] [6] On 25 July 2025, national demand peaked at 7.015 GW[7], about 700 MW higher than the typical peaks of 2015. These changes on the power system have made frequency management more challenging, particularly during peak demand and periods of rapid net demand[8] change exacerbated by IG intermittency.

Together, these changes indicate that increasing the MFK band would support peak-period operation by providing additional regulating headroom when frequency deviations are most likely to coincide with high demand, rapid net-demand change, and increased IG variability.

The MFK review phase 1 report provides evidence that:

1. The regulation signals are increasingly saturated at the MFK band limits during peak and high variability periods, reducing the System Operator's ability to keep frequency within the normal band. Figure 2 shows that MFK utilisation during peak periods was more heavily skewed toward the lower band limit in Spring 2025 than in Spring 2022.

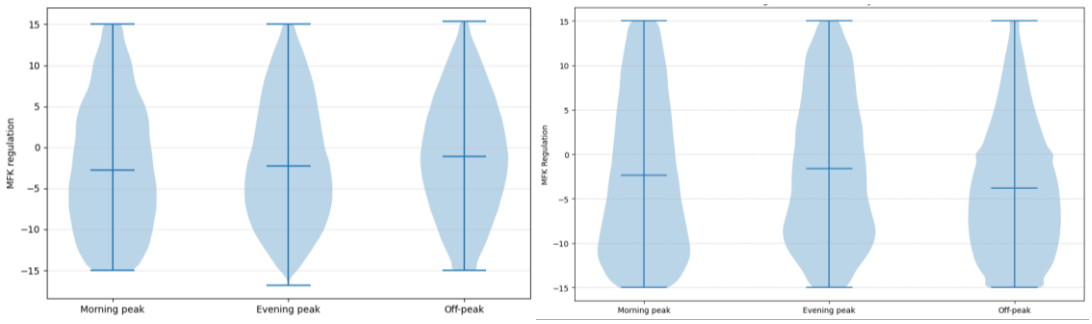

Figure 2 MFK regulation distribution – Spring 2022 (left) v Spring 2025 (right) (Morning peak - 06:00 to 08:00, Evening peak - 17:00 to 19:00)

2. Under current MFK settings, frequency quality analysis indicates that periods of rapid load or generation change are associated with more time outside the normal frequency band and more threshold crossings (Figure 3). These impacts have increased over time, highlighting the limits of the current frequency management framework during periods of rapid and simultaneous demand and generation change.

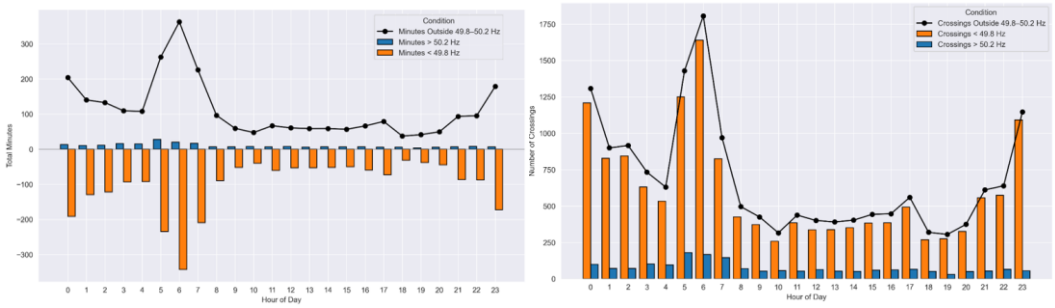

Figure 3 Total time spent outside the normal frequency band (left), Total number of threshold crossings (right) (Aug 2020-Feb 2026).

2 Market Movements 8-8-2021.pdf
3 New Zealand power demand hits 7141MW
4 Weekly Market Summary 26 June.pdf
5 Weekly Summary - 3 September 2023.pdf
6 Weekly Summary - 22 June 2025.pdf
7 Weekly Summary - 10 August 2025.pdf
8 Net demand refers to the demand that must be met by synchronous generation after subtracting IG contribution.

Further detail on the increasing impact of IG on system frequency, and its implications for the adequacy of the MFK tool, is provided in the MFK review phase 1 report.

2.3 Why the trial

The proposed increase in the MFK band responds to a clear operational need to maintain and restore frequency within the normal band under increasingly variable and stressed system conditions. Because a larger procurement quantity may increase FK ancillary service costs, the System Operator has decided to implement the change as a targeted and time-limited trial. This will allow the System Operator to assess whether the expected frequency quality benefits, particularly reduced time outside the normal band and fewer threshold crossings, are sufficient to justify the associated cost and operational impacts before considering any enduring change.

Similar approaches have been used in other jurisdictions. For example, AEMO in Australia's NEM increased procurement of Frequency Control Ancillary Services (FCAS) to continuously correct frequency deviations and support operation within the normal frequency band.[9]

Cost impacts from changes to ancillary service procurement requirements are not unusual. In other ancillary service settings, such as instantaneous reserve, relatively modest changes to risk modelling can affect the amount of reserve scheduled and the resulting cost. The key distinction for FK is that the modelled MFK requirement and procurement setting have remained unchanged since 2015 despite changing system conditions. A trial provides a way to test whether updating the MFK requirement is justified by the frequency quality benefits delivered.

The trial will also provide evidence on market outcomes under higher procurement quantities, support provider readiness for any future enduring increase, and test national selection where FKC is available to enable more efficient least-cost procurement.

To ensure the trial is proportionate and focused on the periods of greatest need, the increased MFK band will apply during periods where the system is most exposed to rapid net-load changes, including peak demand periods and daytime solar ramps that can materially change net load. Cost management and potential trial suspension criteria are set out in Section 4.3.

Higher costs observed during the trial would not necessarily indicate that costs would remain higher over the longer term. A sustained price signal from higher procurement quantities may encourage increased participation, competition, and investment in FK capability, including from fast-responding resources such as BESS.

3 Trial objectives & decision criteria

The objective of the trial is to build a clear evidence base for whether a wider MFK band should be adopted on an enduring basis, by assessing frequency quality outcomes alongside procurement cost, operational impacts, and market outcomes under higher procurement quantities. The key criteria are:

- **Frequency quality improvement**: the wider band reduces time outside the normal band and the number of threshold crossings during trial hours, while improving management of sustained frequency bias away from 50 Hz especially during peak demand and ramping periods.

[9] Regulation-FCAS-factsheet.pdf

- **Cost effectiveness**: the observed frequency quality benefit is proportionate to the incremental FK procurement cost, including whether costs remain within the expected range for the trial settings.
- **Operational outcomes**: any adverse interactions with constraints, HVDC operation, or other operational settings and whether the trial improves (or reduces) the System Operator's ability to maintain and restore frequency within the normal band and maintain frequency stability.
- **Market outcomes and provider participation**: how FK market outcomes respond to higher procurement quantities (including pricing and competitiveness), and whether the trial supports efficient participation by existing and prospective providers (including emerging technologies such as BESS).

4 Trial settings and monitoring

This section describes the trial scope, operating hours, monitoring, and suspension triggers.

4.1 Definitions

- **Normal band**: The normal system frequency band as defined in the Code.
- **MFK band**: The aggregate MW range (up and down) that the System Operator procures and dispatches through MFK offers to manage intra-dispatch frequency deviations.
- **Minutes outside the normal band**: Total minutes when system frequency is outside the normal band (reported for the trial hours and compared to a baseline period).
- **Threshold crossings**: The number of events where frequency crosses to outside the normal band boundaries (a count of excursions, not their duration).
- **Abnormally high procurement outcomes**: Procurement outcomes that are materially outside the expected range for the trial settings, assessed by the System Operator using recent FK prices/costs and prevailing system conditions as comparators.

4.2 Trial settings

The System Operator will undertake a three-month trial from 1 September to 30 November 2026. During the trial period, the aggregate national MFK band will increase from 30 MW to 50 MW during the hours of 05:00 to 21:00, equivalent to 25 MW per island under normal operation. Outside those hours, the current 30 MW national setting will remain in place. The trial will also include two defined test periods to assess procurement of the full 50 MW band within a single island, where operationally and cost feasible, including 5 to 11 October 2026 in the North Island and 2 to 8 November 2026 in the South Island.

The trial period has been selected based on expected system conditions, including periods of higher IG output and the absence of major planned outages, such as HVDC outages. However, unplanned outages may require changes to the trial timing or duration. If the trial is adjusted or suspended due to unplanned outages, the System Operator will notify market participants as soon as reasonably practicable and revert to the current MFK settings.

The trial will be implemented using existing operational procurement and dispatch arrangements for the FK ancillary service. Table 1 below summarises the trial settings, timing, and scope.

Setting	Timing	Start/End date	Value / description	Comments
50 MW MFK band	05:00–21:00	1 Sep–30 Nov	50 MW nationally (25 MW per island)	Increase of 10 MW per island only during trial hours
50 MW MFK band (NI only)	05:00–21:00	5–11 Oct	Procure the full 50 MW in a single island where operationally and cost feasible.	To inform national procurement and selection options.
50 MW MFK band (SI only)	05:00–21:00	2–8 Nov		
30 MW MFK band	21:00–05:00	1 Sep–30 Nov	30 MW nationally (15 MW per island)	No change

Table 1 Proposed MFK trial settings and scenario description.

4.3 Cost management and potential suspension

The System Operator recognises that increasing the MFK band may increase FK procurement costs. The band increase will therefore be implemented as a time limited, closely monitored trial with defined operating hours and clear investigation and suspension triggers.

We have used historical monthly FK costs (Figure 4) to estimate expected and upper reference ranges for the trial. For context, monthly FK costs between September and November, excluding the backup fixed fee, have been around $1 million across each of the last four calendar years. This figure is not a suspension trigger threshold; it provides a baseline for comparing FK costs during the trial months.

To reduce the risk of participants targeting thresholds, the System Operator will not publish trigger values. FK costs will be monitored weekly against the defined ranges, with triggers intended to identify persistent cost pressure rather than isolated high-cost trading periods. The following triggers will apply consistently throughout the trial.

- **Cost triggers** (trial hours only): If FK procurement costs during the trial hours are materially above the expected range over a sustained period, the System Operator will investigate the drivers (e.g. system conditions, constraints, or market behaviour) and may adjust, shorten, or suspend the trial pending further assessment and stakeholder notification.
- **Market behaviour trigger**: Evidence of outcomes inconsistent with effective competition (e.g. sustained outcomes materially above recent norms that cannot be explained by system conditions). Isolated high-price outcomes would be considered through normal monitoring but would not by themselves trigger suspension unless they form part of a repeated or unexplained pattern. In these circumstances, the System Operator will engage with the Electricity Authority and may adjust, shorten, or suspend the trial if required to manage risk.
- **Operational trigger**: Trial settings materially increase operational risk (e.g. adverse interactions with constraints or HVDC operation) or reduce the System Operator's ability to maintain or restore frequency within the normal band.
- **Data quality trigger**: Material data or measurement issues prevent reliable assessment of trial impacts.

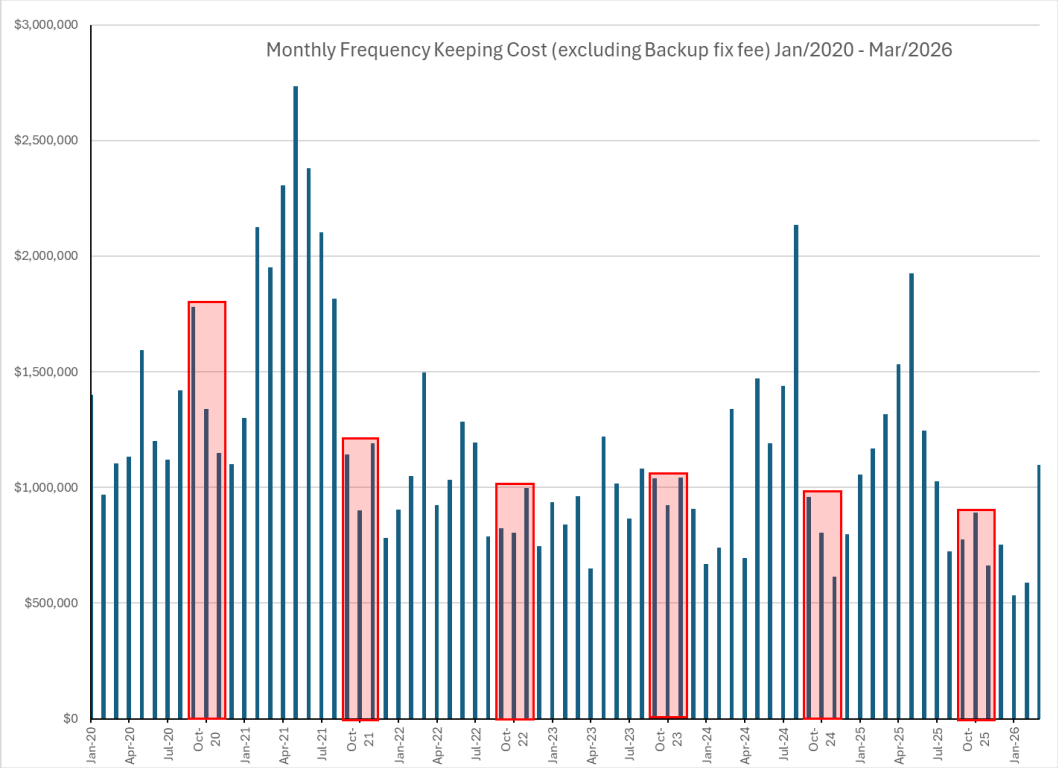

Figure 4 Monthly Frequency Keeping service cost (excluding backup fixed fee) between Jan/2020 and Mar/2026.

Where a trigger is met, the System Operator will promptly review the outcome and may adjust, shorten, or suspend the trial. If the trial is adjusted or suspended, the System Operator will notify market participants as soon as reasonably practicable.

4.4 Monitoring, reporting and results

Monitoring will focus on the indicators used to assess the trial objectives and decision criteria in Section 3, and on the cost and operational triggers in Section 4.3. In particular, the System Operator will monitor:

- **Frequency quality outcomes** during trial hours (minutes outside the normal band and threshold crossings), compared with a baseline derived from recent comparable periods and/or non-trial hours.
- **MFK utilisation and saturation**, including the extent and duration of operation near the band limits and the use of the additional MW band during the trial hours.
- **Procurement cost outcomes** during trial hours, monitored against expected and upper reference ranges in accordance with Section 4.3.
- **Operational impacts**, including interactions with constraints and HVDC operation, and any material changes to operational risk or the ability to maintain and restore frequency within the normal band.
- **Market outcomes**, including pricing and competitiveness outcomes under higher procurement quantities and any implications for provider participation.

Following completion of the trial, the System Operator will publish a summary report that assesses outcomes against the trial objectives and decision criteria set out in Section 3. The report will also

outline any proposed next steps, including whether an enduring change is considered justified and, if so, the indicative pathway and lead time for implementation. This will also support the Authority's work in developing a holistic frequency management strategy and inform the need for future frequency keeping performance and frequency quality monitoring.

4.5 Who is impacted

The System Operator recognises that the trial may affect multiple participants. The primary impacts are expected to relate to FK procurement and dispatch outcomes, potential cost allocation effects, and the operational and market monitoring required during the trial. The trial does not change participants' underlying Code obligations or the existing arrangements for offering and providing FK services. Rather, it increases the procured MFK band during defined trial hours and introduces additional monitoring and reporting. The parties most likely to be affected are:

- **Ancillary service agents** that offer and provide FK ancillary service, including providers using synchronous generation, hydro, or inverter-based resources, including BESS where applicable.
- **Generators, load, and traders**, as FK procurement and dispatch decisions can affect constraints, dispatch outcomes, and ancillary service costs.
- **The System Operator**, in monitoring and reporting trial outcomes, including frequency quality metrics, operational impacts, and costs, and administering any investigation, adjustment, or suspension actions.
- **The Electricity Authority**, where engagement is needed in relation to market monitoring or investigation of outcomes inconsistent with effective competition (e.g., sustained costs materially above recent norms that cannot be explained by system conditions).

5 Next Steps

Before the trial starts, the System Operator will finalise operational guidance, monitoring arrangements, and market participant communications.

During the trial, the System Operator will monitor frequency quality, FK procurement costs, market outcomes, operational impacts, and relevant system conditions. The trial may be adjusted, shortened, or suspended if the triggers in Section 4.3 are met.

Following the trial, the System Operator will publish a summary report assessing outcomes against the objectives and decision criteria in Section 3. The assessment will inform whether the increased MFK band should be discontinued, modified, trialled further, applied only during targeted periods, or considered for an enduring change.

6 Contact us

For questions or feedback on this change, please contact: system.operator@transpower.co.nz