Australian Energy Market Commission

AEMC
Australian Energy Market Commission

REVIEW

Draft report

Review of the Wholesale Demand Response Mechanism

10 July 2025

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About the AEMC

The AEMC reports to the energy ministers. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the energy ministers.

Acknowledgement of Country

The AEMC acknowledges and shows respect for the traditional custodians of the many different lands across Australia on which we all live and work. We pay respect to all Elders past and present and the continuing connection of Aboriginal and Torres Strait Islander peoples to Country. The AEMC office is located on the land traditionally owned by the Gadigal people of the Eora nation.

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To cite this document, please use the following:
AEMC, Review of the Wholesale Demand Response Mechanism, Draft report, 10 July 2025

Summary

1 The Australian Energy Market Commission (AEMC or Commission) has reviewed the role and performance of the wholesale demand response mechanism (WDRM). It has made two draft recommendations: that the WDRM should continue operating; and that the *Expanding eligibility under the WDRM* rule change request be initiated.[1] This draft report seeks stakeholder feedback on these draft recommendations.

2 The Commission maintains its commitment to strengthening demand-side participation in the national electricity market (NEM). The recent *Integrating price-responsive resources into the NEM* (IPRR) and *Unlocking CER benefits through flexible trading* (CER benefits) final rules will help with this.[2]

3 While dispatch mode introduced through IPRR is a key vehicle to facilitate broad demand-side participation, the WDRM can provide important additional benefits alongside dispatch mode. The Commission also considers that there are opportunities to grow participation in the WDRM and increase the benefits it delivers to the operation of the NEM.

4 The AEMC is required to review the WDRM under Chapter 3 of the National Electricity Rules (NER), and in doing so has considered the role of the WDRM in enabling demand-side participation and its performance to date. Stakeholder feedback and analysis has informed the Commission's draft recommendations.

5 Stakeholders are requested to provide feedback on the Review's analysis and draft recommendations. Submissions are due by COB Thursday 14 August 2025. The Commission plans to release its final report by 23 October 2025.

The WDRM continues to play a useful role in the NEM

6 The WDRM was established through a rule made on 11 June 2020 and commenced operation in the NEM on 24 October 2021. The WDRM allows demand response service providers (DRSP) to offer demand response into the NEM, where it can be dispatched and paid for in the same way as generators.

7 This is currently the only market mechanism in the NEM wholesale market that facilitates demand response, that is, payment for reducing load. It is also the only mechanism that allows non financially responsible market participants to participate in the electricity market.

8 These features enable some electricity users to have their demand response participation effectively incorporated into market outcomes, which benefits all electricity consumers. WDRM resources would be unlikely to participate in the NEM through dispatch mode as:

- They can't participate in the same way through dispatch mode. This is because dispatch mode uses actual consumption and generation rather than demand response relative to a baseline.
- Dispatch mode participation requires participants to follow dispatch instructions for every dispatch interval across the day. This is not compatible with WDRM, whose participants are only dispatched when providing a demand response, reducing participation complexity.

9 This means that if the WDRM was phased out existing WDR participants may not continue to participate in the wholesale market with associated loss of dispatch efficiency benefits.

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1 Enel X, *Expanding eligibility under the WDRM,* rule change request, 14 April 2022, available here.

2 AEMC, *Integrating price-responsive resources into the NEM*, rule determination, 19 December 2024. AEMC, *Unlocking CER benefits through flexible trading*, rule determination, 15 August 2024.

Furthermore, as dispatch mode is due to commence in 2027, continuing the WDRM provides a pathway for resources to participate in the market.

10 The Commission's analysis has also estimated that between October 2021 and March 2025, the WDRM has resulted in:

- $4.32 million ($1.30 million per year) of dispatch efficiency benefits
- $38,300 emissions reduction benefits.

11 These benefits show that the WDRM is providing efficiency benefits greater than its operational costs of $350,000 - $500,000 per year. The WDRM has also contributed to downward pressure on wholesale prices, with average price savings of $27.83/MWh during WDR dispatch. While there are costs associated in operating the mechanism, we have assessed that these do not outweigh the benefits and have observed that there would be costs associated with dismantling it.

12 The Commission's draft recommendation that the WDRM continue, provides certainty for participants and recognises that the demand side has an important role to play in the NEM. As part of this, the WDRM plays a role in facilitating wholesale market participation from a subset of large loads. For instance, data centres are well suited to participate in the WDRM, and their prospective growth in Australia provides an opportunity for participation in the WDRM to grow.

13 Having these large loads visible and dispatched, assists in the operation of the market and provides benefits for all consumers, as outlined above. Given that the WDRM provides net operational benefits, the WDRM should be retained.

14 Based on the Commission's recommendation that the WDRM should continue, we also recommend that the pending rule change request seeking to allow sites with multiple connection points to participate in the WDRM be initiated. This request has the potential to immediately allow new participation and does not propose material changes to the WDRM design. Progressing this request through the rule change process will determine the materiality of these benefits and compare them against the potential costs.

15 The consultation paper and stakeholder submissions identified several potential changes to the WDRM's design that could increase participation in and the effectiveness of the WDRM. The Commission has considered stakeholder views and carried out its own analysis and has concluded that further changes to the WDRM would not deliver material net benefits and are not warranted at this time.

Recent market reforms will boost demand-side participation

16 Demand side participation is an umbrella term for the actions a consumer can take regarding their energy consumption by responding to a wide range of incentives and events occurring in the market.

17 Introducing the WDRM in 2020 was a move towards improving demand-side participation in the market by involving the demand side in price setting during high-priced intervals. Since the WDRM final rule, the Commission has continued to progress this through the *Unlocking CER benefits through flexible trading* (CER benefits) and *Integrating price-responsive resources into the NEM* (IPRR) rule changes:

- The CER benefits rule enables energy service providers for small and large customers to separately manage 'flexible' CER from 'passive' loads by establishing secondary settlement points in the energy market. Market participants will also be able to use in-built measurement

capability in technology such as electric vehicle chargers and household batteries, removing the need to install a separate meter to the device.

- IPRR introduced a framework named 'dispatch mode' that allows currently unscheduled price responsive resources to be scheduled and dispatchable in the NEM, in aggregations or individually. It allows virtual power plants (VPP), community batteries, flexible large loads and other price-responsive small resources to compete with large-scale generators and storage in the wholesale market.

18 Through the combination of these two reforms, participants can separate flexible and inflexible resources behind a connection point and participate in dispatch mode with the flexible or controllable resources. As a result, these two reforms provide a flexible and robust method for demand-side participation in the NEM dispatch process for many electricity users.

19 While WDRM is playing a useful role in engaging the demand side, the biggest benefits to the NEM and ultimately electricity consumers will occur through participation of many types of resources through these reforms.

Next steps

20 Stakeholders are invited to provide written submissions responding to this draft report by COB Thursday 14 August 2025. The Commission plans to release its final report by 23 October 2025.

21 Should the draft recommendations be made final, the Commission would look to initiate the *Expanding eligibility under the WDRM* rule change in 2026. This process will seek to fully consider the benefits and costs of allowing sites with multiple connection points to participate in the WDRM.

How to make a submission

Stakeholders can help shape the solution by participating in the review. Engaging with stakeholders helps us understand the potential impacts of our recommendations and contributes to well-informed, high quality reforms.

Making a submission

Due date: Written submissions responding to this draft report must be lodged by COB Thursday14 August 2025.

How to make a submission: Go to the Commission's website, www.aemc.gov.au, find the "lodge a submission" function under the "Contact Us" tab, and select the project reference code EPR0099.[3]

Tips for making submissions are available on our website.[4]

Publication: The Commission publishes submissions on its website. However, we will not publish parts of a submission that we agree are confidential or that we consider inappropriate (for example offensive or defamatory content or content that is likely to infringe intellectual property rights).[5]

Contact us

To contact us please use the form on the project page.

3 If you are not able to lodge a submission online, please contact us.

4 See: https://www.aemc.gov.au/our-work/changing-energy-rules-unique-process/making-rule-change-request/submission-tips

5 See: https://www.aemc.gov.au/contact-us/lodge-submission

Contents

1 The Commission's draft recommendations

The Commission has made two draft recommendations: that the wholesale demand response mechanism (WDRM) should continue operating; and that the *Expanding eligibility under the WDRM* rule change request be initiated. This draft report seeks stakeholder feedback on these draft recommendations.

This chapter outlines:

- an overview of the WDRM
- how our recommendations support demand-side participation in the NEM
- two-sided market arrangements are the key vehicle to facilitate demand-side participation
- the context for the review.

1.1 The WDRM allows demand response to be offered into the NEM

The WDRM allows demand response service providers (DRSPs) to offer demand response into the NEM, where it is dispatched and paid like generators.

DRSPs may apply to the Australian Energy Market Operator (AEMO) to classify one or aggregate multiple qualifying loads as a wholesale demand response unit (WDRU). A key requirement in this process is that the qualifying load meets an approved baseline methodology.[6] This baseline estimates the consumption that would have occurred for the load had it not provided a demand response. The baseline measures the quantity of demand response delivered (and paid for), as the difference between the baseline and actual levels of consumption.

DRSPs bid in their willingness to reduce demand for each WDRU at certain price points, following the same bidding process as other generators. When dispatched, the DRSP must ensure that the relevant WDRU reduces its load by the amount dispatched.

The settlement process for wholesale demand response (WDR) dispatch is managed through AEMO systems. From the customer perspective, where WDRM is dispatched:

- the customer's retailer bills them for their actual consumption
- AEMO bills the customer's retailer for their baseline level of consumption
- the DRSP is paid the spot price for the quantity of wholesale demand response provided
- the DRSP pays the retailer the quantity of demand response provided at the wholesale demand response reimbursement rate (WDRRR).

See chapter 2 of the consultation paper for detailed information on the operation of the WDRM.

1.2 The draft recommendations support demand-side participation in the NEM

The Commission's draft recommendation to retain the WDRM recognises that the demand side has an important role to play in the NEM.

The WDRM is the only market mechanism in the NEM wholesale market that facilitates demand response, that is, payment for reducing load. It is also the only mechanism that allows non financially responsible market participants to participate in the energy market. These features

6 Approved baseline methodologies are defined in the baseline methodology register, available here.

benefit some electricity users and enable their demand response participation to be effectively incorporated into market outcomes, which benefits all electricity consumers.

The Commission's recent rule determinations on *Unlocking CER benefits through flexible trading* (CER benefits) and *Integrating price-responsive resources into the NEM* (IPRR) provide flexible and enduring pathways for electricity users with portfolios of resources to participate in the NEM. The combination of these two reforms are the key vehicle to facilitate demand-side participation in the NEM, see section 1.3 for more information.

However, existing WDR participants may face difficulties or a lack of incentives to participate through these newer mechanisms:

- The resources participating in WDRM can't participate through IPRR in the same way. This is because dispatch mode (introduced through IPRR) uses actual consumption and generation rather than demand response relative to a baseline.
- Dispatch mode participation requires participants to follow dispatch instructions for every interval across the day. This is not compatible with WDRM, whose participants are only dispatched when providing a demand response, reducing participation complexity.

Because of this, if the WDRM were phased out, existing WDRM resources would be unlikely to participate in the NEM through alternative mechanisms. Furthermore, as dispatch mode is due to commence in 2027, continuing the WDRM provides a pathway for resources to participate in the market.

In making this draft recommendation, we consider that the WDRM plays an important role in facilitating a pathway for wholesale market participation from a subset of large loads. Given that the WDRM provides net operational benefits, the Commission sees few reasons for its removal at this point in time.

The Commission's second draft recommendation is that the *Expanding eligibility under the WDRM* rule change request be initiated. This is because if the WDRM is to be retained as recommended, then changes to improve or increase participation in the mechanism should be considered. The pending rule change process represents an opportunity to increase participation in the WDRM, and this request will be initiated after this review has been completed.

1.3 Two-sided market arrangements are the key vehicle to facilitate demand-side participation

Two-sided market arrangements, such as those introduced through IPRR, are the key vehicle to facilitate broad demand-side participation in the NEM.

A two-sided market is characterised by the active participation of the supply and demand side in dispatch and price setting. Introducing the WDRM in 2020 was a move towards a two-sided market by involving the demand side in price setting during high-priced intervals. Since the WDRM final rule, the Commission has continued to progress two-sided market arrangements for the NEM through the CER benefits and IPRR rule changes:[7]

- The CER benefits final rule enables energy service providers for small and large customers will be able to separate and manage 'flexible' CER from 'passive' loads by establishing secondary settlement points in the energy market. Market participants will also be able to use in-built measurement capability in technology such as electric vehicle chargers and household batteries, removing the need to install a separate meter to the device.

7 See section 1.2 of the consultation paper for more information.

- IPRR introduced a framework named 'dispatch mode' that allows currently unscheduled price responsive resources to be scheduled and dispatchable in the NEM, in aggregations or individually. It allows virtual power plants (VPP), community batteries, flexible large loads and other price-responsive small resources to compete with large-scale generators and storage in the wholesale market.

Through the combination of these two reforms, participants can separate flexible and inflexible resources behind a connection point and participate in the dispatch mode with the flexible or controllable resources. As a result, these two reforms provide a flexible and robust method for demand-side participation in the NEM dispatch process for many electricity users.

For price-responsive resources that actively optimise their consumption patterns in response to prices, dispatch mode, introduced by the IPRR, better facilitates their participation in the wholesale market compared to the WDRM. This is because their price-responsiveness can be incorporated into the market across each interval of the day rather than just high-priced intervals.

In establishing the WDRM, the Commission stated that if a move to a two-sided market was to occur in the future then that reform should replace the wholesale demand response mechanism. However, as noted above, the WDRM is playing a role in engaging the demand side currently and may continue to provide this for a select group of users into the future. This niche role contributes to the total demand-side engagement in the NEM alongside the mechanisms introduced more recently.

While WDRM is playing a role in engaging the demand side, the Commission considers that the biggest benefits to the NEM and ultimately electricity consumers will occur through participation of a broad number of resources through the more recent two-sided market reforms.

1.4 This review's process and scope

This section:

- outlines the reasons for this review into the WDRM
- acknowledges the role of stakeholder views in forming the draft recommendations
- notes the interaction of the NEM review.

1.4.1 The Commission is required to review the WDRM

The WDRM was established through a rule made on 11 June 2020 and commenced operation in the national electricity market (NEM) on 24 October 2021. In making the rule, the Commission committed to reviewing the WDRM after a period of operation.

Though this review the AEMC is required to consider the costs, benefits and effectiveness of the wholesale demand response mechanism (WDRM) having regard to:[8]

1. the impact of the arrangements on the spot price
2. the accuracy of baseline methodologies
3. market and technological development
4. any other matters relating to wholesale demand response that the AEMC considers relevant.

In carrying out this review, the Commission is seeking to determine whether the WDRM should be changed, remain as is, or be phased out. In doing so, we have considered:

8 Clause 3.10.7 of the NER.

- whether recent regulatory and market developments have promoted a two-sided market and whether this has reduced or removed the need for the WDRM
- stakeholder feedback on participating in the WDRM and whether changes could increase participation in and the effectiveness of the WDRM.

1.4.2 Stakeholder feedback and our analysis has shaped our recommendations

Stakeholder feedback through formal submissions and discussions with the project team has been critical to the development of the Commission's draft recommendations. This section outlines the key points from stakeholders.

In response to our consultation paper, 19 submissions were received from a range of stakeholders. Submissions highlighted differing viewpoints, ranging from suggestions that the WDRM should be phased out to those suggesting that it still had a role to play.

Suggestions to phase out the WDRM outlined that the mechanism:[9]

- has had limited participation and benefits to date
- it can be replaced through the combination of the IPRR and CER benefits reforms.

AGL and EnergyAustralia considered that no further investment or changes should be made to the WDRM, with EnergyAustralia considering that if removing the WDRM came at a material cost, it should be left as is.[10]

This was contrasted by submissions calling for the WDRM to be retained and potentially expanded, which stated that:[11]

- the changes from the IPRR and CER benefits rules are unproven and removing the WDRM before the impact of these reforms is known would be premature
- the WDRM caters for demand response, which dispatch mode does not and removing the WDRM would remove a valuable participation pathway for these resources
- third-party access facilitated through the WDRM is important for the market.

In addition, Origin stated that this review should consider the findings from the NEM wholesale market settings review (NEM review) before making any decisions about the future of the WDRM. The Commission's consideration of the NEM review is outlined in section 1.4.3 below.

In making its draft recommendations, the Commission has considered feedback received from stakeholders (in submissions and in discussions with the project team) and its own analysis, which is explored throughout the rest of this draft report.

1.4.3 The Commission will consider findings from the NEM review

The scope of the NEM review includes the consumer interaction with the wholesale market, including the large customer demand sector.[12] The Commission has engaged with the NEM review throughout the review and will consider its findings and recommendations in relation to its work.

The NEM review is providing recommendations to the Energy and Climate Change Ministerial Council on how best to shape the future of the NEM. These recommendations aim to promote investment in firmed, renewable generation and storage capacity following the conclusion of Capacity Investment Scheme (CIS) tenders in 2027. As part of these recommendations, the review

9 Submissions to the consultation paper: CS Energy, p. 2; Origin, p. 1; Energy Australia, p. 1; AGL, p. 2; Alinta, p. 1; Red Energy, p. 1; ENGIE, p. 1.
10 Submissions to the consultation paper; AGL, p. 2. Energy Australia, p. 1.
11 Submissions to the consultation paper: AEC, p. 3. ECA, p. 1. EEC, p. 4. Endeavour, p. 2. Enel X, p. 1. VIOTAS, p. 3. JEC, p. 3. Shell, p. 1.
12 NEM Wholesale Market Settings Review Initial Consultation, 11 December 2024, p. 4.

is considering how to facilitate better interaction between the demand-side, the spot market and any existing or future financial markets.

The NEM review is due to publish its draft recommendations after this draft report in Q3 2025. Should the NEM review draft recommendations impact this review's final recommendations, the Commission will consider how best those draft recommendations can be considered. This may include changes to this review's timing or additional stakeholder engagement.

2 The WDRM has a role in the NEM

The Commission has made draft recommendations that the WDRM should continue operating and initiate the pending rule change to allow participation from sites with multiple connection points following this review. These recommendations reflect the current benefits of the mechanism and its potential to continue to be utilised in the future.

This chapter outlines:

- our modelling showing that the WDRM is providing benefits greater than its operating costs
- that the WDRM has the potential to continue to grow in participation
- that participation from sites with multiple connection points should be investigated
- seeking stakeholder feedback on expanding the WDRM to facilitate two-way demand response.

2.1 The WDRM is providing benefits

Our analysis found that the WDRM's benefits outweigh its operating costs. This analysis is required under the NER for this review, and it is a key input in making our recommendations. Our analytical approach involved comparing the WDRM's dispatch efficiency benefits against its actual operating costs to date. Stakeholders broadly supported this approach.

2.1.1 Stakeholder views on the WDRM's benefits and costs and modelling methodology

The consultation paper proposed assessing the benefits of the WDRM in terms of its dispatch efficiency and emissions reduction benefits, and comparing this against the actual costs of operating the WDRM. Reflecting on stakeholder feedback, we are confident that our assessment approach is sound. The approach used for estimating the WDRM's dispatch efficiency benefits is informed by economic theory and grounded in available data.

Estimating WDRM dispatch efficiency benefits involved quantifying the reduced deadweight loss, which is the difference in the deadweight loss when there was demand response during actual dispatch compared to a counterfactual without demand response.[13] This approach is consistent with the WDRM final determination and the terms of reference for this review, which require an examination of the impacts on spot prices.[14]

Stakeholders expressed broad support for our approach and:

- acknowledged the complexity of modelling dispatch efficiency benefits, yet supported our approach.[15]
- noted the inclusion of the WDRM's emissions reduction benefits in line with the requirements for applying the national electricity objective.[16]
- noted the exclusion of the WDRM implementation costs from our assessment, but consider such costs in undertaking future reforms.[17]

The Justice and Equity Centre (JEC) considered that defining WDRM benefits in terms of dispatch efficiency is too narrow and suggested a wider range of benefits, such as increased consumer

13 See appendix A for more information on the method for estimating deadweight loss.
14 AEMC, *Wholesale demand response mechanism,* Rule Determination, 11 June 2020, p. 21
15 Submissions to the consultation paper; AEMO, p.3. Enel X, p.3.
16 Submissions to the consultation paper; ECA, p. 7. Viotas, p. 5.
17 Viotas, submission to the consultation paper, p.2.

choice and cost savings from less expenditure on network augmentation, new generation and Reliability and Reserve Trader (RERT) activation.[18]

The Commission notes that the economic benefits being assessed through this review are a subset of the total potential benefits of the WDRM. The additional benefits outlined by JEC above are difficult to measure, particularly with the current participation level of the WDRM. The economic benefits of the WDRM are likely to be the largest benefits of the WDRM and the benefits that the Commission is able to readily calculate.

Based on the current benefits and the Commission's draft recommendation that the WDRM continue, we do not consider that further analysis of its benefits is warranted.

The benefits from the analysis carried out according to the approach above were compared against the actual costs of operating the WDRM. This review is considering the future of the WDRM, and in doing so, we have considered the implementation costs of the WDRM as sunk. In terms of the WDRM's operating costs, these include costs such as AEMO's financial costs for operating IT systems and procedural costs for participants and AEMO.

In its submission, AEMO stated that its ongoing operating costs since the start of the WDRM were $350,000 - $500,000 per year.[19] Other stakeholders did not provide cost information on the ongoing costs for consumers from facilitating the WDRM.

2.1.2 Our analysis of the WDRM's benefits and costs

Using the approach outlined above, our analysis estimates that the WDRM has resulted in $4.7 million in benefits to date, which is greater than its operational costs.

Our analysis estimated that between October 2021 and March 2025, the WDRM has resulted in:

- $4.32 million ($1.30 million per year) of dispatch efficiency benefits
- $38,300 emissions reduction benefits.

Comparing these benefits against its operating costs of $350,000-$500,000 per year, the WDRM is providing benefits greater than its costs.[20] We acknowledge that this is a backward-looking estimate and may not be indicative of future benefits.

In response to the JEC's submission, we have considered broader qualitative benefits in our assessment, such as increased consumer choice.[21] See section 4.1 for more information.

The WDRM has also resulted in lower wholesale prices, resulting in benefits of $219.3 million, see appendix A for further information. While this is considered a wealth transfer from producers to consumers rather than an efficiency benefit, we note that consumers have nonetheless benefited from these price reductions.

In making our draft recommendation to retain the WDRM continue, we have also considered the potential costs and complexity of removing the mechanism. Removing the WDRM would create costs for AEMO, retailers and DRSPs to remove systems and processes that facilitate the WDRM's operation. Transitional arrangements would also need to be created for the WDR capacity awarded through contractual arrangements. This could include the NSW LTESA contracts, NSW peak demand reduction scheme (PDRS) contracts awarded to WDRM or any out-of-market

18 Justice and Equity Centre, submission to the consultation paper, p. 15.
19 AEMO, submission to the consultation paper, p. 3.
20 AEMO, submission to the consultation paper, p. 3.
21 Justice and Equity Centre, submission to the consultation paper, p.12.

contracts that may underpin WDR participation. The Commission has not sought to quantify these costs, given the net operational benefits of the WDRM.

2.1.3 Incorporating demand response in price setting is important for the market

External research and analysis indicate that the WDRM can also benefit the NEM by incorporating customer demand response into price setting.

Intelligent Energy Systems (IES) modelling for the IPRR rule change quantified the benefits of market participation from VPP resources as well as demand-side participation (DSP). In this work, 'DSP resources' refer to flexible demand responding to high prices, which is analogous to WDR participation.

This modelling showed that the net benefits of DSP resources participating in the market is $189 million.[22] Whether the resources participate through IPRR or WDRM, these benefits would be realised, supporting the Commission's draft recommendation to retain the WDRM for the foreseeable future.

The DSP benefits outlined above are well below the $1.6 billion 'size of the prize' benefits and $645 million probabilistic benefits from incorporating VPP resources.[23] This suggests that the greatest system benefits will come from incorporating a wide range of price-responsive resources through the IPRR's dispatch mode.

Academic research also highlights the benefits of demand-side participation in price setting. In systems with a high share of wind and solar resources, studies have suggested that an energy-only market will break down. This is because without fuel costs, the research suggests that there is nothing to set prices. Where short-term elasticity from flexible demand is included in price setting, these problems can be significantly reduced. [24]

2.1.4 Changing retailer offerings

The WDRM provides a pathway for third parties (that is, parties that are not the customer's retailer) to engage customer flexibility and offer this into the wholesale market. Where retailers engage with customers to utilise their flexibility as part of their retail contract, this would reduce or remove the ability of a DRSP to contract with that customer to provide WDR.

The consultation paper requested feedback on whether the WDRM has had a noticeable impact on retailers offering contracts with demand-responsive aspects.

In response, stakeholders commented that retailers are increasingly offering contracts with demand response components.[25] They highlighted that:

- this trend may be due to the shift in generation from coal closures and a greater reliance on gas generation, resulting in retailers looking at alternative methods to manage risk[26]
- retailers are well positioned to tailor offerings based on the customer preferences and energy consumption flexibility [27]

22 IES, Benefit analysis of improved integration of unscheduled price-responsive resources into the NEM, final report, 24 June 2024, p. 18.

23 IES, Benefit analysis of improved integration of unscheduled price-responsive resources into the NEM, final report, 24 June 2024, p. 18.
IES, Benefit analysis of improved integration of unscheduled price-responsive resources into the NEM, sensitivity modelling results, 8 July 2024.

24 Brown, Tom & Neumann, Fabian & Riepin, Iegor (2024) 'Price formation without fuel costs: the interaction of elastic demand with storage bidding', 10.48550/arXiv.2407.21409.

25 Submissions to the consultation paper, Origin, p.1. AEC, p.1-2. EnergyAustralia, p.2. AGL, p.2. Alinta Energy, p.4. Enel X, p.7. Viotas, p.3. ENGIE, p.2.

26 AEC, submission to the consultation paper, p. 2.

27 Submissions to the consultation paper; Origin, p. 1. AGL, p. 2. Alinta, p. 4.

- aggregator competition may have also improved these offerings.[28]

The Commission welcomes retailers offering more demand response offers, but acknowledges that the impact of the WDRM in driving these offers is uncertain. Nevertheless, the WDRM may have helped to improve competition and provide an alternative pathway for some customers to participate in the wholesale market.

2.1.5 The 2020 final determination accurately considered implementation costs

The consultation paper sought feedback from stakeholders on the actual costs of implementing the WDRM. This was to consider whether improvements in estimating implementation costs could be made for future reforms.

AEMO outlined that its actual costs of implementing the WDRM were $14.8 million, which is within the range used in the 2020 final determination of $13-$17 million.[29]

EnergyAustralia was the only retailer that provided confidential feedback on its implementation costs. EnergyAustralia claimed that the original cost estimates were understated.[30] SAPN commented that the 2020 final determination estimate of $10-16 million in retailer and DRSP costs did not include possible costs for DNSPs.[31] SAPN outlined that it has incurred costs in setting up systems and processes to assess connection assessments for WDR aggregations above 5 MW. See section 3.6 for further details on the DNSP endorsement process.

Acknowledging the limited stakeholder response on this issue, the Commission has concluded that its cost estimation approach in the 2020 final determination accurately considered the WDRM's implementation costs.

2.1.6 Improvements for future impact analysis

The WDRM final determination accurately considered the implementation costs. However, the actual benefits of the WDRM were below those assumed in the final determination and the actual implementation costs. The Commission has taken steps to address this in recent work by undertaking more sophisticated modelling and testing this analysis with stakeholders.

The 2020 final determination completed basic modelling on the WDRM's benefits

The WDRM final determination included quantitative modelling to estimate the efficiency gains for different levels of additional wholesale demand response enabled by the WDRM. This modelling considered that if the WDRM enables 150 MW of additional demand response that results in a price reduction of $4,000/MWh per interval for eight hours per year over five years, an efficiency gain of $23 million could be achieved. This would offset the lower cost estimates from AEMO of $13 million, and an allowance of $10 million in retailer and DRSP costs.

This modelling relied on simplified assumptions and was used to estimate the relationship between the size of demand response, the size of the price reduction due to demand response, and the resulting increase in efficiency (decrease in deadweight loss).

As discussed in the 2020 final determination, the Commission considered that this analysis demonstrated that, under a reasonable set of assumptions, the efficiency gains of the WDRM should exceed the implementation costs. Which would promote the long-term interests of consumers.

28 Enel X, submission to the consultation paper, p. 7.
29 AEMO, submission to the consultation paper, p. 3.
30 EnergyAustralia, submission to the consultation paper, p. 2.
31 SAPN, submission to the consultation paper, p. 1.

Section 2.1.2 shows that the WDRM is providing $4.7 million in benefits. Comparing this to the total (implementation and operational) actual AEMO costs and assumed retailer costs, this means that the WDRM has come at a net cost.

Using more rigorous modelling and engagement in recent rule changes

The modelling outlined above was not the Commission's only driver in deciding to implement the WDRM.[32] However, more extensive analysis may have improved the information used in the decision-making process.

The analysis was provided at the final determination stage and was not tested with stakeholders.[33] Further scrutiny of the analysis and assumptions may have assisted in estimating the required participation in the WDRM and assessing design elements required to achieve this level of participation.

The Commission has taken steps to provide more rigorous impact analysis in recent rule changes. For instance, in the IPRR rule change, market modelling was used to estimate the size of the problem and the benefits from a probabilistic uptake rate.[34] This modelling was tested with stakeholders in the draft determination and during public forums, allowing stakeholder concerns to be considered and addressed where needed.

The Commission recognises that we must make long-term decisions based on our best assumptions, analysis and evidence at the time. The improvements outlined above aim to ensure that our decisions will benefit consumers and be in their long-term interests.

2.2 The WDRM allows large customers to participate in the market

While the WDRM has had limited participation to date, it may still grow in participation over time and provide greater benefits. Noting this, the Commission considers that the WDRM should continue to be part of the NEM and provide opportunities to large participants. The Commission sees no reason to recommend the WDRM's phase-out.

The WDRM has opportunities to continue to grow

WDRM participation is expected to increase with 95 MW of WDR awarded in the NSW long-term energy service agreements (LTESA), which is required to be in place by December 2025. In addition, further volumes of WDR are going through the registration process.[35] The prospective increase in data centre load in Australia also provides opportunities for the WDRM to be further utilised.

The benefits modelling, outlined in section 2.1 above, shows that even with the current level of participation, the WDRM is providing benefits greater than its operational costs. If WDR participation increases, the operational benefits would be expected increase as well.

A**lternative mechanisms may not be as accessible for WDRM participants**

Existing WDR participants are unlikely to participate through alternative mechanisms, such as the dispatch mode. This is because the WDRM was specifically designed to facilitate demand response offered by third parties in the wholesale market. If the WDRM was phased out and

32 AEMC, *Wholesale demand response mechanism*, rule determination, 11 June 2020, Chapter 2.

33 AEMC, *Wholesale demand response mechanism*, rule determination, 11 June 2020, pp. 21-28.

34 IES, *Benefit analysis of improved integration of unscheduled price-responsive resources into the NEM, final report,* 24 June 2024. IES, *Benefit analysis of improved integration of unscheduled price-responsive resources into the NEM, sensitivity modelling results*, 8 July 2024.

35 Enel X, submission to the consultation paper, p. 6.

existing participants did not participate in the wholesale market through alternative mechanisms, then this would result in a net reduction in dispatch efficiencies.

Based on future opportunities for the WDRM and the limited ability for existing resources to participate in alternative mechanisms, coupled with the WDRM's net benefits, the Commission recommends that the WDRM continue to be part of the NEM.

2.2.1 Participation in the WDRM has opportunities to continue to grow

While the WDRM has had limited participation to date, there are opportunities for it to continue to increase in participation and provide greater benefits.

The WDRM has been in operation for over four years, during which time it has gained 74 MW of registered WDRUs and delivered 1,258 MWh of response. This participation is below the Commission's expectations of 150 MW in the 2020 final determination; however, it has been growing over time.

The WDRM is being utilised in the NSW LTESA contracts, with 95 MW of WDRM capacity awarded under this and due to be registered by December 2025.[36] Enel X also noted that it has 100 MW of WDR capacity in AEMO's registration pipeline.[37] Furthermore, additional capacity may be realised if sites with multiple connection points are able to participate, see section 2.3 for more information.

In addition to this, demand for data centres, which are suited to participating in the WDRM, is increasing in Australia. Multiple potential new data centre loads larger than 100 MW and up to 600 MW are at the connection enquiry or preapplication phase, and some projects propose to connect within the next two years.[38] Further, AusNet alone has a total pipeline of more than 10 GW of new transmission data centre connections (including projects in early-stage development).[39]

Data centres are suited to participating in the WDRM as they typically have stable load profiles that are well suited to the baseline process. Data centres also typically have uninterruptible power requirements, meaning that they generally only provide a demand response during very high-priced periods. As these are the only periods when providing a response makes financial sense for their operations, this makes the WDRM an attractive participation option.

2.2.2 WDRM participants may not use alternative mechanisms

The WDRM was specifically designed to facilitate demand response offered by third parties in the wholesale market. These factors mean that WDRM participants are unlikely to participate through alternative mechanisms.

The WDRM is the only wholesale market mechanism that facilitates demand response, that is, payment for reducing load. It is also the only mechanism that allows non financially responsible market participants to participate in the energy market. These factors mean that existing WDR participants may face difficulties or a lack of incentives to participate through the IPRR's dispatch mode, or other mechanisms as:

- WDR resources can't participate and be paid in the same manner through dispatch mode. This is because dispatch mode participants are paid based on their actual consumption or generation rather than a demand response relative to a baseline.

36 AEMO Services, Media Release, NSW tender for firming capacity exceeds expectations, 22 November 2023, p. 3. available here.

37 Enel X, submission to the consultation paper, p. 7.

38 AEMC, Improving the NEM access standards - Package 2, Consultation paper, 8 May 2025, p. 17.

39 AusNet, Submission to Draft Electricity Demand Forecasting Methodology, 17 January 2025, p. 3. availabe here.

- To participate in dispatch mode, you need to be the financially responsible market participant (FRMP) for the relevant participating national metering identifier (NMI). This would mean that for any existing WDR participants who would like to participate in dispatch mode, they would likely need to partner with a retailer to utilise the existing WDR resources.
- Dispatch mode participants need to be dispatched for any and all consumption or generation, compared to the WDRM's dispatch only during high-priced intervals.

These limitations were highlighted in submissions, which noted that the variety of flexibility in loads and business models means that dispatch mode may not be able to cater for all loads.[40] Some stakeholders also strongly considered that, given the limited participation in the WDRM and the Commission's move to a two-sided market through establishing a dispatch mode, the WDRM should be phased out.[41]

However, if the WDRM were phased out, existing resources are unlikely to participate through alternative mechanisms, potentially resulting in a net reduction in demand-side resources participating in the market. Further, as dispatch mode is due to commence in 2027, it is too early to cease operation of the WDRM. This is because there is no information about what resources will participate through the dispatch mode and how successful this will be.

2.2.3 WDRM's baseline approach is well-suited to stable loads

The baselining approach used in the WDRM is well-suited to stable loads, as these users inherently have less variability in their consumption. As CER uptake increases and loads become more active, participation from these customers in the wholesale market is likely best facilitated through dispatch mode which does not rely on a baseline methodology to operate.

Baselines are critical to the operation of the WDRM as they determine the quantity of demand response offered into the market. If baselines are set too high, consumers will pay more than they need to. If they are too low, there would not be enough incentive to encourage demand response in the market. The consultation paper sought feedback on whether baselines are appropriate for a future with increasing levels of CER active in the NEM.

Stakeholders outlined mixed views on the suitability of the WDRM with increasing levels of CER, outlining that:

- higher CER penetration is expected to cause higher rates of load volatility, thereby making it harder to predict baselines, hindering the effectiveness of the WDRM[42]
- baselines that take into account this more 'active' energy use can be developed.[43]

The expected increasing levels of CER will make meeting a baseline harder for loads that want to participate in the WDRM. This may be addressed through new baseline methodologies, but all else being equal, it will likely make it harder to meet a baseline and be able to successfully participate in the WDRM.

The Commission considers consumers with CER would be best facilitated in the wholesale market through the IPRR's dispatch mode. For consumers with stable consumption but want to provide demand response in the wholesale market, the WDRM plays an important role in facilitating this.

40 Submissions to the consultation paper; Enel X, p. 1. VIOTAS, p. 5.
41 Submissions to the consultation paper; CS Energy, p. 2. Origin p. 1. EnergyAustralia, p. 1. AGL, p. 2. Alinta, p. 1. Red Energy, p. 1. Engie, p. 1.
42 Submissions to the consultation paper; EnergyAustralia, pp. 3-4. AGL, p. 1. Alinta, p. 4.
43 Submissions to the consultation paper; ECA, p. 5. EEC, p. 8. Enel X, p. 10. JEC, pp. 8-9.

2.3 Participation at sites with multiple connection points should be investigated

The Commission's second draft recommendation is that the pending rule change request to allow sites with multiple connection points to participate in the WDRM be initiated. Progressing this request should uncover if the proposal:

- has the possibility to unlock significant MW's of participation immediately
- can facilitate participation from new large loads that may connect
- does not require material changes to the existing WDRM dispatch, settlement or retailer billing systems.

This draft recommendation to initiate the pending rule change should not be interpreted as the Commission's endorsement of the proposal, but rather recognition that the proposal raises issues and a potential solution that should be further explored through a rule change process.

2.3.1 Stakeholders supported including sites with multiple connection points

The consultation paper called for stakeholder feedback on whether sites with multiple connection points should participate in the WDRM and what impact it could have on participation.

Customers that comprise a single connection point are eligible to be classified as a WDRU to participate in the WDRM.[44] In April 2022, Enel X submitted a rule change request proposing to allow sites with multiple connection points to participate in the WDRM.

Several stakeholders supported expanding the WDRM to sites with multiple connection points.[45]

Submissions primarily focused on the restriction this causes for signing up commercial and industrial loads. Enel X estimated that there is 300 MW of commercial and industrial flexible demand unable to participate due to this restriction and making this change would immediately enable 100 MW of WDR response to be registered.[46]

EnergyAustralia did not support extending the WDRM to facilitate multiple connection points, citing concerns of:[47]

- load may be shifted between connection points to 'game' the mechanism
- increased complexities in the baseline process leading to a further expansion of different baseline methodologies
- uncertainty on how multiple connection points would create additional value for the customer.

2.3.2 Next steps to consider sites with multiple connection points

The Commission's draft recommendation is to initiate the pending rule change request to fully consider the costs and benefits of allowing sites with multiple connection points to participate in the WDRM. The rule change process should be initiated in 2026. This recommendation does not advocate that the proposed rule change be made, just that the request should be assessed.

Given the limited benefits of the WDRM, outlined in section 2.1.2, the Commission is hesitant to recommend changes that involve significant expenditure or complexity. Expanding the WDRM to sites with multiple connection points could unlock new participation while also allowing for future

44 Clause 2.3.6(m)(1)(i) of the NER.
45 Submissions to the consultation paper; Enel X, pp. 8-9. ECA, p. 4. EEC, p. 7. VIOTAS, p. 4. JEC, p. 21.
46 Enel X, submission to the consultation paper, p. 9.
47 Energy Australia, submission to the consultation paper, p. 4.

participation from new large loads, such as data centres. As this option does not propose material changes to the dispatch or retailer billing systems, it minimises potential costs and complexities in its implementation.

The Commission acknowledges that this request is not without some degree of complexity, as highlighted by EnergyAustralia. However, we consider that there is merit in fully assessing these complexities through a rule change process to determine their materiality and compare against the potential benefits.

2.4 Expanding the WDRM to facilitate two-way demand response

The Commission does not consider that the WDRM should be expanded to include two-way demand response. This is because two-way response does not appear to be compatible with the WDRM due to the limited instances of sufficiently negative prices to incentivise increases in customer consumption, limiting its effectiveness.

2.4.1 Stakeholders suggested that the WDRM change to a two-way mechanism

ECA and JEC suggested the WDRM could be used for 'two-way' demand response, which would encourage customers to consume more during negative prices, which could help to mitigate minimum system load (MSL) events.[48] In its view, JEC considered that it is very likely that a mechanism that enabled this would return more benefits to consumers than it costs.

MSL conditions are driven by low regional load and high rooftop PV exports. Under these conditions, situations may occur where the output from rooftop PV and minimum generation requirements exceed interconnector capabilities, creating risks to system security.[49]

2.4.2 The WDRM is not suited to address MSL conditions

The Commission does not recommend that the WDRM be expanded at this time to include two-way demand response.

Utilising the WDRM to encourage customers to increase load initially appears to be conceptually similar to the existing design, implying that it may not require significant changes to implement. The key elements of the WDRM design, such as baselining, dispatch and settlement could be maintained.

To use the same settlement approach for a two-way WDRM, participating customers would purchase more energy from their retailer, which would need to be offset by a negative wholesale price. The ACCC previously estimated commercial and industrial customers' retail prices at 15.7 c/kWh, which, adjusted for inflation, is approximately 20 c/kWh.[50] This indicates that the wholesale price would need to be less than -$200/ MWh to offset the increased retail costs alone.

However, it appears that prices at such low levels do not occur very frequently. Over the past three and a half years, spot prices below -$200/MWh are typically clustered between -$200 and -$400, primarily in the South Australian and Victorian regions. See appendix B for further detail. Based on these observed negative price outcomes, it is unlikely that there would be enough periods of sufficiently negative prices to offset the additional retail costs and encourage loads to consume more than their baseline amount.

48 Submissions to the consultation paper, ECA, p. 7. JEC, p. 20.

49 Further information on how AEMO manages MSL conditions is available here.

50 ACCC, *Retail Electricity Pricing Inquiry—Final Report*, June 2028, p. 30.

As a result, while conceptually it may appear that the WDRM could be adjusted to include two-way responses and potentially alleviate MSL conditions, the potential benefits are limited. Having regard to this analysis, the Commission does not consider that the suggested change to the WDRM is warranted.

3 The WDRM should maintain its current form

The consultation paper identified several potential changes to the design of the WDRM that could increase its participation and effectiveness. The Commission has considered stakeholder views and carried out its own analysis and has decided not to recommend implementation of these changes. This chapter discusses each of the potential changes in turn:

- Allowing portfolios of resources to be baselined and participate in the WDRM (section 3.1)
- Expanding the WDRM to small customers (section 3.2)
- Facilitate network voltage management in the WDRM (section 3.3)
- Changing the FCAS cost recovery arrangements for DRSPs (section 3.4)
- Changing the methodology of the WDRRR (section 3.5)
- AEMO's baseline development and DNSP endorsement processes (section 3.6)

3.1 Applying baselines to portfolios of resources

Several stakeholders suggested allowing portfolio-level baselines-would improve participation in the WDRM, This section sets out:

- stakeholder submissions recommending portfolio level baselines for the WDRM
- the Commission's reasons for not progressing this change.

3.1.1 Stakeholders suggested allowing portfolio-level baselines would increase participation

The Energy Efficiency Council (EEC) and Enel X suggested that WDR aggregations should have their eligibility assessed at a portfolio level rather than at an individual connection point, stating that this would facilitate greater participation.[51]

The EEC highlighted that in other jurisdictions, accuracy thresholds are commonly applied at a portfolio level. Meaning that while an individual site may not meet the threshold, the aggregate impact of the multiple sites in the portfolio does meet the threshold.

The ECA and the JEC suggested a portfolio approach would also allow small customer participation in the WDRM.[52] The Commission's consideration of small customer participation is outlined in section 3.2 below.

3.1.2 The WDRM should not be extended to portfolio-level baselines

The Commission does not consider that the WDRM should be expanded to portfolio-level baselines, given its potential implementation complexity and costs.

The WDRM uses NMI-level baselines so that each participating customer's retailer (or FRMP) is charged an appropriate baseline amount to fund WDR dispatch. The alternative portfolio-level approach would require creating a methodology for apportioning the portfolios' baseline to each NMI such that the relevant FRMP can fund the WDR dispatch. This new methodology would also be used to apportion the WDRRR.

Creating such a methodology would be complex, contentious and potentially costly as:

- For portfolios with multiple retailers, some FRMPs would be paying more for the WDR dispatch while others would be paying less, depending on the variability of resources in the portfolio. In

51 Submissions to the consultation paper; Enel X, p. 10. EEC, p. 10.

52 Submissions to the consultation paper; ECA, p. 6. JEC, p. 20.

addition, the methodology would need to be tested to ensure that retailers do not encounter unintended issues in managing and understanding the risk level of their portfolio of resources participating in the WDRM.

- Implementing this methodology may be costly, requiring new AEMO procedures and changes to AEMO's settlement systems and potentially participant billing systems. This cost would be incurred with portfolios under a single retailer or across multiple retailers.

Submissions did not provide an indication of the materiality that this suggested change could have on participation in the WDRM to enable analysis of the potential benefits.

The Commission acknowledges that the behaviour of portfolios of resources is typically easier to forecast than individual sites, as is the case with demand forecasting currently. Given the complexity of establishing and utilising this approach for the WDRM and uncertainty on how material the benefits would be, the Commission does not consider that this approach should be progressed further.

Furthermore, dispatch mode provides a pathway for portfolios of responsive resources to participate in NEM dispatch. This is explored further in section 3.2.2 below.

Aggregated site-level baselines, where the site has multiple connection points and a common retailer, may be explored in the *Expanding eligibility under the WDRM* rule change process. This request proposed that each NMI would belong to the same retailer, reducing the complexity outlined above.

3.2 Facilitating small customer participation in the WDRM

Some stakeholders suggested that residential, small business and small commercial loads should be allowed to participate in the WDRM. However, other stakeholders disagreed. This section describes:

- stakeholder feedback on facilitating small customers in the WDRM
- the Commission's reasons why the WDRM should not be extend to include small customers.

3.2.1 Stakeholders views on expanding the WDRM to small customers

Three stakeholders suggested that residential, small business and small commercial loads should be allowed to participate in the WDRM.[53]

The ECA and EEC considered that flexible or controllable residential loads such as pool pumps, hot water heating, and smart electric vehicles (EV) are well suited to the WDRM.[54] This is because these load types have less uncertainty than uncontrolled loads.

JEC and EEC noted that providing aggregated baselines for small customers could help meet accuracy thresholds for smaller loads, facilitating their participation in the WDRM.[55] The Commissions analysis and decision for aggregated baselines is covered in section 3.1.2 above.

The EEC was confident that the Commissions previous reasons in the 2020 final determination for not including small customers in the WDRM could be managed, such as:

- the consumer protection risks can be managed as Australian Consumer Law already provides the key consumer protections people need for demand response

53 Submissions to the consultation paper; JEC, p. 20. ECA, p. 5. EEC, p. 7.
54 Submissions to the consultation paper; ECA, p. 5. EEC, p. 7.
55 Submissions to the consultation paper; JEC, p. 20. EEC, p. 7.

- the risk of distortionary behaviour for small customers is low and could be managed through a robust baseline methodology.

However, JEC also acknowledged that amending the WDRM to facilitate small customers would require changes to the definition of qualifying loads and related changes regarding baselining, settlement, and careful consideration of customer protections.[56]

EnergyAustralia objected to any consideration to include small customers, highlighting similar concerns to those expressed regarding the potential expansion of the WDRM to multiple connection points. Their concerns included that further investment by AEMO and industry into the WDRM is not warranted and complexity and accuracy issues regarding baselining small customers.[57]

3.2.2 Small customer market participation is best facilitated through other mechanisms

The Commission does not consider that changes should be made to facilitate small customer participation in the WDRM. Instead, small customers' participation in the wholesale market is best facilitated through the mechanisms introduced through the combination of the recent IPRR and CER benefits rule changes.

Small customers are not best suited to the WDRM design

Small customer participation was considered in the original rule change process, with the Commission concluding that small customers are not suited to the WDRM as:[58]

- the form of demand response typically used with small customers, behavioural demand response, is not suited to being scheduled
- centrally determined baselines have not been demonstrated to work well for small customers
- there is a risk that relying on centrally determined baselines for small customers will lead to distortionary behaviour
- there would likely be significant additional costs and complexity associated.

These issues and concerns remain relevant. Accordingly, the Commission maintains that small customers are not best suited to the WDRM design. As acknowledged by stakeholders, batteries, pool pumps, hot water heating, and smart electric vehicle charging have more certainty than uncontrollable loads. However, because these loads can be easily adjusted to consume at different times of day, they are difficult to accurately baseline for the purposes of the WDRM.

For example, the charging regime of an electric vehicle will be highly dependent on a number of variables relating to the use of that vehicle, such as how far the car has been driven and when it is plugged in. Similarly, the use of a pool pump varies with factors such as whether it is indoor or outdoor, pool size and season. This makes developing accurate baselines for electric vehicles and similar controllable loads very difficult.

Aggregating small customer loads reduces this inherent variability and makes the aggregate load easier to predict, similar to how demand forecasting is currently done in the NEM. However, the settlement model for the WDRM relies on baselines being determined at individual NMIs. As noted in section 3.1.2, the Commission does not consider that this approach should be developed further.

56 JEC, submission to the consultation paper, p. 20.
57 Energy Australia, submission to the consultation paper, p. 4.
58 AEMC, Wholesale demand response mechanism, rule determination, 11 June 2020, pp. 74-86.

There is still a risk that relying on centrally determined baselines for small customers will lead to distortionary behaviour. This behaviour arises because controllable loads can be changed without a material impact on the customer (unlike larger commercial loads), and because the baseline methodology does not include an adjustment to account for this behaviour.

In addition to small customer unsuitability and the distortionary behaviour risks, facilitating small customers would require significant implementation costs for the AEMO and retailers.[59] This is because if AEMO and retailer systems are required to account for a greater number of customers, the complexity and costs of those systems to operate the WDRM would significantly increase.

We have not attempted to quantify this risk or contrast it against the benefits of the increased participation from small customers. The Commission considers that the complexity, risks and cost of incorporating small customers in the WDRM in light of the small benefits to date, does not justify increased expenditure and consideration of small customer participation in the WDRM.

The recent two-sided market reforms best facilitate small customer participation

The recent two-sided market reforms provide the best opportunity for facilitating small customers in the wholesale market. The CER benefits and IPRR rule change requests have progressed two-sided market arrangements and provided a flexible and robust participation pathway for small customers.

The CER benefits final rule enables energy service providers for small customers to separate and manage 'flexible' CER from 'passive' loads by establishing secondary settlement points in the energy market. This separation allows more innovative products and services to be offered to customers. The final rule also allows the use of in-built measurement capability in technology such as batteries and electric vehicle chargers to enable innovative and essential products and services at a lower cost.[60]

The IPRR rule introduced a framework named 'dispatch mode' that allows currently unscheduled price-responsive resources to be scheduled and dispatchable in the NEM, in aggregations or individually.[61] This allows aggregations of resources, such as electric vehicles and household batteries, to bid into the spot market, set prices, receive dispatch instructions and earn revenue in markets that require scheduling (for example, regulation FCAS). This framework operates similarly to the bidirectional unit framework, which allows bids for both generation and load. By using actual generation or load, baselines are not required for the resources participating.

This new dispatch mode caters for portfolios of resources to be aggregated together. This will allow virtual power plants and other aggregated price-responsive small resources to compete with large-scale generators and storage. As noted by stakeholders above, flexible or controllable resources would be suited to this type of response.

Through the combination of these two reforms, small electricity users can participate in the NEM if they wish, enabling the NEM to become a more inclusive two-way market.

3.3 Participating in the WDRM using network voltage management

Endeavour Energy suggested allowing network voltage management to participate in the WDRM. This section sets out:

59 AEMC, *Wholesale demand response mechanism*, rule determination, 11 June 2020, p. 84

60 AEMC, *Unlocking CER benefits through flexible trading*, rule determination, 15 August 2024, p. i.

61 AEMC, *Integrating price-responsive resources into the NEM*, rule determination, 19 December 2024, p. iv.

- Endeavour Energy's suggestion to enable voltage management technology to participate in the WDRM
- the Commission's reasons that the WDRM should not be expanded to include network voltage support at this time.

3.3.1 Endeavour's suggestion to include network voltage management in the WDRM

Endeavour Energy's submission outlined a suggestion to use voltage management technology, typically referred to as network voltage control, as a means to participate in the WDRM.[62] Endeavour outlined that this would be an efficient and low-cost solution to increase participation in the WDRM.

Endeavour noted that the NER is not flexible enough to accommodate demand response using network assets, but some pragmatic changes could address this. Endeavour suggested that AEMO be given more flexibility under the NER to approve alternative WDRM approaches and technologies. This flexibility would be subject to a set of principles the AEMC could stipulate in the NER, such as the accuracy of demand response measurement, system security and practicality.[63]

Endeavour considered that this approach would both facilitate wider participation in the WDRM and standardise the arrangements, creating efficiencies should other distribution network service providers seek to provide WDRM services. If, according to Endeavour, further additional types of demand response not contemplated by the current WDRM framework were to emerge, AEMO could similarly expand the guidelines upon request to enable this additional participation.[64]

Endeavour highlighted that it has agreements for the provision of RERT utilising a voltage and demand management approach. It has also commenced discussions with AEMO to see whether these similar arrangements might be workable for providing WDRM services.[65]

3.3.2 The WDRM should not be expanded to include network voltage management

The Commission does not consider that the WDRM should be expanded to include network voltage management due to potential implementation complexity and costs. Further details provided to the Commission were confidential; as such, this assessment reflects the public information.

The Commission recognises that network voltage management is a proven technology to reduce load. However, several complexities would need to be addressed to enable its successful application to the WDRM, these include:

- how the baseline amount would be proportioned to retailers downstream of the network area registered as participating in the WDRM
- the systems and procedures needed to ensure that there are no cross-connections to other areas of the relevant distribution network or a connected network

To facilitate network assets in the WDRM, the baseline amount would need to be apportioned to each retailer downstream of the transformer. Similar to portfolio level baselines discussed in section 3.1, this would likely be complex, contentious and potentially costly. If this detail were to be determined through an AEMO guideline, as suggested by Endeavour, the Commission would need further information to assess this approach. This is so that the risks can be fully considered

62 Endeavour Energy, Submission to the consultation paper, p. 2.
Additional information was provided in a confidential section of this submission as well as a confidential appendix.

63 Endeavour Energy, submission to the consultation paper, p. 2.

64 Endeavour Energy, submission to the consultation paper, p. 2.

65 Endeavour Energy, submission to the consultation paper, pp. 2-3.

by the Commission and stakeholders before making a determination on whether determining baselines for network assets could be delegated to AEMO.

Systems and procedures between AEMO and the distribution network service providers (DNSPs) would also need to be established to ensure that downstream of the transformer, participating there are no other connections to other parts of the network. This is to ensure that the participating load is not simply being shifted to other transformers on the network while gaining the benefits of the WDRM. For instance, if load was shifted to other transformers, then this could show a demand response occurring at the participating transformer when no reductions in load have actually occurred.

In addition to these complexities, Endeavour has provided some confidential information about how many MW of participation this would unlock and the magnitude of the costs associated with this change. However, as the information is confidential, the Commission has not been able to test this with other stakeholders and so the potential impact of the suggested change is difficult to gauge. As a result, the Commission is not able to recommend that the WDRM should be expanded to include network voltage management at this time.

The Commission has engaged with Endeavour on its suggestion since the close of submissions and is open to continuing this dialogue to assist in determining whether DNSP voltage management activities are an appropriate and feasible inclusion in the WDRM.

3.4 Extending FCAS cost recovery to DRSPs

This section describes:

- stakeholder feedback on DRSP exclusion from FCAS cost recovery
- the Commission's reasons for considering that DRSPs should continue to be excluded from the systems and processes for FCAS cost recovery.

3.4.1 Stakeholders supported DRSP exclusion from FCAS cost recovery

The consultation paper sought feedback on whether DRSPs should continue to be excluded from regulation and contingency FCAS costs, and if not, how they could be incorporated into the FCAS cost recovery process. Stakeholder feedback generally supported the continued exclusion of DRSPs from both regulation and contingency FCAS cost recovery.

Regulation FCAS cost recovery

Stakeholders broadly agree that DRSPs should continue to be excluded from regulation FCAS costs:

- The Energy Efficiency Council (EEC) argued that the system benefits delivered through the WDRM, including better visibility and dispatchability of price-responsive loads and reducing regulation FCAS costs by more efficient real-time modelling of regulation FCAS requirements, provide a strong case for exclusion.[66]
- AEMO outlined that adding DSRPs into the causer pays process would add cost and complexity to implement in AEMO's settlements. This would be due to the different data granularity requirement for Wholesale Demand Response Units (WDRUs) compared to other market participants[67]

66 EEC, submission to the consultation paper, p. 9.

67 AEMO, submission to the consultation paper, p. 4.

- Enel X stated that they have no major objections to being exposed to FCAS costs, but suggested that greater market and consumer benefits would be derived if AEMO invests in changes that facilitate increased participation in WDRM instead of implementing FCAS cost recovery.[68]

EnergyAustralia, argued that DRSP exclusion from FCAS costs could undermine the market's efficiency in the longer term. It questioned whether there are sufficient incentives for DRSPs to minimise adverse impacts on the system, which could undermine a level-playing field between participants.[69]

Contingency FCAS cost recovery

Similar to the above sentiment on regulation FCAS cost recovery, stakeholders agreed that DRSPs should continue to be excluded from contingency FCAS costs.[70]

AEMO agreed DRSPs should be excluded from contingency FCAS cost recovery as:[71]

- there is a low likelihood of WDR resulting in a low frequency event and therefore costs should not be recovered from these loads
- excluding DRSPs from contingency lower costs reduced the implementation costs by allowing the settlement process for DSRPs to be undertaken separately from settlement for other market participants.

AEMO noted that if WDRM participation increases significantly, it may be prudent to review whether the current exemption remains applicable.

3.4.2 DRSPs should continue to be excluded from FCAS cost recovery

The Commission considers that DRSPs should remain excluded from regulation and contingency FCAS costs. This reflects stakeholder views and our assessment that including DRSPs in these processes would bring costs and complexities in excess of their benefits.

Regulation FCAS cost recovery

DRSPs are excluded from regulation FCAS cost recovery processes, as the method for determining contribution factors is not workable in the context of the WDRM. FCAS costs are apportioned from participants' contribution factors which rely on four-second data from SCADA systems. [72] This method for determining contribution factors is not workable for WDRUs as these units do not have to provide data at the specific data granularity. As such, significant changes would need to be made to the causer pay process to factor in DRSPs.[73]

The Commission considers that DRSP exclusion from FCAS cost recovery processes remains appropriate for the foreseeable future. This is because the costs of changing to include DRSPs would outweigh the associated benefits due to the complexity required to make this change, coupled with the low participation in the WDRM to date.

68 Enel X, submission to the consultation paper, p. 8.
69 EnergyAustralia, submission to the consultation paper, p. 3.
70 AEMO, submissions to the consultation paper, p. 4.
71 AEMO, submission to the consultation paper, p. 4.
72 Clause 3.15.6A of the NER. AEMO, *Regulation FCAS contribution factor procedure*, 14 September 2022.
73 AEMC, *Wholesale demand response mechanism*, rule determination, 11 June 2020, p. 145.

Contingency FCAS cost recovery

Contingency FCAS is used to provide balancing reserves to respond to large frequency deviations, typically from contingency events such as the trip of a large generator or load.[74]

The Commission considers that DRSPs continue to be excluded from contingency FCAS cost, due to the following reasons:

- WDRU operation is unlikely to result in a low frequency contingency event and hence triggering the need to use contingency raise FCAS. As such, these costs should not be recovered from these loads.
- Consumers comprising a WDRU already indirectly pay for contingency FCAS costs through their retailer. Therefore, having DRSPs pay for contingency FCAS costs could result in an over-allocation of FCAS contingency costs.

In addition, including DRSPs in contingency FCAS cost recovery would not be at a zero cost, as this would likely require changes to AEMO, DRSP and potentially retailer billing systems. Given the low participation of the WDRM to date, additional expenditure to incorporate DRSPs is not warranted.

3.5 Determining the retailer reimbursement rate

This section describes:

- stakeholder feedback on the methodology to determine the level of the WDRRR
- the Commissions reasons that the current methodology used to determine the WDRRR should be retained.

3.5.1 Most stakeholders support retaining the current WDRRR calculation

The consultation paper asked whether the wholesale demand response reimbursement rate (WDRRR) appropriately reflected the wholesale costs of an average large customer's retail tariff. The paper also sought feedback on whether an alternative methodology would better reflect this and, if so, how it could effectively be implemented.

The WDRRR is currently calculated as the peak period load weighted average spot price over the 12-month period ending immediately before the start of the quarter.[75]

The WDRRR allows the retailer for the WDRU to cover its costs of hedging for the customer's baseline level of consumption in the wholesale market. To appropriately compensate the retailer, the WDRRR aims to reflect the wholesale cost component of an average large customer's retail tariff.

Most stakeholders agreed that the level of the WDRRR is calculated appropriately. For example:

- Enel X supported determining the WDRRR using information that has broad public access, with minimal risk of distortions arising from illiquid markets with poor price discovery. It expressed support for the current arrangement where WDRRR is calculated as the peak period load weighted average spot price over the 12-month period ending immediately before the start of the quarter.[76]
- JEC noted that it sees no reason to change the level of the WDRRR.[77]

74 AEMO, *Guide to ancillary services in the National Electricity Market*, 8 June 2025, available here.
75 Clause 3.15.6B(g) of the NER.
76 Enel X, submission to the consultation paper, p. 8.
77 Justice and Equity Centre, submission to the consultation paper, p. 2.

- EEC agreed that the calculation of the WDRRR should remain, but noted that any future revision to the WDRRR should aim to minimise the risk of 'wealth transfers' between DRSPs and retailers stemming from inaccurate definitions of 'peak periods' balanced by implementation complexity.[78]

EnergyAustralia outlined that the WDRRR will also likely be inaccurate in virtually all scenarios given retailers' approach to price risk and hedging is extremely diverse and different.[79] Suggesting that if there were a material uptake of WDRM, retailers may begin to hedge in line with the WDRRR methodology, removing competitive differentiation.

Shell Energy shared a similar view, claiming that WDRRR will always be a rough approximation because of the bespoke nature of large customer contracts. As a result, the WDRRR is highly unlikely to completely match the wholesale costs any large customer actually pays. Therefore, in Shell Energy's view, the rate does not need to be right, as much as it needs to be the least wrong.[80]

Red Energy claimed that the current calculation raises financial exposure for retailers with large customers whose contracts permit them to reduce peak demand. This is because the WDRRR is based on a rolling average of wholesale spot prices in the previous 12 months during peak demand periods instead of peak forward prices reflecting the periods demand response would be provided.[81]

3.5.2 The WDRRR methodology is appropriate

The Commission considers that the current WDRRR methodology is appropriate and should remain in place, as the complexity and limitations of the alternative methodologies do not justify a change.

At the time of implementing the WDRM in 2020, the Commission considered four other WDRRR methodologies before choosing the current method:[82]

1. rolling average of wholesale prices over the previous 12 months
2. rolling average of peak ASX futures contract prices over the previous 12 months
3. quarterly peak ASX contract prices traded in the 20 business days immediately prior to the beginning of the quarter in which the demand response is provided, multiplied by a risk weighting of 1.1
4. rolling average of base ASX futures contract prices over the previous 12 months.

The current methodology was preferred, due to trade-offs against limiting factors, such as: [83]

- contract market liquidity issues in South Australia present challenges for methodologies that utilise forward contract prices
- there is no clear or transparent basis on which an appropriate "risk weighting" can be determined for the purposes of method 3 (as listed above)
- retail tariffs of large customers are generally complex and incorporate peak rates to account for variations in load profile, particularly where the customer has high levels of consumption during peak demand periods

78 EEC, submission to the consultation paper, p. 9.
79 EnergyAustralia, submission to the consultation paper, p. 3.
80 Shell Energy, submission to the consultation paper, p. 3.
81 Red Energy, submission to the consultation paper, p. 2.
82 AEMC, *Wholesale demand response mechanism*, rule determination, 11 June 2020, pp. 205-206.
83 AEMC, *Wholesale demand response mechanism*, rule determination, 11 June 2020, pp. 209-210.

- while options for calculating the reimbursement rate may yield incremental improvements inaccuracy, they may also add significant complexity to the process of determining the rate
- the average demand-weighted spot price during peak demand periods provides a simple, transparent and objective reference point to approximate the wholesale cost component of the average retail tariff.

While changes to the WDRRR could marginally improve its accuracy, the complexity and limitations of the alternative methodologies considered when drafting the 2020 final rule do not justify a change.[84]

3.6 Baseline development and DNSP endorsement

This section sets out:

- stakeholder submissions outlining concerns with the baseline development and DNSP endorsement processes
- the Commission's reasons that these issues are best considered through the existing AEMO consultation processes.

3.6.1 Stakeholder concerns with the baseline development and DNSP endorsement processes

The consultation paper sought feedback on whether improvements could be made to the baselining process. Stakeholders suggested changes to the baseline development process and highlighted issues with the DNSP endorsement process.

Baseline development process

AEMO is required to outline the process for developing new baselines, including how proposals for new baselines may be made. This current process outlines timeframes for AEMO to respond and includes a round of public consultation.[85]

Stakeholders suggested that the process for developing new baselines could be improved by:

- subjecting AEMO to timeframes in the rules to deal with requests for new baselines[86]
- streamlining the process for developing new baselines by allowing market participants to work directly with AEMO, rather than requiring consultation.[87]

Enel X suggested that changes be made to exclude 'low load' days in Predictability of Load eligibility tests. It stated that this restriction impacts large 'bimodal' loads, which are loads that are typically characterised by consistent consumption interrupted by process shutdowns.[88]

Enel X further clarified that low load automatic exclusion days are present in eligibility criteria of well tested baseline methodologies employed in many North American markets including PJM and CAISO.[89] PJM addresses this 'bimodal' behaviour in eligibility assessments by the application of an automatic exclusion when energy consumption drops to less than 25% of average daily consumption. Recognising that the load would not be participating in a flexible demand program under low load conditions.

84 AEMC, *Review of the Wholesale Demand Response mechanism*, consultation paper, p. 14-15.

85 AEMO, *Wholesale demand response guidelines,* 24 June 2021, p. 13.

86 JEC, submission to the consultation paper, p. 20.

87 EEC, submission to the consultation paper, p. 10.

88 Enel X, submission to the consultation paper, p. 10.

89 Enel X, submission to the consultation paper, p. 10.
The Pennsylvania-New Jersey-Maryland market (PJM) and California Independent System Operator (CAISO) both have market mechanisms that facilitate demand response.

Enel X stated that this limitation could be readily addressed with small changes to WDRM eligibility and compliance systems with no impact on settlement.

DNSP endorsement of aggregations

The NER specify that AEMO must approve applications for aggregation, with the details on this process covered in the WDR guidelines.[90] During consultation on this guideline, the risk of voltage issues in distribution networks was raised due to the synchronised aggregate response of multiple WDRUs in a localised area of a distribution network.[91] Based on these risks, AEMO included a requirement that proposed aggregations have been endorsed by the relevant DNSP.[92]

Enel X and the EEC outlined that the DNSP endorsement process is dysfunctional and unjustified, as other flexible demand programs are not obligated to seek DNSP endorsement of their flexible demand portfolios.[93]

Enel X's further clarified that endorsement models are restrictive and can require re-endorsement for an additional fee for any changes to the NMIs included in the aggregation. Enel X outlined that they have found it easier to register multiple WDRU aggregations below the 5MW threshold and incur the once-off WDRU classification fee ($12,650) multiple times.[94] Foregoing the portfolio efficiency benefits of larger aggregations tailored to deliver specific characteristics and optimise dispatch participation.

3.6.2 Baseline development and DNSP endorsement processes are being considered by AEMO

The Commission considers that the baseline development and DNSP endorsement issues are best addressed through existing consultation processes with AEMO. This is because the baseline development and DNSP endorsement processes are contained within AEMO guidelines, and AEMO has already committed to reviewing these.

The issues raised by stakeholders were also raised during AEMO's recent consultation on Enel X's baseline proposal, with AEMO's final report outlining that it will review:[95]

1. the DNSP endorsement process, including consulting with DNSPs and other stakeholders on the process
2. the baseline methodology proposal and assessment process to determine whether it remains fit for purpose or if adjustments are required.

The AEMC has engaged with AEMO since the close of submissions and understands that AEMO has commenced work on the further consultation, including initiating discussions with DNSPs. The Commission considers that the issues raised in submissions are best addressed through this consultation process with AEMO, as:

- the DNSP endorsement process is a requirement under AEMO's guidelines and is best consulted on with AEMO
- low-load exclusion days can be considered through the existing baseline development process
- AEMO has self-imposed timeframes in their guidelines, and concerns on timing can first be addressed with AEMO before a rules solution is considered.

90 Clause 3.8.3(b2)(4) of the NER.
91 AEMO, *Wholesale demand response guidelines draft determination*, 21 January 2021, pp.17-18.
92 AEMO, *Wholesale demand response guidelines*, 25 March 2021, p. 7.
93 Submissions to the consultation paper; Enel X, p. 5. EEC, p. 7.
94 Enel X, submission to the consultation paper, p. 5.
95 AEMO, *EnelX baseline methodology proposal*, December 2024, p.4.

In addition, the consultation process for new baselines is important to test the efficacy and risks of any new methodology with broader stakeholders. Based on this, the baseline development process should not be removed, as suggested by the EEC.

The Commission encourages AEMO and stakeholders to collaboratively engage on these issues through AEMO's review process. The review process can also consider whether similar principles outlined in the voluntarily scheduled resource guidelines could guide discussions.[96] For instance, AEMO and stakeholders could consider whether the baseline development and DNSP endorsement processes:

- facilitate the ease of participation in central dispatch by WDRUs
- apply restrictions on WDRUs only to the extent reasonably necessary for DNSPs to manage their network.

96 Clause 3.10A.3(d) of the NER.

4 The draft recommendations contribute to the energy objectives

In conducting reviews, the Commission must have regard to the relevant energy objectives.[97] For this review, the relevant energy objective is the national electricity objective (NEO) which is:[98]

> to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system; and
>
> (c) the achievement of targets set by a participating jurisdiction—
>
> (i) for reducing Australia's greenhouse gas emissions; or
>
> (ii) that are likely to contribute to reducing Australia's greenhouse gas emissions.

The targets statement, available on the AEMC website, lists the emissions reduction targets to be considered, as a minimum, in having regard to the NEO.[99]

4.1 The draft recommendations are consistent with the NEO

The Commission used an assessment framework to guide making its draft recommendations and that they promote the long term interests of consumers.

The following criteria, as described in section 4.2.2 of the consultation paper, were relevant:

- principles of market efficiency
- outcomes for consumers
- implementation considerations
- principles of good regulatory practice.

Stakeholders broadly agreed with the proposed assessment framework but suggested that the criteria be expanded to consider emissions reductions and the value of consumer choice.[100] The Commission has considered these suggestions and has concluded that the suggested criteria are covered under the existing criteria:

- The WDRM modelling, outlined in section 2.1, includes an assessment of emissions reduction benefits that the Commission has considered alongside the efficiency benefits.
- Benefits of greater consumer choice are included in the competition aspect of market efficiency and the outcomes for consumer criteria, which is discussed below.

4.1.1 The WDRM has resulted in more efficient dispatch outcomes

Our draft recommendations recognise that the WDRM has resulted in more efficient dispatch outcomes.

97 Section 32 of the NEL.
98 Section 7 of the NEL.
99 Section 32A(5) of the NEL.
100 Submissions to the consultation paper: ECA, p. 7. Enel X, p. 12. VIOTAS, p. 5.

A central aim of the WDRM is to provide appropriate incentives to facilitate demand response within central dispatch to maintain productive and allocation efficiency. We have assessed the WDRMs against their impact on efficient market outcomes and competition benefits, outlined in detail below.

Efficiency

The WDRM has avoided dispatching more expensive generation when the supply-demand balance is tight, leading to efficient clearing of the spot market. We have estimated that the WDRM has resulted in $4.7 million in dispatch cost efficiencies. Recommending continuing the operation of the WDRM should lead to the least-cost combination of resources to meet demand over the long term. This should result in reduced costs that are recovered from all consumers.

Wholesale demand response has also reduced spot prices by $219.3 million, reducing the total costs of supplying consumers' demand for electricity. We have not included the lower energy prices in our assessment as these are wealth transfers from generators to consumers. These benefits, while small in the context of the NEM, have put downward pressure on wholesale prices, with average price savings of $27.83/MWh during WDR dispatch.

Competition

The WDRM, by nature of its existence, promotes increased consumer choice for demand response offers by allowing a specialist third-party to monetise their capability. While difficult to clearly observe, this competition effect may have promoted retailers to offer more contracts with demand-responsive aspects.

While retailers are increasingly offering contracts with demand response components, the impact of the WDRM in driving these offers is uncertain. Nevertheless, the WDRM may have helped to improve competition and provide an alternative pathway for some customers to participate in the wholesale market.

4.1.2 Our recommendations promote better outcomes for consumers

Our draft recommendation that the WDRM continue operating recognises that it provides price signals, incentives and opportunities for consumers to invest in responsive loads and use these assets in the wholesale market.

The WDRM focuses on large customers who do not have an incentive under their current retail arrangements to respond to market signals. Recommending the WDRM continue allows these customers to be used in the market, where they would not have been utilised in the absence of the mechanism. This results in consumers being rewarded for their flexibility and the market benefits from more efficient price-setting.

4.1.3 We have considered the costs of implementing changes to the WDRM

In making our draft recommendations, we have closely considered the costs of implementing changes to the WDRM framework. Given the WDRM's limited benefits to date, the Commission has considered targeted changes that do not involve significant expenditure or complexity, which have the potential to significantly improve participation.

The draft recommendation to initiate the *Expanding eligibility under the WDRM* rule change reflects this, as it has the potential to immediately allow new participation and does not propose material changes to the WDRM design. Progressing this request through the rule change process will determine the materiality of these benefits and compare them against the potential costs.

This draft recommendation is not the Commission's endorsement of the proposal, but rather that it raises issues and a potential solution that should be further explored through a rule change process.

The consultation paper and stakeholder submissions also identified several potential changes to the WDRM's design that could increase participation and effectiveness. Chapter 3 outlines stakeholder views and the Commission's analysis and conclusion that, based on the potential costs, benefits and complexity, these further changes to the WDRM are not warranted at this time.

In making our draft recommendation to retain the WDRM, we have also considered the potential costs and complexity of removing the mechanism. Removing the WDRM would involve expenditure from AEMO, retailers and DRSPs to remove systems and processes that facilitate the WDRMs operation. Consideration would also need to be given to the WDR capacity awarded through the NSW LTESA contracts, NSW peak demand reduction scheme (PDRS) contracts awarded to WDRM or any out-of-market contracts that may underpin WDR participation.

Based on the net operational benefits the WDRM is providing, the Commission has not sought to quantify these costs. However, our draft recommendation that the WDRM should continue takes into account its current benefits, as well as the potential costs and complexity involved with removing it.

4.1.4 Continuing the WDRM promotes certainty in the regulatory framework

Our draft recommendations promote certainty for participants by clarifying that the WDRM will continue and be part of the NEM framework.

Stakeholders noted that the Commission's view in the final determination that the WDRM is a temporary mechanism may have impacted participation in the WDRM to date.[101] That is, the Commission's 2020 final determination view would have disincentivised consumers and DRSPs from undertaking the necessary investment of time and money to partake in the scheme.

Recommending that the WDRM continue operation ensures participants can make investments with certainty in the regulatory framework. The Commission recognises that a mechanism can and should be amended or even removed if it is not delivering benefits for consumers or the market. However, the WDRM is providing benefits in excess of its operating costs and plays an important role in facilitating a pathway for wholesale market participation from a group of large loads. Based on these factors the Commission recommends it continue.

101 Submissions to the consultation paper; JEC, p. 6. Enel X p. 6. EEC, p. 6.

A Benefits and price savings calculation methodology

The Commission has undertaken detailed analysis to assist it in making its draft recommendations. This appendix describes our approach to calculating benefits that have accrued from the WDRM since its inception in terms of:

- dispatch efficiency gains (otherwise referred to as avoided deadweight loss
- the value of avoided emissions.

This is followed by a description of the methodology and calculation of the price savings of the WDRM, noting that these are considered a wealth transfer rather than a pure economic benefit.

A.1 Using the economic principles of consumer surplus, producer surplus and deadweight loss

We have evaluated the economic benefit delivered by the WDRM according to the standard measure of economic efficiency from welfare economics. This shows that the WDRM enables buyers of electricity in the wholesale market to avoid consuming electricity at prices greater than their willingness to pay.

This approach is applied to estimating the benefits of the WDRM by calculating the change in deadweight loss between the current market where WDR operates and a counterfactual scenario in which there is no WDR available. This section of the appendix details the economic theory behind deadweight loss and provides a stylised example of how it is applied in our analysis. Appendix A.2 then describes how we apply this to real data to estimate a benefits figure.

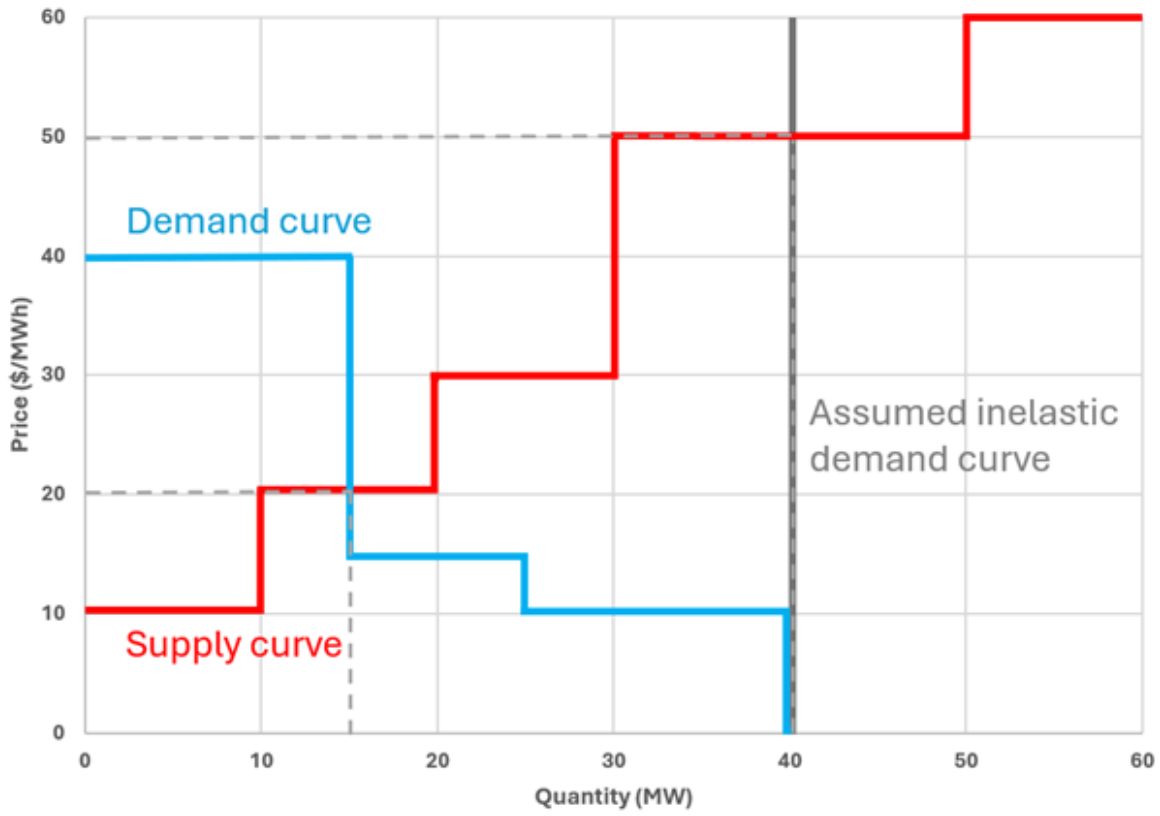
The benefit to consumers, or 'consumer surplus' is the sum of differences between the willingness to pay of, and price paid by, consumers who transact in a market. The benefit to producers, or 'producer surplus', is the sum of differences between the price received by, and willingness to sell of, producers who transact in a market. An efficient market will match relatively high-valuation buyers with relatively low-valuation sellers at a price between their valuations to maximise the sum of consumer and producer surpluses. This sum is known as 'total surplus' or 'social welfare'. It follows that a market that is not efficient will deliver less social welfare than an efficient market. This loss in social welfare is known as a 'deadweight loss'.

A.1.1 Our approach to measuring benefits in this review

Currently, AEMO assumes that buyers who wish to consume a certain quantity of electricity are willing to pay any price for that quantity. We consider that while buyers in the wholesale market might have relatively price-inelastic demand, they do not have perfectly price-inelastic demand as the market operator assumes. Therefore, a deadweight loss exists in the NEM. This deadweight loss is borne by buyers of electricity who are forced to pay more than their willingness to pay.

Figure A.1 presents a heavily stylised market burdened with such a deadweight loss. This inefficiency is represented by the area between the demand curve (in blue), the supply curve (in red), and the assumed inelastic demand curve (in black). Note that the dotted horizontal line at $20 represents the settled price level in the market with a price-responsive demand curve, and the higher dotted grey line at $50 represents the settled price level in a market with a perfectly inelastic demand curve.

Figure A.1: Stylised demand and supply curves without demand response



Source: AEMC

Table A.1 shows how these supply and demand curves are formed. Consumer and producer surpluses are calculated for each participant in an efficient market where total surplus is maximised, and in a market with an assumed inelastic demand curve.

Table A.1: Stylised demand and supply schedules without demand response

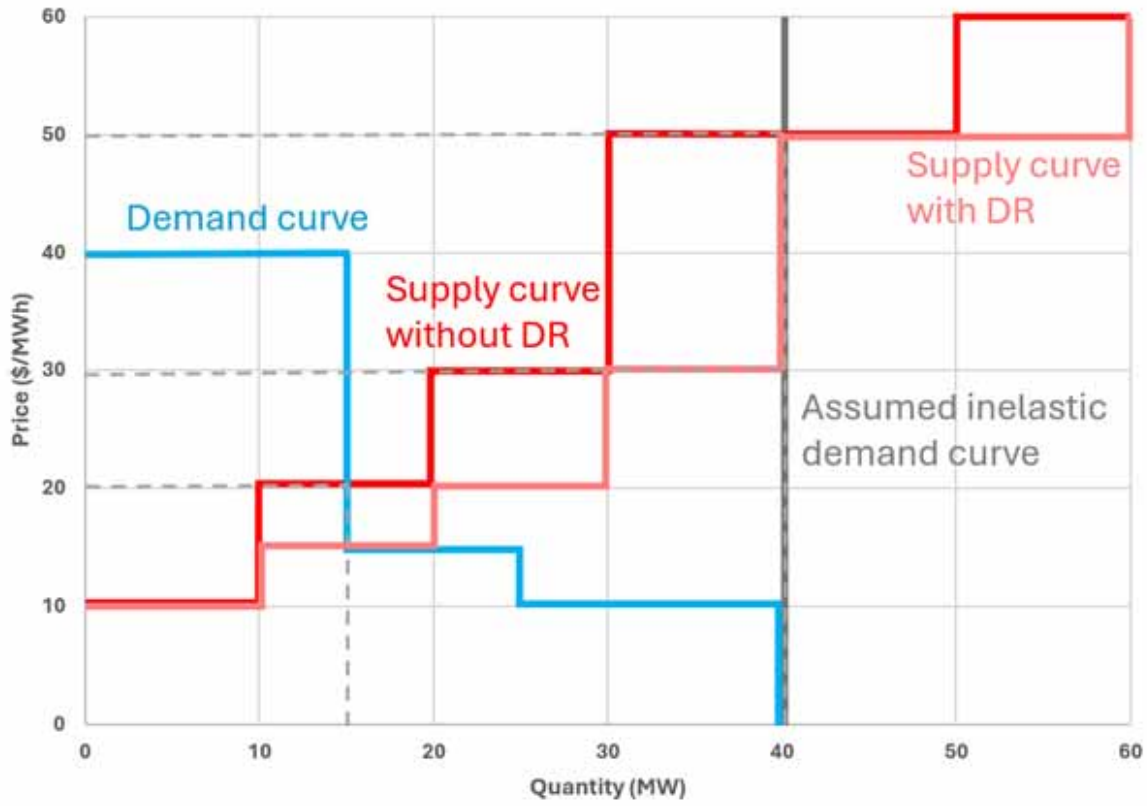
Side	Unit	Quantity	Valuation	Surplus in efficient market	Surplus in market without demand reponse (DR)
Demand	Load 3	15MW	$40	$300	-$150
Demand	Load 2	10MW	$15	$0	-$350
Demand	Load 1	15MW	$10	$0	-$600
Supply	Solar 1	10MW	$10	$100	$400
Supply	Coal 1	10MW	$20	$0	$300
Supply	Coal 2	10MW	$30	$0	$200
Supply	Gas 1	20MW	$50	$0	$0
Supply	Gas 2	10MW	$60	$0	$0
Total				$400	-$200

Source: AEMC

The scenario with an assumed inelastic demand curve delivers the supply side $800 more than the efficient market and delivers $1,400 less to the demand side, as buyers are forced to pay well above their valuation. The deadweight loss created by the assumed inelastic demand curve is the total surplus in a market without demand response (-$200) less the total surplus in an efficient market ($400), and is equal to $600.

Figure A.2 below outlines an example where Load 2 offers 10 MW of demand response for the same price at which it is willing to buy that amount. This offer is treated by the market operator as additional supply and form a a new supply curve that intersects the assumed inelastic demand curve at a lower price.

Figure A.2: Stylised demand and supply curves with demand response



Source: AEMC

Table A.2 shows that this demand response participation reduces the deadweight loss by $350.

Table A.2: Stylised demand and supply schedules with demand response

Side	Unit	Quantity	Valuation	Surplus in efficient market	Surplus in market without DR	Surplus in market with DR
Demand	Load 3	15MW	$40	$300	-$150	$150
Demand	Load 2	10MW	$15	$0	-$350	$0
Demand	Load 1	15MW	$10	$0	-$600	-$300

Side	Unit	Quantity	Valuation	Surplus in efficient market	Surplus in market without DR	Surplus in market with DR
Supply	Solar 1	10MW	$10	$100	$400	$200
Supply	Load 2	10MW	$15	$0	$0	$0
Supply	Coal 1	10MW	$20	$0	$300	$100
Supply	Coal 2	10MW	$30	$0	$200	$0
Supply	Gas 1	20MW	$50	$0	$0	$0
Supply	Gas 2	10MW	$60	$0	$0	$0
Total				$400	-$200	$150

Source: AEMC

In practice, AEMO settles payments among customers, retailers, DRSPs, and generators. If a DRSP helps a customer to reduce its demand by their baseline consumption of 10 MW, as Load 2 does in the example, then:

- The customer will pay $0 to their retailer, which is the customer's metered consumption (0 MW) multiplied by their retail tariff.
- The retailer will pay $300 to AEMO, which is their customer's baseline consumption (10 MW) multiplied by the spot price ($30/MWh).
- AEMO will not dispatch the generator that previously served the last 10 MW of demand.
- AEMO will pay $300 to the DRSP, which is the customer's demand response (10 MW) multiplied by the spot price ($30/MWh).
- The DRSP, via AEMO, will pay the retailer the customer's demand response (10 MW) multiplied by the Wholesale Demand Regional Reimbursement Rate (WDRRR), and
- The DRSP will distribute a share of its profit to the customer.

If the WDRRR is equal to the retail tariff, and the retail tariff is equal to the spot price, then once all payments are netted, each party breaks even. These assumptions are made in the example above, with Load 2 on the demand side representing a customer and its retailer, and Load 2 on the supply side representing the customer's DRSP.

The reduction in deadweight loss of $350 in the example can also be calculated by summing across each supply-side unit's bid multiplied by the difference between their quantity dispatched without demand response and their quantity dispatched with demand response. In the example, when summed across:

- Solar 1: $10 * (10 - 10) = $0
- Load 2: $15 * (0 - 10) = -$150
- Coal 1: $20 * (10 - 10) = $0
- Coal 2: $30 * (10 - 10) = $0
- Gas 1: $50 * (10 - 0) = $500
- Gas 2: $60 * (0 - 0) = $0

the total is $350.

The process above is an example of how we calculate the benefits accruing from changes to deadweight loss. Appendix A.2 explains how we apply this economic theory to WDR dispatch data to calculate the realised benefits.

A.2 Determining counterfactual outcomes

Quantitative analysis was performed to determine price and dispatch outcomes in a counterfactual scenario where the WDRM was not operating. These counterfactual price and dispatch outcomes were then used as a basis to calculate dispatch efficiency gains (avoided deadweight loss), the value of avoided emissions, and consumer price savings in the wholesale market.

Price and dispatch outcomes are determined in the NEM every five minutes by AEMO running an optimisation engine called the National Electricity Market Dispatch Engine (NEMDE)[102]. This dispatch engine works through optimisation methods, determining the least cost dispatch of generation and demand-side participation in both energy and ancillary markets such that all load is met and all power system constraints are satisfied. Wholesale demand response units participate in NEMDE by submitting bids in price-quantity pairs reflecting their willingness to reduce their load.

To determine the price and dispatch outcomes in a counterfactual scenario without the WDRM, we modelled outcomes with all demand response units availability set to zero. Effectively removing these units from the NEM dispatch process. In this scenario we assume that all else is equal, specifically, for each interval where wholesale demand response units were dispatched the following information remains the same:

- bids of all other generators
- underlying level of demand in all regions
- technical constraints.

Given the assumptions above, we can determine the price and dispatch outcomes in the counterfactual by using AEMOs NEMDE-Queue service[103]. This service is an offline version of NEMDE that can be used to model alternative outcomes by submitting NEMDE input files which contains all the necessary market information such as bids, constraints and other market inputs. The steps below outline how we used this tool to determine counterfactual price and dispatch outcomes for each interval in which wholesale demand response was dispatched:

1. download the NEMDE input from AEMOs website which corresponds to the interval[104]
2. set the availability for all Wholesale Demand Response Units (WDRUs) to zero
3. identify the NEMDE version related to this interval
4. submit the modified input file to the relevant NEMDE version
5. receive the corresponding output file containing counterfactual price and dispatch outcomes.

The following sections describe how these counterfactual price and dispatch outcomes were used to calculate the benefits and price reductions associated with the WDR Mechanism.

102 Dispatch Information, AEMO, available at: https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/market-operations/dispatch-information

103 NEMDE-Queue service, available at: https://aemo.com.au/energy-systems/market-it-systems/electricity-system-guides/nemde-queue-service

104 Market Data NEMWEB, available at: https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/data-nem/market-data-nemweb

A.2.1 Calculating dispatch efficiency gains (avoided deadweight loss)

Dispatch efficiency gains were calculated by comparing the differences in dispatch costs between the intervals where WDRU's were dispatched and the counterfactual scenario without WDR. Calculating dispatch efficiency gains, also referred to as avoided deadweight loss, follows the economic principles outlined in appendix A.1. To calculate these benefits using the data available, the assumptions made were:

- generator offers are reflective of their short-run marginal costs and reflect their cost of additional generation,
- demand response offers are also reflective of their costs to respond, and
- impacts on ancillary services are ignored for the sake of the benefits calculation as these markets are much smaller than the energy market, and any impacts will be primarily on enablement rather than generation.

Given the assumptions above, we can calculate the dispatch efficiency gains by comparing the differences in dispatch costs between the historical intervals in which WDRUs were dispatched and the counterfactual scenario without WDR which we ran through NEMDE-Queue. We effectively construct a supply-demand chart for each interval, where the change in deadweight loss is calculated as the cost of additional generation in the counterfactual, less the cost of the wholesale demand response in the original dispatch interval. The generalised equation for calculating these losses is shown below, and follows the stylised example in appendix A.1.

$$\sum_{Unit=i}^{n} \sum_{Band=j}^{10} \frac{\Delta Quantity_{i,j} \times Price_{i,j}}{12}$$

Where:

- j represents the bid and price band (of which there are 10)
- i represents the unit that was dispatched, and could either be a generator, battery or wholesale demand response unit
- ΔQuantity represents the change in dispatch quantity for the unit in the associated band
- Price is the offer price of that unit and band

Note that we divide by 12 to convert the result into $/MW/h as each interval represents a 5-minute period.

We calculate these dispatch efficiency gains for each interval in which WDR units were dispatched, then sum all these intervals to determine the final benefits figure.

A.2.2 Calculating the value of avoided emissions

The value of avoided emissions in each interval is determined by:

1. the difference in emissions in tonnes of Co2e between the historical interval and the counterfactual where there was no WDRM
2. the ascribed dollar value of those emissions.

The former is calculated by comparing NEMDE-Queue output files in each interval to determine which generators had a change in their output, and the quantity in MWh of that change.

The dollar value of emissions is taken from AER's Value of Emissions Reduction where we use a linearly extrapolated value for dispatch intervals before 2023.[105]

The value of avoided emissions for each interval is then calculated through the following equation:

$$\sum_{Year\ =\ y}^{m} \sum_{Unit\ =\ i}^{n} \Delta Quantity_i \times EF_i \times VER_y$$

Where:

- i represents the unit
- y represents the year in which the emissions occured
- ΔQuantity represents the total change in dispatch quantity for the unit
- EF represents the emissions intensity factor associated with the technology type of the unit (i.e. the tonnes of Co2e emitted for each MW produced by the unit)
- VER represents the value of emissions reduction for each tonne of Co2e.

The value of avoided emissions in each interval are summed to determine the final figure.

A.2.3 Calculating price savings

Our modelling also allows us to determine the spot price savings from the WDRM. These are wealth transfers from generators to consumers rather than true efficiency gains, and are therefore not included in the quantitative benefits estimates. However, we have included them in this report to demonstrate that the WDRM is lowering prices for consumers.

These price savings are calculated by comparing the total cost paid by consumers in the wholesale market between each historical interval and its counterfactual scenario without WDRM. This is described by the following equation where, for each interval and region over all intervals in which WDRUs were dispatched:

$$\left(Price_{Historical} \times Demand_{Historical}\right) - \left(Price_{Counterfactual} \times Demand_{Counterfactual}\right)$$

The counterfactual price is taken from our NEMDE-Queue results, and the counterfactual demand is the historical demand less the total dispatch of WDR units in the region and interval. Note that WDR dispatch is netted-off from the counterfactual demand in this analysis but not the dispatch efficiency gains. This is because the price savings analysis considers the total demand faced by consumers, where the dispatch efficiency gains consider only the dispatch outcomes that NEMDE solves for. In the latter case, WDR availability is treated as a reduction in demand response on the supply side rather than a reduction in demand itself. Because of this feature of NEMDE there is no need to net-off demand from WDR units in the dispatch efficiency gains calculation.

105 AER - Valuing emissions reduction - Final guidance and explanatory statement - May 2024, available at :https://www.aer.gov.au/documents/aer-valuing-emissions-reduction-final-guidance-and-explanatory-statement-may-2024.

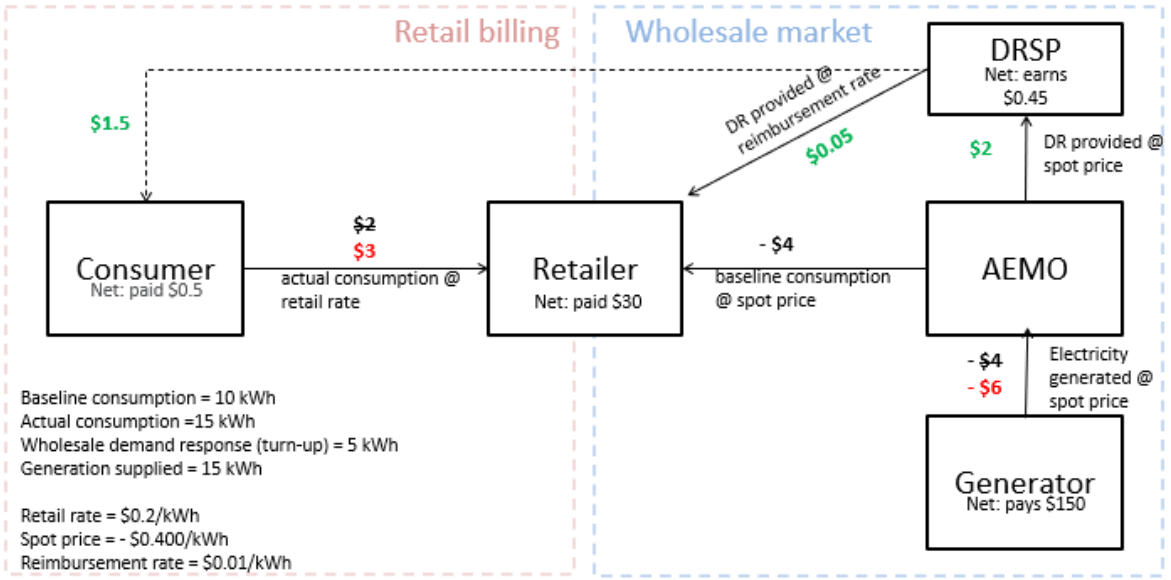
B Additional analysis on two-way demand response

Utilising the WDRM to encourage customers to increase load is conceptually similar to the existing design and may not require significant changes to implement. From the customer perspective, the settlement process for a WDR turn-up mechanism would be:

- the customer's retailer bills them for their actual consumption
- AEMO bills the customer's retailer for their baseline level of consumption
- the DRSP is paid the spot price for the quantity of wholesale demand response provided
- the DRSP pays the retailer the quantity of demand response provided at the wholesale demand response reimbursement rate (WDRRR).

This is outlined in Figure B.1 below:

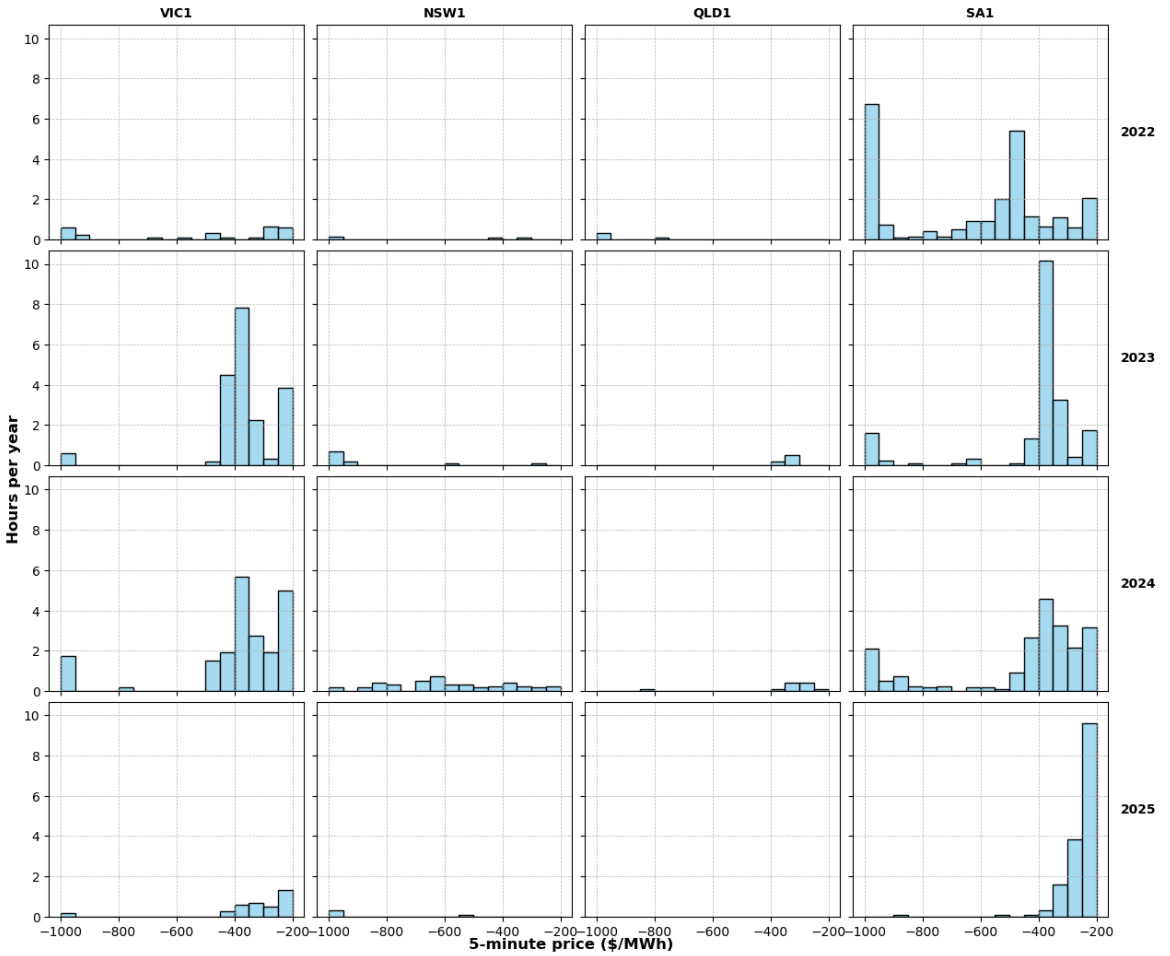
Figure B.1: WDRM turn-up cashflows



Source: AEMC
Note: Prices and reimbursement rate used in this example is indicative only.

Figure B.2 shows the distribution of prices less than -$200/MWh over the last three and a half years. These outcomes below $-200/MWh represent the dispatch intervals where the spot price would offset the participating customers retail costs.

Figure B.2: Distribution of prices less than -$200/MWh by Region and Year



Source: AEMC

Based on these negative price outcomes, there would not be enough periods of sufficiently negative prices to offset the additional retail costs and encourage loads to consume more than their baseline amount.

C Summary of other issues raised in submissions

Table C.1: Summary of other issues raised in submissions

Stakeholder(s)	Issue	Response
SAPN, pp. 2-3.	Should the WDRM be phased out in favour of market participation via IPRR, we consider that the requirements for WDRM participants to seek engineering assessments from DNSPs may need to be carried over into the implementation of IPRR.	AEMO is currently consulting on the implementation processes for IPRR. We encourage stakeholders to engage with AEMO in its consultation process.

Abbreviations and defined terms

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CAISO	California Independent System Operator
Commission	See AEMC
DNSP	Distribution Network Service Provider
DRSP	Demand Response Service Provider
DSP	Demand-side Participation
EEC	Energy Efficiency Council
EV	Electric Vehicle
FRMP	Financially Responsible Market Participant
IES	Intelligent Energy Systems
JEC	The Justice and Equity Centre
LTESA	Long-term Energy Service Agreement
NEM	National Electricity Market
NER	National Electricity Rules
NMI	National Meter Identifier
PDRS	Peak Demand Reduction Scheme
PJM	Pennsylvania-New Jersey-Maryland Interconnection
RERT	Reliability and Emergency Reserve Trader
VPP	Virtual Power Plant
WDR	Wholesale Demand Response
WDRM	Wholesale Demand Response Mechanism
WDRRR	Wholesale Demand Response Reimbursement Rate
WDRU	Wholesale Demand Response Unit