AQUILA CLEAN ENERGY

Submission to the Electricity Authority

Five minute settlement discussion paper

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Core position

Five minute settlement should be framed as a market design reform that strengthens investment signals for BESS and should be considered alongside the Authority's other BESS consultations as part of a coherent reform package. More BESS in New Zealand can only benefit New Zealand consumers by increasing fast flexible capacity, reducing reliance on scarce gas and stored hydro for short scarcity events, and improving competition during peak periods. The costs of implementation should therefore be assessed against these wider market benefits, not viewed as a narrow settlement system cost alone.

Executive summary

Aquila Clean Energy (Aquila) supports a staged pathway toward five minute settlement in New Zealand.

The consumer rationale should be stated at the outset. It is a reform that can improve the way the market values fast flexible capacity. The practical extension is that this will then crowd in BESS. This is important as BESS is the best technology able to convert that sharper price signal into a consumer benefit.

A sharper settlement signal will bring more flexible capacity into the market. More flexible capacity will increase competition during scarcity events, absorb low cost renewable generation when it is abundant, discharge during morning and evening peaks, reduce reliance on higher cost thermal generation including gas which is quickly running out, and lower exposure to short periods of very high prices.

These outcomes only benefit the consumer.

For New Zealand, the power system is moving toward higher renewable penetration, greater weather exposure, more forecast error, tighter winter peaks and greater connection pressure. Transpower's Draft Security of Supply Assessment 2026 (SOSA) identifies fragile near term margins and North Island capacity risk during cold, dark, still winter mornings and evenings. It also states that the SOSA does not assess within island transmission and distribution capacity, project deliverability or commercial viability. Those gaps are material because BESS value is often locational and operational.

Aquila does not submit that the Electricity Authority should move immediately to full five minute settlement without further implementation design and cost testing. Aquila does submit that the Authority should adopt a formal roadmap now. That roadmap should test five minute settlement against future system stress, consumer cost outcomes and investment signals for flexible capacity, not only historic five minute price volatility.

Aquila recommends the Authority adopt a formal roadmap with:

1. shadow five minute settlement and published results;
2. nodal modelling of flexible capacity revenue and consumer benefit;
3. case studies of winter peak, low wind, low hydro, thermal availability and forecast error events;
4. assessment of network constraint and network alternative value;
5. a staged trial before any whole market commencement.

Aquila's interest in the discussion

Aquila is an active renewable energy developer and asset owner in New Zealand. Aquila has an operational solar farm at Pukenui, has energised its second solar farm at Edgecumbe, and has a further New Zealand development pipeline that includes solar and wind projects. Aquila is actively considering BESS investment in New Zealand, including both DC coupled retrofits to renewable generation assets and AC coupled standalone BESS.

Aquila's interest is practical rather than theoretical. Five minute settlement will affect whether flexible resources can be financed and connected quickly enough to contribute to security of supply, grid stability and consumer affordability.

The consumer case for flexible capacity

Five minute settlement should be assessed first as a consumer reform. The central question is whether the market will give efficient signals to resources that can respond when consumers most need them.

BESS matters to that question because it can:

1. charge when renewable output is strong and prices are low;
2. discharge when demand is high and prices are exposed to scarcity;
3. reduce curtailment of wind and solar output;
4. reduce reliance on gas and coal fuel during short peak events;
5. provide reserve and other system services;
6. support local network constraints where the contracting framework allows it.

These actions can reduce total system cost. They also increase competition at the times when market power and scarcity prices are most likely to affect consumers. If settlement design averages away the value of fast response, the market can under invest in the resources that would otherwise reduce those costs.

The consumer benefit is therefore not that BESS owners earn more revenue. The consumer benefit is that efficient revenue signals attract the flexible capacity that lowers cost and risk across the system.

The Authority should not treat hydro flexibility as a full substitute for BESS or other fast flexible resources. Hydro is flexible, but it is not unconstrained. Stored water has opportunity cost, especially when dry year risk is material. Hydro units also cannot simultaneously provide all flexibility services across energy shifting, reserve, ramping, congestion management and local network support. BESS can provide fast response without consuming stored water or gas and can be located at parts of the network where hydro cannot address local congestion or voltage needs.

For New Zealand, this means BESS can help preserve stored water and scarce gas for longer duration dry year, low renewable and winter peak periods, rather than using those resources to meet short duration price and demand spikes. Five minute settlement would improve the investment and operating signal for that outcome.

Australian evidence

Australia provides useful evidence, while recognising that New Zealand has a different market design and resource mix.

The Australian Energy Market Commission made the five minute settlement rule in 2017. The rationale was to align financial settlement with physical dispatch and provide better price signals for fast response technologies such as batteries, peaking generation and demand response. AEMO implemented the reform in the National Electricity Market from 1 October 2021.

AEMO's five minute settlement material explains the consumer logic clearly. Aligning the price signal with the physical system more accurately rewards resources that deliver supply or demand response when the power system needs them. AEMO also identified lower wholesale electricity costs over time as a benefit because wholesale costs form a material part of customer bills.

Since the Australian reform, battery investment and operation have scaled materially. In AEMO's Quarterly Energy Dynamics for Q4 2025, AEMO reported that multiple major BESS projects with combined capacity of 3,796 MW and 8,602 MWh commenced initial commissioning in the National

Electricity Market between the end of Q4 2024 and the end of Q4 2025. AEMO reported total installed capacity, including capacity in commissioning, of nearly 7,000 MW at the end of Q4 2025. Average battery discharge availability rose from 1,087 MW in Q4 2024 to 3,005 MW in Q4 2025, an increase of 176 percent. Average battery discharge increased from 90 MW to 268 MW over the same period.

AEMO also reported that NEM average wholesale prices fell by 44 percent from Q4 2024 to Q4 2025. AEMO stated that increased wind generation and battery discharge, particularly in evening peaks, reduced reliance on gas and hydro generation in those periods, contributing to lower average prices and fewer high price intervals. AEMO also reported that east coast gas demand from gas fired generation fell by 6 PJ from Q4 2024.

Grattan Institute's 2026 report Out of gas describes the same structural shift. It reports that gas powered generation in the NEM is moving from an everyday provider of bulk electricity to a backup firming role. Grattan reports that annual gas use for gas powered generation in the NEM has fallen from 150 PJ to less than 90 PJ over five years, and that average daily gas use for electricity declined from 622 TJ in 2014 to 253 TJ in 2025.

Grattan also reports that batteries are taking over more of the traditional evening peak role of gas generation. Across the NEM and WEM, gas contribution to evening demand declined by nearly 850 MW in a year while big battery contribution increased by 1,400 MW. Grattan states that batteries, rather than gas, are increasingly setting morning and evening peak prices. It also reports that AEMO approved nearly 22 GW of new battery capacity in the NEM over an eighteen month period, compared with 0.2 GW of new gas generation.

That evidence does not prove that five minute settlement alone caused every battery investment. It does show that markets with granular dispatch and stronger signals for fast flexibility are supporting rapid growth of BESS. It also shows the operating effect of that capacity: BESS is increasingly displacing gas during peak periods, increasingly setting prices that were historically set by gas, and helping preserve gas for the longer backup role where it remains most valuable.

Aquila does not consider broad Australian price outcomes to be evidence that BESS and five minute settlement have failed to benefit consumers. Aggregate price outcomes reflect many factors beyond BESS market settings, including fuel costs, demand, weather, coal unit availability, transmission constraints and interconnector limits. Retail bills also include network charges, retail costs, scheme costs and government rebate settings. It is therefore not methodologically sound to infer the consumer impact of BESS or five minute settlement from aggregate Australian price movements alone.

The more relevant evidence is operational and counterfactual. AEMO's Q4 2025 evidence and Grattan's analysis both show BESS changing the marginal price setting role historically held by gas. For New Zealand, the Authority should test what prices, reliability risk, hydro storage and gas use would look like with and without additional fast flexible capacity under five minute settlement.

Western Australia provides a separate but relevant storage example. In AEMO's Q4 2025 WEM reporting, AEMO identified that gas and coal fired generation was replaced by renewable generation and battery discharge, and that batteries increased charging during the day. AEMO reported that the average WEM energy price in Q4 2025 was $69.55 per MWh, down $10.37 per MWh or 13 percent from Q4 2024. AEMO also reported that total normalised WEM costs were $132.09 per MWh, down $18.30 per MWh or 12 percent from Q4 2024, while FCESS uplift costs fell 96 percent and FCESS enablement costs fell 83 percent. Those results reflect a broader set of market and operational changes, not storage alone. The point for New Zealand is narrower and robust: storage and fast flexible resources can contribute to lower system cost when market arrangements value the services they provide.

The Australian lesson is not that New Zealand should copy the NEM or WEM. The lesson is that settlement and market design influence whether flexible capacity is investable, visible and active. Once flexible capacity enters the market, it can benefit consumers where it increases competition during scarcity periods, reduces renewable spill, reduces reliance on higher cost thermal fuel, supports reliability and helps defer or reduce network costs. Those benefits should be tested through counterfactual modelling for New Zealand rather than dismissed on the basis of aggregate price outcomes driven by many unrelated factors.

Current SOSA and network evidence

At the date of writing this submission, Transpower's 2025 SOSA is the latest final annual SOSA, while Draft SOSA 2026 is the latest available 2026 evidence.

The Draft SOSA 2026 is important because it shows that New Zealand's future flexibility need is not adequately captured by historic five minute volatility analysis. In particular:

1. In the near term, the national winter energy margin is expected to remain above the lower security standard in the reference case, but Transpower describes that finding as fragile. The lower standard could be breached if projects are delayed, Huntly support is reduced, demand grows faster, gas supply is lower, or wind and solar output is weaker than assumed. Any or all of these are probable.
2. North Island winter capacity margins are above the upper standard in the reference case, but Transpower identifies capacity risks during very high peak demand periods, especially cold, dark, still winter mornings and evenings where wind output may be low and Rankine availability limited.
3. Transpower states that the analysis does not assess within island transmission and distribution capacity, project deliverability or commercial viability. BESS value is often locational and operational, so those omissions are material to the Authority's assessment.
4. Transpower's grid connection update states that, as of 1 May 2026, it is delivering 17 new generation projects that will collectively add 3,067 MW to New Zealand's electricity supply, and that it is working to connect new generation and load faster.
5. Transpower's transmission alternatives process recognises that third party services can come from battery energy systems, demand side management and other technologies as alternatives to network investment.

The Authority should therefore evaluate five minute settlement against the power system New Zealand is building, not only the power system represented by historic average volatility.

Aquila's position on five minute settlement

Aquila supports a staged push toward five minute settlement. That means the Authority should begin a structured pathway now, while preserving the ability to stop, stage or adapt implementation if the evidence does not support full commencement.

The central market design issue is alignment. New Zealand dispatch is already operationally granular, and BESS can respond extremely quickly. A thirty minute settlement period can dilute the value of that fast response, particularly where prices or constraints move materially within the half hour. That may weaken the investment case for BESS and other flexible resources even when those resources would lower system cost during tight periods.

The correct question is not simply whether historic five minute price volatility is high enough to justify immediate full implementation. The better question is whether New Zealand's market arrangements will produce efficient investment and operating signals for a future system characterised by:

1. higher variable renewable penetration;
2. more frequent forecast error around wind and solar output;
3. sharper morning and evening winter capacity risks;
4. reduced reliance on thermal fuel availability;
5. increasing connection and within island network constraints;
6. growing need for fast reserves, voltage support, congestion management and peak support.

Those conditions are directly relevant to consumers. Flexible capacity can lower the cost of meeting peaks, reduce the need to hold higher cost thermal options, improve renewable utilisation and provide more competitive pressure in scarcity periods.

Challenge to the Authority's current “not now” view

Aquila accepts that five minute settlement would impose implementation costs across metering, reconciliation, clearing, market systems, participant systems and data processes. Those costs must be assessed carefully and transparently.

Aquila also considers that the Authority's “not now” position appears difficult to reconcile with its broader BESS work programme. The BESS reforms recognise that future system operation will increasingly depend on fast flexible resources as renewable penetration increases. If that is the policy basis for BESS reform, the assessment of five minute settlement should apply the same future system lens. The relevant question is not whether current market conditions alone justify immediate implementation. It is whether future market conditions are likely to justify a staged pathway as renewable penetration, operational variability and flexibility requirements increase.

Australian evidence supports a forward looking assessment. Grattan reports that batteries are increasingly displacing gas in evening peaks and increasingly setting morning and evening peak prices. AEMO reported that battery discharge nearly tripled in Q4 2025 and that increased wind and battery discharge reduced reliance on gas and hydro during evening peaks. Five minute settlement should be tested against the role BESS is already beginning to play in comparable high renewable systems.

However, Aquila is concerned that a not now conclusion may rest on assumptions that are too narrow:

1. Historic volatility is not a sufficient proxy for future flexibility value. Draft SOSA 2026 indicates that New Zealand's security risks are sensitive to demand growth, gas availability, project delay and renewable output.
2. National energy and capacity margins do not capture locational network value. The SOSA explicitly does not analyse within island transmission and distribution capacity. BESS may be most valuable at constrained locations, at connection points and during local network events.
3. Five minute settlement benefits are not limited to arbitrage. The benefits include sharper scarcity pricing, better operational incentives, improved demand response signals, more efficient BESS charging and discharging, clearer investment signals for flexible capacity, and stronger competition in peak periods.
4. The relevant counterfactual is not no cost. If market settings under reward flexible resources, consumers may face higher costs through delayed BESS investment, greater thermal reliance, more conservative operation, increased peak prices, or earlier network augmentation.

5. Targeted BESS reforms and five minute settlement are complements, not substitutes. The Authority's proposed BESS reforms are welcome, but they do not fully solve settlement period misalignment.

Targeted BESS reforms are necessary because they improve dispatchability, bid and offer arrangements, state of charge treatment and operational visibility. However, those reforms do not strengthen the price signal for fast response within a thirty minute trading period. They do not address whether a resource that responds to a five minute scarcity or constraint event is rewarded in a way that reflects the value it provides during that interval.

Recent Australian evidence shows BESS increasingly taking the price setting role previously held by gas in morning and evening peaks. Five minute settlement strengthens that signal. It supports BESS investment and operation in the intervals where batteries can displace gas, reduce exposure to high price events, and preserve gas for the longer duration backup role where it remains most valuable.

Recommended roadmap

Aquila recommends that the Authority replace a simple not now position with a formal roadmap.

1. Shadow five minute settlement

The Authority should publish shadow five minute settlement outcomes for a defined period. The shadow settlement should show:

1. five minute prices and settlement amounts compared with thirty minute settlement;
2. distribution of impacts by participant class;
3. impacts on BESS, demand response and flexible generation;
4. effects during high price intervals, low wind and solar intervals and winter peak periods;
5. effects at constrained nodes where data permits.

Shadow settlement would give the sector evidence without committing immediately to implementation.

2. Nodal flexible capacity modelling

The Authority should model flexible capacity revenue and consumer benefits at node level under realistic future scenarios. This should include:

1. standalone BESS;
2. AC coupled renewable and BESS hybrids;
3. DC coupled solar and BESS retrofits;
4. BESS providing energy, reserve and potential network support;
5. different duration and degradation assumptions;
6. low gas, delayed project and high demand sensitivities aligned with SOSA.

The modelling should test whether thirty minute settlement materially under values fast response compared with five minute settlement in the locations and events where flexible capacity has highest system value.

3. Security event case studies

Aquila recommends case studies of recent and modelled system events, including:

1. winter morning and evening peaks;
2. cold, dark, still conditions;
3. renewable forecast errors;
4. periods of low hydro storage or thermal fuel uncertainty;
5. local transmission constraints;
6. high price intervals that are materially shorter than thirty minutes.

This will avoid designing settlement policy around average conditions while missing the value of flexible resources in stressed conditions.

4. Cost and implementation pathway

The Authority should publish a detailed cost and implementation pathway. That pathway should distinguish between:

1. settlement and reconciliation system changes;
2. metering data requirements;
3. participant system changes;
4. WITS, clearing and reconciliation changes;
5. interactions with BESS gate closure reforms;
6. transition issues for smaller participants.

The Authority should also identify whether a staged or class based transition could lower implementation risk.

5. Trial or staged implementation

Before full implementation, the Authority should consider a controlled trial. Options could include:

1. a shadow trial followed by a decision gateway;
2. a limited opt in framework for BESS and demand response;
3. an implementation pilot for selected asset classes;
4. a staged commencement that aligns with BESS dispatch, state of charge and shorter gate closure reforms.

These options should be investigated because the alternative is to defer a potentially important investment signal at the same time New Zealand is asking the market to deliver fast flexibility.

Interaction with BESS reforms

The Authority's BESS work programme is welcome and urgent. Aquila supports reforms that recognise BESS as a single flexible resource that can both consume and inject, trade efficiently, provide reserves, and operate with accurate state of charge constraints.

However, BESS reforms should not be treated as the full substitute for five minute settlement. Dispatchability, bid and offer reform, state of charge constraints and shorter gate closure improve operational integration. Settlement period alignment addresses a different problem: whether the financial signal reflects the time period over which the flexible response is valuable.

Australian evidence shows that this distinction is practical rather than theoretical. BESS is already increasingly displacing gas in peak periods and increasingly setting prices in comparable high renewable markets. Five minute settlement would improve the New Zealand signal for BESS to perform that role before scarce gas or hydro storage is called on for short duration events.

The Authority should therefore progress BESS reforms now, while establishing a five minute settlement roadmap that can be coordinated with those reforms.

Consumer benefits

Aquila considers that the potential consumer benefits of a staged five minute settlement pathway include:

1. lower peak prices where BESS and demand response respond to short duration scarcity;
2. reduced renewable spill and more efficient charging during high renewable output periods;
3. stronger investment signals for flexible resources that reduce reliance on thermal peaking and fuel risk;
4. more efficient operation during forecast errors and system stress;
5. improved ability to unlock BESS as a network alternative resource;
6. improved competition from new flexible entrants;
7. preservation of stored water and gas for deeper scarcity events where longer duration backup is needed.

The Authority should quantify these benefits against realistic future scenarios. It should not assume they are immaterial because historic five minute volatility has declined.

Requested Authority actions

Aquila recommends that the Authority:

1. retain five minute settlement as an active reform pathway rather than concluding that market conditions do not support it;
2. publish a formal roadmap by a defined date;
3. undertake shadow five minute settlement and publish results;
4. model BESS and demand response benefits at node level using future SOSA aligned scenarios;
5. assess network constraint and network alternative value;
6. coordinate five minute settlement work with BESS dispatch, state of charge and gate closure reforms;
7. test a staged implementation or trial before any final whole market decision;
8. refresh all security of supply evidence against the final SOSA 2026 before making final recommendations.