



Meeting Agenda

Meeting Title:	Cost Allocation Review Working Group (CARWG)
Meeting Number:	2022_19_25
Date:	Tuesday 25 October 2022
Time:	1:00pm to 3:00pm
Location:	Online, via TEAMS.

Item	Item	Responsibility	Type	Duration
1	Welcome and Agenda	Chair	Noting	2 min
2	Meeting Apologies/Attendance	Chair	Noting	2 min
3	Minutes of Meeting 2022_09_27	Chair	Decision	2 min
4	Action Items	Chair	Noting	5 min
5	New NEM Causer-Pays Allocation Method for Frequency Regulation			
	(a) Explanation of the Method	AEMO	Discussion	60 min
	(b) Modelling Results – Application of the Method in WA	Marsden Jacob	Discussion	45 min
6	Next Steps	Chair	Noting	2 min
7	General Business	Chair	Discussion	2 min
	Next Meeting: 22 November 2022			

Please note this meeting will be recorded.

Competition and Consumer Law Obligations

Members of the Cost Allocation Review Working Group (**Members**) note their obligations under the *Competition and Consumer Act 2010 (CCA)*.

If a Member has a concern regarding the competition law implications of any issue being discussed at any meeting, please bring the matter to the immediate attention of the Chairperson.

Part IV of the CCA (titled "Restrictive Trade Practices") contains several prohibitions (rules) targeting anti-competitive conduct. These include:

- (a) **cartel conduct**: cartel conduct is an arrangement or understanding between competitors to fix prices; restrict the supply or acquisition of goods or services by parties to the arrangement; allocate customers or territories; and or rig bids.
- (b) **concerted practices**: a concerted practice can be conceived of as involving cooperation between competitors which has the purpose, effect or likely effect of substantially lessening competition, in particular, sharing Competitively Sensitive Information with competitors such as future pricing intentions and this end:
 - a concerted practice, according to the ACCC, involves a lower threshold between parties than a contract arrangement or understanding; and accordingly; and
 - a forum like the Cost Allocation Review Working Group is capable being a place where such cooperation could occur.
- (c) **anti-competitive contracts, arrangements understandings**: any contract, arrangement or understanding which has the purpose, effect or likely effect of substantially lessening competition.
- (d) **anti-competitive conduct (market power)**: any conduct by a company with market power which has the purpose, effect or likely effect of substantially lessening competition.
- (e) **collective boycotts**: where a group of competitors agree not to acquire goods or services from, or not to supply goods or services to, a business with whom the group is negotiating, unless the business accepts the terms and conditions offered by the group.

A contravention of the CCA could result in a significant fine (up to \$500,000 for individuals and more than \$10 million for companies). Cartel conduct may also result in criminal sanctions, including gaol terms for individuals.

Sensitive Information means and includes:

- (a) commercially sensitive information belonging to a Member's organisation or business (in this document such bodies are referred to as an Industry Stakeholder); and
- (b) information which, if disclosed, would breach an Industry Stakeholder's obligations of confidence to third parties, be against laws or regulations (including competition laws), would waive legal professional privilege, or cause unreasonable prejudice to the Coordinator of Energy or the State of Western Australia).

Guiding Principle – what not to discuss

In any circumstance in which Industry Stakeholders are or are likely to be in competition with one another a Member must not discuss or exchange with any of the other Members information that is not otherwise in the public domain about commercially sensitive matters, including without limitation the following:

- (a) the rates or prices (including any discounts or rebates) for the goods produced or the services produced by the Industry Stakeholders that are paid by or offered to third parties;
- (b) the confidential details regarding a customer or supplier of an Industry Stakeholder;
- (c) any strategies employed by an Industry Stakeholder to further any business that is or is likely to be in competition with a business of another Industry Stakeholder, (including, without limitation, any strategy related to an Industry Stakeholder's approach to bilateral contracting or bidding in the energy or ancillary/essential system services markets);
- (d) the prices paid or offered to be paid (including any aspects of a transaction) by an Industry Stakeholder to acquire goods or services from third parties; and
- (e) the confidential particulars of a third party supplier of goods or services to an Industry Stakeholder, including any circumstances in which an Industry Stakeholder has refused to or would refuse to acquire goods or services from a third party supplier or class of third party supplier.

Compliance Procedures for Meetings

If any of the matters listed above is raised for discussion, or information is sought to be exchanged in relation to the matter, the relevant Member must object to the matter being discussed. If, despite the objection, discussion of the relevant matter continues, then the relevant Member should advise the Chairperson and cease participation in the meeting/discussion and the relevant events must be recorded in the minutes for the meeting, including the time at which the relevant Member ceased to participate.



Minutes

Meeting Title:	Cost Allocation Review Working Group (CARWG)
Date:	27 September 2022
Time:	1:00pm – 3:00pm
Location:	Microsoft TEAMS

Attendees	Company	Comment
Dora Guzeleva	Chair	
Oscar Carlberg	Alinta Energy	
Daniel Kurz	Summit Southern Cross Power	
Rebecca White	Collgar Wind Farm	
Noel Schubert	Small-Use Consumer Representative	
Mark McKinnon	Western Power	
Jason Froud	Synergy	
Genevieve Teo	Synergy	
Paul Arias	Shell Energy	
Edwin Ong	AEMO	
Cameron Parrotte	Woodside	
Grant Draper	Marsden Jacob Associates (MJA)	
Peter McKenzie	MJA	
Stephen Eliot	Energy Policy WA (EPWA)	
Shelley Worthington	EPWA	

Apologies	From	Comment
Tom Froud	Bright Energy	

Item	Subject	Action
1	Welcome and Agenda The Chair opened the meeting at 1:00pm.	
2	Meeting Apologies/Attendance The Chair noted the attendance as listed above.	

Item	Subject	Action
3	<p>Minutes of CARWG Meeting 2022_08_30</p> <p>Draft minutes of the CARWG meeting held on 30 August 2022 were distributed in the meeting papers on 21 September 2022. The Chair noted Mr Froud was not listed as attending the 30 August 2022 meeting but attended the meeting until 2:00pm. The CARWG accepted the minutes as a true and accurate record of the meeting.</p> <p>Action: CARWG Secretariat to publish the minutes of the 30 August 2022 CARWG meeting on the CARWG web page as final.</p>	<p>CARWG Secretariat (28/09/2022)</p>
4	<p>Action Items</p> <p>The action items were taken as read.</p>	
5	<p>Assessment of Cost Recovery Options</p> <p>Mr Draper restated the objectives and guiding principles for the review and the priority for the assessment of services, and provided a summary of the timeline for the review.</p>	
	<p>5(a) Allocation of Market Fees</p> <p>Mr Draper noted the CARWG had given the assessment of the allocation of Market Fees a high priority.</p> <p>Mr Draper noted that the following methods were reviewed (slide 6):</p> <ul style="list-style-type: none"> • the current Wholesale Electricity Market (WEM) Method; • the current National Energy Market (NEM) Method; • a WEM Hybrid Method; and • Market Customers Only Method. <p>Ms White asked how capacity was defined with regard to Market Participants selling WEM services.</p> <ul style="list-style-type: none"> • Mr Draper replied that it was the maximum sent out capacity of the generators, as recorded in standing data. <p>Ms White noted that, under the proposed WEM Hybrid Method, capacity for Market Generators is based on sent out standing data, which is substantially higher than the Capacity Credit allocation for intermittent generators, but is based on Individual Reserve Capacity Requirement (IRCR) for Market Customers, which has more to do with the peak. Ms White sought clarity on the rationale for the different approaches.</p> <ul style="list-style-type: none"> • Mr Draper replied that the approach for Market Generators is based on the approach in the NEM, and is based on IRCR for Market Customers because there 	

Item	Subject	Action
	<p>is no alternative measure to use. There was no equivalent measure compared to total sent out from generation.</p> <ul style="list-style-type: none"> • Ms White sought to understand the drivers of AEMO's costs, and noted that she could see the logic for using IRCR and for AEMO having to take action to manage the system, but asked why Capacity Credits allocated to Market Generators was not considered as it is the equivalent of IRCR. • Mr Draper noted that sent out capacity better reflects the effort required of AEMO for things like accreditation. • Ms Guzeleva noted that Capacity Credit allocation, certification and compliance are only part of what AEMO does in terms of Market Generators – there is also daily dispatch, system reliability and security in real time, and Generator Performance Standard (GPS). Ms Guzeleva advised that AEMO has confirmed that, Market Generators currently cause the majority of AEMO's efforts, not Market Customers. • Mr Schubert noted that the sent out capacity of intermittent generators causes a lot of AEMO's effort because their output can vary, so sent out capacity is a good indicator of AEMO's effort to manage the variability of intermittence. 	
	<p>Ms White asked how storage is to be treated, would it be levied twice, once under selling and once under buying.</p> <ul style="list-style-type: none"> • Ms Guzeleva noted that there will be no distinction between Market Generators and Market Customers in the future, so to allocate Market Fees, a definition would need to be determined for Market Participants that predominantly withdraw and that predominantly inject. Ms Guzeleva noted that the treatment of storage is a good question because storage will withdraw and inject in almost equal measure. • Ms White agreed with Ms Guzeleva in terms of a hybrid Facility, that they are predominantly a generator and easier to deal with even if they withdraw from the network, whereas the case of a standalone battery was more difficult and she wanted to confirm how it would be treated. • Mr Draper suggested that, to avoid double counting, a battery could be counted as a Market Participant selling energy. • Ms White asked if it would be practical for AEMO to implement this in terms of how they sort the data and given the systems that they have. 	

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	<ul style="list-style-type: none"> Ms Guzeleva noted that the main question is how to properly define a 'Market Participant selling' versus a 'Market Participant buying', which could be on the basis of whether they predominantly inject or withdraw over a period of time. 	
	<p>Ms White asked if there is a way to charge intermittent rooftop distributed energy resource (DER) for their contribution to AEMO workload.</p>	
	<ul style="list-style-type: none"> Ms Guzeleva noted that allocation of Market Fees to withdrawals is proposed to be based on IRCR because rooftop PVs would not generally inject into the network when the IRCRs are measured, so the PV output would not offset consumption at this time, and these consumers will get their full cost allocation. Mr Draper added that IRCR for a residential customer with a rooftop PV is probably the same with or without the rooftop PV, so using IRCR would not allow customers with PV to avoid paying Market Fees. Ms White suggested that consideration needs to be given to the workload created for AEMO to manage low load in the middle of the day from DER and whether that is actually captured. Mr Kurz agreed with Ms White and sought to understand how the majority of AEMO's work is spent dealing with generators. Ms Guzeleva noted that AEMO has indicated that the majority of its effort is focused on generators, not loads. Ms Guzeleva asked CARWG members to provide any evidence about who are the causers of AEMO market services and who are the beneficiaries of these services. Ms Guzeleva suggested that an allocation different from 50/50 could be considered if evidence suggests that there is a different split of AEMO's effort. 	
	<p>Mr Draper presented MJA's analysis of the impact of the four allocation methods on Market Participants (slides 7-11).</p>	
	<p>Mr Draper noted that allocating Market fees is not about market efficiency, it is more about fair and equitable cost recovery that reflects the effort AEMO puts into servicing different types of customers. The recommendation is to use the WEM Hybrid Method because:</p>	
	<ul style="list-style-type: none"> it better reflects the causer-pays methodology; it provides signals to retailers to pass costs to their customers based on IRCR; and it is more equitable in terms of cost reflective prices that are passed through the value chain and captures new technology that will enter the market, such as storage. 	

Item	Subject	Action
	<p>Mr Carlberg indicated that he understood the benefit of the proposed changes on the market customer side, but the benefits were not as clear on generator side. Mr Carlberg noted that he sees merit in the WEM Hybrid Method, but it may add costs and complexity for both market participants and AEMO, so he leans toward allocating costs on the basis of the current method.</p>	
	<p>Mr Eliot asked CARWG members to provide any advice on what their costs would be to implement the WEM Hybrid Method.</p>	
	<p>Mr Draper noted that the proportion proposed for the WEM Hybrid Method could change over time.</p>	
	<p>Mr Draper asked Ms Gilchrist whether AEMO saw any major concerns with the WEM Hybrid Method, such as data availability or cost.</p>	
	<ul style="list-style-type: none"> ○ Ms Gilchrist replied that AEMO did not have any significant concerns, as long as it has the inputs, but noted that the devil is in the detail. 	
	<p>Ms Guzeleva noted that the simplest and lowest cost option is to make no changes to how Market Fees are currently allocated because everybody can pass Market Fees to their customers through their contracts/PPAs. Ms Guzeleva noted that objective is to achieve an equitable and fair construct for allocating Market Fees.</p>	
	<p>Mr Kurz noted that the whole reason to generate is to meet load, so the causer-pays and beneficiary-pays principles suggest the Customer Only Method, but the WEM Hybrid Method is the next best option because it reflects the changing nature of the system.</p>	
	<ul style="list-style-type: none"> ● Ms Guzeleva questioned the view of some CARWG members that all benefits go to consumers and that generators are not beneficiaries given that they are in the market to make profits. 	
	<p>Mr Draper noted that uncontracted peakers, such as Tesla and Merredin, would not be able to pass on costs to customers. Ms Guzeleva acknowledged that these facilities are not charged under the current arrangements and should be consulted on how any changes would affect them.</p>	
	<p>Mr Schubert noted that Market Fees are a fairly small component of total charges and that the WEM Hybrid Method seems to be the best option.</p>	
	<p>Mr Arias sought to clarify whether Market Fees would be included in reserve capacity pricing moving forward.</p>	
	<p>Mr Draper indicated that this could be considered.</p>	

Item	Subject	Action
	Mr Arias indicated that he does not support the WEM Hybrid Method.	
	Ms White suggested that it would be useful to understand what drives AEMO costs, by category, and what it would cost for AEMO to implement the WEM Hybrid Method.	
	Ms Guzeleva questioned the effort to get a breakdown of the historic causes of AEMO's costs because these are likely to shift over time.	
	Ms Guzeleva questioned the need to change the method to allocate Market Fees if specific benefits from the changes cannot be quantified. Mr Carlberg and Ms White agreed.	
	Action: CARWG Members are to provide evidence about who are the causers and beneficiaries of AEMO market services.	CARWG Members (14/10/2022)
	Action: AEMO is to consider what information can be provided to assist the CARWG in understanding the current breakdown of its expenses by market segment.	CARWG Members (14/10/2022)
	Action: CARWG Members are to provide estimates of the costs for Market Participants to implement the WEM Hybrid Method, including any contracting costs.	CARWG Members (14/10/2022)
	Action: AEMO is to provide a broad estimate of its costs to implement the WEM Hybrid Method.	AEMO (14/10/2022)
	5(b) Allocation of Frequency Regulation Costs	
	Mr Draper noted that the MAC supported assessment of current NEM Causer-Pays Method and the Tolerance Method. Mr Draper presented MJA's analysis of the impact of these methods in the WEM (slides 15-17) and showed how these methods would provide incentives for participants to forecast more accurately and reduce their variability (e.g. for intermittent generators to install batteries) and that there was some efficiency benefits associated with the two approaches.	
	Mr Draper noted the NEM Causer-Pays Method is highly complex, so there may be significant costs to implement this in the WEM. However, the AEMC has approved a rule change to simplify the NEM Causer-Pays Method and AEMO gave a presentation to MJA and EPWA on how this rule change will be implemented in the NEM.	
	Mr Draper noted that:	
	<ul style="list-style-type: none"> • under the New NEM Causer-Pays Method, payments will be provided to participants that make a positive contribution to frequency control; and • the new method is more straightforward than the current method. 	

Item	Subject	Action
	<p>Mr Draper indicated that MJA is modelling the impact of applying the New NEM Causer-Pays Method in the WEM to determine what incentives it provides, who the beneficiaries are and who is likely to be liable for the charges; and will provide that information to CARWG.</p> <p>Mr Draper noted the recommendation was to adopt the New NEM Causer-Pays Method to allocate frequency regulation costs, subject to results of the MJA analysis.</p>	
	<ul style="list-style-type: none"> • Ms Gilchrist advised that AEMO is in the final stages of determining how to implement the New NEM Causer-Pays Method in the NEM and noted that the exact same method did not need to be implemented in the WEM. • Ms White asked what the driver was for the new method, noting that she understood that it is simpler, but that this comes as a trade-off against the incentives to change behaviour or to accurately levy costs on those causing the need for regulation. <ul style="list-style-type: none"> ○ Ms Gilchrist replied that there is a lot of information about this on AEMO's website and that the method would improve the responsiveness for Market Participants. ○ Mr Draper noted that the new method will apply at a-Facility level, which is consistent with where we are going in the WEM. • Ms White agreed that a simpler method is better, as long as it achieves the objectives, but that she does not yet have enough information to support the New Causer-Pays Method. Mr Carlberg agreed that it seems like a good approach but that he needs more information. <ul style="list-style-type: none"> ○ Mr Draper indicated that MJA would arrange for an overview of the New Causers-Pays Method as well as provide results of its analysis of the impact of the method in the WEM. • Following a question from Ms White, Ms Guzeleva clarified that the Current WEM Method, the NEM Causer-Pays Method, and the New NEM Causer-Pays Method all calculate allocations on a Facility basis and that there is no proposal to change this. • Mr Schubert noted that a good feature of the New NEM Causer-Pays Method is that it rewards those who help avoid the need for frequency regulation. 	

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	<ul style="list-style-type: none"> • Mr Carlberg asked for an example on how a generator would help avoid the frequency regulation costs and get paid under this new method. <ul style="list-style-type: none"> ○ Mr McKenzie indicated that the approach considers deviations above and below the frequency target – if you generate more than your target, then you are contributing to a higher frequency, and you would get a payment if you do this when frequency is low. ○ Mr Schubert noted that batteries or generators that have a lower droop setting will respond more quickly to frequency deviations and could automatically help flatten frequency deviations, and this proposal will provide a good incentive for this to happen. • Ms Guzeleva asked CARWG members to propose alternatives if they find the proposed New NEM Causer-Pays Method to be unacceptable. One of the recommendations in AEMO’s State of the System report was that a stronger signal is needed to incentivize behaviour that minimizes the cost of frequency regulation. • Mr Parrotte noted that he expects more storage on the system in the future and that storage may be paired with renewable generators, so where a renewable generator decreases or increases frequency and the remote battery does the reverse, there is no net impact on the system, but the current method would sting them both. <ul style="list-style-type: none"> ○ Mr Draper noted that this is because the two Facilities are not treated as a single Facility. ○ Ms Guzeleva noted that scheduled Facilities are expected to operate within tolerance limits and it would be unacceptable for a storage Facility to unilaterally correct frequency deviations of an associated Facility – it would be a fundamental change to the concept of the WEM to allow Market Participants to self-manage frequency deviations within a portfolio. Mr Parrotte agreed, and indicated that this is not an issue to be addressed now, but may need to be considered later. • Ms White asked if there was a risk that many generators respond and overshoot, causing more problems. <ul style="list-style-type: none"> ○ Mr Schubert replied yes, and that this has to be managed by appropriate control settings. 	

Item	Subject	Action
	<ul style="list-style-type: none"> ○ Mr Parrotte noted that this is a risk, but if a generator does overshoot, then it would be penalised because it is no longer helping, which will encourage the right level of response. ○ Ms Guzeleva indicated that there should be a reward for setting market-friendly control settings, but a line needs to be drawn so that facilities do not deviate too far from their schedule, or they may find themselves in front of the regulator. ○ Mr Draper noted this may be self-correcting because a generator will be penalised if it does this too often and overshoots. ● Ms White indicated that she understands the concept of generators responding without being dispatched for regulation, but wanted to understand how AEMO then knows that a generator did this and then quantifies the payment. Ms White asked for this to be covered when the further information is provided. Ms Guzeleva agreed with this concern. ● Mr Schubert expressed the view that, as generation variability increases, there will be a need for more responses from generation, not just relying on a few generators and Automatic Generation Control (AGC) to manage frequency. ● Ms Guzeleva and Mr Draper asked if the CARWG agreed to recommend consulting on adopting the proposed New NEM Causer-Pays Method, which is simpler and potentially more transparent, subject to the analysis being conducted on the efficiency benefits and impact of the method on Market Participants. Mr Schubert, Mr Froud and Mr Kurz supported the recommendation. 	
	<p>Action: EPWA and AEMO to arrange for further information to be provided to the CARWG on the New NEM Causer-Pays Method to allocate Frequency Regulation costs.</p>	<p>EPWA and AEMO (25/10/2022)</p>
	<p>Action: EPWA and MJA to provide the CARWG with the results of the analysis of the impact of implementing the New Causer-Pays Method to allocate Frequency Regulations costs in the WEM.</p>	<p>EPWA and MJA (25/10/2022)</p>
<p>5(c)</p>	<p>Allocation of Contingency Reserve Raise Costs</p> <p>Mr Draper noted that concerns have been raised that the runway method could attribute too much Contingency Reserve Raise costs to a Facility with multiple generators and multiple connection points because it is unlikely that the</p>	

Item	Subject	Action
	<p>whole Facility would be down at one time, rather it was more likely for an individual unit or connection to be down.</p> <p>Mr Draper noted Collgar Wind Farm as an example – Collgar is not registered as an Aggregated Facility but it has two connections – and suggested that it may be more appropriate for each of Collgar’s units to pay for Contingency Reserve Raise, not the aggregate of the Facility.</p> <p>Mr Draper indicated that further analysis would be done to understand these examples so that application of the runway method does not over-recover costs for an extremely unlikely event, such as a whole power station tripping.</p> <ul style="list-style-type: none"> • Ms White asked if the definition of 'generating unit/system' is appropriate. • Ms Guzeleva noted that it is not consistent with the causer-pays principle to apply the runway method to the whole Facility if the facility is only partially affected if one of the connections fails. • Ms Guzeleva noted that the issue is what is the risk to the system of a facility has more than one connection and how the site is configured. The current rules treat such a Facility as one unit under the runway method. • Mr Schubert and Mr Draper suggested that the question is what is the Credible Contingency – the whole Facility or a particular unit. Ms Guzeleva noted that this depends on how that Facility is connected to the system. • Mr Parrotte noted that Contingency Reserve Raise is there to address the loss of generation output and agreed with what was being discussed, but that there will be challenges in writing the WEM Rules to address the practical reality. Mr Parrotte noted that the intent is to set charges for the amount of generation that may be lost for a single contingency, which has nothing to do with dispatchability. • Ms Guzeleva noted that the WEM Rules will need to be changed to make sure that the risk is properly measured by AEMO and not assume that each Facility has a single mode of failure. • Mr Eliot asked whether the issue applies to Facilities that are not 'Aggregated Facilities' under the definition in the rules , noting that Collgar is not registered as an Aggregated Facility but can be operated as two separate plants. Mr Eliot noted that he did not believe 	

Item	Subject	Action
	<p>resolving this could be tied to the definition of Aggregated Facilities.</p> <ul style="list-style-type: none"> ○ Ms White noted that the issue is about Facility configuration and that Collgar is structured such that it can operate as two totally separate wind farms. Providing an incentive for Facilities to configure in this way will mitigate the need for Contingency Reserve Raise. ○ Mr Eliot agreed that this would provide the right signal but noted that this may make rule drafting challenging. ● Ms Guzeleva noted that, based on the causer-pays principle, we should not penalise Facilities just because they happen to be on the same site or are aggregated by AEMO, if their mode of failure does not mean that the whole Facility is out, as their connections can operate independently. ● Mr Draper asked Ms White whether Collgar had one or two connection points. Ms White confirmed that Collgar has two connection points. <ul style="list-style-type: none"> ○ Mr Draper noted that, in that case, Collgar would not have an aspect of a connection failure either, but would be hit for the whole Facility under the runway method rules that are coming into force on 1 October 2023. ● Mr Parrotte noted that the runway method should ideally be based on the generation output that would be lost for a single contingency. Whether that can be done in the rules effectively/efficiently is what needs to be determined. 	

5(d) Contingency Reserve Lower Costs

Mr Draper noted that:

- large battery electricity storage systems (**BESS**) may enter the market soon – batteries up to 250 MW are being considered – which would more than double the largest credible load rejection contingency;
 - large batteries would only get a minor share of Contingency Reserve Lower costs under the current allocation methodology; and
 - MJA is developing a runway method to address this issue, and provided an example (slide 26).
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Mr Draper asked if the CARWG supported exploring allocating Contingency Reserve Lower costs using a runway approach, noting that:

- allocation could not go down to the smallest load because of the lack of interval metering, so it would likely only apply for Facilities 120 MW and up; and
- there will be challenges to managing issues around the thresholds for any tranches used in the runway method.

Mr Draper asked for feedback from the CARWG.

- Mr Carlberg noted that a runway method seems to make sense but asked whether big Non-Dispatchable Loads present the same risk of requiring load rejection service as smaller Loads.
 - Ms Guzeleva noted that:
 - it is very unlikely that several Non-Dispatchable Loads will be simultaneously impacted by the same issue, it is more likely to be a network issue, in which case the Contingency Reserve Lower costs should be allocated to the network provider rather than the individual Loads; and
 - it is not consistent with the causer-pays principle to send a cost signal to the smaller Loads that have suffered an outage because of a network component.
 - Mr Draper suggested using the existing allocation method for Loads up to 120 MW focusing the runway method on larger Loads.
 - Ms White noted that the runway method for Contingency Reserve Raise includes networks, so it would be consistent to do the same for Contingency Reserve Lower.
 - Ms Guzeleva noted that networks are allocated Rate of Change of Frequency (**RoCoF**) services costs, not Contingency Reserve Raise.
 - Ms White agreed that the runway method for Contingency Reserve Raise allocates costs for network contingencies to the generators on that part of the network, but noted that it could be argued that networks should pay these costs.
 - Ms White noted that the runway method was not previously implemented for Contingency Reserve Lower because of the complexity and cost associated with it, but she can see merit in the method if the tranche approach can achieve some of the benefits of the method without the complexity.
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Item	Subject	Action
	<ul style="list-style-type: none"> • Ms Guzeleva noted that it would be important to make sure that the cutoff is appropriately placed (e.g. the 120 MW) and that interval metering would be required for this to properly work. • Ms White asked whether small Loads are essentially netted off in the Notional Wholesale Meter, and noted that she believed there was previous consideration of Loads behind TNIs or substations but there was not appropriate metering. <p>Ms Guzeleva asked if the CARWG supported exploring the application of the runway method.</p> <ul style="list-style-type: none"> • Mr Parrotte noted that: <ul style="list-style-type: none"> ○ networks are subject to the technical rules, so it would be rare that they cause big contingencies; ○ the intent appears to be to pick a level below which you do not need to worry any more, and 120 MW seems reasonable; ○ bigger Loads and BESS will be operating in the future and should have SCADA; and ○ Woodside is conscious of this and is trying to design its plant not just from a reliability perspective, but also in consideration of the impact that it can have on the power system. <p>Mr Parrotte noted a line had to be drawn somewhere and agreed with Mr Eliot, that bands above that line could drive perverse behaviour, and suggested that a reasonable compromise may be to require any Load or BESS above 120 MW to have SCADA – then you can do a full runway approach above that point.</p>	
7	<p>Next Steps</p> <p>A summary of the outcomes of this CARWG meeting will be provided at the MAC meeting on 11 October 2022, which will feed into the Consultation Paper to be published in December 2022.</p> <p>MJA’s literature review will be published along with the Consultation Paper.</p>	
8	<p>General Business</p> <p>No general business was discussed.</p> <p>The next CARWG meeting is scheduled for 22 November 2022 (pending a meeting for AEMO and MJA to present to the CARWG on the New NEM Causer Pays Method for Frequency Regulation costs).</p>	

The meeting closed at 3:00pm.

Agenda Item 4: CARWG Action Items

Cost Allocation Review Working Group (**CARWG**) Meeting 2022_09_27

Shaded	Shaded action items are actions that have been completed since the last MAC meeting.
Unshaded	Unshaded action items are still being progressed.
Missing	Action items missing in sequence have been completed from previous meetings and subsequently removed from log.

Item	Action	Responsibility	Meeting Arising	Status
6	CARWG Secretariat to publish the minutes of the 30 August 2022 CARWG meeting on the CARWG web page as final.	CAR Secretariat	2022_09_27	Closed The minutes were published on the Coordinator's Website on 28/09/2022.
7	CARWG Members are to provide evidence about who are the causers and beneficiaries of AEMO market services.	CARWG Members	2022_09_27	Closed The CARWG Secretariat did not receive any responses to this action item.
8	AEMO is to consider what information can be provided to assist the CARWG in understanding the current breakdown of its expenses by market segment.	AEMO	2022_09_27	Open AEMO has advised that it is still considering what information it can provide on this action item.
9	CARWG Members are to provide estimates of the costs for Market Participants to implement the WEM Hybrid Method, including any contracting costs.	CARWG Members	2022_09_27	Closed The CARWG Secretariat received one confidential response on this action item.

Item	Action	Responsibility	Meeting Arising	Status
10	AEMO is to provide a broad estimate of its costs to implement the WEM Hybrid Method.	AEMO	2022_09_27	Open AEMO has advised that it will provide a cost estimate at the same time that it provides estimates to implement the other changes proposed under the Cost Allocation Review, once details of the proposals become clearer.
11	EPWA and AEMO to arrange for further information to be provided to the CARWG on the New NEM Causer-Pays Method to allocate Frequency Regulation costs.	EPWA and AEMO	2022_09_27	Closed This information will be presented at the CARWG meeting on 24/10/2022 – see agenda item 5(a).
12	EPWA and MJA to provide the CARWG with the results of the analysis of the impact of implementing the New Causer-Pays Method to allocate Frequency Regulations costs in the WEM.	EPWA and MJA	2022_09_27	Closed This information will be presented at the CARWG meeting on 24/10/2022 – see agenda item 5(b).



101 on new Causer Pays for PFR Incentives amending rule

The following has been prepared to assist stakeholders to understanding the amending rule.

Deployment is subject to change, and further consultation, so please understand this is no more than the author's current way of looking at the proposals



What we'll cover

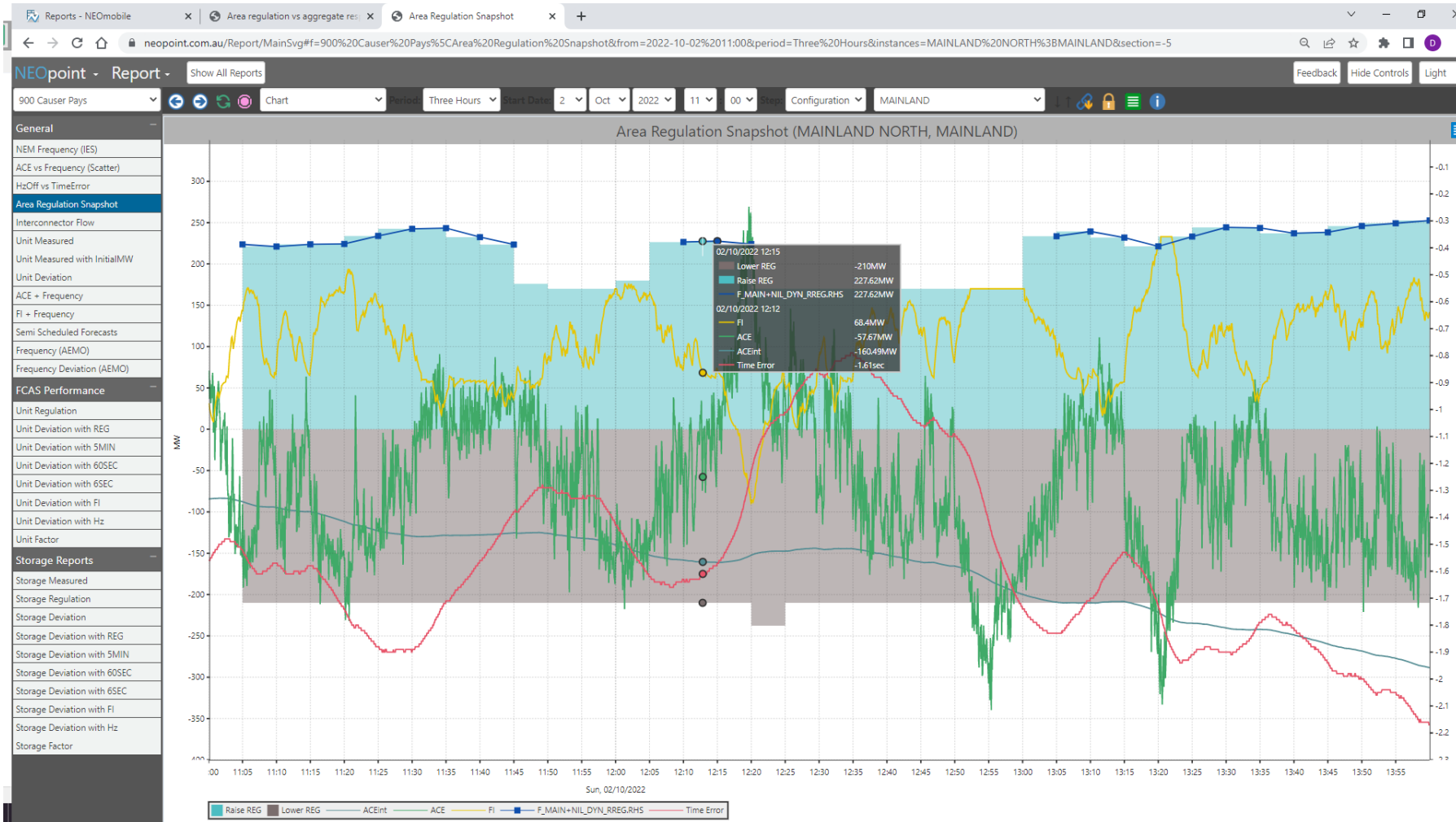
1. Quick recap on existing Causer Pays
2. Amended Causer Pays – introduction
3. Calculation of Contribution Factors
4. Calculation of Trading Amounts



Existing Causer Pays



Regulation FCAS

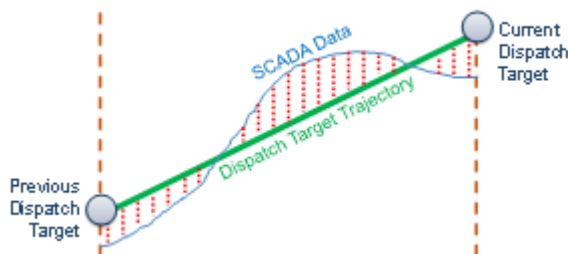


What is the existing Causer Pays system?

Causer Pays is presently a cost allocation method for Reg FCAS costs, based on how 4-second unit deviations from a straight-line dispatch trajectory compares to a central measurement.

It is much complicated by use of:

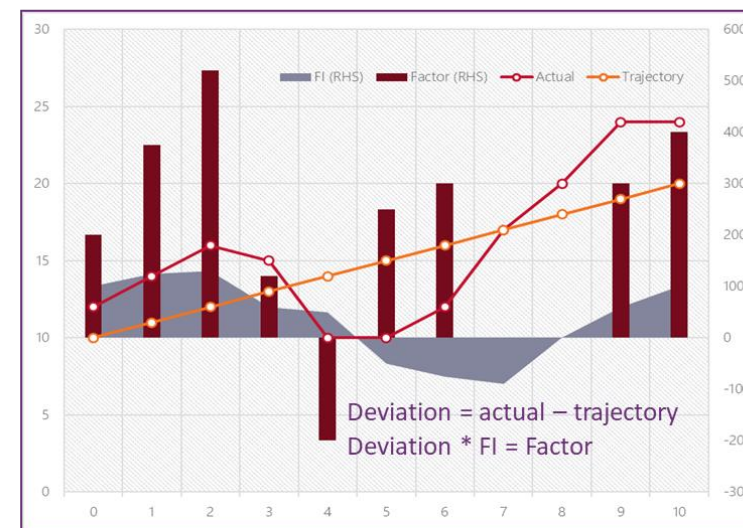
- a 28-day sample period, calculation of regional residual deviation, complex portfolio/registration class netting and aggregation rules.



Regulation FCAS \$ cost

Buy Reg-FCAS by constraints in dispatch e.g. $RaiseReg \geq QtyMW$, with MV of \$/MWh, so cost is $MV * Qty = Requirement Cost$

4-sec factor calculations



MPF calculations

Sum 4-sec factors, over sample period (28 days), then ignore positives (good performance) and sum by participant.

$$\text{Participant Factor} / \sum \text{Factors} = \text{MPF or \%}$$

Settlement

$$\text{MPF} * \text{Requirement Cost} = \text{Settlement amount}$$

Existing Causer Pays



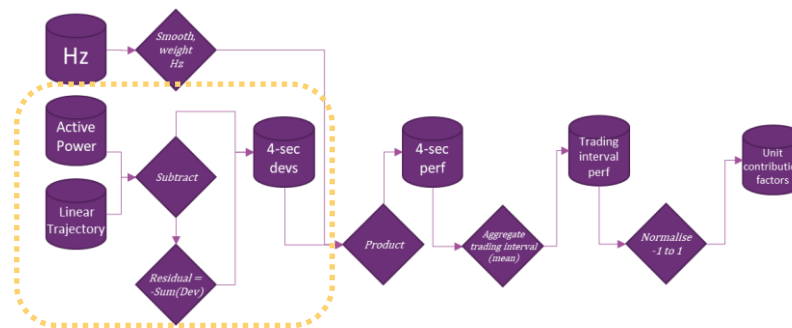
Trading amount = meanCF x Req Cost



Amended Causer Pays

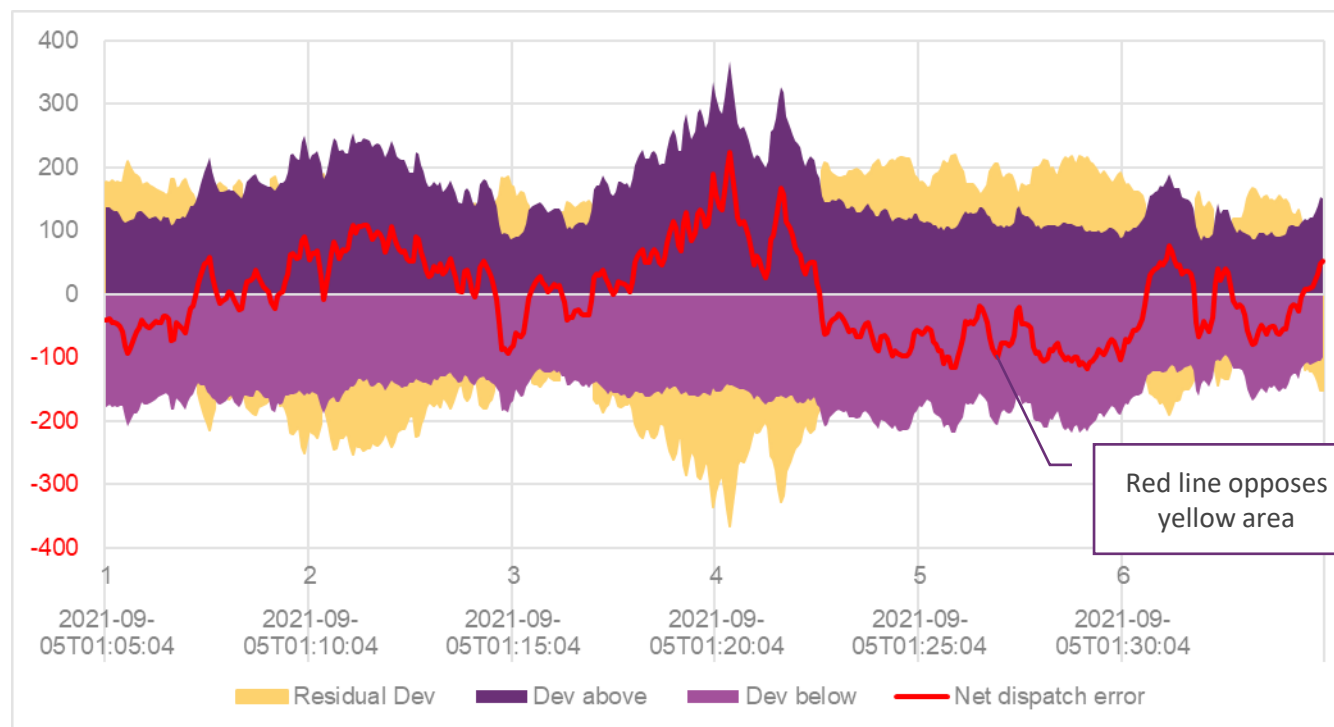


Calculating 4-sec deviations

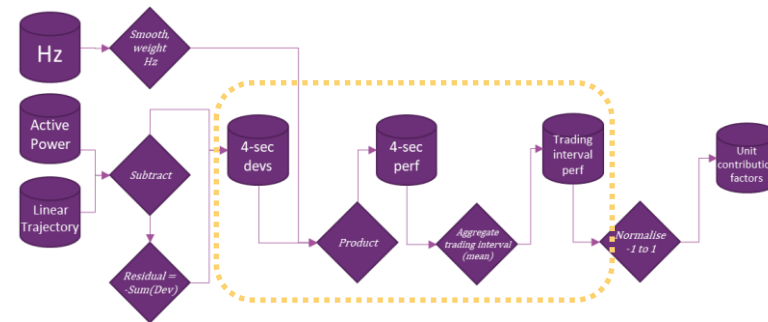


Basic rules:

- Deviations calculated every 4-seconds
- Subtract trajectory from active power
- All deviations balance
- Therefore residual deviation:
 - Sum all deviations for metered elements, multiply by -1,
 - Provides deviation for unmetered elements
- From therein, residual deviation is treated the same as any other metered element.



Calculate, categorise and aggregate 4-sec performance



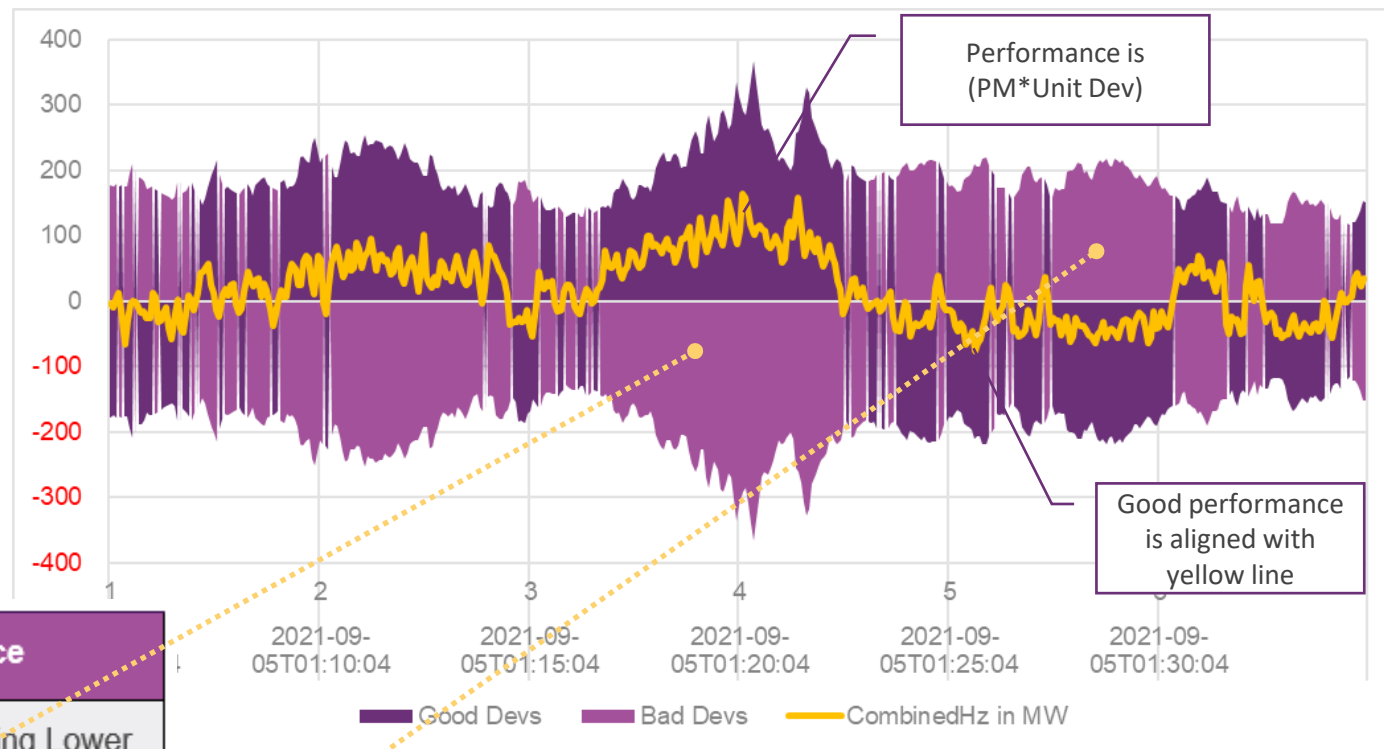
4-sec performance measure is deliberately modified to be the **inverse** of the frequency deviation:

- A positive generating unit deviation when aligned with a positive PM, and a negative generating unit deviation when aligned with a negative PM are good.
- For loads this does not hold true and therefore the negative of the unit deviation is used.

Means, performance is in MW*HzDev where positive is good and negative is bad.

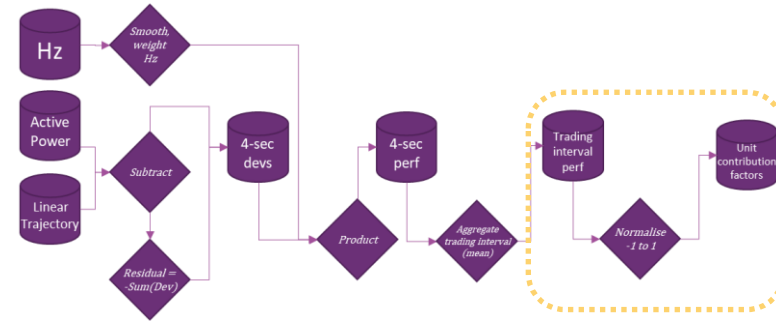
Data is then “flagged” for Raise or Lower as below:

		Relevant FCAS service	
		Regulating Raise	Regulating Lower
4-second performance measure	Positive	Applicable	Not applicable
	Negative	Not applicable	Applicable



Performance is then aggregated to *mean* performance over the trading interval

Calculate contribution factors



Where practical Contribution Factors (CFs) must be calculated each trading interval, and separately for services raise and lower.

CFs are a number between -1 to 1, and sum to 0.

This is unlike current approach, where CFs are calculated in advance, and then “sliced and diced” in settlements for local FCAS requirements.

Trading Interval is $\text{mean}(\text{MW} * \text{HzDev})$ for the Eligible Unit

CF is this as a share of the total:

$$\text{CF} = \text{mean}(\text{MW} * \text{HzDev}) / \sum(\text{mean}(\text{MW} * \text{HzDev}))$$

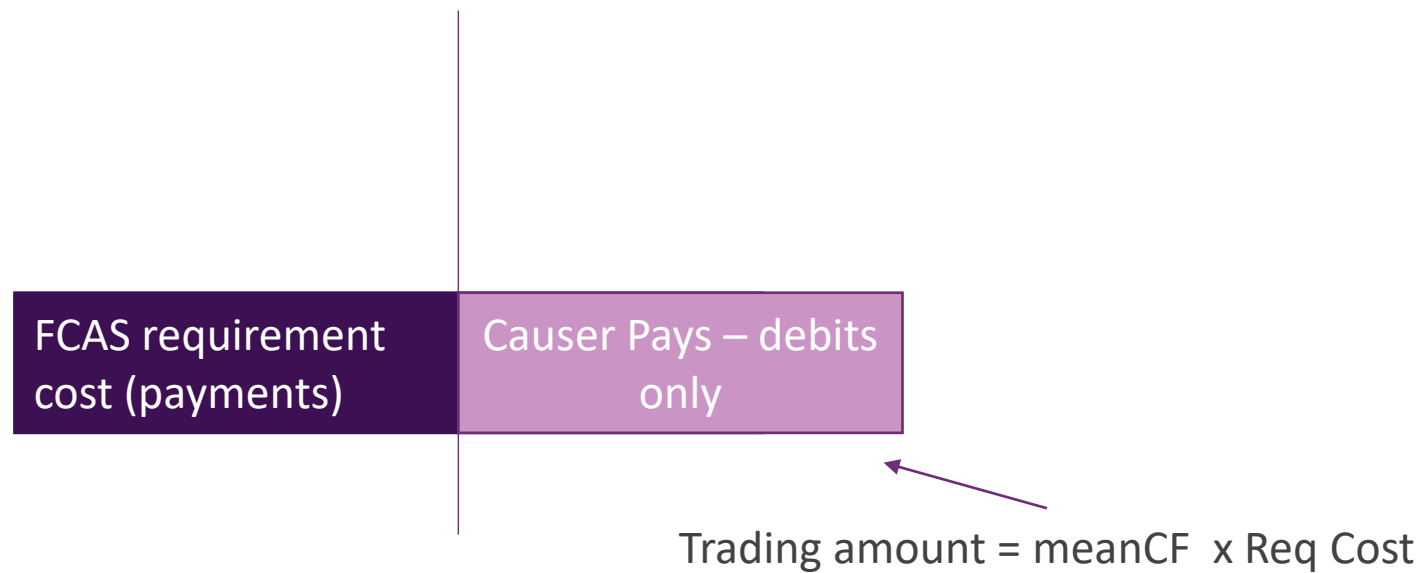
As stated in previous slide data has been flagged, according to PM for Raise or Lower (grey/yellow)



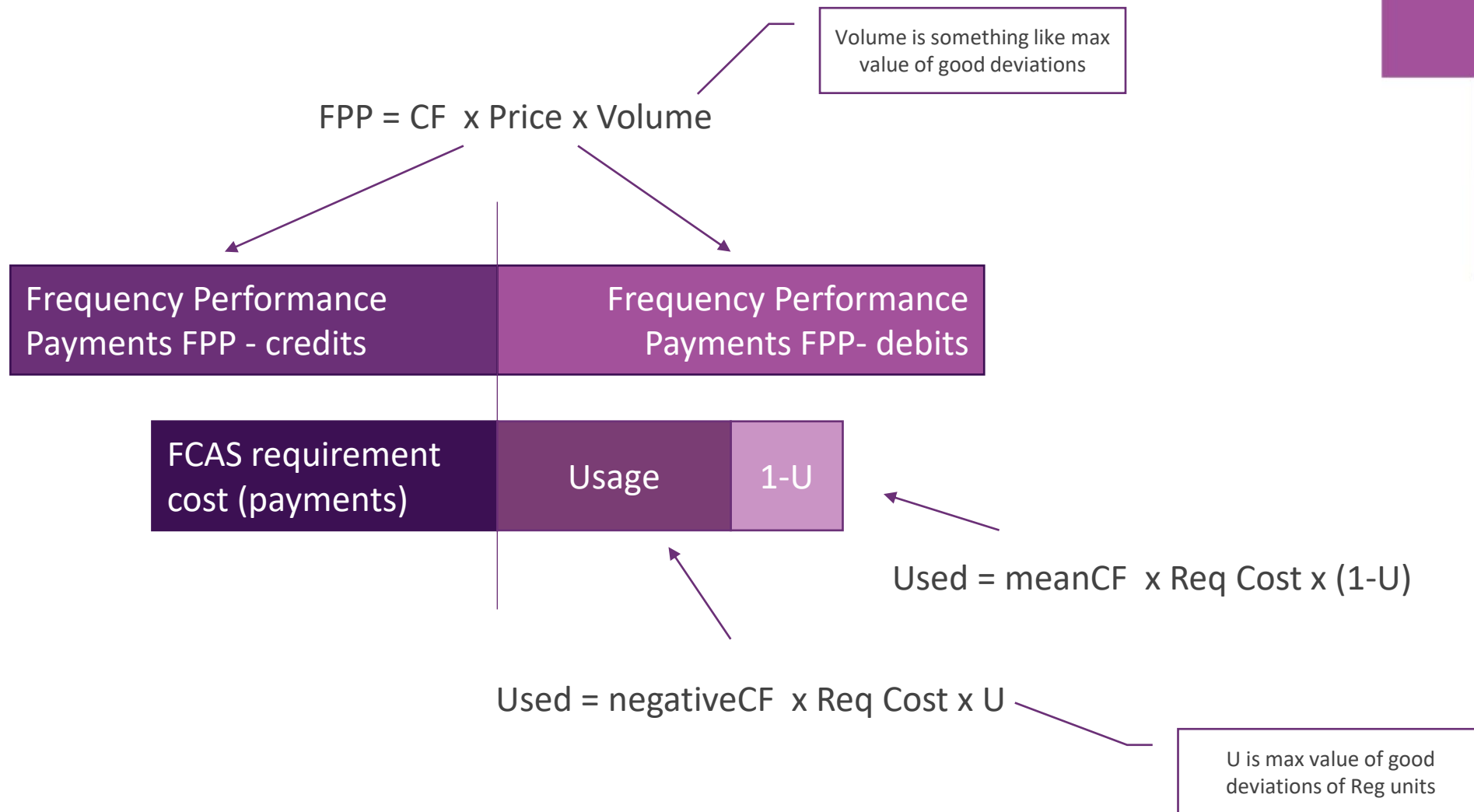
Trading Amounts



Existing Causer Pays



New Causer Pays





For more information visit

aemo.com.au

Agenda Item 5(b)



Government of Western Australia
Energy Policy WA

Using the New NEM Causer-Pays Method for Allocating Regulation Cost in the WEM

Presentation to Cost Allocation Review Working Group (CARWG)

25 October 2022

Grant Draper / Peter McKenzie
Marsden Jacob Associates

Working together for a
brighter energy future.

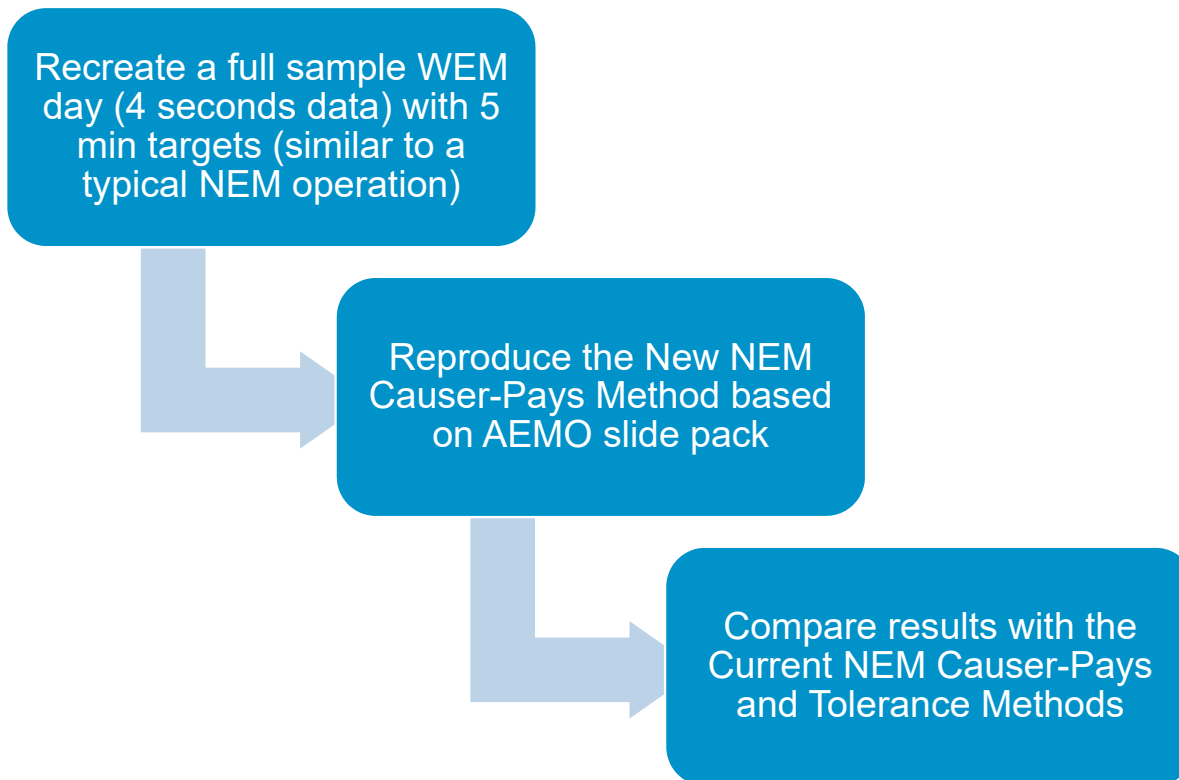
Frequency Regulation Cost Allocation

At its meeting on 27 September 2022, the CARWG:

- considered two methods to allocate Frequency Regulation costs in the WEM:
 - the Current NEM Causer Pays Method
 - a new Tolerance Method
- noted that the AEMC has approved a New NEM Causer-Pays Method and that AEMO is currently implementing this method
- Agreed to two related action items:
 1. EPWA and AEMO to arrange for further information to be provided to the CARWG on the New NEM Causer-Pays Method to allocate Frequency Regulation costs in the WEM (agenda item 5(a))
 2. EPWA and Marsden Jacob to provide the CARWG with the results of the analysis of the impact of implementing the New Causer-Pays Method to allocate Frequency Regulations costs in the WEM (this presentation)

The MAC noted the CARWG's progress at its meeting on 11 October 2022 and agreed that the New NEM Causer-Pays Method should be considered further

Estimating WEM Impacts of the New NEM Causer-Pays Method



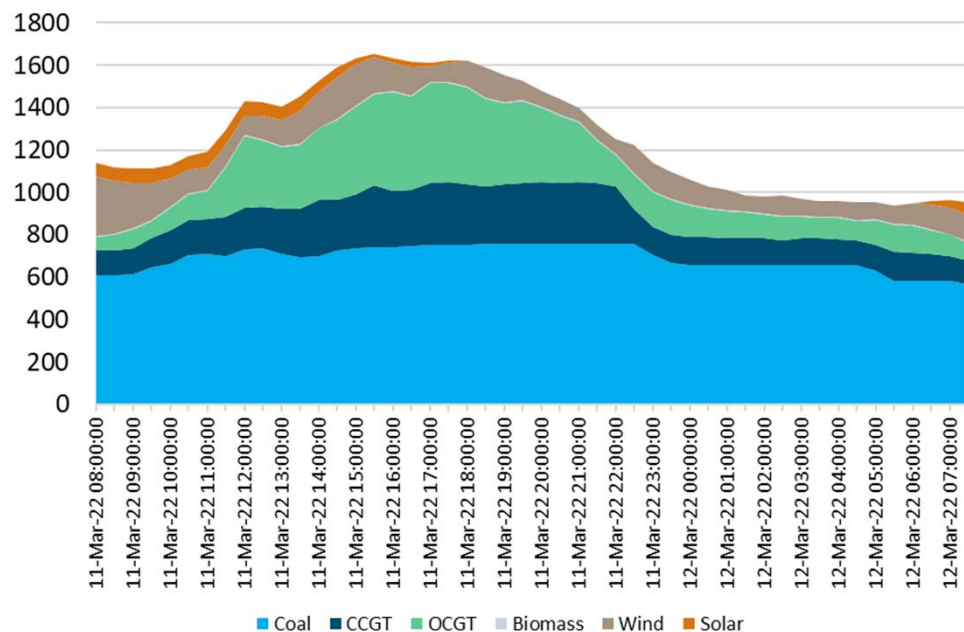
Estimating WEM Causer Pays – Creating a Sample Day

Scaling 4-Second SCADA Data

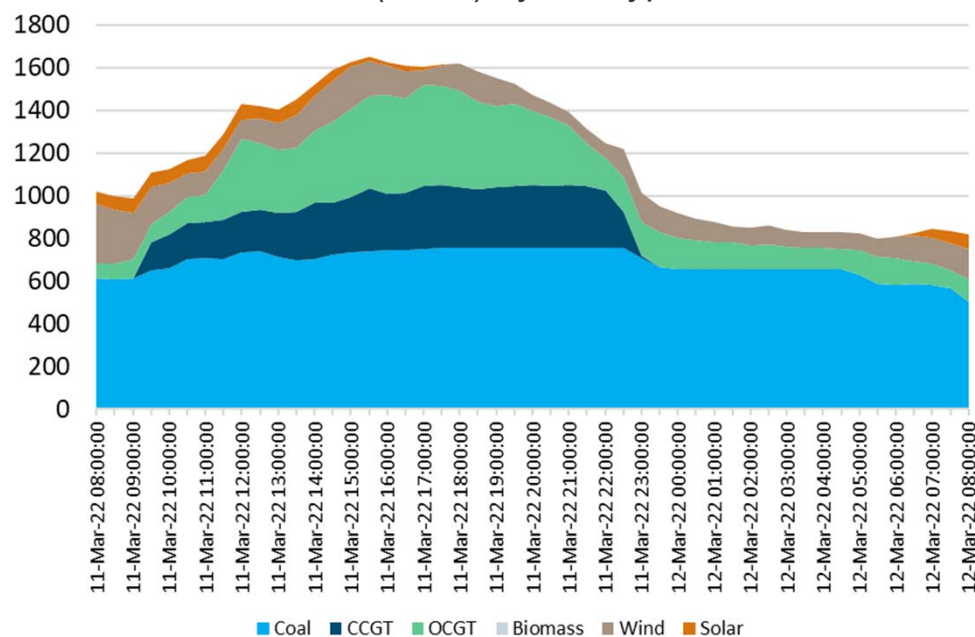
Using the 4 second data from the plants below and selective scaling, an entire day of generation was recreated with 4 second data. Includes the following plant:

ALBANY_WF1, GREENOUGH_RIVER_PV1, MUJA_G7, COLLIE_G1, TIWEST_COG1, COCKBURN_CCG1, WARRADARGE_WF1, MERSOLAR_PV1, COLLGAR_WF1

Actual Generation (MWh) by fuel type 12/03/2022



Modelled Generation (MWh) by fuel type 12/03/2022



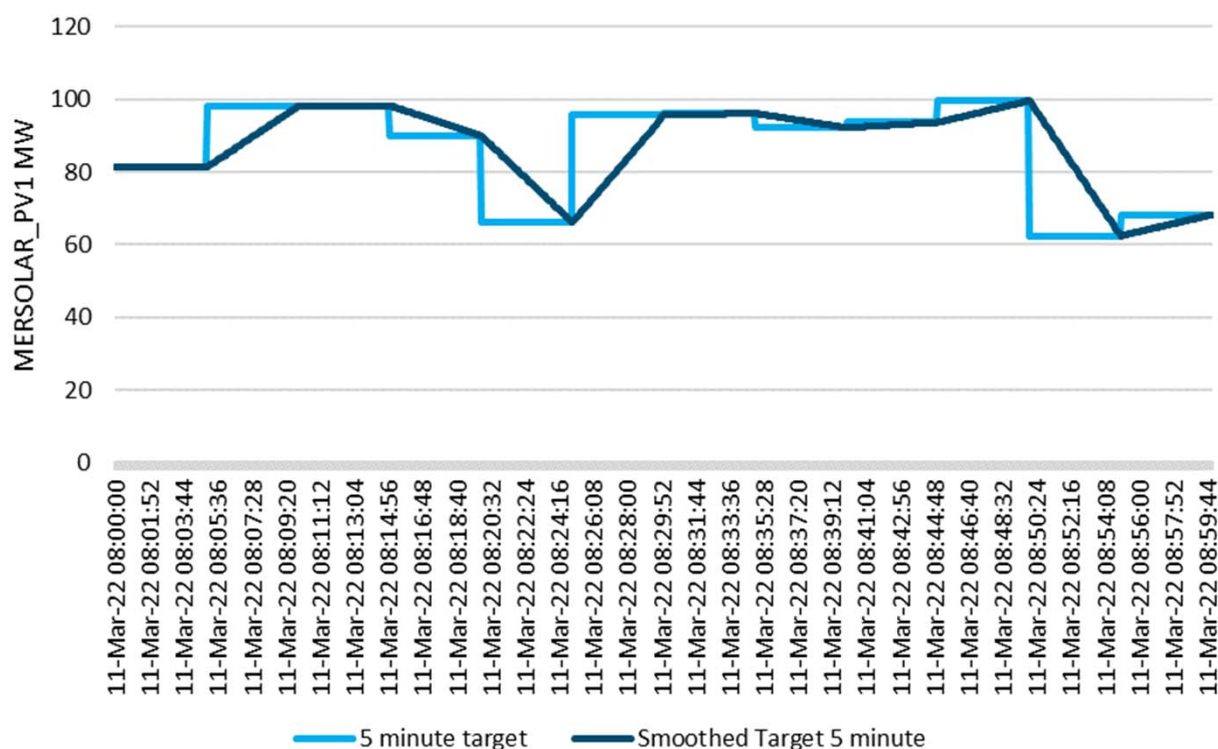
Estimating WEM Causer Pays - Creating a Sample Day

Creating 4-second linear targets

Each unit has a 5 minute target based on actual generation during a 5 min interval

Targets are then smoothed using a linearisation method

Used as a starting point for the New NEM Causer-Pays Method





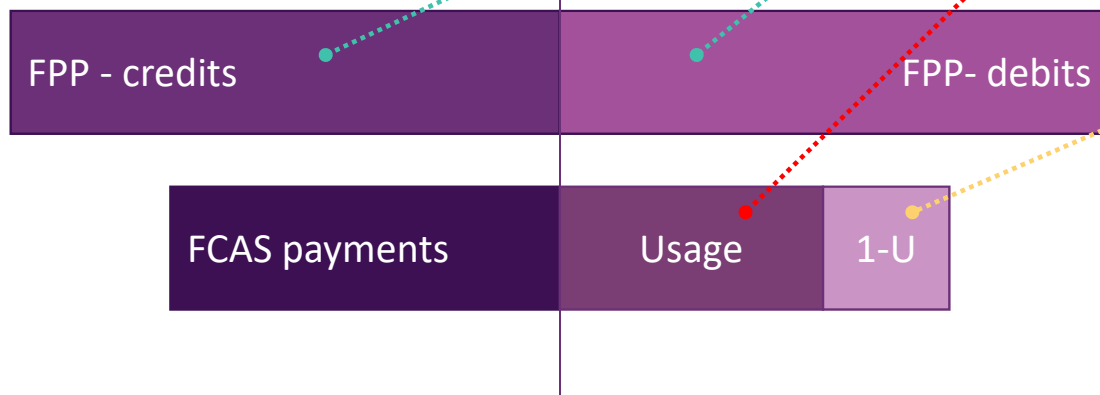
What will the new Causer Pays be?

Table summarizes the settlement transactions and amending clauses:

- Contribution Factor - “CF” is an individual factor for an *eligible unit*, which can be positive or negative; “RCF” is the factor for the residual deviation;
- “N” denotes negative, for example, “NCF” is an individual negative factor for an eligible unit; and
- “D” denotes default, for example, “NDCF” is an individual negative default factor for an eligible unit.

Factors are further separated by Raise and Lower requirements, which would repeat the table. **This means a minimum of twelve types of settlement transaction occur** and these may be repeated where a regulation requirement applies by *region* or group of *regions*.

Trading Amounts	Eligible unit	Residual deviation
Frequency Performance Payments – 3.15.6AA (b)	3.15.6AA (b)(1) $TA = CF \times \frac{P_{regulation}}{12} \times RCR$	3.15.6AA (b)(2) $TA = RCF \times \frac{P_{regulation}}{12} \times RCR \times \frac{TE}{ATE}$
Recovery of Regulation FCAS that is “used”- 3.15.6AA (c)	3.15.6AA (c)(1) $TA = TSFCAS \times U \times NCF$	3.15.6AA (c)(2) $TA = TSFCAS \times U \times NRCF \times \frac{TE}{ATE}$
Recovery of Regulation FCAS that is “unused” - 3.15.6AA (d)	3.15.6AA (d)(1) $TA = TSFCAS \times (1 - U) \times DCF$	3.15.6AA (d)(2) $TA = TSFCAS \times (1 - U) \times DRCF \times \frac{TE}{ATE}$



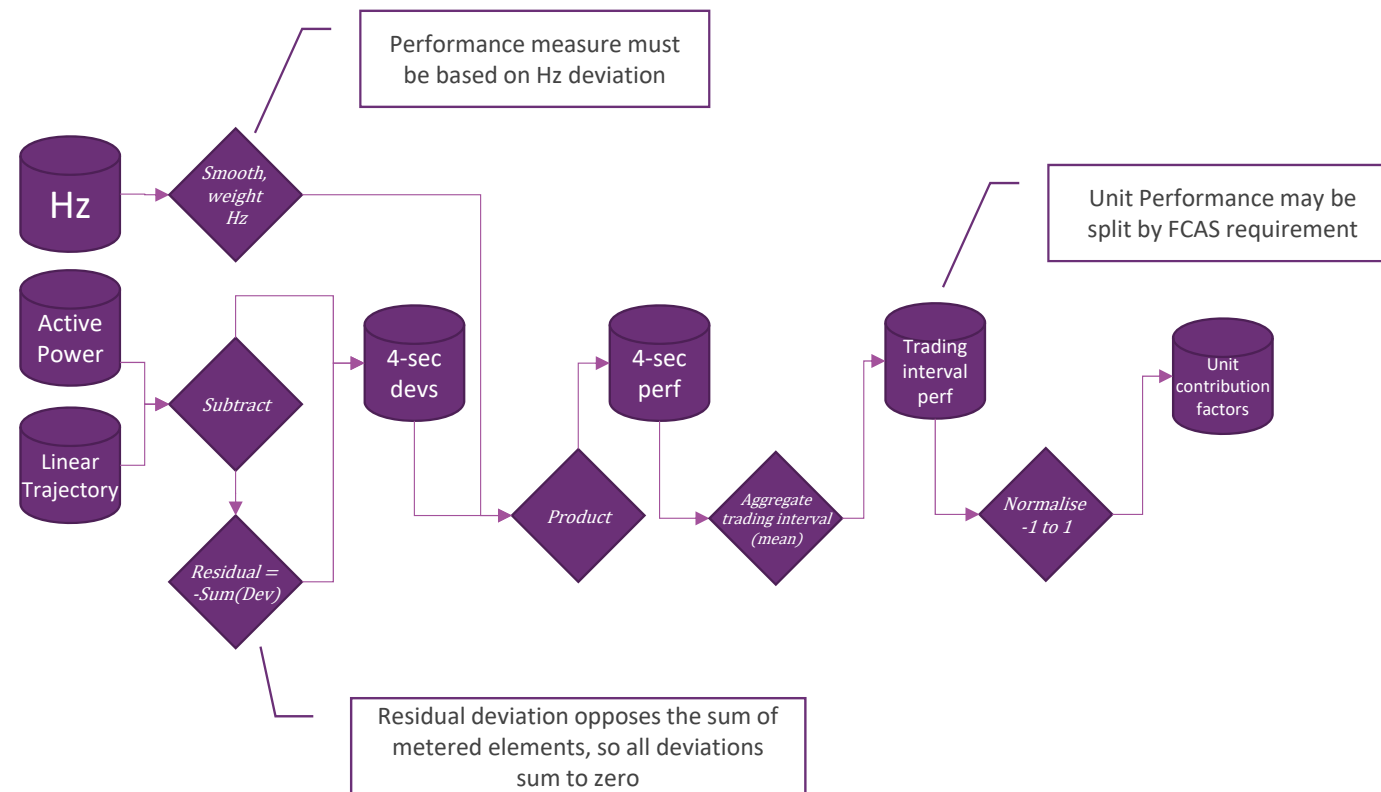
Note:
FPP credits = debits [self-funding]

FCAS payments to enabled units are funded by Used / Unused

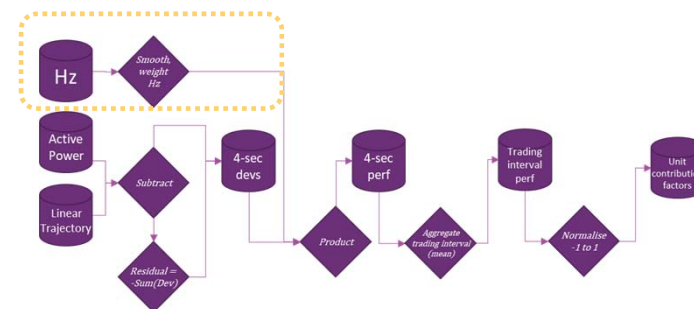
Residual deviation is the elements without appropriate metering, need the TE/ATE to allocate the cost on a \$ per MWh basis



High level process for calculating factors



Calculating 4-sec performance measure (NEM data)



4-sec performance measure is calculated using something like the following formula:

$$PM(t) = W_{raw}f(-Hz, tc_{raw}) + W_{smooth}f(-Hz, tc_{smooth})$$

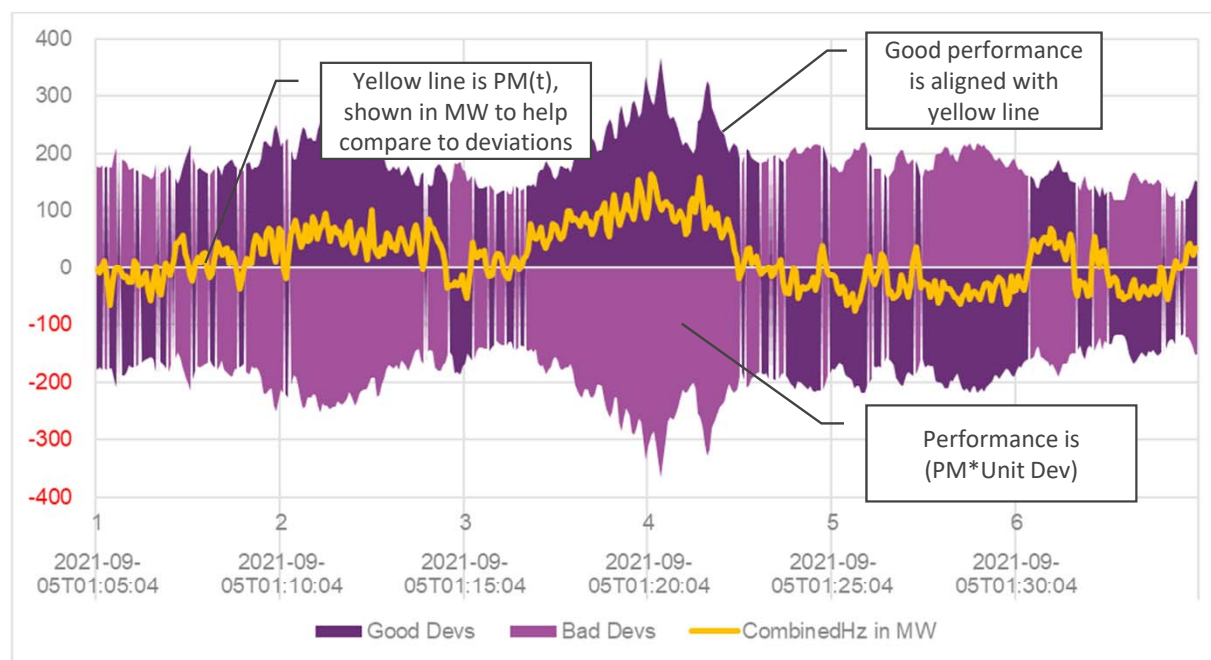
Where:

Hz is frequency deviation

$f(x, tc)$ is a smoothing function, specifically a low pass filter, of x with time constant tc

“raw” and “smooth” denote two different time constants tc

W denotes weighting, e.g. 0.5, and the two weightings, “raw” and “smooth” add to 1



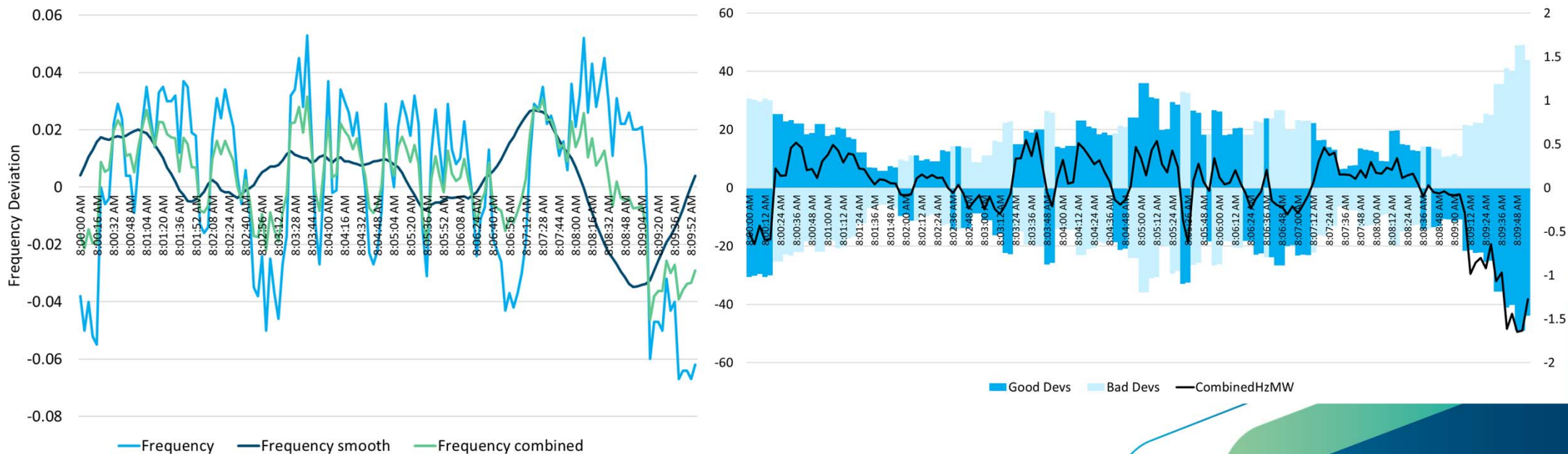
Thinking is this PM balances primary and secondary response adequately

New NEM Causer-Pays Method Applied to WEM – Frequency Deviation

Producing the performance function and identifying good + bad deviations for sample day 11/03/2022

$$PM(t) = W_rawf(-Hz, tc_raw) + W_smoothf(-Hz, tc_smooth)$$

- Weighting used: 0.5
- Smoothing 25 periods



9

Working together for a **brighter** energy future.



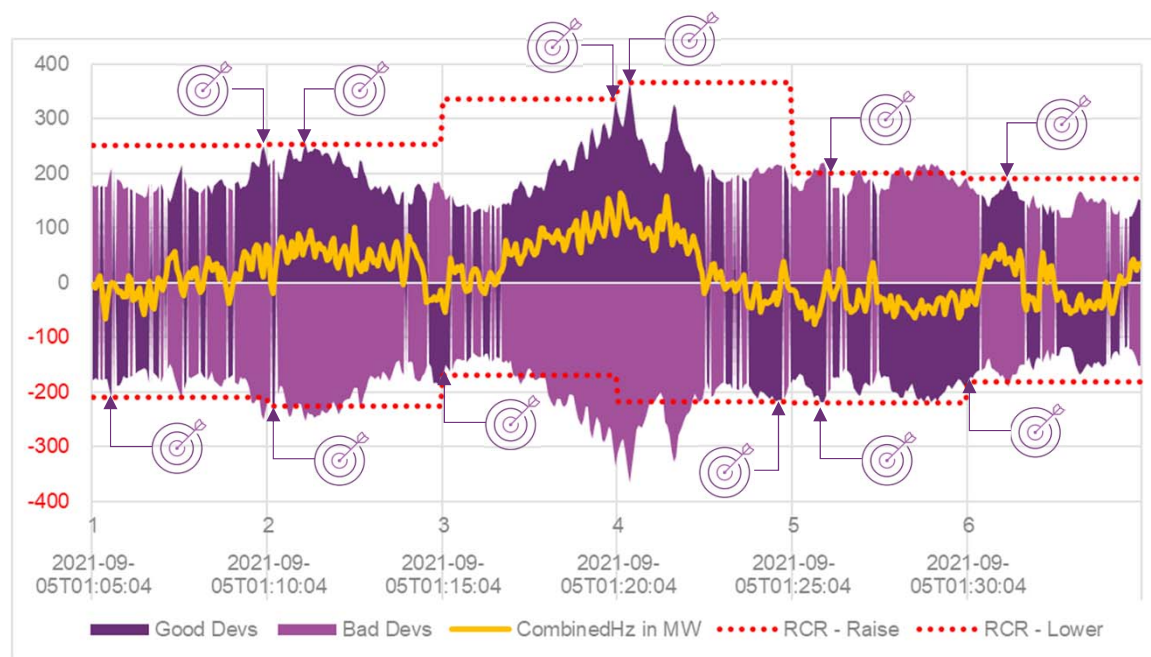
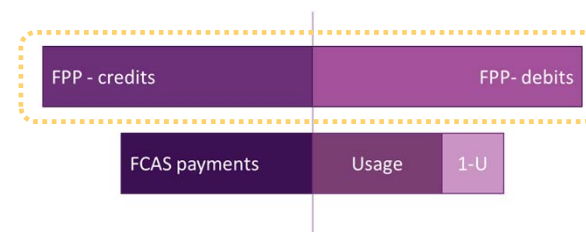
Frequency Performance Payments (FPP) – NEM data

To calculate FPP we need cash to distribute between those with positive and negative CFs:

$$TA = CF \times \frac{P_{regulation}}{12} \times RCR$$

TA = Share * Price * Volume

- $P_{regulation}$ is the Raise/Lower RRP:
 - If by Req will probably be the Marginal Price of the global and local requirement.
- Volume is Req for Corrective Response (RCR) within trading interval:
 - “total volume in MW across the power system that contributed to reducing the aggregate deviation in frequency”

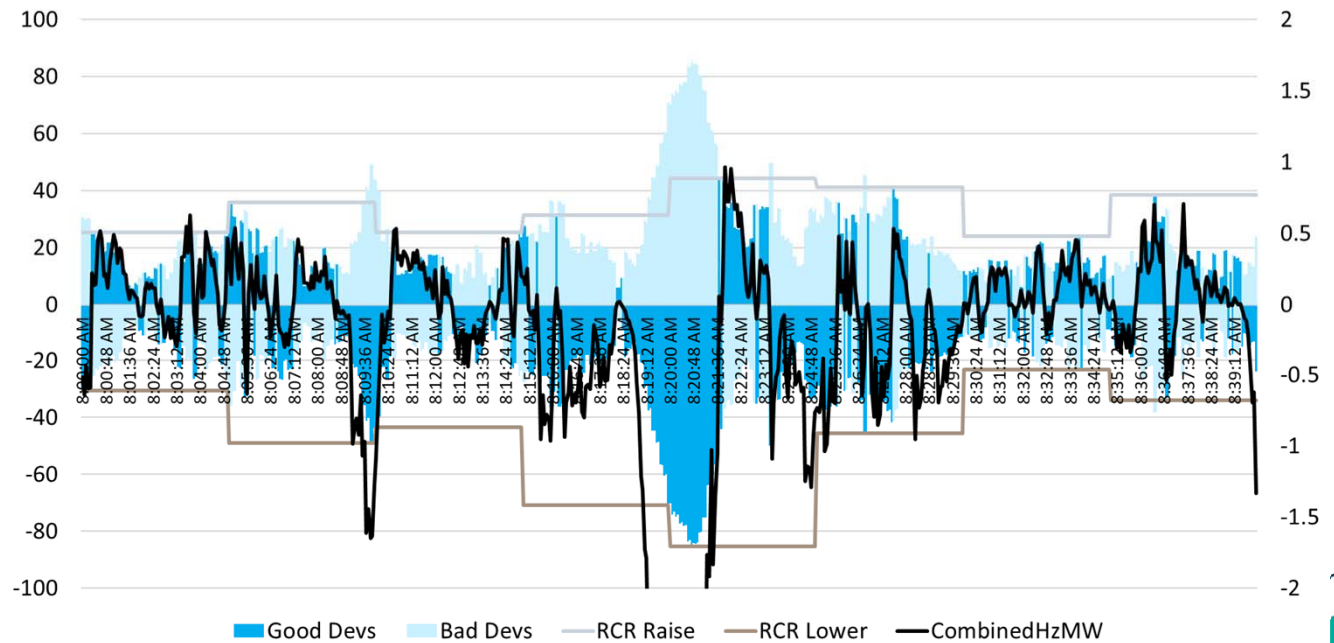


RCR is TBC, probably something like the “capacity” value of good deviations (a measure of gross deviation) within the trading interval

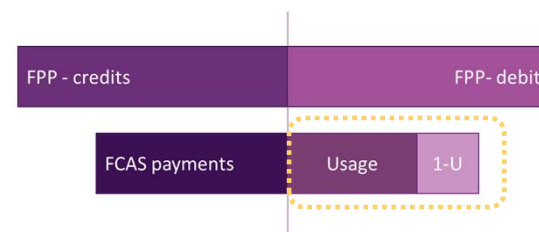
New NEM Causer-Pays Method Applied to WEM – Frequency Deviation

Calculation Requirement for Corrective Response (RCR) for sample day 11/03/2022

RCR was calculated for each 5-minute period based on the maximum level of deviation across the 4 second intervals



Cost recovery of FCAS requirement cost – NEM data



“U” or usage sets the proportion of requirement cost allocated on CFs calculated that trading interval:

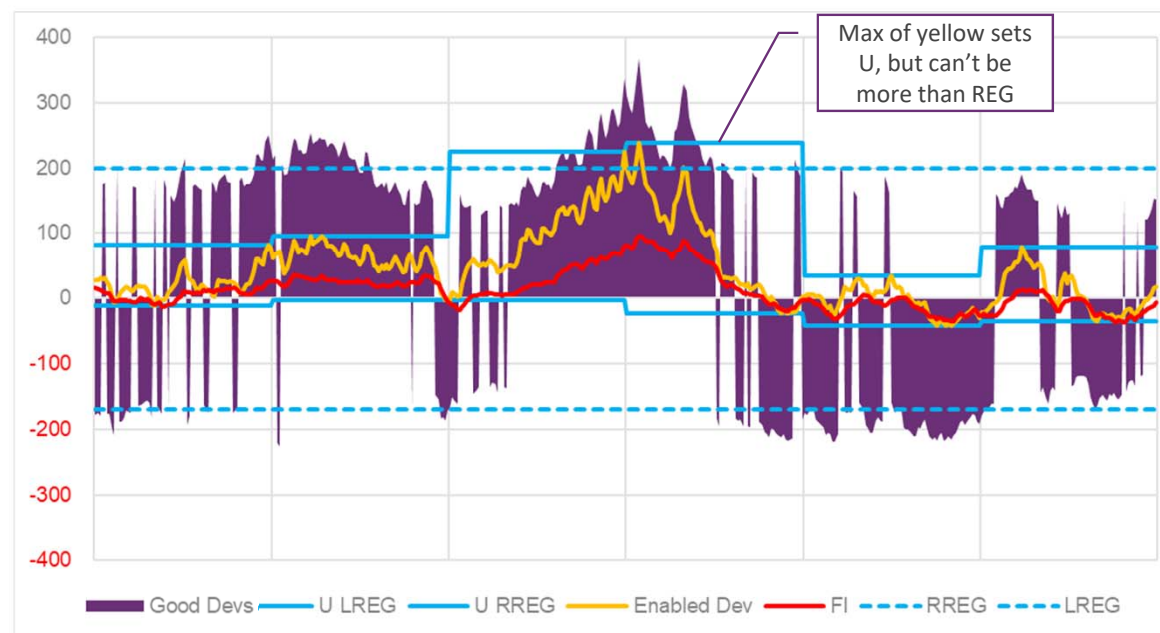
$$TA = TSFCAS \times U \times NCF$$

Leaving:

$$TA = TSFCAS \times (1 - U) \times NDCF$$

Where:

- TSFCAS is Req cost
- “D” is default, or a persisting CF
- “N” is negative
- “U” defined by 3.15.6AA (c)(1) as the max proportion of the dispatched ... regulating service used in that trading interval (between 0 and 1).

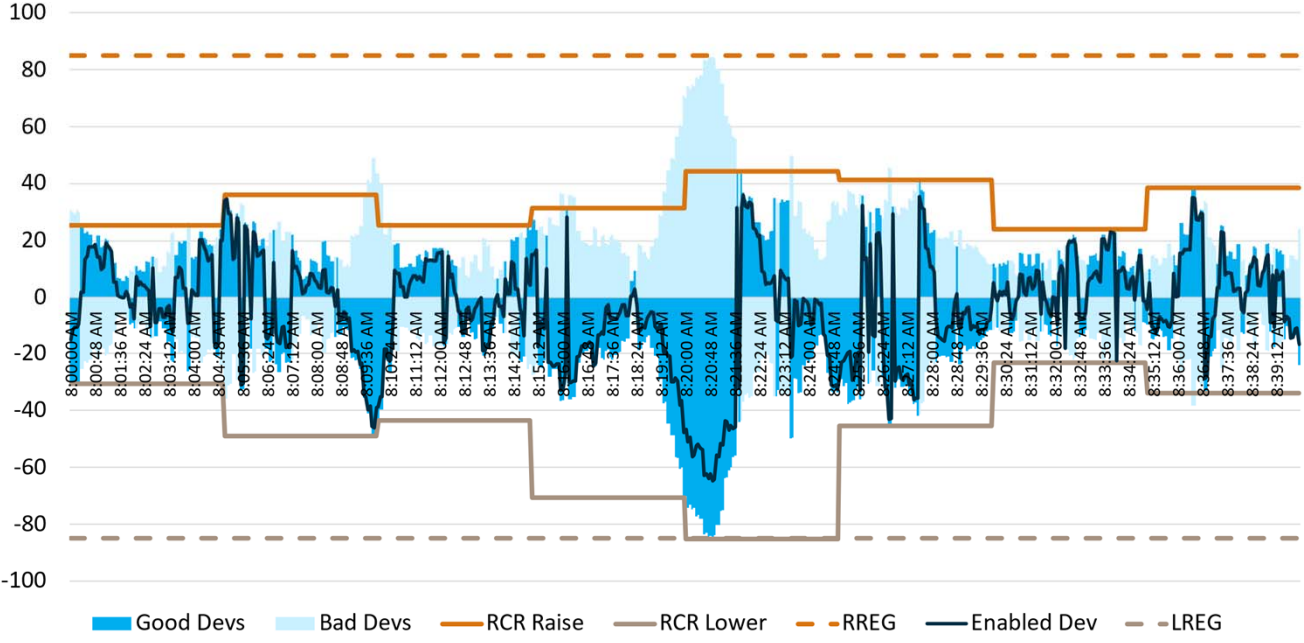


Usage is TBC, could be max/min AGC-signal (FI) or could be the measured good deviations of the enabled units within the trading interval

New NEM Causer-Pays Method Applied to WEM – Regulation Requirement

Calculation Requirement for Cost Recovery for sample day 11/03/2022

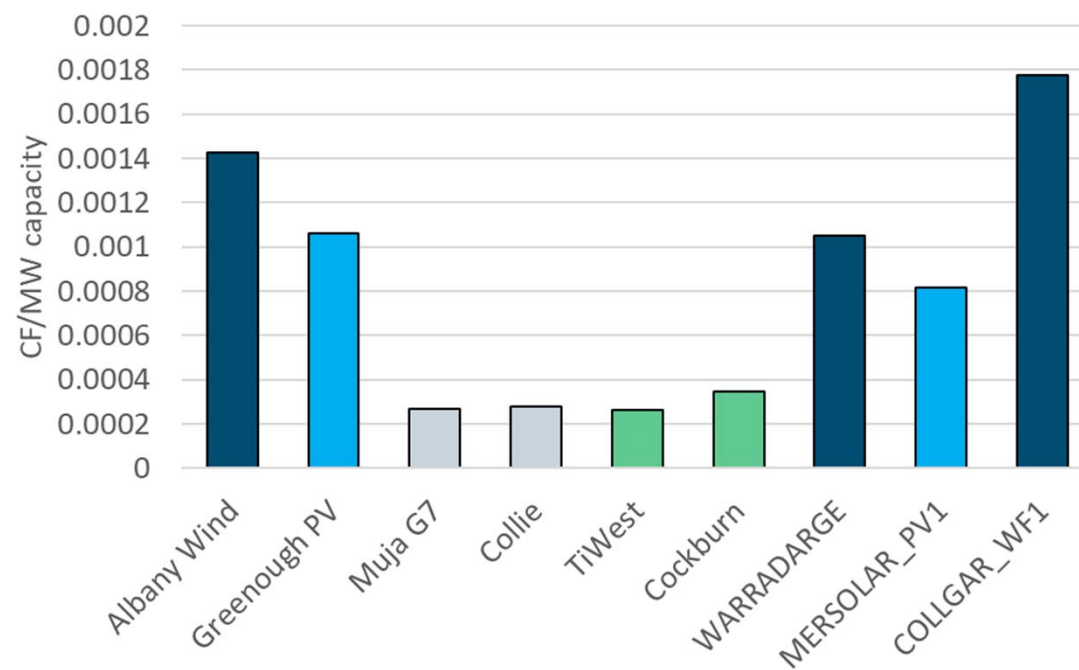
RCR compared to Regulation/LFAS services to determine proportion of costs allocated to generators



New NEM Causer-Pays Method – WEM Causer Pays Factors

Causer-Pays factor per MW of capacity, after scaling to sample day 11/03/2022

Similar with previous methods the renewables had a higher proportion of causer pays factor for each MW of capacity installed.



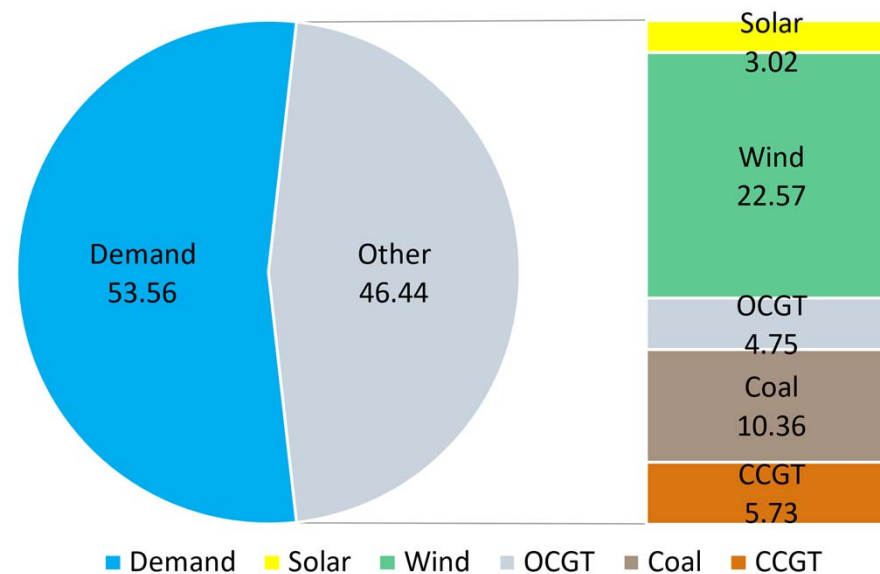
New NEM Causer-Pays Method – WEM Sample Day 11/03/2022

Results for sample day 11/03/2022

New NEM Causer-Pays Method tends to assign more costs to demands based on small sample set compared to other methods (i.e., Tolerance and existing Causer-Pays)

This needs to be tested with larger sample (in progress).

Frequency Control Cost Recovery in the WEM (%)



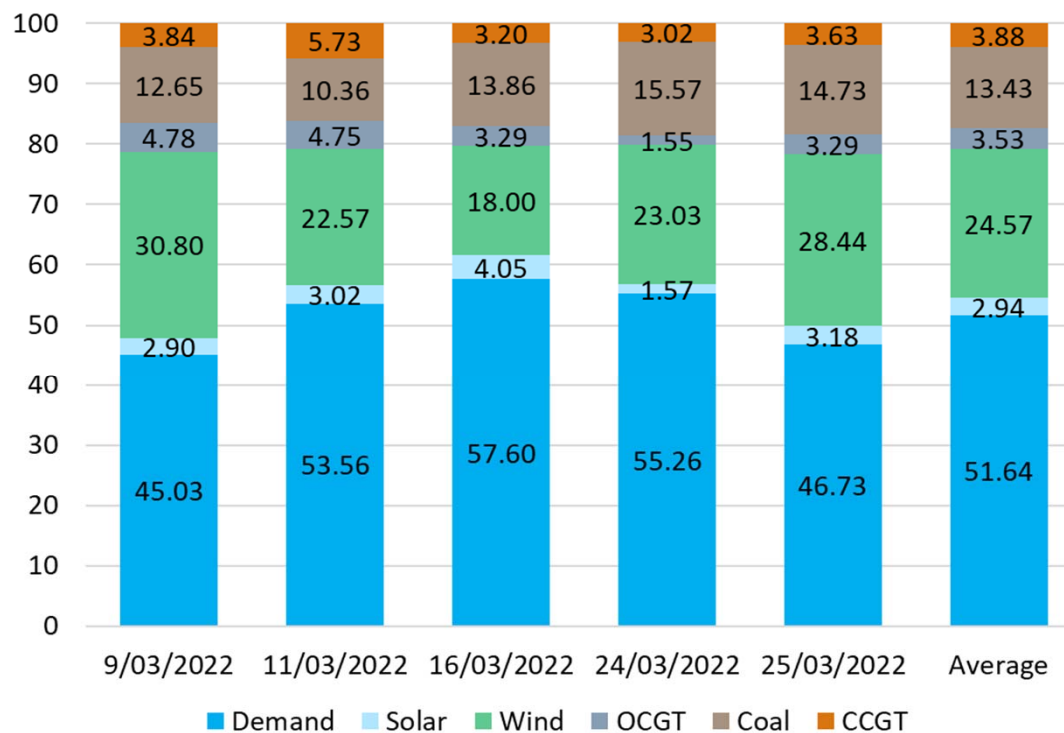
New NEM Causer-Pays Method – Multiple Days

Results for 5 sample days

Greatest variation in estimated Causer Pays Factor was wind facilities in the WEM which ranged from 18% to 30.8%.

Sample days were selected based on the ability to scale up the existing plant to full WEM capacity (i.e., no major coal or gas plant outages).

Frequency Control Cost Recovery in the WEM (%), by day

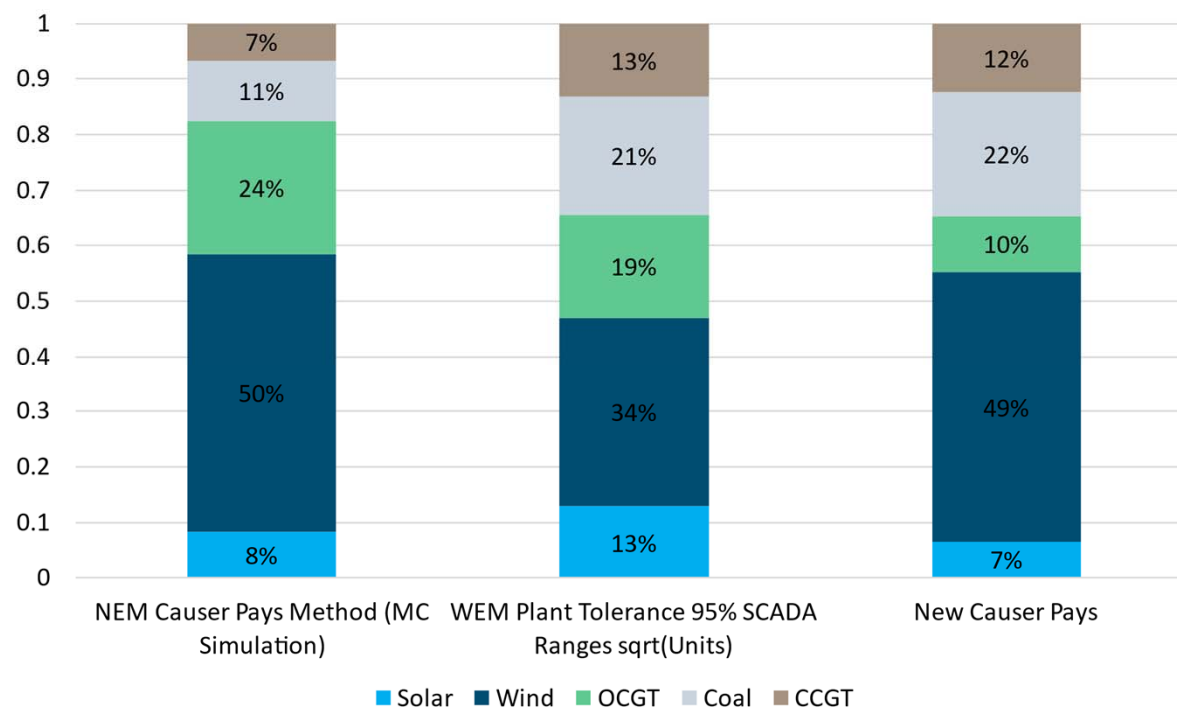


Working together for a brighter energy future.

Results of Applying Tolerance Ranges to Determine Frequency Regulation Cost Recovery Percentages

- The Tolerance method results in higher cost recovery from solar plant and lower cost recovery from wind plant compared to the NEM Causer-Pays Method (Current and New)
- The reduction in wind and increase in solar is caused by the small number of solar PV plant currently in the WEM
- New NEM Causer-Pays Method is based on a sample day so will have more variation than other methods that use a full month of data (will increase sample and present subsequent results)
- The two NEM Causer-Pays Methods have similar outcomes

Frequency Control Cost Recovery for Generators in the WEM



Note: sample restricted to generators ≥ 30 MW

Any Questions?