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(Lodged electronically to mass.consultation@aemo.com.au) 19 August 2021

AEMO Consultation on Amendments to the Market Ancillary Services Specification (MASS) – Very Fast FCAS – July 2022

To Whom it May Concern,

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 turbo-generators. Since market start in 1998, Delta Electricity has participated in the support of frequency by way of installed controllers and systems subject to the market ancillary services rules and specifications.

Delta Electricity appreciated the opportunity to discuss the draft determination of proposed changes to the MASS to include for Very Fast FCAS at the consultation forum held on 2 August 2022 and appreciates this further opportunity to comment on the draft determination and proposed revision to the MASS.

Very Fast FCAS

The changes to the MASS that AEMO proposes to include for the new Very Fast FCAS seem generally reasonable and it is understood that AEMO wishes to keep the new design as simple a change from the existing system as possible. However, the concern AEMO has about how other adjustments to timing of existing services may overcomplicate the process, causing additional registration revisions and need for retesting of the existing services, is not shared by Delta Electricity. On the contrary, Delta Electricity considers it likely many existing participants, when registering for the new very fast service, will take the opportunity to reconsider and re-register the capability of the existing FCAS services, in which case other options for the timing of each service could be considered by AEMO.

It is also noted that AEMO expects the proposed active power cap on service delivery may only generate a need for re-registration not warranting retesting. However, as the test of service delivery for many participants really amounts to evidence provided from actual events, the additional testing to accommodate any changes in the timing of other services, should AEMO reconsider changing these, is not considered an overbearing difficulty.

Delta Electricity continues to consider there is merit in maintaining a focus on the faster forms of FCAS and would prefer AEMO extending the proposed ramp up period of the Fast service by a second to have it applied over 1 to 7 s and retire over 7 to 61 seconds instead of AEMOs proposed 1 to 6s retiring over 6 to 60s. Rather than such a suggestion being considered to have an economic or market basis, Delta Electricity considers it to be technical with impacts on the capacity on the existing fast services. Most proportional controllers are not limited by the time frames involved but the longer specification time allows for the equitable amount of overall time in the assessment to that which exists for the fast service now. Examining typical responses of steam generators to typical events suggests that shortening the rising period from 0 to 6 to 1 to 6, particularly taking the

proposed cap on delivery into account, will remove capacity from the fast service delivered by steam generators. After 6s into typical frequency events with smaller deviations, service delivery of proportional controllers appears to be still increasing. Maintaining the Fast 6s services with a 6s rise time over 1 to 7s can maintain the present capacity of existing services as opposed to shortening it by a second, coupled with active power "capping", which is expected to reduce it. It is the speed of response, the fact that fast services from steam plants will usually continue to increase from 6 to 7s for most assessable deviations, and the method of application by AEMO of the proposed new cap that will be deciding factors. The shortening of the rising portion of the fast service will have more impact on fast service capability than would a shortening of the longer rise period of the slow service. A 1s removal from the ramp up time of the slow service, being only one second removed from a 54s ramp up, would have much less impact compared to the removal of the 1s ramp up time from existing 6s of the fast service, which removes a much larger percentage of the overall assessable service period. However, Delta Electricity considers that the slow service and delayed period timing could also be shifted with minimal impact on all services.

The application of "caps" to the service needs to also ensure that the measured maximum determined from recorded data is compensated in the arithmetic to make sense of the purpose of the arithmetic that compares the reaction that may have occurred for a 0.5Hz deviation as represented in enablement quantities. As most deviations are much smaller than 0.5Hz, the real peak MWs experienced in a proportional reaction to any one event will be relative to the experienced deviation and will not necessarily match the quantity of Contingency FCAS procured. For a steam plant, the maximum possible delivery in faster time frames, particularly of relevance to the new service, is larger than existing maximum service capacities registered for the fast service. e.g. a 660MW steam turbine with a mechanical-hydraulic governor has capability to rapidly deliver a 165MW retardation to a 0.5Hz rise in frequency and, when operated with suitable additional pressure (often in the order of 10% additional to that required for the energy dispatch), will react to try to initially deliver upwards of 66MW increase in output in response to a 0.5Hz fall. A mechanical-hydraulic governor reaction to the initial speed change will be followed by other responding actions both local and system-based. It is the coordination of all of these actions and reactions that determines the overall result. For these reasons, most steam generator participants have conservatively registered capacity at less than half of the comparable peak MWs that may be delivered and the proposed capping of active power therefore makes it necessary to reconsider fast and slow service capability.

Other Changes

The change proposed to the Contingency Event time and the proposal to apply a narrow deadband adjustment to correct the base level MWs is not supported. The proposed change is simply not considered to be a reliable adjustment because it:

(a) will adjust the baseload of some Units that may actually not have provided any response,
(b) may not make sensible outcomes with the regular 50-75mHz variations over 25-30s period occurring in normal conditions impacting on the accuracy of the adjustment as determined from the measured average frequency, and
(c) the proposed change will overestimate the adjustments for most participants in events where the total change in frequency has occurred over a long timeframe and where the relevant deviation, for the actual triggered data record and subsequent calculations, is only a portion of the overall deviation, particularly when considering adjustments made, during the same long timeframe of the event, by AEMO energy and regulation FCAS dispatch which can also affect the result should an event extend across several dispatch intervals.

Delta Electricity favours the use of adjustments by comparing actual MWs at the precise moment in time the event leaves the normal operating frequency band, to that predicted by the linear trajectory from the last actual of the preceding dispatch interval to the next assigned dispatch target. A more complex but fairer trajectory might also include commencing the trajectory timing from the determined time of the initial receipt of the AGC target at the Unit. Such a calculation may also need extrapolation of the trajectory line across a dispatch interval up until the time of commencement of receipt of the next dispatch target from AEMO. This would be particularly necessary when a frequency event occurs late in a dispatch interval or just inside the next prior to commencement of receipt of the target for the next dispatch interval from AEMO. Such times sometimes extend well into the first minute of the dispatch interval and, where the AEMO target itself has been interrupted for whatever reason, which has also been regularly experienced in recent times, can occur even later in the interval.

Delta Electricity also supports no adjustment being made if the Unit is found to be off target unfavorably compared to the change in frequency direction caused by a contingency event.

Type of event	Difference to trajectory at time of leaving the NOFB	Adjustment
Low Frequency	positive	Subtract the absolute MW difference between actual MWs above the estimated trajectory MWs, from the base levels calculated for Very fast, Fast and Slow services
Low Frequency	negative	No adjustment
High Frequency	positive	No adjustment
High Frequency	negative	Add the absolute MW difference between the estimated trajectory level MWs above the actual MWs, to the base levels calculated for Very fast, Fast and Slow services

Requiring providers to need a Contingency Event Time determined by AEMO in order to undertake an assessment has made self-assessment less achievable and so any change that overcomes any impediment to self-assessment capability is considered a good idea. Other alternatives would be for AEMO to publish the contingency event time for every event.

Finally, however, Delta Electricity also has concerns that the permitted continuation of 50-75mHz variations in normal frequency conditions will also hamper accuracy in MASS arithmetic including adjustments for PFR, particularly when it is remembered that mechanical-hydraulic governors for many steam turbines react proportionally to any detected speed change and are therefore sensitive to the larger up and down transitions. The variation maybe hampering the effectiveness of the calculations for the services. The existing MASS, guide and the AEMO FCAS Verification Tool may benefit from a reconsideration of this point and AEMO are encouraged to consider smoothing the frequency record more extensively than is presently the case in the assessment arithmetic.

The removal of the definition “trigger rate” may benefit from some further considerations by AEMO of its purpose as defined and utilised in past versions of the MASS. Previous versions of the MASS excluded the need for service providers to capture data if the trigger rate was less than 0.05Hz/s. The version 7.0 published in February 2022 appears to have omitted the reference to trigger rate in the last row of Table 4 on page 17, perhaps by mistake. Regardless of this possible typographical error in version 7.0, previous AEMO engineers must have considered assessment unnecessary when frequency changed at less

than this rate. Such slow changes may have been considered outside the correction FCAS can reasonably provide for and which are more in the sphere of energy demand/supply dispatch adjustments and/or other controls that AEMO centrally maintains. If this was the case previously, without details as to why it is no longer the case, it is unclear why a possible error should now be consolidated, and further, the definition deleted entirely.

Certification of FCAS metering equipment

The advice provided to AEMO that supported the application of IEC 61557-12 seems to have formed the viewpoint that existing systems have no requirement for traceability of the measurements to ensure the measurement itself is of a known accuracy. Whilst it is agreed the MASS has been lacking in this area, it is suggested that for some participants, the existing equipment is also incorporated into the power station performance standard compliance programme, meaning equipment accuracy checks are being made to high standards. At such stations, it is considered the additional check under application of IEC 61557-12 will be an impost possibly carrying some expense to achieve but it is also acknowledged that ensuring all service providers provide a consistent quality of recorded signal is important to overall frequency control and performance in the NEM.

As was discussed on this point in the recent forum, a future revision to the MASS could also consider time-stamping protocols and conventions. Without consistency in this area, comparison of the recorded data from one participants to another will be less successful. However, it is also probably useful to note that system frequency is generally expected to be consistently measurable and comparable over great distances in an enmeshed AC system so it ought to also be possible and straight-forward to time shift less synchronised data in comparison to nearby data carrying more accurate time-stamps such as may be obtainable from TNSPs and/or existing service providers with suitable equipment synchronised to relevant national time conventions.

Implementation periods

Some of the changes proposed, particularly if installed equipment requires removal and off-site testing to meet the proposed certification to IEC 61557-12 or new devices are needed to be acquired to bring controllers up to full compliance with the revised MASS, may not be easily implemented particularly on Units that do not undergo outages more frequently that once per year. AEMO are requested to consider providing a grace period of two years from commencement of the very fast services in October 2023 to allow enough time for existing systems to fully adopt such changes as might impact on installed equipment.

A “Specification” and Participant Self-Assessment

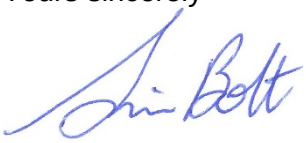
From experience with performing assessments since 2004, Delta Electricity considers that the MASS remains difficult to translate into custom built spreadsheets that can perform full assessment. Previous amendments that relocated relevant and necessary assessment calculations out of the specification into the supporting guide have actually made the task more difficult in our opinion. Even if service providers successfully interpret the Rules, understand the relevant system operating procedures and the MASS and follow the FCAS verification Tool user guide, to build an assessment calculator, they have less confidence that the calculations are NER compliant because they are no longer an integral section of the specification. Of course, participants can opt to use the AEMO provided tool instead and this tool appears effective in most cases even though it contains caveats that even it may not be strictly representing the expectations of the Rules.

Delta Electricity reiterates comments from previous submissions on MASS changes, that the word “specification” has its own sensible English definition that should be remembered. In its present form, Delta Electricity considers any description of arithmetic that adequately performs an assessment really belongs in the specification else relegating both the AEMO tool and any other calculation of performance into possible contradiction with the Rules and the default purpose of normal specifications. The Rules dictate that the MASS be a “specification” therefore, to avoid disagreements with participants and Rule arbitrators about the need for the MASS to completely define the specification of the services, it is recommended that AEMO return the calculations to the specification body as a schedule.

An alternative to the above is to remove almost all technical details completely and rewrite the specification to describe a process by which participants must develop a compliant FCAS system in consultation. Those proposing to provide a new service can be instructed by the specification of the need to make a request to AEMO for design requirements. Design requirements could then be uniquely provided by AEMO for each proposed project or selected from an evolving library set of design requirements allowing flexibility to AEMO to advance FCAS system designs. Following design requirements provided by AEMO, each new proposing service provider would then design the system. Typical design requirement examples could be included in the specification for reference but the specification would indicate that each design, including modelling to demonstrate the expected performance, must be individually approved by AEMO, and then tested (or assessed from real event conditions) to confirm the predictions of the design. Such a process would provide full latitude to AEMO and flexibility to participants to provide a variety of service designs to achieve the design expectations of AEMO, would be relevant to the time of the proposed project, and be ultimately determined by both design reports and commissioning testing in a similar way to processes that develop automatic voltage regulators. Such a specification would lead to a wider variety of systems, reduce the dependency on specific calculations and develop specific plant testing procedures from commissioning activities. However, such a process would make frequency control less transparently understood by NEM participants which may not be favourable.

Delta Electricity will continue to be engaged with the frequency control work program and future changes to the MASS and if AEMO wishes to discuss this submission please contact Simon Bolt on (02) 4352 6315 or simon.bolt@de.com.au.

Yours sincerely



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