Response to Third Party Submissions Regarding Alleged UTS of 2019

PREPARED FOR

Meridian Energy

PREPARED BY

Pinar Bagci
James Reitzes
John Tsoukalis

16 September 2020

THE Brattle GROUP

Notice

- This report was prepared for Meridian Energy Ltd, in accordance with The Brattle Group's engagement terms, and is intended to be read and used as a whole and not in parts.
- The report reflects the analyses and opinions of the authors and does not necessarily reflect those of The Brattle Group's clients or other consultants.

Table of Contents

Executive Summary

1. Meridian has asked The Brattle Group to respond to the economic issues raised in submissions from third parties regarding the Electricity Authority's preliminary decision on the alleged UTS in late 2019 and early 2020.

2. In this submission we respond primarily to the main themes of some third-party submissions to the UTS investigation that, in workably competitive markets, generator offers should always reflect their short-run marginal costs (SRMC). We also provide a preliminary response to the assumptions and analysis of the modelling undertaken by Haast Energy and Professor Philpott which use the SRMC standard as the workably competitive counterfactual.

3. The Haast and Philpott submissions appear to equate a workably competitive market with the theoretical construct of perfect competition in which generators' offers always reflect their SRMC. Such an approach is inconsistent with the workable competition paradigm of economic regulation in New Zealand. It also does not fit the real-world design, structure and energy mix of New Zealand's energy-only electricity market. In other words, Meridian is being held to a standard that is not relevant within the present design of the New Zealand market.

4. As we explained in the first Brattle submission,[1] prices in energy-only markets must be expected to rise above SRMC to reflect physical trading conditions and generators' bidding strategies. In a market in which all generators are paid the system marginal price (SMP), it is economically rational for generators to structure their bids in a way that anticipates the level of the SMP in order to maximise their revenues. The concentrated structure of the New Zealand market means that many generators are potentially price-setting, resulting in prices deviating from SRMC depending on prevailing market circumstances and economic trading strategies.

[1] "New Zealand Electricity Authority's Preliminary Decision on UTS", Response prepared by The Brattle Group for Meridian Energy, 18 August, 2020. https://www.ea.govt.nz/code-and-compliance/uts/undesirable-trading-situations-decisions/10-november-2019/

5. The physical characteristics of the New Zealand electricity market also have an important bearing on generator behaviour. The large share of hydro, including run of river, makes it highly complex to manage trading during abnormal weather conditions, such as that occurring during December 2019. In such extreme circumstances, the focus of hydro generators shifts from executing trading strategies to managing water flow. The UTS investigation is being undertaken with the benefit of hindsight which diminishes the uncertainty of real-time hydro management. For real world analysis, Meridian's bidding conduct should be assessed within the real-time context of an extreme weather situation in which the primary focus was the management of water.

6. Haast Energy claims an extended period of UTS beyond the 3-18 December period. However, the extended time period does not account for the differing physical and trading conditions that occurred within this period. As the time period of the analysis lengthens, it becomes increasingly unlikely that the assumptions underlying Haast's implementation of the vSPD model will hold throughout the period. Implied changes to generation patterns, market pricing, spill management, and storage management from week to week must all be considered. Haast has not done this.

7. Generator offers in the New Zealand electricity market reflect the prevailing physical circumstances and trading characteristics associated with the current structure and design of the market. This means that market prices may deviate from the perfect competition standard as part of the process of achieving long-run efficiency and that the speed and extent of adjustments to changing supply and demand conditions may not be predictable ex ante.

8. If the Electricity Authority wishes to force prices to reflect SRMC, it should work to achieve this through changes in market design, rather than through a UTS investigation. The proper route is to engage in open consultations with market participants to determine if changes in the design and trading rules of New Zealand's electricity market, which encourage generators to behave differently, may be of benefit to consumers in the long-term.

I. Workable competition

9. New Zealand's regulatory policy towards its electricity market is based on the principle of "workable or effective competition".[2] A workably competitive market is one in which outcomes are reasonably close to what may be found in strongly competitive markets. However, the existence of workable competition cannot readily be tested by analysing outcomes at a particular point in time. Outcomes in workably competitive markets tend towards cost-reflective prices and normal returns over the long-term.

10. The focus on achieving long-term benefits for consumers is emphasized in Section 2.1.1 of the Electricity Authority's interpretation of its statutory objectives,[3] which states its objective "as requiring it to exercise its functions in section 16 of the [Electricity Industry] Act in ways that, *for the long-term benefit of electricity consumers* [the Authority's emphasis]:

    - facilitate or encourage increased competition in the markets for electricity and electricity related services, taking into account long-term opportunities and incentives for efficient entry, exit, investment and innovation in those markets…."

11. Furthermore, in relation to the competition limb of the Act, the Authority interprets competition to mean workable or effective competition. In regard to long-term benefit, the Authority states that its focus is long-term efficiency which includes taking into account long-term opportunities and incentives for efficient entry, exit, investment and innovation in the electricity industry, by both suppliers and consumers.

12. The workable competition paradigm, which governs the Authority's regulation of New Zealand's electricity market, may be distinguished from a perfectly competitive market in which prices always reflect short-run efficient costs. As explained in our previous submission, and consistent with the Authority's interpretation of the Electricity Industry Act, workably competitive markets typically target long-run market efficiency, where firms have incentives to

---

2 See "Interpretation of the Authority's statutory objective", Electricity Authority, 14 February, 2011, Section 2.21.

3 "Interpretation of the Authority's statutory objective", Electricity Authority, 14 February, 2011.

invest in capacity and enter the market when prices are at attractive levels. The corollary is that there may be periodic deviations from short-run efficiency in the sense of prices that do not reflect SRMC. In workably competitive markets, the entry process disciplines prices that exceed levels needed to recover capacity costs, while the ability of firms to exit the market boosts prices when they are below those levels. This leads to a price level over the long-term that is consistent with long-run marginal costs.

13. The tension between short-run and long-run efficiency is present in all energy markets, as described in the previous Brattle submission. We explained in our previous submission that, due to the "missing money" problem, energy-only markets work well provided prices rise sufficiently at times such that generators are able to recover their capacity costs.

14. Investors in energy-only markets must trust regulators not to subsequently undermine the market design in a way that reduces generators' ability to recover capacity costs. Jurisdictions that mostly contain low-variable cost generation resources (such as hydro, geothermal, wind, and solar) may find that the energy market alone does not provide enough revenue to cover generators' capacity costs.

15. Using an SRMC standard as a counterfactual by which to judge whether Meridian's behaviour constituted a UTS is inconsistent with the workable competition paradigm of the New Zealand market and also a departure from the design and regulatory approach of other energy-only markets, a selection of which we briefly summarize below.

II. Alternative approaches to regulating energy-only markets

16. In the previous Brattle submission, we described two different approaches to achieving long-run efficiency in the energy-only markets of AESO in Alberta and ERCOT in Texas. The ERCOT market design is structured to achieve high prices during tight supply conditions, usually during periods of peak summer load. Marginal generation resources in the market anticipate that they will be able to recover their capacity costs during these high-priced hours. If resources do not recover capacity costs in those hours, they will exit the market and the reserve margin (i.e., excess capacity for reliability purposes) will decrease.

If generators recover their capacity costs, it will attract new investors into the market and the reserve margin will increase. The reserve margin in ERCOT, and therefore the level of resource adequacy and reliability, is determined by market outcomes.

17. The ERCOT market allows prices to increase to $9,000/MWh, to reflect the marginal cost of power from supramarginal resources or the expected value of lost load during shortage conditions, but it also contains a price mitigation regime that caps offers from generators at an estimate of SRMC when their supply is necessary to solve a transmission constraint in the market. Otherwise, each generator is free to offer as it would like into the market.

18. The AESO market in Alberta takes a slightly different approach from ERCOT. It is less tolerant of price spikes as prices are capped at $1,000/MWh, but prices are allowed to rise above SRMC in many more hours during the year, not just during tight supply. It also does not take the same market power mitigation approach. Specifically, there are no ex ante generator offer mitigation measures taken in Alberta.

19. The ERCOT and AESO approaches represent alternative methods for achieving long-run efficiency whilst also mitigating potential short-run inefficiencies. In New Zealand's energy-only market, there is no regulatory requirement for generators to adhere to SRMC-based offers. [4] If the Electricity Authority wishes to force generators to bid their SRMC, but still achieve its long-run efficiency aims, it should consider modifications to the current market design and regulation.

---

[4] "Interpretation of the Authority's statutory objective", Electricity Authority, 14 February, 2011., states as follows (see Section A.22):

> From an aggregate consumer perspective, workable competition delivers benefits to consumers by placing pressure on firms to set their prices close to their marginal cost of supply.

Section A.23 states:

> Workable competition also delivers productive and dynamic efficiencies, which also have aggregate consumer benefits:
>
> > …(b) dynamic efficiency benefits occur when competition encourages efficient investment in capital goods and innovation, and when it provides consumers with confidence that price movements reflect underlying demand and supply movements.

20. Other energy-only markets, such as ERCOT and AESO, provide generators with comfort over the ability to recover their capacity costs and are therefore more likely to attract efficient entry and long-term investment. By contrast, generators in the New Zealand electricity market will face greater risk over their ability to recover capacity costs if the Authority maintains its draft position on the UTS. Generators such as Meridian have developed economically rational trading strategies to manage such risks and maximise their revenues. The Authority has previously found these trading strategies to be acceptable and consistent with the workable competition framework of New Zealand's energy-only power market.

21. If the Authority wishes to change the conduct of generators by forcing them to offer at SRMC, the correct way to do that is not through a UTS investigation but, rather, through consultation with market participants to consider ways that the design of the New Zealand power market might be modified. We have referred to the experience of other energy-only markets, such as ERCOT in Texas and AESO in Alberta, to indicate where the Authority should work with market participants to ensure generators have the opportunity to recover all their costs and earn a normal return on their investment.

22. Moreover, if the Authority contemplates restricting generator bidding behaviour or otherwise penalizing generators during spill periods through an ex post UTS investigation, or imposing ex ante rules that are overly restrictive, generators may respond by managing their lakes in a manner that reduces the likelihood of a spill occurring. In that event, generators potentially would run their lakes lower, which could adversely affect system reliability during dry conditions.

III. Submission of Haast Energy

23. Haast Energy, OJI, and other independent electricity retailers ("Haast Submission") claim that the UTS period extends from 10 November 2019 to 16 January 2020, and estimate that the offer behaviour of the South Island hydro generators resulted in an increase in spot prices worth $177 million over that period. However, there are several aspects of the Haast analysis that are cause for concern and may invalidate their results.

24. The Haast Submission claims that generator offer prices should reflect SRMC and that the outcomes during the UTS are instead consistent with oligopoly or monopoly market outcomes.[5] The Haast Submission defines offers at SRMC as consistent with the workable competition standard; in reality, Haast is using a perfect competition standard. As described in the previous sections, the workable competition standard applied in New Zealand reflects the realities of the energy-only design of the power market, and is consistent with offers rising above SRMC. If Haast believes that the Authority should apply a perfect competition standard, the more suitable approach is to propose a modification to current trading arrangements.

25. In addition, Haast's modelling has four main limitations due to their failure to adequately account for the following:

- **Water Management**—the legal obligations, environmental restrictions, health and safety regulations, and hydrological conditions that restrict the usage of water through entire hydro schemes, in downstream waterbodies, and in respect of different lake levels.

- **Station Constraints**—the physical capabilities of the hydro power stations. Hydro stations have operational constraints such as rough running ranges that must be avoided, restictions on how quickly they can ramp up or down production, limitations on control structures or spillways (or

[5] 18 August 2020 letter from Haast, OJI, and independent retailers to the Chief Executive of the Electricity Authority https://www.ea.govt.nz/code-and-compliance/uts/undesirable-trading-situations-decisions/10-november-2019/

combinations of flow through generators and control structures), and constraints on how long they can generate power before requiring maintenance. All of this is considered during the iterative process of forecasting dispatch against generation offers to ensure that the final dispatch solution is physically feasible, but it is not considered in the Haast modelling.

- **Modelling of Reserve Risks**—Significant changes in dispatch solutions alter HVDC flows and change the generators that are identified as the largest risk setter in each trading period, requiring an iterative re-run of the System Operator's Reserve Management Tool alongside SPD (to update relevant risk inputs, such as the various free-reserve risk paramaters). In the real world, this adjustment would happen after gate closure. The Haast model does not do this.

- **Competitive Dynamics**—The lower offers and market prices in Haast's simulated counterfactual may have altered the behaviour of other generation owners in the market. For example, other generation owners may have scheduled maintenance outages, altered their purchases of fuel, or adjusted their offers into the market. Different generators may have employed different offer strategies in response to lower offers by their rivals; for example, some may have adjusted their own offers to follow price changes and seek continued dispatch of their generation to cover contracted volumes.

26. Due to its inability to account for the above constraints and market dynamics, the Haast modelling effort is blind to whether or not the outcomes it predicts in its simulated counterfactual are actually achieveable in the real world. In short, Haast has not provided any evidence that the modelling approach it uses can accurately replicate market outcomes.

27. Despite not calibrating its model in a manner that confirms its accuracy, Haast compares its simulated counterfactual market outcomes with actual historical market outcomes. This is an important consideration because if Haast's model is systematically underpredicting market prices, then it would be overpredicting the size of any reduction in market prices associated with its counterfactual scenarios regarding Meridian's (and other generators') price offers.

28. The proper approach is for Haast to first calibrate their model against historical market outcomes to prove that the model can accurately replicate the market. This could have been achieved by conducting a simulation over the many historic periods of spill prior to the end of 2019 for which market outcomes were accepted as normal. If the model works properly, the results of this calibration simulation would closely mimic the real-world historical market outcomes.

29. As Haast has not provided any calibration of its model against the historical performance of the market, there is no way to determine if the model's results are due to offer behaviour by South Island hydro generators (as Haast claims) or simply the result of inaccuracies in their model as it attempts to re-create market outcomes. This type of calibration is industry standard procedure when modelling power markets. The same critique is valid for the modelling efforts undertaken by the Authority and, as described below, by Prof. Philpott.

30. In addition to the limitations of the vSPD modelling provided by Haast discussed above, Haast employs other modelling assumptions that call into question the validity of their results. First, Haast extends their modelling of the UTS period to over two months, which exacerbates the limitations of their modelling effort. Second, Haast employs an implausibly low estimate of the SRMC for hydro resources.

31. The Haast Submission claims the Electricity Authority Preliminary Decision was conservative in its finding of the duration of the alleged UTS. The Haast Submission says this was due to a pattern of "suppression of price separation between South and North islands" from 10 November 2019 to 16 January 2020. However, the longer is the time period covered by the analysis, the larger is the distortion to the results because of the four modelling limitations discussed above. The Haast vSPD model is flawed for an analysis of a short period, but these errors will be magnified in a longer period to the extent that their model misrepresents water management, reserves, station constraints, and competitive dynamics.

32. For example, misrepresenting water management constraints for one week in the model may not significantly impact results, as additional/reduced water can be managed with limited impact on market outcomes for one week. However, misrepresenting water management constraints in the model over two months

of market operation will cause large distortions in the simulated prices and generation dispatch patterns.

33. As Energy Link point out in their submission,[6] the power system and hydro storage management are intrinsically and subtly linked through time. Dynamic intertemporal effects need to be considered carefully, including in extreme conditions, the impacts on security of supply.

34. Haast also assumes a SRMC of hydro resources of $0.01/MWh, which is implausibly low, even during spill conditions. This assumed SRMC does not account for any of the marginal costs associated with hydro production, such as the costs allocated to South Island generators for the HVDC link (allocated based on the MWh of production),[7] the North Island reserve pass through costs (also allocated based on MWh of production),[8] or any other variable costs associated with hydro production.

IV. Submission of Prof. Philpott

35. In a submission by the Electricity Power Optimization Centre, Professor Philpott provides vSPD simulation results, using an SRMC pricing benchmark and calculating an "efficient" opportunity cost of water, which produces counterfactual prices that would result under perfect competition. As Prof. Philpott states, "[p]erfect competition, although arguably unattaintable in practice, is a computable benchmark against which market participant behaviour can be assessed."[9] His submission compares historical and

---

6 19 August 2020 Energy Link "Submission on UTS Nov, Dec-19 Spilling" https://www.ea.govt.nz/code-and-compliance/uts/undesirable-trading-situations-decisions/10-november-2019/.

7 See Electricity Authority, Code and Compliance, Schedule 12.4 "Transmission Pricing Methodology" located at https://www.ea.govt.nz/code-and-compliance/the-code/part-12-transport/schedule-12-4.

8 See Electricity Authority, Code and Compliance, Part 8 "Common Quality", Section 8.59 located at https://www.ea.govt.nz/code-and-compliance/the-code/part-8-common-quality/8-59-availability-costs-allocated-to-generators-and-hvdc-owner.

9 18 August 2020 Electric Power Optimization Centre, "Consultation on UTS Preliminary Decision" p. 3 https://www.ea.govt.nz/code-and-compliance/uts/undesirable-trading-situations-decisions/10-november-2019/.

counterfactual power prices in 2017, and therefore does not cover the alleged UTS period. Therefore, his results are of limited relevance in the present context except to show that SRMC-based pricing is not the market norm.

36. Consequently, Prof. Philpott provides a general critique of bidding behaviour in the market against an "ideal" and unattainable benchmark based on an analysis of market behaviour from three years ago. Observing sometimes significant deviations between the observed and ideal outcomes, he appears to suggest that there are broader competitive issues that need to be addressed in the New Zealand power market. As we stated previously, a UTS investigation is an ineffective way to implement market design changes. If the Authority agrees with Prof. Philpott, and wishes to alter market behaviour, it should conduct an open process to investigate potential changes to the market rules so that the costs and benefits can be properly assessed.

37. As he appears to admit, Philpott's SRMC benchmark is not consistent with a "workable" competition standard where there can be deviations from short-run marginal cost pricing.[10] In a model based on SRMC bidding, marginal generators risk not covering their capacity costs, implying that the market cannot sustain consistent bidding at that level without risks to investment, the viability of generators, and security of supply. For this reason and others described above, the SRMC benchmark is not well suited to providing a counterfactual for assessing competitive behavior in energy-only markets like New Zealand where there is no separate mechanism for the recovery of capacity costs.

38. As a practical matter, a hydro generator such as Meridian is very unlikely to derive the same valuation for water as that obtained by Philpott, and on a forward-looking basis, it is difficult to predict the future distribution of market prices under a price-taking assumption for a generator the size of Meridian.

---

[10] From 18 August 2020 Electric Power Optimization Centre "Consultation on UTS Preliminary Decision" (p. 3):

> Perfect competition in markets is often claimed to be an unrealistic standard by which to judge wholesale electricity markets, to be replaced by a standard of "workable" competition. The latter standard unfortunately is difficult to measure or assess and is open to interpretation. Perfect competition, although arguably unattainable in practice, is a computable benchmark against which market participant behaviour can be assessed.

That would be an unrealistic performance threshold upon which to assess whether Meridian is engaging in undesirable trading behavior.

39. Prof. Philpott's modeling approach also has the same limitations as Haast's approach. Prof. Philpott fails to demonstrate that his simulation model can accurately replicate actual market outcomes in terms of generation output by individual plants, resource consents and other regulatory limitations, and the resulting water reservoir conditions and river flows.

V. Concluding remarks

40. In this submission we have primarily responded to a key theme in the cross-submissions of several other parties, in particular Haast Energy (along with other independent energy retailers) and Professor Philpott, concerning the standard to use in assessing the competitiveness of generator offers in New Zealand's electricity market. We have explained that the perfect competition standard used by Haast Energy and Professor Philpott is not the correct counterfactual in the New Zealand market context. This is because the design and regulation of the New Zealand electricity market require the Authority to aim for the attainment of long-term efficiency within a workably competitive market framework.

41. As we have explained in this and our previous submission, the workable competition paradigm has a long-term efficiency focus, allowing prices to deviate from SRMC without compromising the goal of long-run efficiency. We have accordingly pointed out that the perfect competition assumption used in models employed by Haast Energy and Professor Philpott is not the correct approach for estimating a workably competitive market counterfactual.

42. As explained at greater length in our previous submission, and reiterated here, there are alternative approaches to the New Zealand market design that have been employed in other energy-only electricity markets. The regulators of the ERCOT and AESO energy-only markets allow prices to increase above SRMC to reflect scarcity as well as competitive trading circumstances. Both markets employ price caps, and ERCOT also applies an ex ante screening mechanism used to trigger market power mitigation. Both these markets aim for long-run efficiency whilst allowing generators to recover their capacity costs.

43. If the Authority wishes to force generators in the New Zealand electricity market to bid their SRMC, then the correct approach to achieving this aim is through changes to market design and trading arranagements. This is best achieved through open consultations with market participants. Such an approach would provide market participants with greater certainty over the rules for generator conduct. It is also preferable to using an ad-hoc UTS investigation to bring about lasting changes to the bidding behaviour of generators.

NORTH AMERICA | EUROPE | ASIA-PACIFIC

THE Brattle GROUP