Ms Anna Collyer
Chair, Australian Energy Market Commission
Attention: Mr Ben Hiron
201 Elizabeth St., Level 6
PO BOX A2449
SYDNEY SOUTH NSW 1235

(Lodged electronically) 16 June 2022

re: ERC0263 - Primary frequency response incentive arrangements – Second Directions Paper 19 May 2022

Delta Electricity operates the Vales Point Power Station situated at the southern end of Lake Macquarie in NSW. The power station consists of two 660MW conventional coal-fired steam turbogenerators. Delta Electricity appreciates the opportunity to comment on the directions paper and work with the AEMC technical working group on the proposed PFR Incentivisation Rule Change.

Delta Electricity previously stated in the response to the draft determination that it did not support maintaining Mandatory PFR rules indefinitely and has not changed its viewpoint on this point. However, Mandatory PFR has provided a more secure environment in which participants should continue to explore PFR incentivisation. It is understood that the AEMC second direction paper on PFR Incentivisation had no intention of re-examining the decision already determined for this rule change to cancel the sunsetting of the Mandatory rule. Trended frequency distribution does not demonstrate any improvement in frequency distribution since January 2021 when 40% of first tranche generators had implemented AEMOs requirements and the latest data should be examined if there is to be any reconsideration of this point.

The recent work by the AEMC to examine in more detail mechanisms for incentivising PFR using modifications to existing market mechanisms has been informative. Delta Electricity agrees that the development of performance payments for supportive reactions and the linking of the proposed mechanism to the Regulation FCAS price will improve the financial incentives for participants to deliver more effective PFR.

The proposed mechanisms the rule change has explored, whilst having inception in previously examined concepts, are innovative and it is hoped the AEMO delivery of the rule change by way of revised FCAS Contribution Factor procedures will also deliver a system to the expectations of the AEMC from its work with IES. As previously determined, the rule change has avoided reforms that would have developed a PFR service market which, in comparison to existing FCAS market dispatch quantities, would outweigh the megawatts (MWs) of all FCAS services combined tenfold. A price based on the quantity in MWs of supportive energy and footroom actually needed to effect good PFR control would present an expensive impost on the market some consider. However, in a market environment, such a market, if valued comparably to energy and co-optimised with energy is one that Delta Electricity considers would best motivate suppliers to provide PFR especially if the mechanism was directly linked to energy revenue and directly settled with it such that effective PFR resulted in substantial bonuses to energy revenue and/or ineffective PFR resulted in substantial

reductions in revenue. Maintaining PFR incentives along with regulation FCAS and Contribution Factor arithmetic in a smaller less impacting market, will lead some traders continuing to, on occasion, sacrifice the pursuit of FCAS regulation in cheaper, lower volume and less substantial service markets to chase an energy revenue result. Such behaviour is that which a perfect execution of this rule change should seek to retard or at least provide enough reason to question the merits of such action.

Despite these continued possibilities and the freedom of market participants to choose to trade or not to trade on the Regulation FCAS market for whatever reason, it is considered that the proposed solution will improve incentives to deliver better PFR. It remains to be seen whether the combined performance bonuses and/or penalties actually drive sustained PFR improvement and, more importantly, whether the mechanisms and resulting data easily demonstrate to investors in new technology estimated returns attractive enough to adequately pay back the investment. This is especially relevant in an environment whereby Mandated PFR continues because quantities reserved to provide occasional 6s FCAS are being continuously utilised. Continuously utilised PFR is a demanding product that generally shortens the life, or period between overhauls, of equipment that provides it, especially at the present deadbands of the Mandatory PFR Rules and AEMOs present interim primary frequency response requirements (IPFRR). Hopefully, the review of the FOS and the finalisation of the PFRR later in 2022 will find the right overall balance of PFR control for the NEM. Mandatory PFR has not actually delivered a technically superior outcome because it hasn't found a balance and, in combination with AGC dispatch, and as demonstrated by the irregular shape of the resultant frequency distribution with higher counts experienced at frequencies of 49.975Hz and 50.025Hz than at 50Hz, is subsequently maintaining and enhancing some poorer technical outcomes. Effective tuning, if pursued by the operator, could explore different PFCBs to find the smoothest overall distribution. For various reasons, apart from the observed results, +-15mHz is not considered to be the optimum deadband.

The challenges that may remain after the FCAS contribution factor process is reformed and implemented may include some matters discussed in the work to develop the PFR Incentivisation rule change:

1. Future consideration of splitting performance assessments of Regulation FCAS and PFR delivery. The mechanisms of each are quite separated on many plants. Performance measurement that produces a single combined assessment has several risks:

    a. Regulation FCAS is not dispatched for instant delivery on many plants. On such plants it really is better evaluating only 5minute results because the delivery process is not expected to be instant by design. If instant delivery of Regulation FCAS can produce a more favourable PFR reaction for a participant, and this will be a control consideration many may realise needs exploring, especially in comparison to delivery to other participants which may already be delivering Regulation FCAS instantly, then many plants may suddenly be seeking to obtain FCAS regulation dispatch separated from energy dispatch so that the energy stores and controllers that deliver an instantaneous reaction (as utilised in 6s FCAS controllers), can

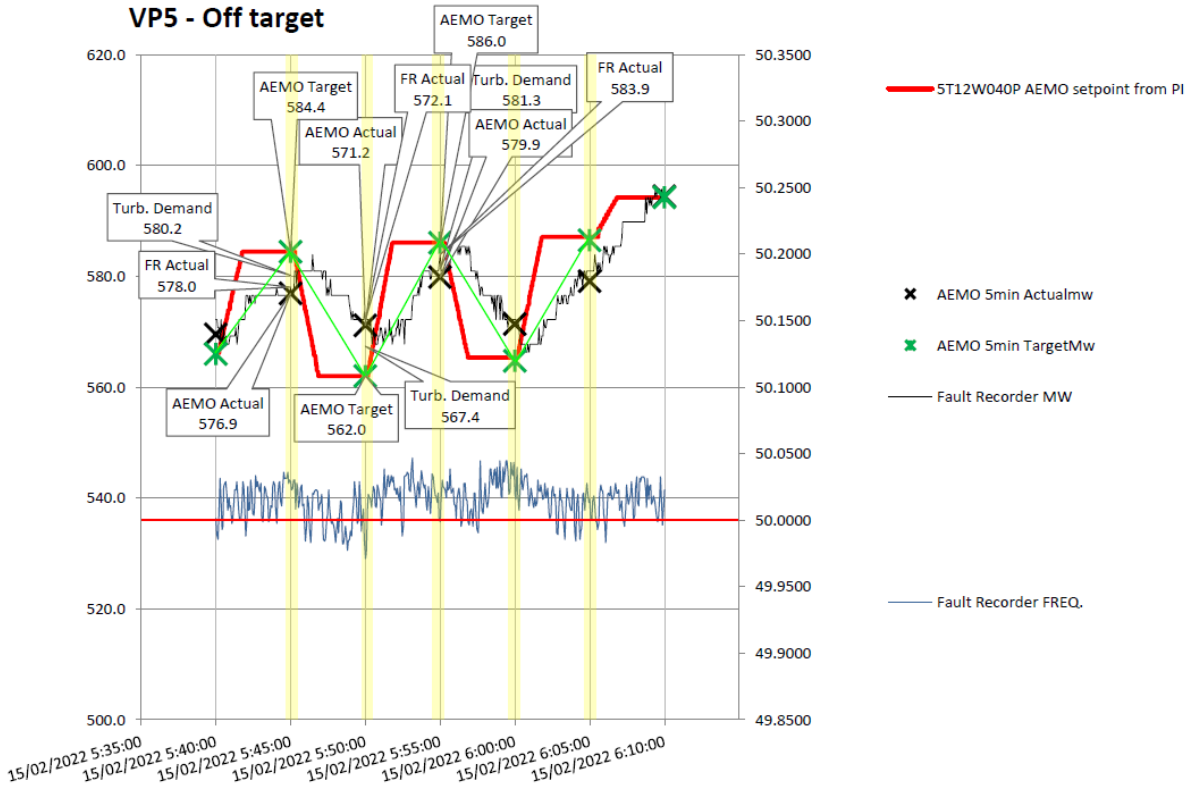
deliver the dispatched regulation target. The system presently designed for many participants was deliberately more cautious via energy ramping controllers.

b. PFR is instantly delivered directly in proportion and in opposite sense to local frequency. Comparing any unit to a measure that is not its local frequency will not result in incentives that if optimised are fully coordinated. Some small participants may be impacted by the frequency responses of the larger nearby participants and either have a beneficial or unfavourable equation from the real-time measures that is not yet apparent from the studies done. Such impacts could be discriminatory if no amount of control adjustment can improve the participant's factors despite efforts they may take after tracking and monitoring the data from the new performance and expense payments process.

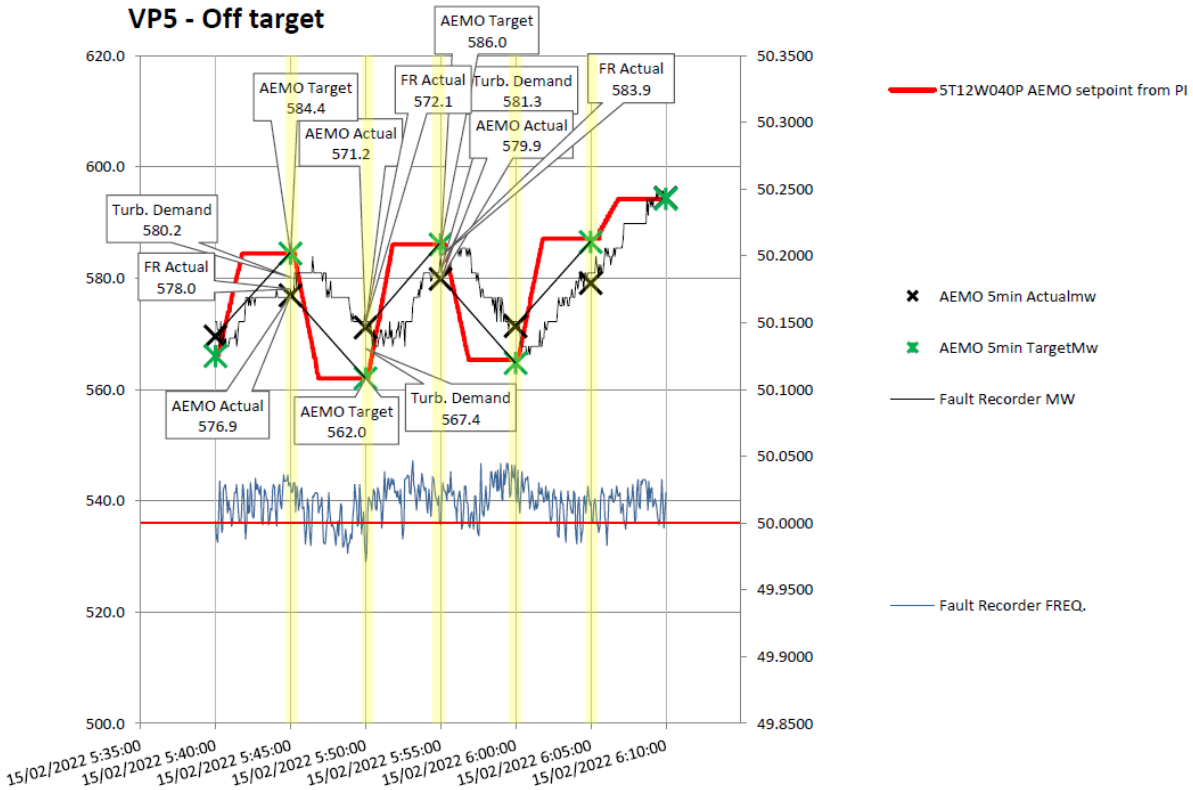
2. Trajectory from which to determine performance – Many participants continue to believe that in order to represent a match to actual dispatch, the trajectories used by performance arithmetic should use actual-to-target rather than target-to-target or else the performance arithmetic will produce erroneous results especially when Units, by virtue of price to energy bid coincidences, are dispatched in regular ramp direction changes in consecutive five-minute dispatch intervals. Some Units are inherently delayed in commencing to ramp and changing direction and cannot easily design this out whilst still inherently able to respond to frequency instantly and provide good PFR. The real delivery of dispatch is not based on target-to-target. The AEMO AGC necessarily has to refer to the last actual in order to generate the next possible target based on the Unit's rate of change. Some charts from Delta Electricity attempt to highlight possible unexpected outcomes in Target-to - target versus Actual-to-target trajectories using real data.

In the first chart, the green line connects the green crosses that represent the target-to-target trajectory. Due to continually changing ramp directions and the assigned rate of change of the Unit (3MW/min), the green line trajectories are actually not achievable by the Unit and then, after considering that, the random conditions of system frequency mean that for much of the period, frequency being higher than 50Hz, PFR really wants the Unit to be under trajectory. However, because of the connection between impossible targets, the support the Unit is providing is under appreciated in one DI and over appreciated in the next and the performance is not actually representative of the true condition or true performance.

The left hand vertical axis is load in MWs and the right hand vertical access is frequency in Hz.



In the next chart, the black lines display the actual-to-target trajectory and is considered to be a more effective comparison that, because it is also not what is used in the present FCAS contribution process arithmetic, would uncover causation that won't be identified or managed by the target-to-target approach especially if the approach actually reduces the causation impact which appears to be the case in this example at least.



In the 0545 DI, with frequency largely above 50Hz, the Unit is contributing better in the second chart than the first but won't realise it in a target-to-target approach.
In the 0550 DI, frequency is evenly spread above and below 50Hz but both trajectories are generally below actual MWs so when frequency is below 50Hz, the second chart would produce greater performance than the first which is not really representative of the actual performance as it starts from the wrong point reflective of the previous unmet target and charts a trajectory to a target that is impossible for the Unit to reach without changing its rate of change.
In the 0555 DI, Frequency is generally above 50Hz and the first chart shows a close correlation of the actual to the impossible green line trajectory and would not demonstrate the fact that the Unit is actually below its real trajectory supporting frequency much better that the green trajectory will show. The situation in the second chart shows that the Unit is almost entirely under the next real trajectory and would therefore be more supportive of frequency recovery that the target-to-target trajectory indicates.
In the 0600 DI, with frequency largely above 50Hz, and the unit above both ramp down trajectories, the Unit is poorly performing somewhat worse in the actual-to-target trajectory than the target-to-target impossible trajectory.
The 0605 DI result is similar to the 0555.

Whilst assertions have been made that, in the overall summations of all events, the effects above are expected to smooth out to provide a similar general impact, to motivate companies in real time, the real time comparison to the real trajectory a Unit is dispatched to is the only comparison that makes sense to a Unit control engineer. A trajectory which represents something which is impossible for a Unit to meet is not easily explained as being the correct comparison from which to check performance.

Thanks again for the opportunity to participate and provide comment on this important work. If the AEMC wishes to discuss any aspect of this letter, please contact Simon Bolt on (02) 4352 6315 or simon.bolt@de.com.au.

Yours sincerely

Simon Bolt
Marketing/Technical Compliance