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Submissions

Electricity Authority

PO Box 10041

Wellington 6143

Consultation on Price discovery in a renewables based electricity system - MDAG Issues Discussion Paper

Thank you for the opportunity to submit on this important topic.

No part of this submission is confidential and I am happy for all of it to be published.

This submission

- Endorses MDAG's good work to date in identifying issues for price discovery in a renewables based electricity system;
- Notes the need for increased competition in the firming services market to support an affordable transition to a high renewables electricity system;
- Agrees with MDAG's proposal for a new reserve product to cover sudden reduction from intermittent sources (Recommendation A4);
- Suggests the proposed DSF trial should focus on this new reserve product as it is likely to capture the low hanging fruit of DSF (mainly hot water controlled load); and
- Suggests some issues that should be considered as part of this trail.

10 Hataitai Rd, Wellington 6021
Mobile +64 21 626 851
www.NWCL.co.nz, Email: Neil.Walbran@NWCL.co.nz

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Background

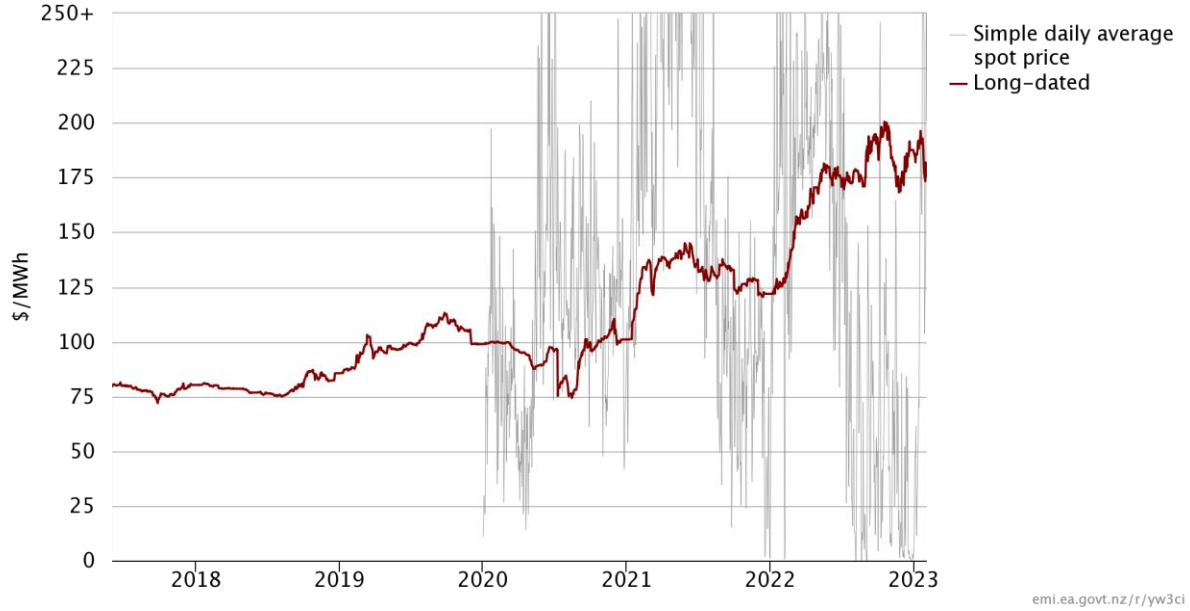
Balancing affordability and high renewables penetration

The MDAG has rightly focussed on how demand-side flexibility (DSF) can help balance affordability and high renewables penetration in the NZ electricity market. This submission agrees this is part of the solution as DSF can help increase competition in the firming services market. However, firming services cover a wide range of time frames from intraday to inter year. And DSF can only cover part of the need. So it is likely to need to be coupled with fuel availability for longer duration firming services.

New Zealand already has a reasonable proportion of renewable energy in our electricity system and is making admirable progress in further developing renewable options with a number of new entrant renewable generators lining up to invest in New Zealand. See https://www.ea.govt.nz/assets/4-Monitoring/Information-paper-Generation-Investment-Survey-2022-Concept-Consulting-report-for-the-Electricity-Authority.pdf

And it is generally accepted that the costs for new renewable generation continues to fall as innovation in this area brings benefits.

However the forward price curve for electricity continues to rise, despite many regulatory initiatives to lower prices.



Balancing the trilemma of sustainability, affordability and security of supply is challenging, and the above forward price curve suggests affordability is likely to require some attention going forward.

The role of firming services in balancing affordability and high renewables

What the above forward price curve does reveal is how the marginal cost of firming services is driving the overall cost of electricity supply in New Zealand. And the high cost of firming services is inhibiting new entrant renewable generators from making final investment decisions. We have plenty of retail competition in NZ and there are many retailers who would love to sign a PPA with a new entrant renewable generator if they could find a reasonably priced firming service contract to back up the intermittent renewable generator so they can provide a firmed service to the end consumer.

Lack of firming services competition in NZ

I endorse MDAG's work on investigating the issues with lack of competition in the firming services market in NZ, see https://www.ea.govt.nz/assets/dms-assets/31/Competition-analysis-FINAL-v2.pptx

I agree there is a current lack of competition in the firming services market in NZ and that this is behind the current upward trend in the forward price curve. I also agree with the winter 2023 security of supply review that this lack of depth of firming services in NZ could have real security, as well as price, issues as soon as this winter. See https://www.ea.govt.nz/assets/dms-assets/31/Driving-efficient-solutions-to-promote-consumer-interests-through-winter-2023.pdf

I also agree that a new reserve product, to cover sudden loss of renewables (recommendation A4) is a key step in the right direction to promote competition in the firming services market. I also strongly support a DSF trial and suggest a key component of such a trial should be a trial of such a new reserve product and this trial should proceed as a matter of urgency.

Role of demand-side flexibility in promoting firming services competition

The key issue with the current firming services market is lack of depth in supply. Too few suppliers, and an ever increasing demand for the service. Demand-side flexibility services are unlikely to be supplied by the existing suppliers of flexible generation, so any increase in supply and depth of suppliers needs to come from new sources. The low hanging fruit in provision of flexible demand is likely to come from the EDBs with their existing ripple control of hot water heating load etc. As I mentioned in my previous submission. See https://www.ea.govt.nz/assets/dms-assets/29/Neil-Walbran-Consulting-MDAG-100RE-issues-submission.pdf

Role of new reserve product to cover sudden loss of renewables - What it can and can't do

Although I firmly endorse the EA's proposal for a new reserve product to cover sudden reduction of renewables I think we need to bear in mind what it can and can't do. It is part of the answer for competition in the firming services market. But the firming services market needs to cover not just sudden loss of renewables but the longer duration loss, such as a dry year or a year with less wind or sun than normal. The firming service market is actually multiple markets with multiple different physical characteristics. There is an intraday market, which DSF can provide, and interday, interseason, and intra year markets, which DSF is not suitable to participate in. At present only some form of gas generation is suitable for these markets. (Coal used to provide the intra year firming service but lacks the sort of flexibility now needed with more wind and solar in the system).

Only gas can provide interseason and interyear firming

DSF can cover intraday firming, but most DSF can't cover interday, intraseason or interyear firming. Some types of industrial load, such as Tiwai point aluminium smelter, can play a role in interseasonal or interyear firming. But even this is limited. Longer term firming is principally provided by gas fired generation.

Coal not flexible enough

Coal has historically also provided some interyear firming but struggles to compete in a highly renewable market due to high start up costs and lack of flexibility in operation. That is as more wind and solar renewables enter the market the firming service needs to be more flexible. And only gas, with its faster start and lower capital costs, can provide this type of flexibility.

Restoring investor confidence for gas fired firming generation

Gas fired generation can provide a variety of firming services, from intraday, to inter season. So competition in the overall firming services market(s) will need more new investment in gas fired generation, and likely in the next few years, as noted in the 2023 winter security of supply issues. But building such gas fired generation requires confidence in the security of fuel supply. Which in turn requires restoring the confidence of those who invest in gas exploration and development. Restoring this investor confidence may take some time in NZ. Thus the firming services market may, even with the development of a new reserve product to cover sudden loss of renewable generation, remain relatively tight for some years.

Issues to consider in designing firming ancillary service

I fully support the proposed development of a new short term firming ancillary service as a pragmatic solution to an urgent problem. But I suggest it is a second best option and several issues will need to be considered in its development. The best way to understand these issues is to urgently proceed to the proposed DSF trial (with a key component being the development of this ancillary service), as this will allow the magnitude of these issues to be understood and solutions devised. This section:

- Expands on why 5 minute settlement would be a better long term option, for promotion of DSF, than a new ancillary service;
- Why a sunset clause might be needed on the proposed new ancillary service; and
- And some performance and competition issues to consider in designing the proposed new ancillary service.

Again, it is noted that the best way to get clarity on all these issues is the proposed DSF trial.

First best option - Flexible demand participate in energy market

I support the proposed new ancillary service to cover sudden reduction from intermittent sources because it is a pragmatic option that can be developed quickly and allows the low hanging fruit in flexible demand, namely EDB controlled hot water load, to quickly participate in this market, and earn a return on an underutilised resource. This source of flexible demand is available now and can provide some

quick wins in increasing competition in the firming services market. The advantage of an ancillary service is that the EDBs can participate without the need for any major regulatory change as any income from the ancillary service is unregulated income.

However, my first best option would have been to allow the EDB's to offer the controlled hot water load into the energy market, via a regulatory change to allow them to recover their costs (and profits) via a custom price path, and a tariff structure which ensured the benefits of the service are assigned to retailers. See my earlier submission on this topic: https://www.ea.govt.nz/assets/dms-assets/31/Efficient-Solutions-Winter-2023-Submission-NWCL-1383027.pdf

The advantage of participation in the energy market is that it takes care of the cost allocation issue. That is, the benefits are automatically assigned to the beneficiary of the service. A further enhancement of this approach would be to, eventually, move to 5 minute settlement, as well as 5 minute prices. This would provide the best cost and benefit allocation of such a fast reaction service. But I recognise that such changes would be complicated to implement and take a long time to design. So I support the proposed new ancillary service, and the associated trial, as a pragmatic step along that path. With a preference to head towards an energy market solution in the long run. Noting that design of the cost allocation methodology for the new ancillary service is likely to be a key and contentious issue. For which I propose a possible approach.

Urgency justifies quick fix - Sunset clause needed

I have concerns that the above wholesale forward price curve will, if nothing else is done, continue to rise and filter through to final consumer prices in due time. Which is a massive impact on New Zealand's energy costs. And the Authority is right to be concerned about security of supply in winter 2023. So urgent action is justified, and it is on that basis that I strongly support the proposed new reserve product to back up intermittent renewable generation. And on the same basis I strongly encourage the Authority to both trail the proposed product (option A4) and to structure the new reserve product in a way that facilitates ripple controlled hot water load to participate in the new reserve market. The existing ripple controlled hot water load is the low hanging fruit in the DSF market as it is an existing technology that is currently underutilised and ready to go now. I am certainly not the first to suggest the existing hot water load control could have a role in intraday firming service provision, see http://www.bryanleyland.co.nz/uploads/2/9/7/1/29710909/a_smart_water_heater_thermostat__eea_2016.pdf.

However, I also recognise that:

- A separate reserve product is a second best option to encouraging DSF participation in the energy market directly, e.g. via 5 minute settlement; and

- Other forms of DSF, including other forms of controlling hot water load, will emerge with time and provide competition for the ripple control.
- Therefore quick fix solutions need to be constrained to avoid locking more natural market evolution from competitive forces. So some kind of sunset clause on the new reserve product might be needed.

Details to consider in the design new reserve product

I support all the recommendations in the consultation paper and in particular recommendation A4 for a new reserve product to cover sudden reduction from intermittent sources. This will be a key in helping develop demand side flexibility (DSF) and the role of DSF in providing competitive price pressure on incumbent generators (particularly NI hydro) on provision of firming services for new entrant intermittent renewable generation. As such I think it has to be a significant market development both in its effect and the potential value at stake. So the detailed design will matter. A trial of this market (as part of the proposed DSF trial) will definitely help identify key issues to be addressed in the final design. So I fully support the proposal for funding for a DSF trial. Below are a few areas where a trial would help understanding of this market.

Evolution of DSF - How much is likely to be available when

I agree with the consultation paper's assertion that the future is coming faster than we thought, and is upon us now. And that the timing of development of DSF and a new reserve product matters. What worries me is that MDAG may be assuming some of the current technology is more mature than it actually is. And the speed at which the DSF market can develop depth may be less than hoped.

- ***The proposed trial would help understand the depth of the DSF market and how quickly we can expect this to be made available to participate in the new reserve product market.***

I outline the basis for my concerns in a bit more detail below.

Limitations of Current Smart Meters - Can you really get fast response from 4G Mobile for Mass Meters?

The obvious candidate for an immediately available source of DSF is the hot water load control, because it is proven and is there now. But the paper seems to be assuming that this will be controlled via the existing smart metering technology, currently being upgraded to 4G. The advantage of using the smart metering control is it is individually addressable and thus retailers or other aggregators can target offerings to customers for use of their controllable load. The disadvantage is that the speed of response of this technology is unproven at this point.

- ***The proposed trial would help develop an understanding of the speed and depth of response that could be expected from DSF controlled by the existing smart meter network.***

Advantages and Disadvantages of Ripple Control

I have previously submitted on how the existing ripple control of the hot water controllable load (or other controllable load) is an underutilised resource that could contribute to the intraday firming market, see: https://www.ea.govt.nz/assets/dms-assets/31/Efficient-Solutions-Winter-2023-Submission-NWCL-1383027.pdf

Those submissions assumed this would be via participation in the energy market, rather than via a 'firming' ancillary service such as you propose (A4). In some ways I like your proposed ancillary service better, as it might be easier for EDB's to offer their ripple control load into. Subject to the challenges of cost allocation of the ancillary service costs, as noted below. A problem which doesn't arise with the energy market, where costs are inherently allocated to the causer.

<u>The key advantage of ripple control is that it has a proven response rate.</u> Because it is a broadcast technology, which doesn't try to address each receiver individually, it is inherently faster than smart metering control of the same resource.

<u>The inherent disadvantage is that customers don't get a choice.</u> Hence my proposed design of a regulatory opt out arrangement. This may still need to be considered for ripple control to participate in the proposed new ancillary service.

- ***It will be important for the trial to be clear on the conditions on which ripple control could participate in the new reserve product market.***

Different Characteristics and Value of DSF - Different Ramp Rates Matter

My above arguments assume that the requirements for a new reserve product might be differentiated by ramp rate. In much the same way that the existing reserve market is differentiated by ramp rate, and sustainability of response. That is, I am assuming that as intermittent generation penetration increases the frequency and size of drop offs in collective supply from intermittent resources will increase. And that on the generation side the depth of market for supply of really fast ramping generation is quite small, particularly in the NI (mostly owned by Mercury).

So to increase the depth of the intraday firming market, including via a new ancillary service, different types of DSF, with different ramp rates will be needed, and those with faster ramp rates will be more valuable.

- ***The proposed trial of the new reserve market (A4) will help to understand how reserve products, to back up the sudden reduction from intermittent sources, needs to be differentiated by ramp rates.***

Market Concentration of DSF Resource - Who Owns It and Will Economies of Scale Matter?

As I mentioned above I fully support DSF as a means of increasing market depth in the intraday firming service market. Particularly given the market concentration on the generation side for this service. But I have mixed feelings about the current level of market concentration in the DSF market. Vector metering appears to have, by their own initiative and forward thinking, have gained quite a dominance in this market. With ownership of most of the NZ smart metering and much of the NZ ripple relays and behind the meter control technology.

Similarly they are one of the more active players in the current market in exploring new technologies in this area, including exploring collaboration with Google on smart in home technology. There may well be economies of scale in this market and market concentration in the DSF control market in our small national market is inevitable.

It is likely that the existing EDB owned ripple control of hot water load control could provide some level of competitive pressure to Vector meterings dominance in the smart metering controlled part of the hot water load control market. The concern here is that because Vector Metering is so dominant in the smart metering control of hot water load they could extract monopoly rents from all retailers wanting to use this service. So the benefits to consumers get eroded. The EDBs, by using the ripple control, have some ability to directly offer a competing service to consumers, for

control of the same load. But the level of consumer choice is less. That is the opting out of the ripple control requires more effort on the consumer's part. The ripple relay would have to be actively disabled. Nevertheless it does provide some level of competitive pressure.

Also their will be competing uses of the same hot water controlled load. Between EDBs wanting to use it to manage their need for new network investment, and using the same DSF resource to manage intraday firming services prices. Exactly how much these uses clash and if so how the clash is best managed is still an open question. A trial of the proposed new ancillary service (A4) would help to gain insights on these issues.

- ***The proposed trial should help identify the potential for market concentration in the DSF control market in NZ, and the extent to which this is an inevitable consequence of economies of scale.***
- ***It should also help us understand how much of a problem this is for competitive price pressure in the intra day firming market.***

- ***Additionally the trial should help us understand how competition between EDB ripple control and smart meter control of the same hot water load might work for the benefit of consumers.***

- ***And the trial will help us understand how competing uses for the same load (between EDBs wanting to manage network investment and energy market use to firm intermittent generation) might evolve and whether they need to be managed.***

Cost Allocation for New Ancillary Service (A4) - It Matters But It Might Be Difficult

One of the reasons I had favoured trying to create a situation where DSF can participate in the energy market is that the energy market largely automatically assigns costs in an efficient manner. And even more so as we have moved to 5 minute pricing, and ideally will eventually move to 5 minute settlement.

However I still like your proposed new ancillary service for DSF that can respond to fast changes in intermittent renewable generation output.Mainly because I think it can be developed quickly and can be designed to be open to a wide range of DSF resources.

But if I am right and it is a highly successful market in restraining market power in the intraday firming services market it will also have a lot of value riding on it. Possibly

including lots of value transacted through it. So cost allocation will matter and be contentious.

One possible approach to a causer pays cost allocation methodology could be to adopt something similar to the FCAS market in NEM.

My limited understanding is that these costs are (or used to be) allocated based on 5 minute SCADA snapshots of actual generation deviation from dispatch. The advantage of this approach is that it has already been tried elsewhere (Australian NEM) and it uses existing data (5 minute SCADA snapshot data). The disadvantage is that it might not be the optimal cost allocation that is closer to causer pays than beneficiary pays. This may not matter if the service has a sunset clause. That is the inefficiency would be short lived.

- ***A key consideration for the trial to investigate will be the importance of the cost allocation for the new ancillary service (A4) and how this should be approached.***

Regards

Neil Walbran

Managing Director

Response to specific consultation questions

Q1	Do you agree that, weighing costs and benefits, our preferred options in Table 7 above are likely to best address the operational coordination issues described in that chapter? If not, why not?	Yes, agree.
Q2	What is your view of the proposed sequencing and timing of measures to strengthen operational coordination?	I suggest option A4, the new reserve product to cover sudden reduction from intermittent sources should proceed to a funded trial with urgency. This is an area where there should be some low hanging fruit where immediate gains can be made. But getting the detail right is important and a trial will help understand which details matter, as outlined in the earlier parts of this submission.
Q3	What, if any, other options should be considered to strengthen operational coordination?	Longer term I would like to see an option developed, for flexible demand services, including hot water load control, to participate in the energy market, as per my earlier submissions. But I acknowledge this may take time to develop and option A4 is an important first step in the development of DSF.
Q4	Do you agree that, weighing costs and benefits, our preferred options in Table 10 above are likely to best address the risk management and investment issues described in that chapter? If not, why not?	Yes, agree.
Q5	What is your view of the proposed sequencing and timing of measures to improve risk management and investment?	No comment.
Q6	What, if any, other options should be considered to improve risk management and investment?	No comment.
Q7	Do you agree that, weighing costs and benefits, our preferred options in Table 13 above are likely to best address the demand side flexibility issues described in that chapter? If not, why not?	Generally support but would like to see greater emphasis within option C5 on shaping the trial to specifically target trial of the proposed new reserve product (A4) and allowing existing flexible load, mainly ripple controlled hot water, to participate in the trial. I believe this is the low hanging fruit in DSF and can bring quick wins.
Q8	What is your view of the proposed sequencing and timing of measures to improve demand side flexibility?	It would be ideal if the trial of the new reserve product, funded as a trial as per options C5, could be given higher priority as I believe there is some low hanging fruit in this area.
Q9	What, if any, other options should be considered to improve demand side flexibility?	No comment.
Q10	Do you agree that, weighing costs and benefits, our preferred options in Table 15 above are likely to best address the	No comment.

	competition issues described in that chapter? If not, why not?	
Q11	What is your view of the proposed sequencing and timing of measures to strengthen competition?	No comment.
Q12	What, if any, other options should be considered to strengthen competition?	No comment.
Q13	Do you agree that, weighing costs and benefits, our preferred options in Table 17 above are likely to best address the public confidence issues described in that chapter? If not, why not?	Yes, agree.
Q14	What is your view of the proposed sequencing and timing of measures to increase public confidence?	Yes, agree.
Q15	What, if any, other options should be considered to increase public confidence?	I suggest a successful trial of the proposed new ancillary service (A4) if it succeeds in improving competition for firming services, and dampening price volatility, may increase public confidence.
Q16	Do you agree the measures in Table 19 should be prioritised to help ensure a smooth transition to a renewables-based system? If not, why?	Yes, agree, and would like to see urgent work on a trial of option A4, the proposed new ancillary service to back up sudden large fluctuations in wind / solar output. Also prefer to avoid more interventionist options such as option D7 (virtual disaggregation of flexible generation).
Q17	What, if any, other measures should be considered to facilitate a smooth transition to a renewables-based system?	In the longer term it might be good to see the DSF resources participating in the new reserve market (A4) be able to transition to the energy market. Ideally with 5 minute settlement. But I recognise this may be some time away.
Q18	Do you agree with the proposed categorisation of how measures should be progressed between Code-processes, market facilitation and hybrid approaches in Table 20? If not, why?	Yes, agree. Would like to see high industry engagement on development of option A4.