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Dear Commissioners,

ERC0263 - NATIONAL ELECTRICITY AMENDMENT (PRIMARY FREQUENCY RESPONSE INCENTIVE ARRANGEMENTS) RULE 2021

EnergyAustralia (EA) welcomes the opportunity to comment on the Australian Energy Market Commission's (AEMC's) Draft Determination on Primary Frequency Response (PFR) Incentive Arrangements for the National Electricity Market (NEM). EA is one of Australia's largest energy companies with around 2.4 million electricity and gas accounts in NSW, Victoria, Queensland, South Australia, and the Australian Capital Territory. EA owns, contracts and operates a diversified energy generation portfolio that includes coal, gas, battery storage, demand response, solar and wind assets. Combined, these assets comprise 4,500MW of generation capacity.

EA is dedicated to building an energy system that lowers emissions and delivers secure, reliable and affordable energy to all households and businesses. This requires being a good neighbour in the communities we operate in. We, therefore, recognise Aboriginal and Torres Strait Islander peoples as the traditional custodians of this country and acknowledge their continued connection to culture, land, waters and community.

EA is appreciative of the AEMC's efforts to investigate the PFR arrangements beyond the expiration of the current settings in 2023. Ensuring these are fit for purpose will be a vital enabler of a rapid and robust energy market transition.

MPFR Has Been Effective

The Mandatory PFR (MPFR) rollout has seen a marked improvement in NEM frequency performance. The proportion of time frequency is concentrated around 50Hz has steadily increased while excursions outside the Normal Operating Frequency Band (NOFB) have decreased. Moreover, these improvements have been seen at all times, rather than only outside daylight hours as had been feared earlier.

EA's implementation experience has been better than expected. Initially, there was noticeable frequency response volatility which seemed to validate our concerns about plant wear and tear. However, as the rollout has continued, stable frequency has been seen more often. With 'a lot doing a little' our concerns about the immediate wear and tear impacts have, therefore, abated.

But MPFR Is Unlikely To Be An Efficient Long-Term Solution

Despite the positive short-term success, we do not consider that MPFR alone will ensure effective and efficient frequency performance in the future. Large-scale, frequency

responsive synchronous plant is being replaced with Variable, Renewable Energy (VRE) generation and Distributed Energy Resources (DER). In the absence of other developments, we see this will present increasingly significant challenges in maintaining sufficient capacity to keep frequency stable under normal operating conditions. This is a conclusion supported by GHD who see frequency performance deteriorating to levels seen before the introduction of MPFR by mid to late 2020s unless other measures are put in place [1].

This outcome would likely see increased wear and tear on the remaining generation plant. AEMO has suggested this challenge could be overcome by sourcing additional headroom or footroom from curtailed VRE generation. Further, that MPFR for Distributed Photovoltaic (DPV) and Battery Energy Storage Systems (BESS) could be instituted. Unfortunately, neither of these are likely to be suitable solutions.

As highlighted in the GHD report, both are hostage to variability in fuel source and charge status making the availability of reserves unpredictable. Significant curtailment is also unlikely to perpetuate given it would underwrite the case for network augmentation to relieve it or incentivise increased sector coupling (hydrogen production, desalination etc.) to use the curtailed energy more efficiently. Moreover, as highlighted in Infigen's Lake Bonney Battery trial, instituting MPFR for BESS would have significant impacts on warranted throughput and investment incentives[2].

Proposed Performance Payments Are Perverse

The Draft Determination proposes reforming the Causer Pays Procedure to supplement MPFR to get around these problems and incentivise long-term PFR investment. EA strongly supports the intent behind introducing payments for positive frequency contribution. However, we note this approach was developed in the absence of Technical Working Group (TWG) input. Unfortunately, this has resulted in an idiosyncratic and inconsistent approach which is unlikely to deliver the desired PFR investment.

The key issue is that as more headroom is procured, the Regulation Utilisation factor decreases. In turn, this results in a larger unused Regulation Frequency Control Ancillary Service (R-FCAS) costs component, which is smeared across all generators. The clearest example of this is shown in Table C.4 where the scaling factor is below 1. Generator A ends up paying $100k for the costs of unused R-FCAS. This is despite following its dispatch targets perfectly as shown by the 0 MPF value:

Scaling	0.5							
	MWh	RAW MPF	CPF	Reg allocation	FPP	Used Costs	Unused Costs	Total Participant Costs
Gen A	20	0	0	$0.00	$0.00	$0.00	-$100,000.00	-$100,000.00
Gen B	20	-20	-0.4	-$200,000.00	$0.00	-$220,000.00	-$100,000.00	-$320,000.00
Gen C	10	5	0.1	$0.00	$50,000.00	$0.00	-$50,000.00	$0.00
Residual	-50	-30	-0.6	-$300,000.00	$0.00	-$330,000.00	-$250,000.00	-$580,000.00

A similarly perverse outcome is seen if Generator C contributes any more than 10 MWh. Despite *positively* contributing to frequency performance, the costs of unused R-FCAS swamp its performance payment such that it ends up paying overall:

[1] GHD, Enduring Primary Frequency Response – Power System Operation and Strategic Regulatory Advice, page ii.
[2] Infigen, Submission to Frequency Control Rule Changes, page 9.

Scaling	0.5							
	MWh	RAW MPF	CPF	Reg allocation	FPP	Used Costs	Unused Costs	Total Participant Costs
Gen A	20	0	0	$0.00	$0.00	$0.00	-$100,000.00	-$100,000.00
Gen B	20	-20	-0.4	-$200,000.00	$0.00	-$220,000.00	-$100,000.00	-$320,000.00
Gen C	25	5	0.1	$0.00	$50,000.00	$0.00	-$125,000.00	-$75,000.00
Residual	-50	-30	-0.6	-$300,000.00	$0.00	-$330,000.00	-$250,000.00	-$580,000.00

These outcomes undermine the proposed approach. Indeed, generators with better frequency performance would have worse outcomes than under the current Causer Pays Procedure. It is, therefore, hard to see how improved frequency performance would be efficiently incentivised.

The Efficiency-Efficacy Trade-Off Needs Further Thought

The reformed Causer Pays approach might be rehabilitated by allocating unused R-FCAS costs only if they were less than the corresponding positive performance payment. Positive performance payments could also be scaled to offset unused R-FCAS costs. Both would ensure that a generator would not face a net negative outcome when contributing positively to frequency performance. Alternatively, a Double-Sided Causer Pays (DSCP) framework could be pursued as recommended by GHD.

Unfortunately, none of these measures is likely to result in the necessary investment incentives when combined with the current MPFR settings. As shown in Figure D.1 of the Draft Determination, the largest frequency improvements have come from those generators above 200MW enabled for MPFR. However, applying MPFR on all generators undermines the ability of a 'little to do a lot'. Moreover, with MPFR settings being so tight, deviation pricing is unlikely to provide much in the way of additional value to underpin investment business cases.

The degree to which the efficacy and efficiency of future PFR arrangements can and should be traded off requires further deliberation. Per our earlier submission, we consider this is best achieved via a Reliability Panel review of the Frequency Operating Standards (FOS). Lacking such deliberation, there is a risk that the optimal balance between the efficacy and efficiency of future PFR arrangements will not be struck.

The Future Is Now, But More Time Is Required

The issues above will ramify as more highly responsive synchronous generation retires. Unfortunately, this is likely to occur sooner rather than later. GHD's forecasts about frequency deterioration later this decade are based on the Integrated System Plan's (ISP's) Central Scenario. However, GHD notes that if the ISP Step Change scenario plays out, deterioration will be accelerated by four or more years.

EA considers that the current rate of change is already well beyond that predicted in the Central scenario. This is a view AEMO endorsed earlier this year in a letter to the Australian Energy Regulator (AER):

"AEMO considers that the future NEM is currently developing more in line with the Fast Change scenario than the Central scenario…"[3]

More recently, AEMO has strengthened its view. That is, by nominating the Step Change scenario as the most likely of all ISP scenarios in its response to the ISP Delphi Panel weighting survey[4].

[3] AEMO, Impact of Recent Policy Announcements on Project Energy Connect Benefits, page 1.
[4] AEMO, Scenario Weighting in the ISP Stakeholder Workshop Presentation, page 17.

If these views are correct, frequency deterioration could be seen much earlier than 2025. This makes it critical that further work to consult on and design a robust, enduring and efficient PFR mechanism is expedited. We consider GHD's PFR-FCAS and the AEC's 'wide-band PFR' proposals have the most merit in this regard. Noting the limited time until the Final Determination, we strongly encourage the AEMC to extend the consultation timeframe so that these proposals can be appropriately considered in collaboration with the TWG.

Regardless of which solution ultimately prevails, we suggest a fixed, three-year review date be set. This is so that learnings from the ongoing implementation of MPFR and any new supplementary mechanism can be judiciously evaluated against ongoing NEM frequency requirements.

We would welcome the opportunity to discuss this submission further with you. Should you have any questions, please contact me via bradley.woods@energyaustralia.com.au or on 0435 435 533.

Regards,

Bradley Woods
Regulatory Affairs Lead