



## Minutes

<b>Meeting Title:</b>	Cost Allocation Review Working Group ( <b>CARWG</b> )
<b>Date:</b>	25 October 2022
<b>Time:</b>	1:00pm – 3:00pm
<b>Location:</b>	Microsoft TEAMS

<b>Attendees</b>	<b>Company</b>	<b>Comment</b>
Dora Guzeleva	Chair	
Sam Lei	Alinta Energy	Proxy for Oscar Carlberg
Daniel Kurz	Summit Southern Cross Power	
Rebecca White	Collgar Wind Farm	
Noel Schubert	Small-Use Consumer Representative	
Mark McKinnon	Western Power	
Justin Ashley	Synergy	Proxy for Jason Froud
Genevieve Teo	Synergy	
Paul Arias	Shell Energy	
Mena Gilchrist	AEMO	
Tom Froud	Bright Energy	
Cameron Parrotte	Woodside	
Grant Draper	Marsden Jacob Associates ( <b>MJA</b> )	Presenter
Peter McKenzie	MJA	Presenter
Hugh Ridgway	AEMO	Presenter
David Scott	AEMO	Presenter
Lisa Laurie	AEMO	Observer
Stephen Eliot	Energy Policy WA ( <b>EPWA</b> )	
Shelley Worthington	EPWA	

<b>Apologies</b>	<b>From</b>	<b>Comment</b>
Jason Froud	Synergy	
Oscar Carlsberg	Alinta	

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1	<p><b>Welcome and Agenda</b></p> <p>The Chair opened the meeting at 1:00pm.</p>	
2	<p><b>Meeting Apologies/Attendance</b></p> <p>The Chair noted the attendance as listed above.</p>	
3	<p><b>Minutes of CARWG Meeting 2022_09_27</b></p> <p>Draft minutes of the CARWG meeting held on 27 September 2022 were distributed in the meeting papers on 19 October 2022.</p>	
4	<p><b>Action Items</b></p> <p>The action items were taken as read.</p>	
5	<p><b>New NEM Causer-Pays Allocation Method for Frequency Regulation</b></p> <p>Ms Guzeleva welcomed the staff members from AEMO who were present to discuss the New National Energy Market (<b>NEM</b>) Causer-Pays Method to allocate Frequency Regulation costs.</p>	
	<p><b>5(a) Explanation of the method</b></p> <p>Mr Scott noted that the Australian Energy Market Commission (<b>AEMC</b>) had approved a change to the NEM Rules to introduce incentive arrangements to replace the existing NEM Causer-Pays Method that:</p> <ul style="list-style-type: none"> <li>• institutes payments for parties that provide good frequency response (primary or secondary response); and</li> <li>• allocates the cost of regulation Frequency Control Ancillary Services (<b>FCAS</b>).</li> </ul> <p>Mr Scott noted that AEMO is developing a procedure to implement the New NEM Causer-Pays Method, which will be a data-driven project, requiring real-time calculation and publication as soon as possible. Mr Scott provided an overview of the Existing Causer-Pays method, noting that it is a cost allocation mechanism for regulation FCAS, which is an Automatic Generation Controlled (<b>AGC</b>) enabled every 5 minutes to correct dispatch and forecast errors.</p> <p>Mr Scott noted that nearly all the large units in the NEM were on AGC, particularly all of the coal and gas units, that some peaking units are not on AGC and are manual or operator controlled, and that there were some aggregated units that were semi ACG.</p> <p>Mr Scott indicated that the Existing NEM Causer-Pays is based on four-second unit deviations from a straight-line dispatch trajectory compared to a central measurement.</p> <p>Mr Scott indicated that a performance indicator is calculated and tells you whether your deviation is good or bad and also how good or bad. Any positives deviations are ignored and the negative deviations are summed by Participant. The total sum of each Participants' factor over the total sum of all Participants results in a percentage, which is multiplied by the requirement cost to equal the settlement amount for each Participant.</p>	

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- Ms Laurie asked whether this was based on SCADA values and if the SCADA values were replaced with any metered values later. Mr Scott answered that they do not use metered values, just one single set of data.
- Mr Lei asked, when measuring good and bad performance, whether that was based on luck and what the grid is doing rather than something that the facility can control. Mr Scott provided examples of how performance could be measured and Mr Ridgway added that the current method is based on AGC and it may be difficult for participants to work out, but the new system will be based on the actual frequency itself and participants will be able to calculate for themselves what performance should be in real-time, based on local frequency.
- Mr Schubert noted that there may be a number of units on AGC and asked if, in any particular interval, there may be only one or two contributing to the requirement. Mr Scott replied that this would be fairly unusual but noted there have been instances where response had concentrated in certain regions, and that the reserve services like FCAS will tend to migrate to the cheapest state where those reserves are available and they may be enabled more because they will be more competitive.

Mr Scott noted that in some circumstances there was high participation by some providers who can provide a lot of FCAS because they have high ramp rates (i.e. batteries). Coal and gas-fired generators would typically have a number of units on and would tend to mimic their bids, spreading them across all of their units, in effect distributing their ramping responsibilities across all of the units. Mr Scott noted that increased provision by some large batteries with extremely high ramp rates meant they can provide regulation FCAS very well, but in doing so will probably push down prices.

Mr Schubert indicated that he was trying to compare the NEM with the system in the Wholesale Energy Market (**WEM**) and that it was his understanding that there are only a few units participating in FCAS in the WEM. Mr Scott noted that, because FCAS is a co-optimized market service, there is not a lot of difference between treatment of regulation FCAS and energy. Mr Scott noted that the market in the NEM is quite a lot deeper than the WEM in terms of the provision of regulation.

Mr Scott explained how the deviations would be calculated in the New NEM Causer-Pays Method noting:

- it will be every four seconds;
- the trajectory is subtracted from the active power measurement; and
- there is a rule that all deviations will balance to allow allocations to the metered population.

Mr Scott noted the performance measure indicates a positive generating unit deviation when aligned with a positive performance measure and that a negative generating unit deviation when aligned with a negative

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performance measure is good. The good performance is when it is aligned with the yellow line, the dark area indicates the good deviations and the lighter area bad. The data is separated for Raise and Lower as those two markets tend to have fundamentally different cost characteristics at any one time, so it was determined to separate the cost allocation and payments associated with those. Mr Scott noted that was probably an improvement overall.

Ms Guzeleva noted that it appeared there would be an incentive for generators second guess what is happening and not match the target in the dispatch instruction and asked if this is a risk or if it is considered to be self-correcting.

Mr Scott noted that AEMO cannot do anything to control output, but most parties would want to operate in the regulation markets and are obligated to comply with their dispatch targets – AGC is the primary arrangement for this. The main reason for mandatory Primary Frequency Response (PFR) in the NEM was because generators were turning off their droop response within a certain hertz dead band, and only providing it beyond that, and AEMO were not controlling frequency within that band because the regulation system was too slow.

The rule change requires all generators to provide PFR at a very tight hertz dead band, so as soon as frequency starts moving outside that band, generators will tend to respond according to the PFR requirements which specify that there must be a certain amount of droop and a certain amount of response within 10 seconds (subject to certain agreed changes by exception). This means there are a lot of units on AGC, a lot of units aiming to provide regulation FCAS by making ramping available, and nearly all of the units are providing droop response, and the intent is that this will provide a stable level of primary and secondary response. If parties start trying to second guess what the requirement is, AEMO would expect that would start to correct itself over time.

- Ms Guzeleva noted that the analysis suggests that, while that is happening, bids in the FCASS will be lowered and asked why that was expected.
- Mr Scott replied that this was because, for units providing regulation FCAS, the AGC system is set up so that they respond reasonably fast and provide a lot of the required response, and they are paid for that response and, because the regulation market is reasonably competitive, we expect them to take account of that in their regulation offers.
- Mr Scott noted that overall the behaviours should be balancing.

Mr Scott noted the current arrangement for calculating contribution factors only allows recovery of FCAS costs, and the new method tries to capture all of the response in the system, including good PFR.

- Ms Guzeleva expressed concern that the existing method is quite complex but that the new method appears to be equally complex, and asked which of the two methods would be simpler to apply. Mr Scott

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replied that the new method is a vast improvement, and under no circumstances should the old method be applied as it was designed. Moving towards calculating more real time factors in each dispatch interval rather than over a 28-day period was an important feature of the new method.

- Ms White asked if it would be more costly to implement the existing or new method. Mr Ridgway indicated that was difficult to say because the new method has not been implemented and will not just deal with cost allocation, but will also create incentives for PFR, which is a value add for the new method.
- Ms Guzeleva asked if the main advantage was that it incentivises the right behavior.

Mr Scott indicated that the rule change is not really about incentivising PFR but about charging the parties that might cause PFR and paying the parties that are providing that PFR. Mr Scott noted the aim is also to try and improve the performance of the secondary response. Left unaddressed, plant which is inherently variable or have poor control would receive a cross subsidy because the units on PFR would be compensating for it.

- Ms White noted there are many facilities in the WEM that do not have AGC, rather they have Automatic Balancing Control (**ABC**), and asked if this would cause an implementation issue (other than those facilities presumably not being able to adjust their behaviour to minimise regulation demand).
- Mr Scott noted those units will probably be on PFR response and could provide primary droop response and can control their output, so they could be paid through this or be indifferent to it.
- Mr Lei asked if it was correct to assume facilities which have a tighter droop dead band would have a better performance factor and hence be paid for their performance.
  - Mr Ridgway responded that you would expect a tighter dead band to improve your performance, but noted there are other factors at play here. For example, how you determine the frequency measure and how accurately you follow that measure.
  - Mr Ridgway noted that another thing to remember is that your factors are not just determined by whether you are providing frequency response, but also how much stress the system is under and a performance metric will calculate your contribution factors. Mr Ridgway added that incentives are more heavily weighted towards periods where frequency may be more strongly deviated from the ideal, where you might have a wider dead band and, by doing more when the system is really under pressure, you would expect to get a much better contribution factor than someone who is just doing a little bit all the time.
  - Mr Scott added that the droop settings and the speed of response would also be important.

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- Mr Schubert noted that most generators in the NEM seem to be controlled on AGC and asked if that is for their normal scheduled MW output, noting that it was his understanding that AGC is only used in the SWIS for frequency control units.
  - Mr Parrotte noted that it was probably a bit of a mix and it was his understanding that everyone will go onto AGC in the new market.
  - Mr Schubert clarified that he was thinking more about real time dispatch and if there is a difference between the WEM and in the NEM, and if this was through AGC settings or through other signals.
  - Mr Scott indicated that he could not speak for the WEM but that the NEM is not dependent on all units being on AGC. If units in the NEM are not on AGC and are manually controlled, and they are not very good at following their targets, then this will cost them, which is a good thing.
  - Mr Schubert agreed, noting he was trying to understand where our methods in the WEM might not be as good.
- Ms White noted some facilities have a substantial SCADA lag and asked if this would cause equity issues in implementing this method (lag in signals to adjust behaviour compared to other facilities with little SCADA lag).
  - Mr Ridgeway noted they were looking at this in the implementation of this project and one partial solution is looking at using local frequency readings to determine a bespoke frequency measure for the unit. Mr Ridgeway noted that AEMO did not know if it will go down that path because it is still subject to consultation and adding a new SCADA channel is not trivial. AEMO will also consider setting an appropriate frequency measure, not just using a raw frequency deviation, that will be a moving average component over, say, 120 seconds so that it is slower and really only substantial frequency deviations that lead to strong factors will be generated.
  - Ms White noted that Collgar has about a 30 second SCADA lag, which is substantial, so even if it spends the money to get AGC, there is a risk that it will contribute to costs if it responds to an old signal.
  - Mr Scott suggested that the impact on financial settlements might not be large because everyone has a bit of a delay, but that was something to be proven through trials.

Mr Scott noted that there is a requirement in the NEM for corrective response, so the size of the frequency deviation does not dictate the cost. A relatively small frequency deviation could cause a large error on the system, which may be hidden because there was lots of droop response available, so ideally you would identify that they are all good performers and would pick this up in the calculation of the requirement for corrective response.

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Mr Schubert noted that encouraging good droop response seems to be a key ideal and asked whether most WEM generators are on 4% droop.

- Ms Guzeleva noted that generator performance standards (**GPS**) will apply in the WEM and that people were working with Western Power to negotiate their compliance. The GPS require certain droop response and that a key objective of the GPS is to incentivise the right behaviour so that customers do not need to buy more regulation through the market.

Ms Guzeleva noted the New NEM Cost-Reflective Method sounds better than the old method in that it will provide better response and asked if it will appropriately target financial incentives at those that can respond to that incentive to behave in a better way.

- Mr Ridgway suggested that it is appropriate for a facility that cannot respond to still wear costs because, if you are looking to invest and build a new facility, then you should be mindful that this is a real cost that this type of facility is going to impose on the system, or vice versa for a facility that responds well to this incentive.
- Ms Guzeleva noted that the New NEM Cost-Reflective Method appears to try to incentivise a positive behaviour from those that can provide it, but does not do much to change intermittent generators' behaviour through the cost allocation mechanism.
- Mr Scott suggested that it will change behaviour because the current arrangements only recover FCAS costs, and the new mechanism will also provide incentives for new investments, which is the other important aspect of this.

Mr Draper noted, with regard to the ability for renewables to provide regulation services, that a wind farm can back off a bit if the spot price is negative because of solar output and then provide regulation raise services when coal may not be operating. If batteries are charging, then wind will be the marginal plant and will need to provide this service, and should be compensated. Mr Draper noted the solar and the duck curve effect fundamentally changes the system and plant can benefit from these payment streams because of the changing nature of how and who is going to be providing these services going forward.

Mr Scott noted the separation between Raise and Lower are not in the current arrangements, and this is important because it provides opportunity to maximize performance against the prevailing dispatch conditions.

Ms Guzeleva queried how the New NEM Causer-Pays Method would sit with GPS, and whether it would mean starting to pay for something that is a compulsory provision under GPS.

- Mr Scott noted that there is not a full mandate to provide PFR in the NEM, it is a mandate to operate with your governor setting in a particular way. Mr Scott noted that it was not really about making a payment to those that are mandated, but about redressing the fact that parties that are currently providing PFR are forced to provide this

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response while others can be operating in a very random way, maximizing their output but causing all sorts of dispatch errors, and those PFR units have to compensate for this.

Ms Guzeleva noted that in the WEM there are dispatch tolerances and that we currently have PFR that is not paid for because it is part of the minimum standard on the system, but people take this into account and would incur penalties if they go outside dispatch tolerance limits.

Mr Scott noted that there was nothing like tolerance limits in the NEM, rather a requirement to comply with dispatch instructions and asked what the value was of a tolerance limit.

- Ms Guzeleva replied that a Participant who repeatedly steps outside these would face the regulator.
- Mr Scott noted that was more of a regulatory solution rather than pricing the deviations at any one time.

Ms Guzeleva noted that it would have been preferable for the New NEM Causer-Pays Method to have already been implemented so that we can find out what behaviour it incentivises, and queried the practicalities of implementation, noting that AEMO would implement this by 2025 while the WEM was moving to a new market in 2023.

Mr Ridgway added that the system is designed to be very flexible, and the frequency measure can be changed if it is not accurately describing which direction you want people to move in.

Mr Scott agreed with Ms Guzeleva and noted that the NEM has a regulated requirement to provide mandatory PFR and found that PFR is not really suitable for the new FCAS market. Therefore, it was determined that it is best to use secondary response bidding arrangements to create a market and that the Causer-Pays arrangements can be extended to compensate for both primary and secondary response. Mr Scott noted there was no intent to replace the mandatory requirement, rather the design was intended to work with that requirement while the AMEC was very keen to remove the requirement.

Ms Guzeleva asked if unmetered generation pick up a proportion of the charges and Mr Scott replied that they did.

Ms Guzeleva thanked Mr Scott and Mr Ridgway for their presentation.

### **5(b) Modelling Results – Application of the Method in WA**

Mr McKenzie indicated that MJA modelled the New NEM Causer-Pays Method based on four-second SCADA data, recreating a sample WEM day for a small sample of plant covering most of the plant types, focussing on the Causer-Pays factors and how these were assigned. Mr McKenzie indicated that there was a slight difference between the actual and modelled generation depending on what plant was generating at the time.

- Mr Lei asked how the performance of wind farms was calculated as they do not receive dispatch target.
  - Mr McKenzie noted dispatch targets were made up for the WEM and provided slide 5 as an example, where for Meriden Solar

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they looked at the generation during the time period and took an average value.

- Ms Guzeleva asked, in the absence of dispatch targets in the WEM dispatch process, did they intend to use forecasts.
  - Mr Ridgway noted they used forecasts in the NEM.
  - Mr McKenzie replied yes that they would be using forecasts and Mr Draper noted that, in that instance, they were likely under forecasting the liability for solar and wind.
- Ms Guzeleva noted that, if this method were to be implemented in the WEM, it would have to use forecast quantities and asked if there is a way to model this to use realistic forecasts to see what the deviation would be, noting that it would be important to get an understanding of the real impact.
- Mr Draper noted that they could develop a forecasting methodology to determine the scale of the liability for intermittent plants, noting that MJA used the average in its modelling due to time constraints.
- Mr McKenzie noted, for the Causer-Pays factor per MW of capacity (after scaling), that the amount of deviation per MW of capacity was similar for solar and wind, which had higher contribution factors. Mr Draper noted that, because no one was below the line, they were all liable but that wind and solar were the greatest payers per MW for the sample day, and then coal and gas plant.

Mr McKenzie noted that, based on the small sample set, the New NEM Causer-Pays Method assigned more costs to demand compared to other methods and that slide 15 showed a breakdown of the percentages by generator type, with wind the biggest contributor for the sample day.

Mr Draper noted demand was getting more than 50% of the contribution factors.

Mr McKenzie noted that the assumptions made with the mean contribution factor resulted in more skewing towards demand than other methods and that this could change as the method is finalized. The process was repeated for five days and Mr McKenzie noted that there was some variation between days.

Mr Draper noted that the greatest variation was for solar, with demand varying substantially as well. Mr McKenzie agreed that solar had the biggest variation, with coal and gas fairly steady, and noted that Open Cycle Gas Turbines (**OCGT**) could change depending on how much is dispatched on an individual day.

Ms White asked how the payments for these facilities would change under the new NEM Causer-Pays Method compared to the Current NEM Causer Pays Method and the current WEM method.

- Mr Draper replied that MJA's comparison across the different methodologies was depicted on slide 17 and Mr McKenzie added that the results were aligned across the methods.

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- Mr Lei noted that the new NEM method shifts the costs to generators from loads currently paying 90% to generators paying ~50% and asked whether this was proportional to the issue they are causing.
- Mr Draper noted that loads are getting more costs because there is not much solar plant on the system, and wind and solar will probably end up being about 50/50 by 2030 as more wind and solar plant enters the system.
- Mr Draper indicated that he believed that there will be similar percentages by about 2030.
- Ms Guzeleva asked, if that was the case, then the key question is – are we actually reducing the overall costs.
- Mr Draper suggested that they needed to determine whether causer-pays pricing results in reduced deviations and reduced regulation requirements (both up and down) leading to a lower overall cost for the system.
- Ms Guzeleva agreed, noting that the cost of implementing a new but more complex method in the WEM had to lead to an overall system benefit that far outweighs that cost.

Mr Draper noted that the WEM requirement for regulation will increase from 110 MW at peak to around 300 MW with the amount of renewables and solar coming onto the system over the next decade.

Ms Guzeleva noted that the costs to move to the New NEM Causer-Pays Method and the impacts of that method on growth in services between now and 2030 needs to be better understood, and that we would be in a better position to understand the overall cost and impact on the system if the NEM had implemented it five years ago.

Mr Draper noted that as part of this exercise, they would have to attempt to determine what the tangible benefits will be in implementing Causer-Pays and that MJA would look at the NEM to try to work out what that would look like without the Causer-Pays methodology and how it would have been different.

- Ms White asked if the NEM method planned to also include the residential loads.
- Mr Ridgway replied that everyone who participates in the market will be impacted by this, as it is aggregated together and treated as a pool. If you are a residential load without four-second metering, then you fall into the residual and you receive a portion of the cost along with everyone else who is not metered. Mr Scott added that was the residual deviation.
- Ms White asked if that was captured in the light blue slot on slide 17.
- Mr Draper replied that demand was captured on slide 15 and that includes all the notional meter customers. On slide 17 demand was removed to focus on generation.
- Ms White asked whether the notional meter still had the netting off affect or is it able to do the sum of the residual for each load.

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	<ul style="list-style-type: none"> <li>• Mr Draper noted that they were just doing an aggregate demand trace, not individual values and Mr McKenzie added that it was just one residual value.</li> <li>• Ms Guzeleva clarified that this was not splitting photovoltaic supply from demand that it looks at the notional meter as a whole.</li> <li>• Mr Schubert noted that the costs and benefits need to be worked out, but that if incentivised, fast acting wind and solar with inverters could help with frequency regulation and, in the future, that would be a cheap source of regulation capacity if they were incentivised to help by operating below their potential output.</li> <li>• Ms Guzeleva noted that in the new market they will be able to provide regulation and that it was a question of how to provide that incentive, by either: <ul style="list-style-type: none"> <li>○ encourage them strongly via pricing or otherwise to participate in the actual market for services; or</li> <li>○ reward them for something that they would do naturally.</li> </ul> </li> </ul>	
7	<p><b>Next Steps</b></p> <p>Next steps were not discussed due to time constraints.</p>	
8	<p><b>General Business</b></p> <p>No general business was discussed.</p> <p>The next CARWG meeting is scheduled for 22 November 2022</p>	

**The meeting closed at 3:00pm.**