

COULD KIWI CONSUMERS BENEFIT FROM 5-MINUTE SETTLEMENT?

Executive Summary

Some stakeholders have suggested that New Zealand move from the current 30-minute market settlement period to 5-minute settlement (5MS)¹, as implemented in the Australian National Electricity Market (NEM). Proponents argue that 5MS would better align settlement with the technical capabilities of fast-responding technologies such as battery energy storage systems (BESS), enabling them to respond to short-duration price signals and supporting greater investment in flexibility. It is suggested this could improve price stability and deliver benefits to consumers.

Recent analysis undertaken by the Authority² suggests that 5-minute price volatility in the New Zealand electricity market (NZEM) has been declining, while volatility between trading periods has increased.³ This outcome is likely influenced by the flexible and responsive nature of New Zealand's hydro-dominated generation fleet, which is well suited to managing short-term variability. The observed increase in 30-minute volatility appears to be driven, at least in part, by inaccuracies in intermittent generation forecasting.

On the basis of this analysis, the Authority considers that current market conditions do not support a case for transitioning to 5-minute settlement. Implementing 5MS would require substantial, end-to-end changes across metering, wholesale trading, scheduling, reconciliation and clearing systems. These changes would impose significant costs on retailers, metering equipment providers and market operators, which would ultimately be borne by consumers.

The Authority is also progressing, or has recently implemented, a range of targeted market changes that are expected to improve incentives for BESS participation without the need for wholesale settlement reform. These initiatives are expected to deliver benefits to the market, and potentially to consumers, at materially lower cost.

¹ <https://www.ea.govt.nz/projects/all/unlocking-the-benefits-of-battery-energy-storage-systems/consultation/wholesale-market-arrangements-for-battery-energy-storage-systems/>

² <https://www.ea.govt.nz/news/eye-on-electricity/eye-on-electricity-five-minute-price-volatility-and-intermittent-generation/>

³ <https://www.ea.govt.nz/news/eye-on-electricity/past-and-future-spot-market-volatility/>

Electricity spot market settlement in New Zealand

The New Zealand electricity market (NZEM) settlement is based on 30-minute trading periods. The market dispatch schedules look ahead 5 minutes; however, generation doesn't always need to be dispatched every 5 minutes. When market conditions are relatively stable, in the early hours of the morning for example, generation may be dispatched once per trading period.

Prior to 2022, the final settlement prices were calculated using a Final Pricing schedule was run the following day, using revenue metering data for the load inputs. Forecast and dispatch schedules relied on less accurate system monitoring data, which could result in material differences between expected and final prices.

In 2022, settlement pricing was changed to a time-weighted average of dispatch prices within each trading period. Improvements in technology allowed aspects such as binding transmission constraints and scarcity pricing to be incorporated into forecast and dispatch schedules and more accurate load data became available in real-time. These changes have improved price transparency, reduced forecast error, and enabled settlement prices to more accurately reflect system conditions during the trading period.

Drivers for 5MS in the Australian NEM

The NEM moved from time-weighted average of dispatch prices to 5MS in October 2021. One of the principal drivers for the change was a concern that the misalignment between 5-minute dispatch and 30-minute settlement created incentives for strategic bidding behaviour. In particular, some generators were able to withhold capacity to drive short-duration price spikes to the market price cap, before rebidding to increase dispatch volumes for the remainder of the trading interval.

In a 2015 rule change request⁴, it was argued that aligning dispatch and settlement intervals would reduce these incentives, encourage investment in fast-responding technologies, and dampen extreme price volatility. The reform was also intended to improve incentives for demand response. Under 30-minute settlement, scheduled demand was required to respond for an entire trading period, which limited the economic case for short-duration responses.

Impacts of 5MS in the NEM

Implementation of 5MS in the NEM occurred from 2017 to 2021. The final design mandated 5MS for all participants, including domestic loads requiring extensive changes in the power system metering and settlement arrangements. Under the Australian National Energy Law, there is no requirement for Australian Energy Market

⁴ [Rule-change-request-Sun-Metals-151207.pdf](#)

Commission to undertake a cost benefit analysis prior to approving the change and no report of implementation costs has been released following implementation. However, one collation of publicly available information has estimated a full industry implementation cost of at least AUD\$500m⁵.

Reports of the impact of 5MS on wholesale prices have been mixed. A paper that described early modelling suggested the first three months post-implementation saw prices ~4.9% lower than they would otherwise have been⁶. However, a second study of the first eight months of operation suggested prices are trending higher over time as there is no incentive to “bid to the floor” following a price spike resulting in lower price volatility but higher prices on average⁷.

Frequency Control Ancillary Services (FCAS) revenue still provided 68% of gross BESS revenue for the first three months of 5-minute settlement operation⁸. However, by early 2025, energy arbitrage revenue had increased significantly and accounted for 93% of BESS revenue⁹ despite BESS providing more than 50% of FCAS volume by 2025. This demonstrates BESSs ability to capture significant revenue benefit from highly volatile pricing periods.

Four years on, demand side participation in the NEM is still low and further initiatives have been developed to incentivise demand side participation^{10,11}.

The case for 5MS in the NZEM

The NZEM does not exhibit the same degree of intra-trading period volatility that provided the driver for 5MS in the NEM. Gate closure and trading conduct rules in the NZEM provide a high degree of bid and offer stability within trading periods. Intra-trading period prices can be volatile, but this is more common during¹² demand ramping periods and is due to the narrow marginal offer bands of generators and large changes in demand from the start to the end of the trading period.

Generators typically construct their marginal offers to reflect expected average demand over the trading period. During periods of rapidly increasing demand, such as the morning ramp, dispatch prices often rise steadily across the trading period, producing a characteristic “saw-tooth” price pattern. In some cases, the resulting average price may be lower than the marginal offer price required for generation at the end of the period.

⁵ [\(belatedly\) one year on from Five Minute Settlement - WattClarity](#)

⁶ [How do changes in settlement periods affect wholesale market prices? Evidence from Australia's National Electricity Market - ScienceDirect](#)

⁷ [From 30- to 5-minute settlement rule in the NEM: An early evaluation](#)

⁸ [AEMO quarterly energy dynamics report Q4 2021](#)

⁹ [AEMO quarterly energy dynamics report Q2 2025](#)

¹⁰ [Integrating price-responsive resources into the NEM | AEMC](#)

¹¹ [Unlocking CER benefits through flexible trading | AEMC](#)

¹² <https://www.ea.govt.nz/news/eye-on-electricity/eye-on-electricity-five-minute-price-volatility-and-intermittent-generation/>

Where this occurs, generators receive constrained-on payments to ensure they are compensated in line with their offers¹³.

Engagement with large industrial consumers indicates limited ability or willingness to vary demand at 5-minute intervals due to safety, operational and process constraints. This makes them unsuitable for 5-minute dispatch¹⁴.

The winter 2023 trial with Solar Zero, involving their fleet of aggregated domestic batteries, highlighted the technical challenges of monitoring and controlling distributed assets to respond to dispatch signals¹⁵.

New Zealand's generation mix is dominated by flexible hydro generation, in contrast to the NEM predominantly being supplied by relatively inflexible coal fired generation. Moving to 5MS could see a change in behaviour by generators to structure their offers to the 5-minute average load at the margins instead of the 30-minute average load. This could reduce short-duration price volatility and limiting arbitrage opportunities for BESS. Experience in the NEM suggests trading strategies adapt to preserve portfolio revenues¹⁶, and similar behaviour could be expected in New Zealand.

It is difficult to estimate likely costs to the New Zealand consumer of implementing 5MS, experience with smaller change projects and using the NEM costs as a guide, suggest possible end-to-end costs in the order of NZD\$100m. With full 5MS, many revenue meters would need a software update at the least to accommodate 5-minute meter reads. The meters themselves may also need increased data storage to comply with the minimum storage period requirements under the Code¹⁷. These increased data storage and transmission requirements would also impact Metering Equipment provider and retailer data and communication systems. The Reconciliation and Clearing Manager systems would need to be upgraded to handle the 6-fold increase in data provision volumes and trading period calculations. Finally, the System Operator would be required to develop new 5-minute trading period forecast schedules and redevelop data transfer protocols between themselves and the Clearing Manager.

Opportunities for BESS in the NZEM

Changes to the NZEM are planned or have recently been made that would provide improved revenue incentives for BESS:

- New standardised flex products provide an opportunity for BESS to contract capacity in a way that suits the physical limitations of their storage capacity: 2-hour discharge windows. This would provide revenue certainty for BESS owners

¹³ Clauses 13.202 – 13.204 of the Code describe the constrained-on calculations for generators.

¹⁴ Para 3: <https://www.ea.govt.nz/documents/1472/25100MEUG.pdf>

¹⁵ [Ara Ake Winter Peak Innovation Pilot learnings and insights report](#)

¹⁶ [From 30- to 5-minute settlement rule in the NEM: An early evaluation](#)

¹⁷ Part 10, Schedule 10.7, Cl 38(b)(ii)

and support independent retail competition through peak price risk management. The management of peak price risk may also provide some risk premium relief in baseload and peak hedge products.

- Bi-directional offer forms for BESS making it more efficient and simpler to offer BESS and to more easily utilise the full range of BESS capability. Adding a single offer form for instantaneous reserves would allow the full dynamic capabilities of the BESS to be offered and dispatched into the power system.
- Review of Multiple Frequency Keeping settings to include participation of BESS. Reviewing the purpose and operation of MFK to manage intra-trading period variability could allow for larger purchase bands during high-risk periods and increased participation opportunities and revenue in the ancillary services markets for BESS.

Conclusion

Taking account of market conditions in New Zealand and experience in the Australian NEM, the Authority considers that:

- There is currently limited evidence that increased intermittent generation is translating into materially higher short-duration price volatility in the NZEM.
- This may change though it may also be a feature of New Zealand's more flexible hydro generation base.
- While the NEM trading settings have allowed scheduled BESS to significantly increase revenues, it's unclear that this has translated to an overall reduction in wholesale prices¹⁸¹⁹. It's also unclear what benefit consumers may be receiving from this.
- Existing NZEM trading settings, trading conduct and gate closure rules, already mitigate many of the issues that 5MS was designed to address in Australia.
- The costs of transitioning the wholesale market to 5MS are likely to be significant and would ultimately be borne by consumers, without a clear, demonstrable consumer benefit.
- Targeted market changes already underway provide a more proportionate and cost-effective means of supporting BESS and enhancing system flexibility.

Accordingly, the Authority does not consider that moving to 5-minute settlement is warranted at this time.

Any feedback can be sent to OperationsConsult@ea.govt.nz with "Five-Minute settlement" in the subject line by 5pm, 30 June 2026.

¹⁸ <https://www.aer.gov.au/industry/registers/charts/annual-volume-weighted-average-30-minute-prices-regions>

¹⁹ <https://www.aer.gov.au/industry/registers/charts/annual-count-30-minute-prices-above-5000mwh>