Fonterra's submission on the MDAG "Price Discovery Under 100% Renewable Electricity Supply, Issues Discussion Paper"

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Introduction

Fonterra welcomes the opportunity to provide feedback to the Market Development Advisory Group (MDAG) on the consultation paper, "Price discovery under 100% renewable electricity supply, Issues discussion paper" (Issues Paper).

Fonterra is a co-operative owned and operated by around 9,000 New Zealand farming families. We are New Zealand's largest exporter and have 27 manufacturing sites spread across New Zealand, in addition to science and innovation centres and distribution facilities which are integral to the business.

Fonterra uses approximately 800 GWh per annum of grid electricity, and also 200 GWh per annum of electricity generated by our third-party co-generation on-site cogeneration partners. This combined annual electricity usage of approximately 1,000 GWh is the 4th largest industrial use in New Zealand at circa 2.5% of the total.

Due to Fonterra's manufacturing sites being located throughout the regions this represents the largest collective kilometres of electrical transmission and distribution use, from Kauri in the north to Edendale in the south, Edgecumbe in the eastern Bay of Plenty, to Whareroa in the Taranaki region.

Fonterra is pleased to have the opportunity to submit to the Electricity Authority (EA) and MDAG on it's Issues Paper as electricity is a critical energy source currently and into the future with potential for an expanded role in our decarbonisation plans, depending on commercial consideration versus other renewable energy sources.

Overall we believe that MDAG has identified the key issues that need to be quantified and resolved as we move from an 80% renewable electricity grid to 100% renewable electricity grid.

But it must be noted that the construct of 100% renewable electricity supply, 100%RE, refers to a system where there will be between 90% and 110% renewable electricity supply largely driven by whether or not 5TWh of hydro turns up each year. Therefore the system needs to be able to accommodate how the market will clear on all of its components, being energy, firm capacity in the short term, energy capacity in the medium term (by which I mean firming for low hydrology entry year) frequency, short and long reserves, etc.

These are quite different constructs below 100% compared with being above 100% renewable at any given time in the market. Above 100% we can expect spot prices to collapse to almost 0 at certain times if there is not enough ability to unwind the hydro capacity which provides critical reserves in the NI and SI and frequency keeping, not just energy, and below 100% it will trend towards the cost of running reliable stored energy, most likely thermal fuel to meet the systems requirements.

Because the thermal fuel will be run infrequently, the owners of assets which have brought to bear for a large energy shortfall because of poor SI hydro inflows will be expecting more than SRMC for them to both operate over the long term and/or invest further to provide that service.

If there are any clarifications, or if there is any further information that would be of use to the EA or MDAG, please do not hesitate to contact us.

Fonterra's response to the MDAG Issue Paper questions

1. Do you agree with the broad conclusions that emerge from the simulations in relation to spot price levels and volatility, in particular:
   a. Significantly more spot price volatility is likely with a 100%RE system, especially shorter-term weather-driven volatility?
   b. New Zealand's sizeable hydro generation base is likely to moderate the growth in volatility to some extent, making extreme oscillations between zero and shortage spot prices relatively unlikely?

Yes, we agree that spot market prices will be more volatile as we can look at historic situations to provide guidance on what pricing might be like with a 100%RE system. Historically, in a normal hydrological year, the general observation is that spot market prices will drop significantly as wind generation increases, and that spot market prices increase as wind generation decreases and thermal generation increases.

increase.

Our view into the future with a 100%RE system will be that there will be clear price steps reflective of what the marginal generation or demand response is. The seasonal modelling in figure 10 is reflective of how we would expect the spot market might move to in a 100%RE future.

As identified in the Issues Paper, the role of hydro generation will change significantly and therefore will potentially smooth out price volatility more than has been indicated in the modelling and this situation will need more exploration as it could have a greater benefit to volatility than current modelling shows.

3. Do you agree that in a 100%RE system there will be many diverse and disaggregated resources to coordinate, and that a wholesale market will be the preferred mechanism to coordinate plans and actions among all the resource owners?

Fonterra is of the view MDAG and IPAG will need to work together to ensure the electricity market of the future is open access, technology and solution agnostic as well as capital efficient while delivering the lowest cost electricity to all users. It must be remembered it is key that central coordination is not central control but instead it is about maintaining trust in clearing the market through spot prices, futures and OTC's or PPA's.

We agree that there will be significantly more scope for diverse and disaggregated resources that have the potential to provide meaningful benefit to the wholesale market. In many situations, there will need to be new market tools to incentivise and compensate the owners without subsidising these disaggregated resources to provide them to the wholesale market at scale. The current example of EDB's benefiting financially from the control of hot water load without compensation to the actual hot water load owner needs to be considered as this will stifle future opportunities.

The market must efficiently encourage the use of new technology (such as the 'Internet of Things') to drive greater demand response entering the market directly or through aggregators. The work on multiple party relationships at a single ICP level will be critical as it will allow the introduction of competition with the EDB's for that demand response solution and compensation to the load owner. We encourage the EA and MDAG to explore this issue further.

4. Do you agree that these are the key issues in relation to real-time coordination?

Yes, however the issue of hydro operation change, decision making, and subsequent impact to wholesale market issue needs to be called out separately as it needs its own workstream to adequately address this issue.

5. Do you agree that these are the key issues in relation to ancillary services with 100%RE?

Yes, however the timeline is more critical as the new physical controls like grid forming inverters or energy storage systems need to be designed and installed prior to the grid getting to 100%RE. We note that this view is backed up in the FSR project report.

6. Do you agree that these key issues in relation to price signalling with 100%RE as summarised in paragraph 3.42?

We partially agree – yes prices could potentially be more volatile and might be higher, however it is critical that trust in the market as a whole is maintained, and this trust mainly comes from the view that the prices are explainable and defendable at all times. The past history has shown that complaints about the market and UTS claims have arisen when spot market prices have reached levels that are sustained above LRMC.

What has not been fully explored in the issues paper is this issue of very high prices apart from the discussion around avoiding price suppression. The issue we see is as industry moves to de-risking spot price volatility via hedges and PPA's, is the signal to reduce demand as signalled by higher prices during trading periods. The economist view that the high spot price and level of hedge coverage will still incentivise industry to curtail production as the best commercial decision, but this view fails when products must be made to meet customer orders or due to the nature of the raw materials they process. We encourage the EA and MDAG to further explore and resolve this issue to enable "acceptance" of temporary high spot prices.

7. Do you agree that the preconditions in paragraph 3.38 would need to be in place for an energy-only market design to be effective?

Yes, however as explained above, there does need to a realistic cap on price in events (similar to the 9th of August 2021 event) when high prices cannot drive extra generation or demand reduction there does need to be a realistic cap on price that balances the need to incentivise new generation or demand response not dull it, but also signals an undesirable trading situation is occurring.

8. Do you agree that we should take forward to the next stage of the process (options identification and analysis) the measures refed to in paragraph 3.43 above?

The Issues Paper does not elaborate on what types of price suppression are occurring apart from the discussion of UTS claims after the fact. That then flows into the "necessity" for high prices when they no longer drive response within a trading period. More critically is the forward commitment to thermal plant retirements to occur after sufficient new generation has been built, unlike the past experience of the market with Southdown and Otahuhu retirements and the resulting flexibility loss. This can be incorporated into the stress testing and the hydro risk curves to allow better indication of what the spot prices at the scarcity zone would be. The backstop solution of a capacity market has shown in overseas jurisdictions to not deliver the optimum commercial benefit to all market participation and instead result in a wealth transfer.

9. Do you agree that these are the key issues in relation to demand-side flexibility with 100%RE?

No, what is missing is the technological solutions requirement – for example, are there hurdles to allow technology providers like smart appliances or aggregators to integrate into the market. Are there appropriate rules in place to ensure load owners will receive appropriate compensation for offering their load

for demand response and not retained by EDB's. Addressing these issues must also be incorporated to optimise demand side flexibility.

10. Do you agree that these are the key issues in relation to contract markets with 100%RE?

As we move to 100%RE, we note that yes there are contractual tools to reduce price risk, it might be explored if a longer than 3 year ASX hedge should or could be traded. We note that what is missing is the discussion on the supply side backing up the hedge.. Historic experience has shown that the supply side risk is not carried by the generators over the long term but is instead passed onto the end user as a price premium. The current ASX hedge market is showing significant price premium to LRMC and therefore is questionable as to who is holding the true risk. Will the future price volatility mean that contracts will not decrease down to the LRMC at the top of the spot price stack but instead be offset by a significant margin via a risk premium? We encourage the EA and MDAG to explore this issue further.

11. Do you agree that these are the key issues in relation to transition to 100%RE?

We partially agree – yes it has historically been shown by the retirement of Southdown and Otahuhu as well as the operation or not of the Huntly Rankine units that lumpy changes in generation lead to price shocks in the market.

We are also seeing the impact of ETS costs (approaching $75/MWh on a Rankine unit at the current NZU rate) and the uncertainty that introduces, climatic uncertainty (for example increased low rainfall events), as well as thermal fuel unavailability (both domestic natural gas and imported coal have recently faced supply challenges). We encourage the EA and MDAG to explore these issues further.

12. Are there any other lumpy issues that warrant specific consideration in the transition to 100%RE?

Adoption of new technology like smart EV chargers, grid forming inverters, smart appliances, and energy storage systems need to encourage through enabling regulatory arrangements into the grid now and integrated into the market revenue stream now. This is because we need time to see what works and what other changes need to be made to maximise the benefit prior to getting to 100%RE point. We need to monitor existing electricity market participants to ensure that this development is not stifled at all levels of the market, and that the market is moving in this direction.

13. Do you agree that we should analyse how competition in the wholesale market is likely to be affected by a shift to 100%RE, in particular, in competition for seasonal flexibility services?

Yes, as the baseload thermal generation exits the market and the role of hydro changes there could be a loss of competition for generation that could support firmed contracts and other base energy services. Effectively deep energy storage (not peak) market concentration is increasing, and this is not fungible with demand response which is short term (except for the NZAS demand response opportunity).

What other key areas of opportunity or challenge (if any) will arise in the wholesale electricity market with 100%RE that are likely to have a significant impact in relation to achieving the statutory objective of the Authority, which is to "promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers?

As noted earlier in our submission, we would like to reiterate several important points: the need for depth of competition for each component (energy, short and long term firming frequency and reserves), visibility of price drivers like water value, ease of new participants to enter the market, and ability to utilise new technology.