

31 October 2019

Mr John Pierce  
Chair  
Australian Energy Market Commission  
PO BOX A2449  
Sydney South NSW 1235

Tasmanian Networks Pty Ltd  
ABN 24 167 357 299  
PO Box 606  
Moonah TAS 7009

Via online submission

Dear Mr Pierce,

**RE ERC0274 - PRIMARY FREQUENCY RESPONSE RULE CHANGE**

TasNetworks welcomes the opportunity to make a submission to the Australian Energy Market Commission's (AEMC) consultation paper on increasing the provision of Primary Frequency Response (PFR) in the National Electricity Market (NEM).

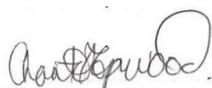
TasNetworks is the Transmission Network Service Provider (TNSP), Distribution Network Service Provider (DNSP) and Jurisdictional Planner (JP) in Tasmania. TasNetworks is also the proponent assessing the business case for Marinus Link, a new interconnector between Tasmania and Victoria. The focus in all of these roles is to deliver safe and reliable electricity network services to Tasmanian customers at the lowest sustainable prices. TasNetworks is therefore appreciative of the AEMC's efforts to review PFR in the NEM.

TasNetworks supports Energy Networks Australia's (ENA's) submission. The key points raised in this submission are:

- TasNetworks agrees that the need for action on PFR is growing more urgent given the increasing installed capacity of both Distributed Energy Resources (DER) and large scale intermittent generating systems across the NEM. TasNetworks therefore supports the AEMC's proposed assessment framework to prioritise system security concerns.
- TasNetworks also supports the intent of the rule changes submitted by the Australian Energy Market Operator (AEMO).
- TasNetworks does not support or endorse changes to the definition of *inertia* in Chapter 10 of the National Electricity Rules (NER) and has instead suggested an alternative change to the definition of *inertia support activities*.

TasNetworks' responses to individual questions are provided below and we would welcome the opportunity to discuss this submission further with you. Should you have any questions, please contact Andrew Halley, Principal Operations Engineer, by phone on (03) 6271 6759 or via email ([andrew.halley@tasnetworks.com.au](mailto:andrew.halley@tasnetworks.com.au)).

Yours sincerely,



Chantal Hopwood  
Leader Regulation

**QUESTION 1: Issues raised by AEMO in its rule change request, *Mandatory Primary Frequency Response*.**

TasNetworks agrees with AEMO's assessment of the implications of poor frequency regulation as summarised on page 39 of the Consultation Paper. TasNetworks also agrees that the observed degradation of frequency control across the NEM is at a point where action is required beyond simply continuing to increase the volume of regulation Frequency Control Ancillary Service (**FCAS**) which is dispatched. TasNetworks considers that sufficient evidence exists<sup>1</sup> which demonstrates that Automatic Generation Control (**AGC**) alone is an insufficient mechanism to adequately control network frequency. Further, that increasing PFR as provided by appropriately configured speed governing systems, and other continuously acting frequency control devices, can and will address this issue.

TasNetworks supports the observations and conclusions made by John Undrill in relation to the need for broad participation from generators and therefore agrees with the principle that the most effective control outcome will be achieved if 'everyone contributes a little'. This will help to mitigate the risks associated with relying on only a few key frequency control sources which may include:

- geographic dispersal, or lack thereof;
- the ability to adequately manage any unexpected network performance outcomes given the increasing levels of uncertainty and variability within the power system; and
- the potential impacts of any modelling deficiencies that might be associated with a single generating unit or generating system.

As a specific observation for the Tasmanian region, it can be noted in Figure 3.2 of the Consultation Paper that the frequency standards are being routinely exceeded, with frequency being outside of the *normal operating frequency band (NOFB)* for more than 1% of the time. The occurrence of a contingency event at such times materially increases the probability that:

- Customers who provide contracted load shedding for the purposes of delivering fast raise FCAS may be interrupted for smaller contingency events and therefore be interrupted more often than anticipated. This complicates the decision about what frequency trigger levels to apply to avoid 'nuisance' activation of such schemes and could ultimately impact on the viability of providing such services.
- The ability to control frequency above, or below, the thresholds where emergency frequency control schemes are activated becomes more difficult following credible contingency events. The risk of Under Frequency Load Shedding (**UFLS**) is most acute in Tasmania given the relatively small 1.0 Hz margin between the lower limit of the *operational frequency tolerance band* (48.0 Hz) and the *extreme frequency excursion tolerance limit* (47.0 Hz). Load shedding must commence 'just' below 48.0 Hz for the UFLS scheme to be effective, thereby providing little working margin to cater for scenarios where dispatched FCAS is marginally insufficient. It should be noted that the assumption applied in the FCAS requirement calculation process run by AEMO is  $f_{init} \geq 49.85$  Hz.

When running simulations and performing various analyses, it is standard practice for TasNetworks to assume that initial steady state frequency is within the NOFB and thereby compliant with the frequency standards. It is therefore not unreasonable to assume that the risk of unintended and/or unexpected outcomes in the network following a contingency event increases when the network is operated outside of these limits for longer periods of time.

---

<sup>1</sup> TasNetworks notes the comments made on page 40 of the Consultation Paper (third bullet point) and also highlights the positive results coming from two frequency control trials which were run in Tasmania during 2018 and 2019.

**QUESTION 2: Issues raised by Dr Sokolowski in his rule change request, *Primary Frequency Response Requirement*.**

In general, TasNetworks agrees with the observations that mirror, or are similar to, those raised by AEMO. It is unclear whether the additional observations pertaining to measurement errors and power quality impacts are as material given that all power systems experience off-nominal operation as shown in Figure 2.11 of the Consultation Paper. TasNetworks considers that the uncontrolled, oscillatory nature of NEM frequency over the full range of the NOFB, and then some, is the immediate issue of most concern. This is rather than the absolute difference from 50 Hz subject to the limits of the NOFB being adhered to.

**QUESTION 3: Issues raised by AEMO in its rule change request, *Removal of disincentives to primary frequency response*.**

Consistent with the identified need for action outlined in Question 1, TasNetworks supports making clarifying changes to the existing rules which encourage and/or support the continuous provision of PFR by removing perceived or real disincentives. TasNetworks considers that any generator responding in a manner consistent with its performance standards, and submitted modelling data where this exists<sup>2</sup>, should not be penalised for deviating from its market dispatch target when responding appropriately to a local frequency deviation. The proposed change to S5.2.5.11(i)(4) is also considered to be a worthwhile modification to remove any uncertainty as to when frequency response can/cannot be enabled.

**QUESTION 4: Capability of generation plant and the implementation process for AEMO's proposed mandatory PFR requirement.**

No comments.

**QUESTION 5: AEMO's expected costs and benefits for its proposed rule, *Mandatory Primary Frequency Response*.**

TasNetworks shares AEMO's concerns in relation to the forward costs likely to be incurred in the absence of measures to better control network frequency. Any delay in responding to PFR issues risks increasing uncertainty and reducing network robustness in the face of the NEM's 'world leading' penetration levels of asynchronous generation. This will only inevitably need to be countered with additional future conservatism in the design and operation of the power system. This will not be in the customer's best interests and TasNetworks therefore supports immediate action to address PFR concerns to keep future costs to customers down.

**QUESTIONS 6-10: Various**

No comments.

**QUESTION 11: Inertia and inertia support arrangements in the NER.**

For context in answering this question, TasNetworks' interpretation is that the proposed rule change discussed in Section 4.3.2 of the Consultation Paper relates to clause 5.20B.5(a) and not 5.20B.5(g) as written.

TasNetworks does not support a change to the existing definition of *inertia* in Chapter 10 of the NER, specifically, any attempt to delete the reference to 'electromagnetic coupling'. The original intent of the definition was to clearly differentiate between inertia provided by 'traditional' rotating machinery and Fast Frequency Response (FFR) as might be delivered from a variety of energy

---

<sup>2</sup> Recognising that some older plant may not have governor modelling data associated with them as their network connection may pre-date the requirements to provide such information.

sources including inverter connected equipment. The two are not interchangeable as they have different dynamic response characteristics. In this respect, TasNetworks considers that sources of FFR need to be assessed on a case by case basis to determine their relative contribution to network frequency control over time noting the potential for response latency. That is, unlike the inertial response provided by electromagnetically coupled rotating plant which responds instantaneously.

TasNetworks would, however, be supportive of a change to the definition of *inertia support activity* in Chapter 10 to capture the basic intent of the proposed rule change. The existing definition is not entirely clear and relies on the note provided at the end of 5.20B.5(a) creating something of a circular reference within the rules. An alternative approach may be to delete the note and amend the definition of *inertia support activity* in Chapter 10 by adding the bolded text below:

*inertia support activity*

An activity approved by AEMO under clause 5.20B.5(a) which may include installing or contracting for the provision of *frequency* control services, installing emergency protection schemes, contracting with *Generators* in relation to the operation of their *generating units* in specified conditions, **and installing or contracting fast frequency response delivered from inverter connected equipment.**

**QUESTION 12: Assessment framework.**

TasNetworks supports the hierarchy of priorities outlined in Section 5.1 of the Consultation Paper. The restoration of frequency regulation to an acceptable industry standard should be the initial focus so as to address the various power system security concerns which have been raised. The need for any further refinement of initial solutions can be determined thereafter, e.g. to better address the long term economics of any strategies adopted.

**QUESTION 13: Technical requirements of effective primary frequency response.**

In considering the potential for mandatory provision of PFR, TasNetworks recognises that some stakeholders may wish to seek compensation for providing what is essentially a complementary and necessary service to existing regulation FCAS, albeit that it is delivered via a different mechanism. TasNetworks considers the two primary and competing views on this issue can be represented as follows:

- The physical construct of the power system at the present time still relies on certain capabilities to be available if it is to operate in an acceptable manner. More recent practical experience in the NEM suggests that PFR is one of those capabilities. On this basis, and assuming that contributions can come from a dispersed and broad range of providers, the real cost of delivering the capability may trend toward something small. It may be questionable as to whether a market approach is justified on this basis, with the NER ensuring that sufficient ongoing capability continues to be available, including from new technologies as they are progressively introduced over time.
- Alternatively, given that a market exists for regulation FCAS and the service is already 'valued', it could be questioned whether it is appropriate to mandate the supply of a complementary capability without the opportunity for providers of that service to be remunerated. Further, would failing to do so discourage investment in technologies or solutions that could deliver a better outcome for the power system in the longer term?

On these points, TasNetworks suggests there is likely to be value in adopting a hybrid approach rather than taking a polarised view. That is, in a not too distant world where the marginal cost of generation is secondary to the costs of supporting the network to deliver that energy to end-users, regard for future developments should be maintained.

TasNetworks acknowledges the international experience where mandatory provision of certain response capabilities is accepted practice and considers this should be the general expectation to achieve network connection<sup>3</sup>. However, if an income stream is available to support the mandated requirements that may better promote quality outcomes and encourage innovation, TasNetworks considers this should be supported. In particular, in the realm of energy storage which might include developments such as variable speed pumped hydro.

Beyond this, a linkage to positive causer pays factors might be one other simpler mechanism available for implementation in the short term, especially if the market price of regulation FCAS is used as the basis for payment. That is, with providers of PFR compensated as price takers based on their positive contribution to the control of frequency within the NOFB.

TasNetworks' additional observations on Section 6.1 of the Consultation Paper are as follows:

- Simply enabling more contingency FCAS may not have the desired effects in terms of better controlling frequency within the NOFB. As a minimum, the existing settings of governor dead bands may not result in sufficient PFR being provided until frequency exceeds the NOFB limits. There is merit in applying the technical performance specifications drafted by AEMO to ensure sufficient PFR is delivered within a narrower frequency band.
- TasNetworks acknowledges the issues associated with geographic dispersion of frequency control capabilities and the risks associated with concentrated provision of both regulation and contingency FCAS services. TasNetworks' observations relate to the potential for rapid variations of interconnector power flows following contingency events and the variation of power flows from expected targets under normal (non-contingent) network operation. Increased provision of PFR across a larger number of generating systems would likely assist with the latter issue.

Notwithstanding these points, TasNetworks reiterates its support for the AEMC's hierarchy of priorities. System security issues need to be addressed now with the potential development of longer term market solutions following later.

**QUESTION 14: Temporal considerations.**

TasNetworks suggests that available options be triaged so that any opportunities to take advantage of 'quick wins' be identified and implemented as soon as practically possible. Further changes can then be implemented in a staged manner as required.

**QUESTION 15: Considering the cost benefit trade-off for the provision of PFR.**

No comments.

---

<sup>3</sup> Noting that inevitable exceptions to the general rule will apply at times.