NewPower energy

24th July 2025

Submissions
Electricity Authority
P O Box 10041
Wellington

Via email: fsr@ea.govt.nz

Dear team,

Re: Submission on the Regulatory Roadmap for Battery Energy Storage Systems (BESSs)

Tēnā koutou,

NewPower Energy Services Ltd (NewPower) appreciates the opportunity to make this submission on the Electricity Authority's (Authority) consultation on the proposed voltage related code amendments.

NewPower, the holding company for Infratec NZ Limited (Infratec) and NewPower Energy Limited (NEL), are subsidiaries of WEL Networks Limited, New Zealand's sixth largest Distributor. Infratec, an Engineering, Procurement and Construction (EPC) company, is delivering low-carbon utility-scale solar and battery solutions at a time of unprecedented growth in New Zealand. Infratec developed and commissioned Rotohiko, NZ's first utility scale 35 MWh battery energy storage system (BESS) facility at Huntly, connected to WEL Networks' distribution assets. By way of context for this submission, NEL is the owner, operator and trader of generation assets including the Rotohiko BESS, which operates within both Network and Grid compliance modes, and so can offer a range of network, transmission, and energy market services within NZEM's wholesale market dispatch compliance rules. This BESS is already contracted to the System Operator as an ancillary service agent for instantaneous reserves.

Infratec has also constructed and commissioned approximately 118 MW of utility-scale solar farms connected to distribution networks across New Zealand for both NEL and customers, with an additional 80 MW currently under construction.

We support the Authority's leadership in preparing the electricity system for a future that is renewable, resilient, and affordable. Battery energy storage systems (BESSs) are central to this future, and we welcome the development of a dedicated regulatory roadmap.

BESS can do far more than shift energy across time. With the right settings, they can accelerate decarbonisation, strengthen grid resilience, and reduce long-term costs for consumers. However, current market structures and regulatory settings are limiting their potential—and the pace of reform must now increase.

NewPower are keen to work with the EA to ensure that the workstreams are prioritised, correctly based on their importance and cost benefits, rather than just looking for 'quick wins'.

The size of the task isn't to be underestimated, but the speed of progress is extremely high, and the regulations need to keep up. NewPower would urge that the roadmap timeframe is

considered against the current pipeline of new generation projects and consider how it can be optimised to ensure the regulatory aspects remain ahead of the market and systems.

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1. Opportunities to Accelerate the Energy Transition

Battery energy storage systems present a wide range of opportunities to accelerate New Zealand's energy transition and unlock value for customers. In addition to their core role in energy arbitrage, BESS can deliver multiple critical system services that improve efficiency, reliability, and affordability.

New technologies such as grid-forming inverters are increasingly being recognised as viable alternatives to traditional synchronous machines. AEMO's most recent *Integrated System Plan* acknowledges that synchronous condensers will play a transitional role only and are likely to be replaced over time by grid-forming inverters embedded in BESS.

In New Zealand, these technologies could support the grid through periods of high inverter-based generation and declining synchronous inertia. They are also highly relevant to system resiliency, which will become even more important as climate change increases the frequency and severity of extreme weather events.

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2. Grid-Forming Capabilities

BESS can deliver a range of essential services currently provided by synchronous generators, including:

- Resilience (islanded networks)
- Black start capability;
- Inertia and synthetic inertia;
- Frequency and voltage regulation;
- Oscillation damping;
- Fault current injection and ride-through.

As synchronous capacity retires, grid-forming BESS can provide these same services without emissions, water use, or dependence on fuel logistics. They can also be deployed closer to demand, improving local system strength and reducing transmission risk.

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3. Smart Charging and Vehicle-to-Grid (V2G)

New Zealand's growing electric vehicle (EV) fleet presents a large and flexible energy resource that could complement grid-scale batteries.

By 2030, the EV fleet is expected to reach **266,700 vehicles**. With an average battery size of 50 kWh, this equates to a combined storage potential of **13.3 GWh**. If just **5%** of this capacity were made available to the grid through smart charging or V2G, that would provide:

- **665 MWh** of distributed, controllable energy capacity.

This could support:

- Frequency regulation
- Peak demand reduction
- Local network constraint management
- Backup supply during outages

Unlike grid-scale batteries, EVs are already connected to homes and businesses. Smart charging technology could therefore unlock significant system value with relatively low incremental cost.

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4. New Zealand Is Falling Behind – Faster Progress Is Needed

BESS deployment is expanding rapidly overseas. Projects in the 300–400 MW range are becoming standard. Grid-forming inverters, storage-specific regulations, and new flexibility markets are already operational or in trial in multiple jurisdictions.

In contrast, New Zealand's efforts—though well-intentioned—remain slow and fragmented. Many issues highlighted in the roadmap have been recognised for some time, yet reforms remain pending. Meanwhile:

- On sunny, windy days, inverter-based renewables already represent a high share of output.
- Traditional system support services (e.g. inertia, fault response) are declining.
- Investors are holding back due to lack of clarity on dispatch, pricing, and system roles.
- Large 200 MW + hybrid plants are in the planning and feasibility stages now and may arrive before the road map timeframes allow.

We understand that major reforms like real-time pricing (RTP), market measures, and flexibility programmes are interconnected. However, this complexity should not become a reason for delay. Storage-specific changes can and should be prioritised where possible.

Recommendation:

- Treat storage enablement as an urgent system priority.
- Progress storage-specific rule changes independently where feasible.
- Provide transparent timelines and regular updates to build confidence.
- Deliver interim measures where longer-term changes are still under design.

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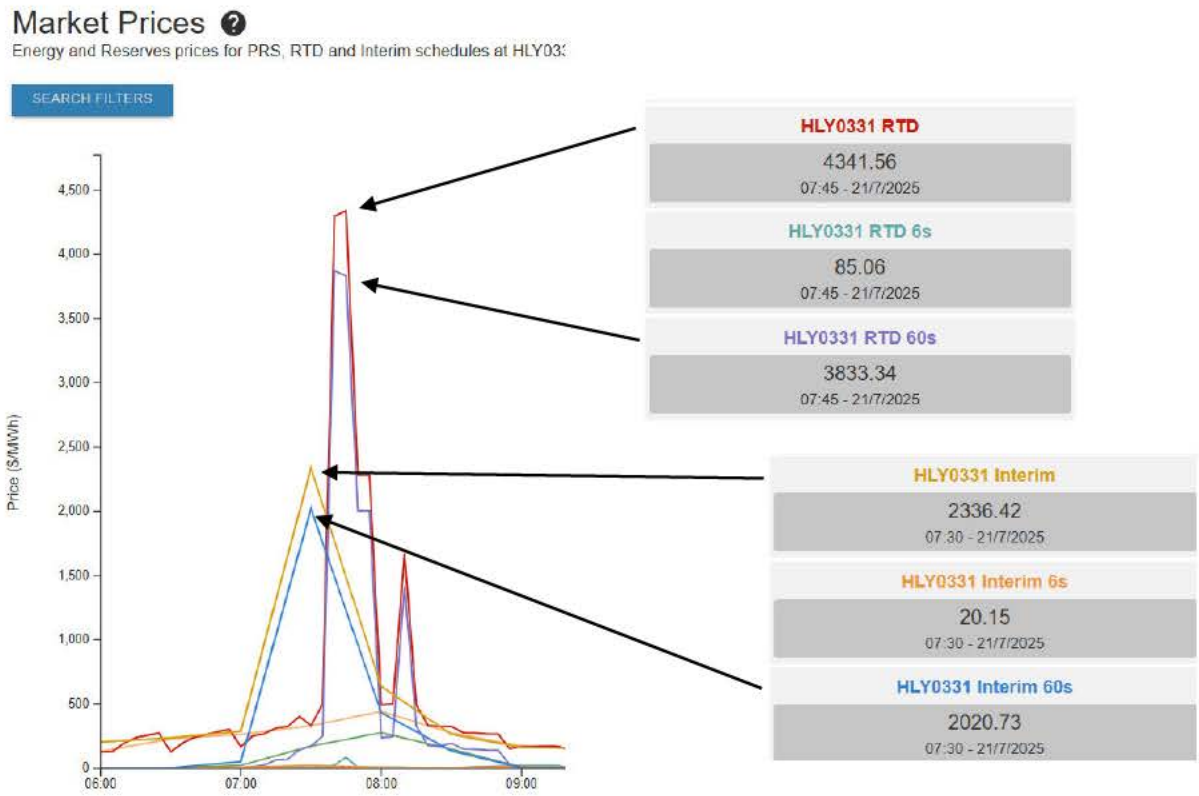
5. Time Weighted Average Compensation (TWAC): Payments Don't Match Dispatch

The current pricing method for dispatch, called **Time Weighted Average Compensation (TWAC)**, creates a significant barrier to battery participation.

Under TWAC, although batteries are dispatched based on real-time spot prices, they are **paid or charged based on the average price across the 30-minute trading period**. This creates a mismatch between operational decisions and financial outcomes.



The above screenshot for the 21st of July shows the difference between the dispatch price, and the interim price for the period, in the case over $2,000 for energy and over $1,800 for reserves.

There is the potential for fast acting providers to work in the 'five minute' space, but the rules don't adequately enable or reward them to do so.

Example 1: A battery begins charging when the spot price is very low. The price rises sharply during the same trading period. The battery stops charging to avoid high prices but still ends up paying the **average** price for the whole period—including the higher prices it avoided. This can turn a zero-cost dispatch into a loss.

This disconnect penalises fast-responding BESSs that act in support of system stability. In volatile periods, this pricing model discourages the very flexibility that BESSs are designed to provide.

The ability to accurately price is also diminished, as the reconciled price may be the constrained offer price, or the 'averaged' price, rather than the actual price that the BESS was dispatched at.

The accuracy of price signals (musical conductors of the electricity market) is a guiding principle of the market design, and one of the areas that Real Time Pricing was introduced to improve. The efficiency and accuracy of prices is critical to a highly functional market.

Recommendation:

- Transition toward a dispatch-based pricing model that compensates or charges BESS at the **actual dispatch price**, not the period average.
- That various scenarios are modelled for BESS and other flexibility providers to show the potential benefits for reconciling at the actual dispatch price.

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6. Gate Closure: Too Rigid for Fast-Acting Technology

BESS units are currently required to honour their bids and offers for 60–90 minutes in advance. This limits their ability to respond dynamically to system conditions where a full BESS rating may only be capable of honouring one trading period.

- State of Charge (SoC) must be carefully managed to avoid under-delivery.
- Forecasting errors can cause operators to reduce offered volumes.
- Modelling scenarios suggests that removing gate closure could increase BESS utilisation by 200%, by allowing higher bid volumes to be used.
- Battery warranties add another layer of complexity to SoC management and bid / offer strategy.

Recommendation:

- Shorten gate closure windows
- Allow limited intra-period adjustments
- Clarify treatment of SoC and bona fide obligations
- That various scenarios are modelled for reduced (or no) gate closure times to show the potential benefits to the system, and how this can increase utilisation factors for flexibility providers.

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7. Behind-the-Meter (BtM) Storage Lacks Market Access and Protection

- BtM systems that are large enough (in size or number) have the potential to trade in the market, rather than being reliant on their retailer for flexibility services and payments.
- Many BtM systems lack trading partners or tools for bidding and offering.

- They are exposed to price risk without constraint protection from having bids and offers in the system.
- . The combination of the inaccuracies of the forecast, and the lack of protection means that business cases are much harder to realise, and some perverse behaviours may be introduced, such as waiting for the price to develop in a period before discharging.

Example 2: Charging begins at low prices; the price spikes mid-period. The battery stops, but the BtM operator still pays the higher average price. There is no 'constrained on' protection as a dispatched generator would have.

Example 3: Discharging begins at high prices; the price drops. The battery stops, but the BtM operator is still paid the lower average price. 'There is no constrained off' protection as a dispatched generator would have.

Recommendation:

- Support aggregated market access
- Simplify registration and protections for BtM
- Enable constraint mechanisms for BtM providers

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8. Energy Storage Needs Its Own Code Definition

Currently treated as generation in the recent code updates, storage has unique behaviours separate from generation and load:

- BESS can **charge, discharge, or be idle;** these separate states must be recognised correctly in the code to ensure requirements like frequency response do not become highly onerous for BESS
- Must manage state-of-charge across services
- Different storage types have different operational constraints
- Need to differentiate short term ratings and sustained ratings

Recommendation:

- Create a new asset class in the Code for storage, enabling tailored obligations and rights

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9. Lack of Industry Best Practice for Storage

- Forecasting errors affect ability to maintain offers
- SoC changes affect dispatch commitments

Example 4: If spot price rises and dispatch increases, a BESS may run out of charge before end of commitment period.

This raises the question: **when should a BESS operator issue a bona fide withdrawal?**

If always required to bid conservatively, system flexibility is unnecessarily restricted.

Recommendation:

- Provide guidance on SoC and bona fide practices
- Allow bids/offers that reflect high-confidence operation rather than conservative limits

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10. MFK Product Design Is Incompatible with BESS Operation

- Multiple Frequency Keeping (MFK) is a **unidirectional product**, designed for hydro
- BESS is **bi-directional** and incurs real energy costs
- During MFK, batteries cannot control when they charge or discharge and may lose money

Recommendation:

- Design frequency products suited to BESS
- Pay average prices for energy moved
- Compensate BESS for net energy losses under frequency-following

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11. Distribution and Transmission Pricing Discourage BESS Use

- No Avoided Cost of Distribution (ACOD) incentives for distribution-level discharge
- No Regional Coincidence Peak Demand (RCPD)-style transmission signals

In addition, BESS are not rewarded for:

- Voltage regulation
- Local resilience
- Network constraint support
- Emergency backup

Recommendation:

- Develop new pricing mechanisms for distribution/transmission support
- Contract for grid support from BESS
- Ensure services beyond peak shaving are recognised

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12. Uncertainty in Market and Investment Signals

Investors face unresolved questions:

- How will hybrid assets be treated by the code and SO?
    - Intermittent forecast or dispatchable? Or both?
    - Will there be 'gate closure'?
    - How will the code define them? This will have a large effect
- What will future services (e.g. voltage, system strength) look like?
- Will participation be voluntary or mandatory?

Recommendation:

- Clarify regulatory path for co-located and hybrid assets; these assets may be starting construction in the next year and will arrive fast.
- Provide interim guidance on service design and obligations

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13. Non-Wires Solutions Remain Too Difficult

BESS could avoid costly grid upgrades, but barriers remain:

- Consenting, especially at substations or urban areas, is inconsistent and complex
- Safety and visual concerns are not standardised
- Regulated utilities are incentivised to **overbuild** rather than adopt flexible solutions which could save customers money
- **Scarcity pricing and reliability pressures** push planners to avoid risk at all costs

Recommendation:

- Streamline consenting for BESS, especially near load
- Align financial incentives to support Non-Wires Alternatives
- Provide guidance encouraging flexibility and proportionate risk-taking

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14. AUFLS Treatment for Embedded ESS Creates Competitive Disparity

The current treatment of **Automated Under-Frequency Load Shedding (AUFLS)** creates a competitive and operational imbalance between grid-connected and embedded energy storage systems (ESS), with cost and reliability implications for distributors and their customers.

Under clause 8.21(1) of the Code, ESS above the specified size threshold are **not considered connected asset owners** and are **not required to provide AUFLS** when charging. To account for this, the system operator procures **additional reserves**, with the associated cost **recovered from generators**.

However, **distributors are still required to meet AUFLS obligations**, including for embedded ESS charging below the threshold. This means:

- Distributors must make up for the shortfall caused by embedded ESS charging through additional AUFLS capacity.
- The **costs are recovered from the distributor's customers**, who may also face an increased risk of having an interruption during an AUFLS event due to greater AUFLS quantities being required.
- To maintain equity (customers do not face additional costs and risk), some distributors may seek to place **operational or financial obligations** on embedded ESS owners through connection agreements.

This places embedded ESS at a **competitive disadvantage** compared to grid-connected ESS, which are not subject to equivalent AUFLS-related constraints. It also creates inconsistency in how different types of storage assets are treated across the system.

Recommendation:
We support that a dedicated **workstream be initiated** to resolve this issue. This should:

- Ensure AUFLS responsibilities are applied consistently across storage technologies and connection types.
- Prevent the unfair transfer of system costs onto end users in one part of the network.
- Maintain investor confidence in embedded ESS by avoiding unpredictable obligations introduced through connection terms.

Conclusion

We support the Authority's vision and strongly encourage action to unlock the full value of BESS. Timely and targeted reforms to dispatch pricing, gate closure, storage classification, and access to services will enable storage to deliver on its potential.

NewPower welcomes discussion with the Authority on any points in our submission that the Authority would like further clarification or information for.

Yours Sincerely,

David Barnett
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NewPower Energy Services Ltd