

Submission by



to the

Electricity Authority

on the consultation document

Ensuring an Orderly Thermal Transition

28 July 2023

**– SUBMISSION BY THE BUSINESSNZ ENERGY COUNCIL –
ENSURING AN ORDERLY THERMAL TRANSITION**

Introduction

1. BusinessNZ Energy Council (BEC)¹ welcomes the opportunity to provide feedback on the Electricity Authority's (the Authority) consultation document (the paper) titled *Ensuring an Orderly Thermal Transition*. This submission comments on certain matters raised in the paper.
2. The reduction in the portion of thermal generation represents a promising and advantageous development for New Zealand's electricity sector. Currently ranked high in renewable electricity globally, New Zealand is off to a solid start. If new generation is constructed as planned and projected, the country is expected to achieve at least nearly 96% renewable electricity generation by 2030, as reflected in our TIMES-NZ modelling and other models. This would be a significant achievement.
3. Under the market's trajectory, without significant intervention, New Zealand's electricity sector is expected to experience a substantial reduction in emissions intensity. The sector currently emits 120 tonnes of CO₂-equivalent per gigawatt-hour (GWh). By 2030, emissions intensity is expected to plummet to 23 tonnes of CO₂-e. This represents an impressive 80% reduction.²
4. This is in large part because thermal generation is gradually moving away from serving as a source of baseload electricity to predominantly providing a back-up and flexible role to an electricity system that is increasingly intermittent with more wind and solar expected on the horizon. This is evident in Concept Consulting's assessment in the paper, including the countless models depicting the potential supply mix in the future.
5. Despite the growth of renewable generation, thermal generation will remain essential for providing inter-year and intra-season flexibility during dry periods. Additionally, it will offer intra-day flexibility to ensure sufficient supply during high-demand peaks or when variable wind and solar generation is insufficient.
6. Recognising its importance, the Authority has assessed the commercial viability of thermal generation up to 2032 and the associated risks of an inefficient thermal exit. BEC supports the Authority in conducting this assessment and their proactive efforts to explore and implement measures that ensure the market participants have timely information and accurate price signals, thereby encouraging incentives for firming. However, BEC recommends the assessment should expand to encompass the wider risks, including the consequences that arise with insufficient new peaking capacity and the scenario of fast or sudden deterioration of existing thermal assets.
7. Apart from the Authority's assessment of the continued commercial viability for existing thermal generation, the paper downplays the need for new peaking generation, noting that additional thermal generation will not be economic, at least out to 2032, and therefore it is not necessarily needed assuming the market under the current settings would provide flexible back-up resources. BEC strongly cautions against this conclusion that new thermal generation is not needed as inferred in the paper's assessment.
8. BEC agrees with the Authority's assessment that it is currently uneconomic to build new capacity as the assets would operate in short durations too infrequently to cover their operating costs. In simpler terms, the incentives to invest in and operate new thermal capacity, even as backup, are weak. This situation is concerning because the weak economics of building new capacity does not mean that the need for additional capacity is weak from a system's security perspective. Despite the lack of economic viability, there still is a highly probable requirement for new thermal capacity to ensure the system's security and reliability.

¹ More information about BEC can be found in APPENDIX ONE

² *The Future is Electric*, Boston Consulting Group, 2022

9. Alternative assessments conducted within the industry show a different conclusion to the Authority – that New Zealand requires new fast start peaking capacity. This need becomes apparent due to the system’s mounting constraints, which is at risk of lacking the necessary capacity to meet growing peak demand for electricity. The inadequate presence of firming resources poses significant risks to the security of electricity supply for New Zealand’s business community. These risks could translate into higher electricity prices and potential shortages. It is crucial not to underestimate these concerns and to treat them with utmost seriousness.
10. This necessity for new peakers becomes even more apparent when considering the lifespan of New Zealand’s current thermal assets. There is a considerable risk to the electricity system if these aging assets suddenly and permanently fail. The current analysis conducted by the Authority does not address this possibility and its potential impact on consumers.
11. The situation becomes critical if such an event occurs during a cold weather snap when wind generation is limited, and hydro generation is already operating at maximum capacity. In such a scenario, there is a real possibility of facing outages. Having new peaking power plants is seen as the most effective insurance policy to safeguard against this risk. These fast start peakers can swiftly respond to sudden increases in demand and act as a reliable backup during insufficient supply, ensuring a more secure and stable electricity supply for consumers.

Assessing the risks of a disorderly transition

12. The Authority’s assessment suggests that the risk of inefficiently retiring thermal generation is low. BEC questions this conclusion and disagree that the risk is low. Caution should be exercised as there are significant risks associated with a disorderly thermal transition. One major concern is the possible lack of sufficient flexible resources to cope with the increasing electrification growth and peakier demand periods, particularly in the next few years. The last two winters have seen the top 10 largest peaks in demand despite record warmth, and El Nino weather conditions may further exacerbate the strain on the electricity system.
13. The combination of peakier demand, a significant increase in intermittent wind generation since 2019, and the reliance on slow-start thermal units has resulted in several grid emergencies, with less than 200MW of projected headroom in the supply stack. Uncertainty also looms over whether new capacity will be available in time to offset the planned closure of some thermal generation, particularly during peak demand periods.
14. Concept Consulting’s modelling notes that by 2032, thermal generation will be close to 1.5%, compared with the averaging about 14% over the last five years. This reflects assessments across the sector that thermal generation will play a lesser role than currently. Concept’s modelling also concludes that no new gas peaker plant will be needed or will be economic to build, at least to 2032. However, they note a caveat. If slow-start plant were less flexible than modelled, it might be viable to build new peakers.
15. This conclusion of no new thermal peaking plants, at least to 2032, is in direct contrast with industry assessments which shows a different conclusion altogether. For instance, Transpower has highlighted in its most recent six monthly *Whakamana i Te Mauri Hiko* monitoring report that more flexible capacity will be needed with more solutions like peaking capacity and demand response.³ Transpower also reiterated the need for more flexible capacity in its recent Security of Supply Assessment.⁴ The assessment went on to call for urgent investment in possibly grid-scale batteries or flexible peaking plant. Transpower’s own *Whakamana i Te Mauri Hiko* modelling shows the need for additional new thermal capacity.

³ [Whakamana i Te Mauri Hiko Report](#), Transpower, April 2023

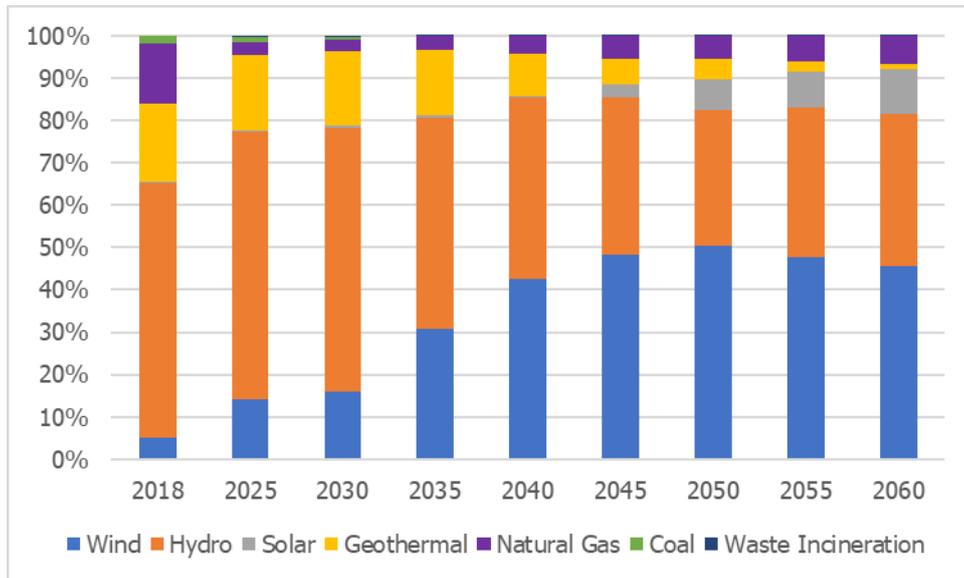
⁴ [Security of Supply, Annual Assessment](#), 2023

16. The energy sector's TIMES-NZ model also illustrates the importance thermal still plays and is likely to play out to into the future. TIMES-NZ, developed with over 60 partners from across the private and public sector, explores two possible future energy scenarios: Kea, where climate change is prioritised as the most pressing issue, and Tūi, where climate change is one of many pressing issues. According to the TIMES-NZ modelling, New Zealand's electricity system is likely to need natural gas, with gas peakers playing a role beyond 2030, both in Kea and Tūi, as shown in Figure 1 and 2 below, ensuring a backup to intermittent sources. Kea needs an additional 200MW of new thermal plant by 2030, and Tūi requires 400MW by 2030.
17. Given the high probability that the system will require thermal generation and new fast start peaking capacity, it becomes essential to address how the market ensures their construction and who bears the cost. This question has become increasingly prominent and requires an answer, especially considering the current lack of economic viability in building new gas peaking plants. Finding solutions to encourage the development of such capacity is critical to mitigate against the potential risks for the system's resilience.
18. Ensuring we do not entirely exclude thermal generation safeguards flexibility, optionality, and system-wide resilience, in the face of intra-day, intra-season and inter-year variability. This importance of protecting safeguarding flexibility was recently demonstrated through sensitive analysis in TIMES-NZ, a study commissioned by BEC.⁵ The analysis revealed that even in a scenario with extremely high gas prices, reaching \$39NZD/GJ, while also meeting the ERP emissions budgets, the model found the utilization of small amounts of gas for thermal generation to be economically viable in Tūi and Kea. In the more climate ambitious Kea, gas usage was phased out by 2060, but remained in operation until 2055. Assuming that additional hydro options are not available, thermal usually stands as the most-effective choice and TIMES-NZ places significant value on this firming source.
19. The findings suggest that eliminating thermal generation, or prematurely and haphazardly retiring it, would come with substantial costs. Had it been economically feasible, the model would have identified a pathway to eliminate thermal generation, even at the high cost of \$39NZD/GJ. The emissions attributed to thermal generation are relatively small, accounting for only a fraction of total emissions. In both Tūi and Kea, the annual emissions from gas amount to approximately 160kt to 320kt of CO₂-e, which is less than one-tenth of the current emissions from the electricity sector.
20. The proposal to invest in fast start peaking capacity gains further strength, or at the very least, the need to maintain flexibility by safeguarding against inefficient thermal exit becomes evident if alternatives such as grid-scale batteries or biofuels do not experience cost reductions as expected, particularly in the medium term. Naturally, there exists a level of uncertainty surrounding the availability, pricing, and timing of substitutes for flexible supply, which may eventually displace a significant portion of the flexibility that thermal may provide in the future. While some alternatives, like Genesis' biomass trail, show promise at present, it is crucial to keep the system settings open to preserve resilience, ensuring continuous power supply and sufficient energy for the country's needs.
21. Despite the necessity of maintaining optionality within the system, BEC acknowledges that certain factors lie outside the realm of the most efficient energy system outcomes. The situation is further complicated by the waning social acceptance for operating thermal generation, let alone constructing flexible thermal capacity, as both consumers and the public demand decisive action on climate change. The lack of incentives to build flexible fast-start peakers poses a considerable risk, particularly as peak demand continues to grow. Securing financing for such projects might prove challenging, given many investors shy away from fossil fuel related ventures. The complexity

⁵ [Energy Strategy Deep Dive using TIMES-NZ](#), May 2023

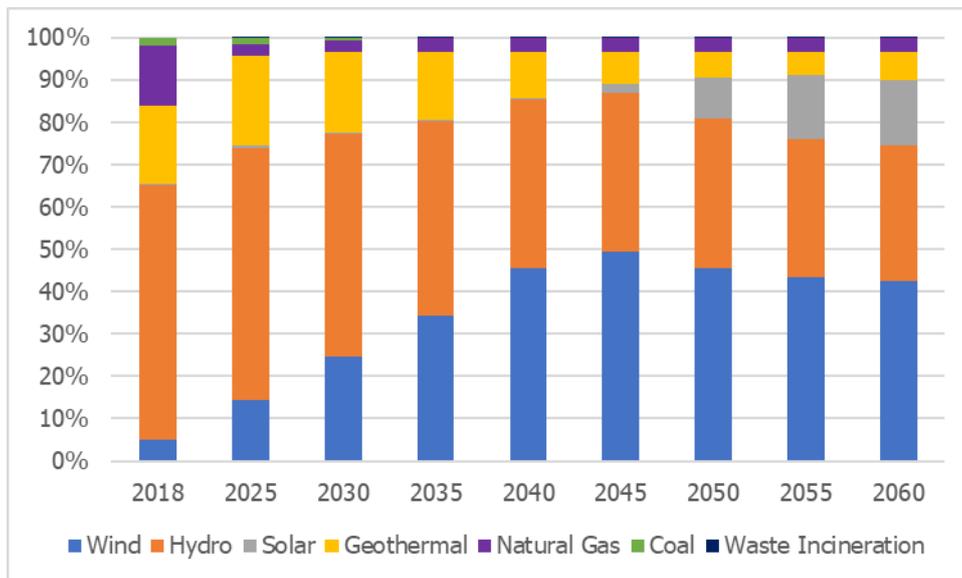
of the situation is exacerbated by obstacles within the resource planning regime, and the uncertainties surrounding obtaining consent in its replacement legislation.

Figure 1: Kea electricity generation



Note in purple and green, the ongoing role thermal plays in firming out to 2060.

Figure 2: Tūi electricity generation



22. The myriad of factors that could potentially influence the premature closure of thermal generation, as explored in the Authority’s deep dive analysis, are likely to evolve in the near future. Recognising the critical role thermal plays, BEC firmly believes that the Authority must conduct ongoing assessments to explore the potential risks of the inefficient retiring of thermal capacity. Ongoing evaluations will be paramount, especially as the composition of the electricity supply mix and the market continues to rapidly evolve as more renewables penetrate the system. As the extent and viability of thermal substitutes and backup services become clearer over time, these assessments will provide essential insights for prudent decision-making.

Comments on the options to address the risk of a disorderly transition.

23. **BEC is pleased the Authority has undertaken an assessment of the commercial viability of current thermal assets.** It is important to assess the underlying commercial conditions related to the continued operation of existing thermal assets. This will help identify whether thermal assets may be at risk of retiring earlier than is efficient from an energy system's perspective. **However, BEC recommends that this analysis should be ongoing because the risk of a premature closure(s) of existing assets is ongoing. Identifying the problem, and outlining measures to address the problem, is important because premature retirement would likely have significant implications upon resource adequacy within the system, and thus the prices consumers face.**
24. **BEC recommends that the Authority's analysis should be broadened to encompass a more comprehensive, contestable, and open assessment.** This assessment should investigate the costs borne by the system and consumers in a scenario where no new thermal power plants are built until 2030 and beyond. The analysis should account for the sudden retirement or degradation of existing thermal assets. By identifying these costs, the assessment might emphasise the importance of further investigation, depending on the level of risk the Authority is willing to tolerate. This may lead to highlighting potential benefits in reforming existing mechanisms or the implementation of new ones, ensuring the system offers adequate signals and incentives for the development and maintenance of suitable levels of thermal generation, which would provide much needed firming to support the system. BEC emphasises that considering different viewpoints and assessments from across the industry, through an open exchange of advice and modelling, is vital to ensure the Authority's assessment is comprehensive. This is crucial as the industry's evaluation of the necessity for new peaker plants, and the required incentives, significantly differs from that of the Authority's conclusions.
25. It is indeed true that as the market embraces more renewable energy sources, the cashflows for thermal plants may become more volatile, especially if they heavily rely on spot market prices. **BEC agrees with the Authority that instruments like forward contracting will do some of the heavy lifting in providing a crucial role in mitigating the cashflow volatility caused by weather variability. However, BEC reiterates that it would be sensible to conduct ongoing assessments about whether current settings are sufficient over time.**
26. **BEC agrees with the notion that, in theory, a decrease in demand may not necessarily lead to a disorderly phase-out of thermal generation.** The Authority's expectation is that the market should offer adequate financial incentives to encourage the construction of new thermal capacity and maintain existing generation, especially if there are no more cost-effective alternatives to support renewable energy as a backup. **However, at present, market participants express their deep concerns about the lack of incentives and inadequate returns to justify the investment in fast start peaking plants,** which involves substantial operating costs. This situation is deeply **concerning** because, despite the current absence of economic rewards to build new thermal capacity, the system will likely require new capacity in the future, as shown in the TIMES-NZ modelling.
27. **BEC agrees that decision-makers need sufficient information** about the likelihood of thermal retirement to inform their decisions. BEC supports measures that reduce barriers to timely information. We support the Authority's continued efforts to reduce such barriers. Efficient and adequate incentives are vital in the wholesale market, and **BEC agrees with the Authority's emphasis on the significance of efficient spot prices in driving efficient decision-making.**
28. **BEC believes the Authority's work on exploring and implementing a new ancillary service product(s) is a sensible step in the right direction.** A product integrated into the

spot market that ensure flexible resources in a standby reserve, could be beneficial, ensuring adequate resources in the situation of stark demand and supply fluctuations. This is an increasingly likely scenario as more intermittent renewables are deployed. We agree with the Authority that the product(s) should be technology agnostic to safeguard against subsidising unproductive and inefficient power plants, while also encompassing a range of resources, including batteries and demand-side flexibility. However, this fits within a medium longer-term option considering its complexity, and the importance of implementing this option in a robust manner.

29. **BEC believes introducing a capacity market is not a prudent course of action** considering the adverse and costly unintended consequences. Capacity markets have inherent challenges in procuring either insufficient or excessive capacity, with a conservative approach to reliability sometimes leading to excessive procurement. These markets also add complexity and may hinder efficient decision-making, as they rely less on market forces and more on politics, creating winners and losers in the process. Ultimately, consumers end up bearing the higher costs associated with capacity markets.
30. **On the flipside**, the Authority must be confident that the costs, and unintended consequences, of implementing a capacity mechanism outweigh the potential benefits before making this definitive decision. An assessment looking at all the possible options, and their corresponding costs, would be beneficial. However, we note that MDAG investigated capacity mechanisms globally and ruled out its implementation due to its costs and unintended consequences.
31. **Similarly, BEC believes that implementing a strategic reserve is not advisable** as it could lead to unintended outcomes akin to capacity mechanisms. While it may offer assurance of resource adequacy, the potential drawbacks may not justify its implementation, as evidenced by the discontinuation of New Zealand's previous reserve market due to reduced incentives for risk managements and peaking plant development. **However, again, all options, including their costs and benefits should be considered, and investigated compared to the status quo. Moreover, the possible risks and costs to the wider economy arising from inadequate thermal capacity should be considered.**
32. While the paper acknowledges that gas supply concerns are outside its scope, **BEC emphasises the importance of considering gas supply in the broader conversation about sufficiency of thermal capacity.** The gas supply conversation is important and evidently flows through to the conversation about whether there will be sufficient plant. The two are not isolated. Concerns surrounding adequate supply is a salient issue. MBIE recently released its annual dataset of operator-reported oil, gas, and LPG reserves, which showed a dramatic decrease in reserves. Future gas production looks precious unless large investment is made. But for these investments to occur, policy settings must work in tandem to encourage investments.
33. **BEC strongly emphasise that policy uncertainty beyond the Authority's remit will impact the orderly transition of thermal generation.** Specifically, the aspirational target of achieving 100% renewable electricity by 2030 presents barriers to new thermal peaking plant development. Current consented gas-fired peaking generation projects face significant uncertainties, and the likelihood of them being constructed is questionable due to the insufficient economic rewards. This uncertainty extends to concerns related to the aspirational target, which could result in sovereign risk and jeopardize investment viability. BEC has reiterated in several submissions that eliminating the last portion of thermal generation is costly, while also jeopardising the system's reliability and exacerbating the cost of electrification, as noted also by the Climate Change Commission.

APPENDIX ONE – BACKGROUND INFORMATION ON THE BUSINESSNZ ENERGY COUNCIL

The [BusinessNZ Energy Council \(BEC\)](#) is a group of leading energy-sector business, government and research organisations taking a leading role in creating a sustainable, equitable and secure energy future.

BEC is a brand of BusinessNZ and represents the [World Energy Council](#) in New Zealand. Together with its members, BEC is shaping the energy agenda for New Zealand and globally.



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- [Major Companies Group](#) of New Zealand’s largest businesses
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- [Affiliated Industries Group](#) of national industry associations
- [ExportNZ](#) representing New Zealand exporting enterprises
- [ManufacturingNZ](#) representing New Zealand manufacturing enterprises
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