Wholesale Demand Response baseline methodology proposals – EnelX

September 2024

Draft Report

Draft report to commence public consultation on new WDR baseline methodologies proposed by EnelX.

Important notice

Purpose

The purpose of this document is to outline EnelX's baseline methodology proposal and present AEMO's assessment and draft decision for consultation.

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AEMO Group is proud to have launched its first Reconciliation Action Plan in May 2024 (scan QR code to read).

Executive summary

On 27 March 2024, EnelX submitted three new proposed wholesale demand response (WDR) baseline methodologies for AEMO's consideration in accordance with the WDR Guidelines. This is the first set of baseline methodology proposals that AEMO has received since the WDR Mechanism (WDRM) commenced in October 2021. A letter of support for the proposals was also provided by Shell Energy.

This draft report presents AEMO's initial assessment of EnelX's proposals and seeks stakeholder feedback on its draft decisions.

EnelX's baseline methodology proposals

EnelX submitted three proposals to expand eligibility in the WDRM and better accommodate a broader range of load types, including loads that vary seasonally, have solar PV, or are temperature sensitive. Key aspects of the proposals are outlined in the table below.

Proposed baseline methodology	Summary
CAISO 10 of 10 (all days) with new settings	Proposed to better accommodate seasonal and solar PV loads. New settings: • 20-day lookback window for eligibility and compliance • Uncapped negative day-of adjustments (note AEMO has considered a lower, but not uncapped, negative adjustment floor instead) • Open End of Period Date for compliance assessment.
High 3 of 10 (all days)	Proposed to better accommodate temperature-sensitive loads. Includes the same three settings as above. Selects the three highest consumption (kWh) days out of the preceding ten eligible days for the baseline.
High 3 of 10 (business days only)	Proposed to better accommodate temperature-sensitive loads. Includes the same three settings as above. Selects the three highest consumption (kWh) days out of the preceding ten eligible days for the baseline, for business days only.

Draft decisions for consultation

AEMO has considered the costs, benefits and risks of the proposals and has determined that there may be value in introducing some new baseline methodology options to expand eligibility, with other settings requiring further consultation to understand whether there are sufficient benefits to justify implementation. In addition to assessing specific proposals, the report explores a range of broader considerations around WDR outcomes and assessment limitations which provide important context to this process.

AEMO is seeking feedback on the following draft decisions:

Draft decision	Explanation
1. **Approve** new All Days 10 of 10 baseline methodology options with a 20-day lookback period and **consult on** negative adjustment floor options including: a. standard negative adjustment floor (-20%) b. lower negative adjustment floor (e.g., -200%).	AEMO considers that there is value in providing baseline methodology options with a shorter 20-day lookback period for eligibility and compliance to better accommodate seasonally varying loads. AEMO will consult on negative adjustment floor options to accompany this methodology. AEMO's view is that a new baseline option should be introduced rather than applying new settings to existing methodologies. This is because shorter lookback period and/or lower negative adjustment floor settings do not necessarily provide for better accuracy and bias results for all load types.
2. **Not approve** new High 3 of 10 baseline methodologies.	While AEMO agrees there may be value in a "High X of Y" baseline methodology option to better accommodate temperature-sensitive loads, it does not consider that High 3 of 10 baseline methodologies strike the right balance between baseline accuracy and alignment to conditions under which dispatch is most likely to occur.
3. **Consult on** introduction of new High 5 of 10 baseline methodologies with a 20-day lookback period, including: a. All Days, with standard negative adjustment floor (-20%) b. Business Days, with standard negative adjustment floor (-20%) c. All Days, with lower negative adjustment floor (e.g., -200%) d. Business Days, with lower negative adjustment floor (e.g., -200%).	AEMO is consulting on whether introducing alternative "High 5 of 10" baseline methodology options for accommodating temperature-sensitive loads is likely to support additional participation in the mechanism. This approach utilises more data in calculating the baseline (relative to High 3 of 10 options) whilst also recognising that WDR dispatch events are more likely occur on days when consumption is higher than usual for some loads. AEMO proposes that, if supported, these new methodologies could be accompanied by a 20-day lookback period setting and is seeking stakeholder feedback on negative adjustment floor options. These methodologies will be more resource intensive for AEMO to implement and will require AEMO to further consider how any new "High X of Y" baseline methodology would be incorporated into its eligibility and compliance processes if implemented.
4. **Not approve** open End of Period Date selection for compliance assessment.	AEMO does not consider it is appropriate for WDRM participants to have choice over compliance testing timeframes, particularly in combination with a short lookback period.

Stakeholder feedback and next steps

AEMO is interested in stakeholder feedback on the draft decisions and consultation questions outlined in Section 5 of this report by Thursday 24 October 2024. Feedback may be provided via wdr@aemo.com.au.

AEMO will publish a Final Report by Thursday 21 November 2024 taking into consideration the content of stakeholder submissions and any additional analysis it considers should be undertaken to inform its final decision.

Milestone	Date
Initial assessment	Thursday 4 July 2024 (complete)
Draft Decision communicated to proponent	Thursday 1 August 2024 (complete)
Publish Draft Report & consultation commences (this document)	Thursday 26 September 2024
Submissions due	Thursday 24 October 2024
Publication of Final Report & Decision	Thursday 21 November 2024

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1 Background and process

On 27 March 2024, EnelX submitted three new proposed wholesale demand response (WDR) baseline methodologies to AEMO for consideration. A letter of support for the proposals was also provided by Shell Energy.

EnelX's proposal is the first request for additional baseline methodologies that AEMO has received since the WDR Mechanism (WDRM) commenced in October 2021.

1.1 Assessment process and timeframes

The process for proposing, assessing and developing new baseline methodologies for the WDRM is outlined in:

- the **WDR Guidelines**, which establishes the assessment and consultation process AEMO must follow in determining whether to approve new baseline methodologies; and
- the **New baseline methodology proposal – required information**, which outlines the information a proponent should provide to AEMO when submitting a new baseline methodology proposal.

Table 1 below outlines the key milestones and next steps for the assessment process.

Table 1 Timeframes for baseline methodology consultation process

Milestone	Date
Initial assessment	Thursday 4 July 2024 (complete)
Draft Decision communicated to proponent	Thursday 1 August 2024 (complete)
Publish Draft Report & consultation commences (this document)	Thursday 26 September 2024
Submissions due	Thursday 24 October 2024
Publication of Final Report & Decision	Thursday 21 November 2024

1.2 Feedback sought

AEMO is seeking feedback from NEM participants and other stakeholders on EnelX's proposals, AEMO's draft decisions, and the relevant matters outlined in this Draft Report.

Stakeholder feedback will inform AEMO's Final Decision on whether and how to implement EnelX's proposals.

Section 5 contains a list of consultation questions. Stakeholders may respond by sending written submissions to wdr@aemo.com.au.

1.3 About the WDRM

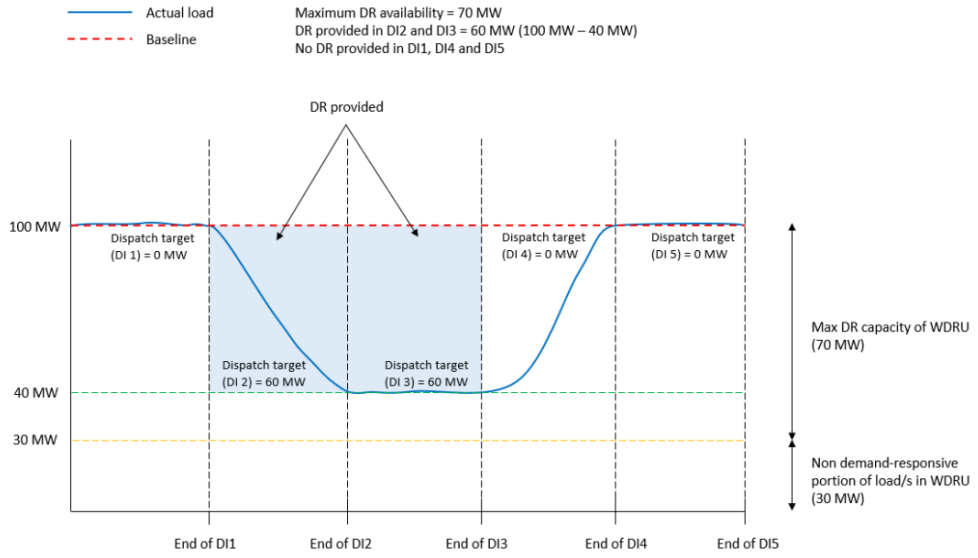
On 11 June 2020, the Australian Energy Market Commission (AEMC) released a final rule and final determination to implement the WDRM in the National Electricity Market (NEM). The rule caters to participation of large customer

loads, with small customer loads excluded from participation in the WDRM for a range of reasons outlined in the AEMC's final determination[1].

The WDRM allows for a single or aggregation of demand-responsive market load connection point(s) within a region to be identified as eligible, classified, scheduled, and dispatched as a Wholesale Demand Response Unit (WDRU) by a registered market participant category known as a Demand Response Service Provider (DRSP). DRSPs typically bid in to provide demand response during high-priced events. When a DRSP receives a reduction target greater than zero, the DRSP must reduce its consumption by the given target. Figure 1 below provides an example of the scheduling and dispatch process.

As part of settlement, the DRSP receives payment for its dispatched response, measured in MWh against a baseline estimate, at the electricity spot price.

Figure 1 Example of scheduling and dispatch of WDRUs under the WDRM



Source: AEMC WDR Final Determination

Further information on the general design and implementation of the WDRM may be found in the AEMC's rule determination and on AEMO's website.

1.3.1 Baselining in the WDRM

For detailed information on baselining, eligibility and compliance, refer to the Baseline Eligibility Compliance and Metrics Policy (see also specific information on Exclusion Days and Post-Event Dispatch Conformance).

A DRSP can provide WDR by reducing the consumption of electricity or increasing the export of electricity with respect to the baseline at the connection point of a WDRU.

[1] https://www.aemc.gov.au/rule-changes/wholesale-demand-response-mechanism

The baseline for a WDRU is a counterfactual estimate of the amount of electrical energy flowing at the connection point for the WDRU, had it not been dispatched for demand response, calculated in accordance with NER clause 3.10.5.

To participate in WDRM, a DRSP must demonstrate that a baseline can be determined for its qualifying load that complies with the **baseline methodology metrics**, both:

- Prior to classification of a WDRU (**baseline eligibility assessment**).
- At regular intervals during normal operations (**baseline compliance testing**).

The **baseline methodology** is the set of parameters and logic used to calculate a baseline. Under 3.10.3 of the NER, AEMO must develop one or more baseline methodologies and publish these in the baseline methodology register. There are currently four baseline methodologies available to participants, all based on a California Independent System Operator (CAISO) "10 of 10" framework:

1. All Days Baseline Methodology (BM1)
2. Business Days Baseline Methodology (BM2)
3. Non-Business Days Baseline Methodology (BM3)
4. Business + Non-Business Days Composite Baseline Methodology (BM4).

A participant may select the baseline methodology that is most appropriate to the characteristics of the load it is seeking to participate with.

1.3.2 Predictability of Load (PoL) assessment and baseline methodology metrics

As described above, to participate in the WDRM, the WDRU must demonstrate sufficient predictability against an identified baseline methodology, so that a baseline can be calculated (against which demand response settlement and dispatch performance assessment will occur).

Predictability of the WDRU's load is tested by applying the selected baseline methodology to a history of days[2] for each trading interval and using statistical techniques to demonstrate that they meet the baseline methodology metrics.

There are two metrics used for PoL assessment:

- **Accuracy**, which measures how closely a baseline methodology predicts the actual load. Accuracy is measured using relative root mean squared error (RRMSE)[3] which is based on squared prediction errors that weights large errors more heavily than small errors.
- **Freedom from Bias**, which is the systematic tendency of a baseline methodology to over- or under-predict actual loads. Bias is calculated using average relative error (ARE)[4]. An ARE value of zero indicates no systematic tendency to over- or under-predict loads using the selected baseline, while positive and negative values indicate a tendency to over- or under-predict loads respectively.

[2] for which a demand response did not occur.

[3] the baseline's average accuracy over a trading interval as a fraction of average qualifying load over a trading interval.

[4] the average baseline per trading interval less the average actual qualifying load per trading interval, expressed as a fraction of actual qualifying load per trading interval.

Accuracy and bias scores for a load are compared against defined accuracy and bias thresholds summarised in Table 2 below.

Table 2 Accuracy and bias thresholds (Baseline Eligibility Compliance and Metrics Policy)

	Threshold	Baseline eligibility testing	Baseline compliance testing
Accuracy	20%	RRMSE value calculated for the qualifying load, over all of the required eligibility days, for all the TIs in the eligibility trading intervals window for that baseline methodology, has to be equal to or lower than the accuracy threshold specified.	RRMSE value calculated for the WDRU, over all of the required compliance days for all the trading intervals in the compliance trading intervals window for that baseline methodology, has to be equal to or lower than the accuracy threshold specified.
Bias	±4%	ARE value calculated for the qualifying load, over all of the required eligibility days for all the TIs in the eligibility trading intervals window for that baseline methodology, has to be equal to or lower than the bias threshold specified.	ARE value calculated for the WDRU, over all of the required compliance days for all the TIs in the compliance trading intervals window for that baseline methodology, has to be equal to or lower than the bias threshold specified.

Source: https://aemo.com.au/-/media/files/initiatives/wdr/baselines-eligibility-compliance-and-metrics-policy.pdf?la=en

Each baseline methodology specifies relevant parameters for PoL calculations, such as day types, the required number of eligibility/ compliance days, selected days, eligibility/ compliance trading interval windows, and baseline adjustment settings. These settings are described in detail in the baseline methodology register and the Baseline Eligibility Compliance and Metrics Policy.

The sections below briefly discuss the baseline settings that are directly relevant to EnelX's proposal only.

Selected days, exclusion days, and eligibility and compliance days/windows

Eligibility days are days for which baselines can be calculated for a load, for the purposes of conducting baseline eligibility assessment. Starting from the most recent eligibility day, the PoL calculation "looks back" at any historical qualifying days, until the required number of eligibility days are found.

Compliance days are days for which baselines can be calculated for a load, for the purposes of conducting baseline compliance test. Starting from the most recent compliance day, the PoL calculation "looks back" at any historical qualifying day, until the required number of compliance days are found.

Eligibility/ Compliance TIs (trading intervals) window: the trading intervals from which meter data is taken for the load for the purpose of conducting baseline eligibility/ compliance assessment.

Existing baseline methodologies:

- Use **50 eligibility days** and **50 compliance days** (except in the case of BM3 which uses 20 as it only selects non-business days for baseline calculations). That is, when the PoL calculation is undertaken for eligibility and compliance purposes, it looks back and calculates baselines for 50 qualifying days (that are not exclusion days) and uses that to calculate accuracy and bias metrics.
- Use a **trading interval window of 3pm to 8pm (eligibility/ compliance TIs window)** as the window for conducting baseline eligibility and compliance testing.

Exclusion days are days on which the NMI load was not measurable or deemed to be far outside the usual for the NMI. Examples of eligibility exclusion days include blackout/outage, plant shutdown, scheduled maintenance,

scheduled and unscheduled outages and site commissioning. AEMO determines, at its discretion, the eligibility/ compliance exclusion days for a NMI.

Selected days

The selected days are the most recent qualifying days used to calculate the baseline. In the case of the existing CAISO "10 of 10" baseline methodologies, the baseline for a given trading interval is generated using the average metered energy for the most recent 10 qualifying (non-excluded) days.

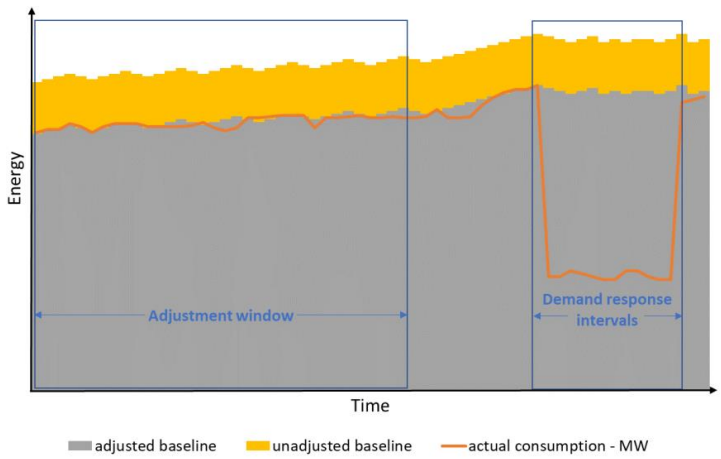
For example:

- A "10 of 10" baseline for the 3:05pm trading interval would be generated using meter data from the 3:05pm trading interval for all 10 of the most recent 10 qualifying (non-excluded) days.
- A "High 5 of 10" baseline for the 3:05 trading interval would be generated using meter data from the 3:05pm trading interval for the highest 5 consumption days of the most recent 10 qualifying (non-excluded) days.

Baseline adjustment settings

"Day-of" baseline adjustment is used to calibrate the baseline calculation so it more accurately reflects the load conditions on the day. In all of the existing WDRM baseline methodologies, these day-of adjustments look back to the three hours ending one hour before the trading interval for which a baseline is being calculated (the **adjustment window**), and adjusts the baseline up or down to reflect the difference between what the load is actually doing and the unadjusted baseline during that period (see Figure 2). International studies have demonstrated the large improvement in baseline accuracy provided by day-of adjustments.[5]

Figure 2 Illustration of baseline adjustment



For the purpose of PoL assessment, baseline adjustment is applied to each trading interval in the eligibility or compliance TIs window (3pm to 8pm) as if that trading interval was the first to be bid into WDR. For example, for 3:05pm trading interval, the adjustment would be based on the difference between the actual load and the unadjusted baseline between 11:05am and 2:05pm (the relevant adjustment window) on that same day, and so

[5] https://www.elia.be/-/media/project/elia/elia-site/public-consultations/2021/20210927_study_baseline_methodologies_draft_clean_en.pdf, NYISO SCR Baseline Study Analysis, NYISO Management Response to the NYISO's SCR Baseline Study Analysis and Report and IESO Hourly Demand Response Baseline Methodology Review.

forth for subsequent intervals. This would mean that if the load in the adjustment window is higher or lower than usual, the 3:05pm baseline would be adjusted up or down to reflect this.

The adjustment logic used in all existing baseline methodologies is a **capped multiplicative adjustment**, using the percentage difference between actual consumption and the unadjusted baseline over the adjustment window period. The adjustment may be positive or negative and the **adjustment cap (/ floor) is set at ±20% across all existing baselines**. The cap/floor limits the extent to which the baseline calculation can be influenced by the relative level of energy consumption earlier in the day.

Compliance testing and the "end of period date"

AEMO undertakes periodic baseline compliance testing of WDR loads to ensure they are still able to meet PoL accuracy and bias metrics. Compliance checks are typically run around the end of May/ early June and end of November/ early December each year. When compliance checks are undertaken, they are typically run looking back from approximately the date the compliance check is run, looking back the specified number of compliance days (typically 50 days).

The "end of period date" and compliance testing regime are not baseline methodology settings, but rather AEMO policies around how it conducts compliance assessment.

2 Baseline methodology proposals

EnelX has submitted three baseline methodology proposals to AEMO. These are summarised at a high level in Table 3, and detailed parameters are provided in Table 4.

EnelX argues that the existing baseline methodologies available to WDRM participants may work well for certain (typically flat) loads but do not effectively accommodate other types of suitable loads, including loads that vary seasonally, are temperature sensitive, or have solar PV.

EnelX argues that eligibility and compliance barriers are preventing the WDRM from attracting more participation and hence reducing the benefits that can be realised for customers and the market. EnelX considers that Australia is lagging internationally in terms of demand response participation, and that expanding eligibility through more choice in baseline methodologies would "encourage other providers to join the market", "increase participation from current levels" and enhance the WDRM's ability to deliver against its original objectives.

It considers that key sectors benefitting from expanded eligibility from the proposals would include:

- Commercial refrigeration facilities, which are installing solar PV at increasing rates. EnelX expects that its proposed setting changes would increase eligibility to 80% of commercial refrigeration loads with solar PV.
- The commercial building sector, which is highly temperature sensitive largely due to space heating and cooling requirements.

Table 3 High-level summary of proposals

Proposed baseline methodology	Summary
CAISO 10 of 10 (all days) with new settings	Proposed to better accommodate seasonal and solar PV loads. New settings: • 20-day lookback window for eligibility and compliance • Uncapped negative day-of adjustments • Open End of Period Date for compliance assessment
High 3 of 10 (all days)	Proposed to better accommodate temperature-sensitive loads. Includes the same three settings as above. Selects the three highest consumption (kWh) days out of the preceding ten eligible days for the baseline.
High 3 of 10 (business days only)	Proposed to better accommodate temperature-sensitive loads. Includes the same three settings as above. Selects the three highest consumption (kWh) days out of the preceding ten eligible days for the baseline, for business days only.

Table 4 Full detail on proposed baseline methodologies as submitted by EnelX

Purple cells highlight the settings where there are proposed changes relative to what is used for most existing baseline methodologies.

	10 of 10 (all days) w/ new settings	High 3 of 10 (all days)	High 3 of 10 (business days)
Framework	10 of 10	High 3 of 10	High 3 of 10
Day type	All days	All days	Business days only
Baseline window	20 days	20 days	20 days
Selected days	Most recent 10 days (minimum 5)	Most recent 10 days (minimum 5), *from which the 3 highest kWh days are used**	Most recent 10 business days (minimum 5), *from which the 3 highest kWh days are used**
Unadjusted baseline energy for TI	Average metered energy for trading interval for selected days.	Average metered energy for trading interval for selected days.	Average metered energy for trading interval for selected days.
Baseline adjustment	Multiplicative adjustment, with a 20% cap on upward adjustment and no cap on downward adjustment.	Multiplicative adjustment, with a 20% cap on upward adjustment and no cap on downward adjustment.	Multiplicative adjustment, with a 20% cap on upward adjustment and no cap on downward adjustment.
Baseline adjustment window (settlement)	3 hours ending 1 hour prior to the first TI of WDR	3 hours ending 1 hour prior to the first TI of WDR	3 hours ending 1 hour prior to the first TI of WDR
Baseline adjustment window (PoL)	3 hours ending 1 hour prior to the first TI of WDR	3 hours ending 1 hour prior to the first TI of WDR	3 hours ending 1 hour prior to the first TI of WDR
Required number of eligibility days	20 days	20 days	20 days
Eligibility TIs window	3pm to 8pm (market time)	3pm to 8pm (market time)	3pm to 8pm (market time)
Required number of compliance days	20 days	20 days	20 days
Compliance TIs window	3pm to 8pm (market time)	3pm to 8pm (market time)	3pm to 8pm (market time)
End of Period date	Any days within the bi-annual testing season that complies with the required number of compliance days.	Any days within the bi-annual testing season that complies with the required number of compliance days.	Any days within the bi-annual testing season that complies with the required number of compliance days.

Source: EnelX proposal. **Detail added by AEMO for clarity*.

EnelX's proposal and the following sections of this report provide more detail on the specific elements of the proposals.

3 Analysis and key considerations

3.1 Approach to assessment

3.1.1 WDR Guideline requirements

The WDR Guidelines require AEMO to analyse the baseline methodology proposals on the basis of:

- AEMO's estimate of the cost and time that would be required to develop the proposed baseline methodologies in AEMO's systems; and
- AEMO's estimate of the benefits to end consumers of electricity that may be realised through development of the proposed baseline methodologies, which may include:
  - reduced compliance costs arising from improved baseline compliance; and
  - lower spot prices arising from increased WDR participation.

AEMO is required to approve a proposed baseline methodology if, in AEMO's reasonable opinion:

- it can allow consistent results to be achievable when AEMO, a DRSP or any other person calculates a baseline for a WDRU using the proposed baseline methodology and the same set of metering data (NER 3.10.3(c)); and
- the benefits to end consumers of electricity are likely to exceed AEMO's cost to develop the proposed baseline methodology in AEMO's systems.

3.1.2 Approach to assessment of proposals

This is the first baseline methodology assessment AEMO has undertaken since WDRM commenced and the lack of participation and operational experience to date makes it challenging to quantitatively assess the potential benefits from introducing the proposed changes (e.g. spot price reductions from additional participation, given expansion in eligibility may not correspond proportionately to additional active participation). As such, AEMO will consider and consult on the benefits, costs and risks of approving the proposals against a broader range of considerations in addition to those raised in the Guidelines.

This includes:

- key considerations and limitations for WDRM participation, other processes relevant to WDRM and the broader demand activation landscape, and operational experience to date in the mechanism.
- the efficacy of the specific proposals in terms of suitability for participation by a broader range of loads, robustness against gaming and other risks, and complexity of implementation.
- costs and benefits of implementation.

3.2 Key considerations and limitations

It is important to recognise that baseline methodologies are just one element of the WDRM, and just one variable impacting the overall uptake and performance of the mechanism. There are a range of limitations to benefits

assessment, broader barriers to participation and factors outside the scope of this assessment which affect the outcomes of the WDRM and the draft changes recommended in this consultation paper.

3.2.1 Limitations to assessing benefits

Participation in WDRM is lower than expected

Analysis undertaken by Oakley Greenwood[6] in 2021 concluded that around 20% of medium-sized (160 MWh to 750 MWh) businesses (~7,700 NMIs) and 37% of large Commercial and Industrial (750MWh to 100 GWh) businesses (5,941 NMIs) would be eligible for participation under a 20% accuracy threshold and similar baseline methodology as is available today (10 of 10 with +/-20% pre-period adjustment cap). In comparison, the 2024 WDR Annual Report noted that only 26 NMIs were registered for WDRM in June 2024 with a total registered capacity of 63 MW (this declined from 34 NMIs with a registered capacity of 65 MW in June 2023). The current level of participation relative to estimates of the volume of eligible loads makes it challenging to calculate expected benefits from new baseline methodologies, including benefits driven by expanded eligibility, as expanded eligibility may not equate to proportional additional participation.

There are only two participants in the WDRM

Until recently, EnelX was the sole participant in the WDRM, with VIOTAS very recently joining the mechanism as the second participant since the mechanism commenced. As such, it is difficult to draw from operational experience across a range of industry participants to determine which settings and baseline methodologies will work most effectively across participants or support more participants to enter the WDRM.

There is limited active participation in the WDRM

Often when WDR events occur, only a limited portion of the available capacity in the mechanism typically responds, making it difficult to assess likely market benefits from expanded participation. AEMO's operational experience to date is that the WDRM is relatively resource-intensive to operate relative to the market benefits it provides.

3.2.2 Baseline methodologies are not the only barrier to participation

There are a range of factors that may be contributing to limited participation in WDRM to date which are outside the scope of baseline methodology assessments. These include:

- Industry preferences for participation in out-of-market mechanisms like Reliability and Emergency Reserve Trader (RERT) rather than in-market participation in WDRM.
- Limited awareness, interest, experience and/or capability to engage in the mechanism from large customers across the NEM. For most of these customers, energy is only one (non-primary) component of managing their business operations.

[6] See Phase 1: https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2020/wdrm-becm-policy/first-round/oakley-greenwood-report---phase-1-analysis-final-report-december-2020.pdf?la=en and Phase 2: https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2020/wdrm-becm-policy/first-round/oakley-greenwood-report---phase-2-analysis-final-report-march-2021.pdf?la=en

- Many retailers are already capturing demand response value from their customers, including through event-driven programs and spot price pass-through products, outside of formal market mechanisms like the WDRM.

AEMO is considering broader improvements which may be support participation in WDRM.

3.2.3 Related reforms that will affect WDRM outcomes

Shift towards two-sided market mechanisms

There is an overarching reform direction in the NEM towards a "two-sided market" and away from baseline dependence for facilitating demand side participation. The Australian Energy Market Commission (AEMC) is progressing two-sided market reforms such as *Unlocking CER benefits through flexible trading* and *Integrating price-responsive resources into the NEM* which evolve the way customers participate in the energy market. In its Final Determination to the WDR rule change, the AEMC noted that the WDRM "will eventually be outgrown by the market because it is reliant on the use of centrally determined baselines."[7]

AEMC's upcoming WDR review

The AEMC will be publishing a review of WDR by October 2025.[8] The review is required under Rule 3.10.7 and is a "self-initiated review of the costs, benefits and effectiveness of the mechanism". The AEMC has delayed the review from October 2024 on the basis that it is "currently investigating two-sided market solutions that would potentially contribute to a future state of the NEM" and that it needs to consider findings from these two rule changes as part of the review. It is likely that the review will consider and make recommendations about the future role of the WDRM in the NEM.

3.3 Analysis of proposed baseline methodologies

3.3.1 Proposed new settings

20-day lookback period for eligibility and compliance

As described in section 1.3, the current approach to assessing eligibility and compliance for WDRM loads across most existing baseline methodologies requires the load to meet 20% accuracy and ±4% bias thresholds calculated over a 50-day lookback period[9]. For example, if a compliance assessment is conducted on 29 November 2024 for a 10 of 10 "All Days" baseline methodology, it would look back to 10 October 2024 in calculating accuracy and bias scores.

EnelX argues that a 50-day lookback period captures the impacts of seasonal changes on load patterns (including over the shoulder season) and therefore may decrease baseline accuracy, making it more challenging to demonstrate eligibility and compliance for seasonally varying loads and reducing the pool of sites eligible to participate.

[7] https://www.aemc.gov.au/sites/default/files/documents/final_determination_-_for_publication.pdf, page iv.

[8] https://www.aemc.gov.au/market-reviews-advice/review-wholesale-demand-response-mechanism

[9] Or 20 days for BM3.

EnelX instead proposes a 20-day lookback window should apply to its new baselines. This means the accuracy and bias scores would be based on a smaller sample of more recent data, which EnelX argues is a better indication of adherence to the baseline compared with incorporating data from further back.

AEMO considers that introducing a 20-day lookback period has the potential to better accommodate seasonal loads that are otherwise suitable for WDRM participation, by avoiding the impact of capturing shoulder season effects on baseline eligibility and compliance assessments. A key aspect of seasonal load variation is solar PV, as the output varies considerably between seasons and impacts the profile of the load which can affect baseline compliance, even if the underlying load is relatively stable. As solar PV uptake continues to proliferate in the market, including in the C&I space, AEMO considers it is reasonable to implement baseline settings that better accommodate the adoption of these technologies.

AEMO analysed the impact of a shorter 20-day lookback period across a small sample of large/C&I site NMIs across several different eligibility/compliance periods (including periods prior to the summer and winter dispatch seasons). It found that:

- Accuracy (RRMSE) outcomes for most of the sites benefitted from a shorter lookback period across most eligibility/compliance periods. In some cases, the magnitude of improvement in RRMSE from using a 20-day lookback relative to a 50-day lookback was considerable.
- Bias (ARE) outcomes were more mixed. Bias scores improved (i.e. got closer to zero) for around one third of cases tested and worsened for the remaining cases. Where bias worsened, it typically did not deteriorate to the extent that it changed a compliant case to a non-compliant case in relation to the ±4% ARE threshold.

These results suggest that while a 20-day lookback period delivers better baseline accuracy for some loads, it does not necessarily work better for all potential WDR loads. This may be explained by different load characteristics:

- Where the load exhibits considerable seasonal variation, moving from 50 days to 20 days removes the major source of volatility by removing the impacts of seasonal change on baseline accuracy scores.
- However, for loads that do not vary seasonally but have a higher degree of non-seasonal volatility (i.e. more day-to-day variation), accuracy scores may be worse over a 20-day lookback period relative to a 50-day lookback period, as the latter contains more data to smooth day-to-day volatility to a greater degree.

As such, if introduced, AEMO considers that a 20-day lookback period should be part of new baseline methodologies rather than being applied across all existing methodologies as suggested in the EnelX's proposal.

Uncapped negative day-of adjustments

EnelX argues that the -20% negative adjustment floor used for all existing baseline methodologies creates a restriction that adversely impacts baseline accuracy for some loads, including C&I loads that have a significant drop in load due to the nature of their operations (e.g. at the end of a shift or production run), or where solar PV causes a drop in grid demand. It notes that the existing negative adjustment cap can prevent these drops from being accurately reflected in the baseline, resulting in:

- baseline compliance and eligibility failures; and,
- during dispatch events, more demand response being credited than was actually provided.

EnelX proposes an uncapped negative adjustment floor as an alternative, allowing the difference between the actual level of consumption and the unadjusted baseline in the adjustment window to be more heavily reflected in the baseline calculation. The positive adjustment cap would remain at +20%. It argues that while there is a reasonable justification for capping positive adjustments to prevent gaming through artificial increases in the baseline, there is no corresponding risk associated with negative adjustments because a participant has no incentive to artificially *decrease* its baseline and reduce the amount of creditable demand response during events.

EnelX noted in its proposal that Energy Policy WA (EPWA) was considering uncapped negative adjustments for baselining participation of Demand Side Programmes in the WA Reserve Capacity Mechanism as part of its recent Demand Side Response Review. AEMO notes that EPWA has subsequently amended this approach, with the Baseline Adjustment formula now including a -200% floor to prevent large negative adjustments where average unadjusted baseline energy is very close to zero.[10] EnelX considered that an alternative low but capped floor, such as -200% would have similar benefits to the proposal to allow uncapped negative adjustments. As such, AEMO used a -200% floor in its initial analysis.

Understanding and drawing conclusions on the efficacy of introducing a lower negative adjustment floor across a diverse range of loads is complex.

International studies do not necessarily translate well to EnelX's proposal as they typically only consider asymmetric adjustments where baselines are adjusted upward with no downward adjustment, or baselines that are uncapped in both directions. In contrast, EnelX's proposal is seeking to enable an asymmetric capped adjustment in both directions, with the upward adjustment cap being retained at 20% and the downward floor being reduced to a much lower floor.

AEMO's analysis on a small sample of large/C&I site NMIs across several different eligibility/compliance periods (including periods prior to the summer and winter dispatch seasons) found that:

- A low negative adjustment floor only improves accuracy scores for certain types of loads, such as those where the variation in the level of consumption during the adjustment window corresponds strongly to the level of consumption in the baselined trading interval. EnelX notes that sites with solar generation (i.e. where there is a drop in grid demand when solar output is high) or those that have a drop in grid demand due to nature of operations (e.g. at the end of a shift or production run) are most suited to a lower adjustment floor.
- Bias scores will typically worsen from application of a lower negative adjustment floor; however, they tend to worsen in the direction of systematic *underestimation* of the counterfactual level of consumption (this is a predictable result given the asymmetric cap/floor). As such, in contrast to raising the positive adjustment cap, AEMO considers that the risk from this setting change would generally sit with the participant rather than the market.
- Using a -200% floor rather than an uncapped floor made little difference to the results because none of the sample NMIs tested exhibited that degree of variation relative to the adjustment window. It is possible that there are other negative adjustment floor values that could provide a better balance and AEMO seeks stakeholder feedback on this.

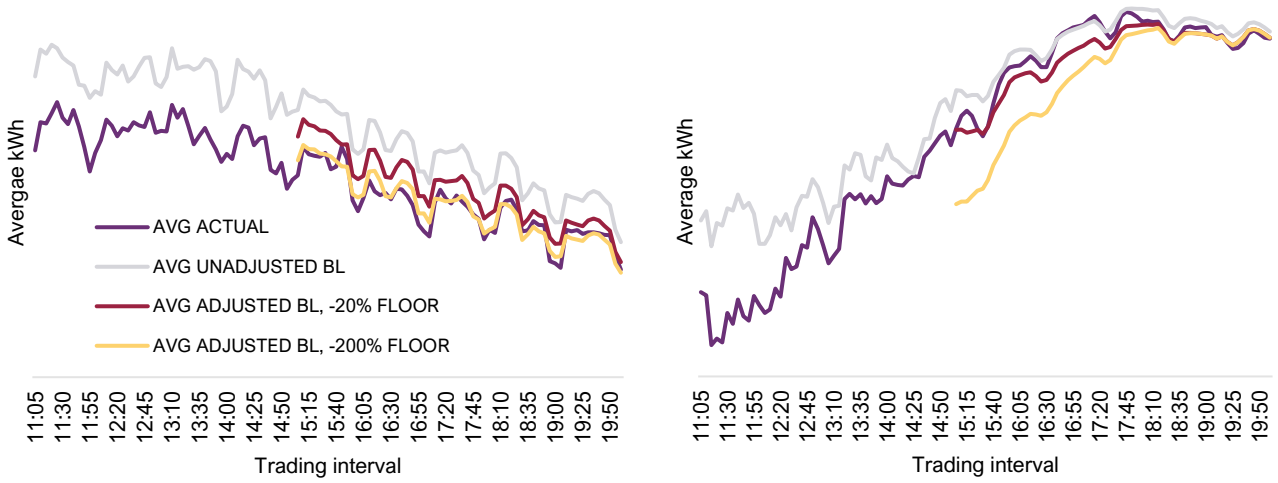
Figure 3 illustrates two specific (anonymised) examples of the impact of a lower -200% adjustment floor. The example on the left shows an improvement in the accuracy of the baseline in predicting the actual behaviour of

[10] https://www.wa.gov.au/system/files/2024-06/wholesale-electricity-market-rules-exposure-draft-misc-3.pdf

the site relative to the unadjusted baseline and a -20% floor. The example on the right shows a case where the change results in a lower and less accurate baseline in the trading intervals early in the eligibility/ compliance TIs window relative to the -20% floor (this is because the large variation between the actual and unadjusted baseline early in the day was not a good predictor of actual load during the start of the eligibility/ compliance TIs window).

Figure 3 Examples of baseline changes associated with a lower negative adjustment floor

Note data is averaged and kWh volumes are removed for data confidentiality. For eligibility and compliance testing, the baseline for each trading interval in the Eligibility/ Compliance TIs window (3pm to 8pm) is adjusted based on the difference between actual consumption and the unadjusted baseline in the adjustment window (the three hours ending one hour before the trading interval being baselined), as if each interval in the Eligibility/ Compliance TIs window is the first to be bid into WDR (this is shown in the figures below). In the case of a WDR dispatch event, for an event starting in trading interval *t*, trading intervals *t*-48 to *t*-13 are the adjustment window, and that adjustment applies to all demand response trading intervals during the dispatch event.



AEMO's assessment is that a lower negative adjustment floor may improve eligibility and compliance outcomes for certain loads, but also increases the likelihood of an understated baseline. This may reduce the value of participation for the load under some circumstances but does not present the same risk to the market as systematic overestimation.

As such, it would not be beneficial to take an approach that adjusts all existing baseline methodologies with a lower negative adjustment floor, but AEMO considers this setting could instead be an option as part of a new baseline methodology and is consulting on options for this.

Open end of period date

EnelX is requesting that the new baseline methodologies include the ability to select an 'end of the period' date from which AEMO's bi-annual baseline compliance testing is conducted (while ensuring the minimum number of compliance days is included).

EnelX proposes that rather than AEMO's PoL Calculator using default end of period dates corresponding to the date the compliance assessments are run (typically around the end of May and end of November prior to peak dispatch seasons), compliance assessments should be conducted using data that better reflects the "two distinct dispatch seasons for WDR" and that WDR participants should have a choice about what this date should be.

EnelX argues that, combined with a 50-day lookback window, the current method often captures the shoulder season and results in PoL failures, which could be addressed through more flexibility around the period over which compliance assessments are run.

The End of Period Date is not a baseline setting, but rather an AEMO policy around when twice-yearly compliance is checked for NMIs participating in WDR. AEMO may run compliance checks at any time outside these periods.

AEMO does not consider it is reasonable for DRSPs to have the ability to select the period for which compliance is measured. In combination with the proposed 20-day lookback period, allowing open End of Period Date selection would enable DRSPs to be highly selective about when and how they demonstrate compliance. Although allowing an open End of Period Date would potentially support additional participation, it creates a risk of enabling unsuitable loads to participate in WDRM and potentially compromises the integrity of responses from the mechanism. WDR can respond to high prices and be dispatched at any time of the year, and should therefore always be expected to be compliant.

3.3.2 High 3 of 10 baseline methodologies

EnelX proposes two variations of High 3 of 10 baseline methodologies, one covering All Days, and the other covering Business Days only. The High 3 of 10 baseline methodology selects the three highest kWh days over the past ten days and calculates the baseline from these values (rather than using the values from all ten days). It therefore excludes the seven lowest consumption days out the previous ten qualifying days from the baseline calculation.

Several different “High X of Y” baseline methodologies are used internationally to better reflect the load patterns of temperature-sensitive loads; that is, loads where the key determinant of electricity consumption is weather. This is relevant to sectors such as commercial buildings, which can use considerably more energy for space conditioning on very hot days.

Periods of extreme temperatures are not only the periods where consumption will be highest for temperature-sensitive loads, but also tend to coincide with peak demand and high price events – when demand response is most likely to provide value. The logic of any “High X of Y” baseline methodology reflects this dynamic: temperature-sensitive loads are more likely to participate if they are compensated for their demand reduction on the basis of their elevated demand on the days they are bidding in and providing the demand response. If a customer has demand response capability on a high price, high demand day, but knows that the baseline against which its dispatched response is measured will understate its counterfactual level of load, it may be less likely to consider participation worthwhile.

The introduction of a High X of Y baseline methodology for the WDRM requires careful consideration as it represents a different logic to existing baseline methodologies in the mechanism, will be more resource intensive for AEMO to implement, and may present a higher risk to the integrity of the mechanism.

AEMO considers that a baseline option to better accommodate temperature-sensitive sites for the WDRM may be valuable for incentivising additional participation. Whilst High X of Y methodologies have the potential to compensate these customers more fairly for their dispatched demand reductions, and potentially provide for a better indication of the actual demand reduction achievable on a day for better operational visibility, they also increase the potential for gaming and over-compensation where less data is used to generate the baselines. A High 3 of 10 methodology is unlikely to strike the right balance between better accommodating temperature-

sensitive loads and managing these risks. For example, a High 3 of 10 methodology may allow extreme outliers to have excessive influence on the baseline.

There are other methodologies which may better balance these considerations, by utilising more data for calculating the baseline while still excluding some lower usage days to recognise the conditions under which dispatch events are more likely to occur.[11] AEMO considers that a High 5 of 10 baseline methodology similar to that utilised by the New York Independent System Operator (NYISO) may provide a better approach. International evidence suggests that a High 5 of 10 baseline methodology, with capped or uncapped multiplicative adjustments, represents a robust option for accurately calculating a counterfactual level of energy consumption against which to measure delivered demand response.[12]

Table 5 compares example baseline calculations for High 3 of 10, High 5 of 10 and 10 of 10 methodologies. It shows that the baseline value against which demand response would be compensated is higher when a selected number of higher consumption days is used, and declines as more days are included in the calculation.

Table 5 Example of High 3 of 10, High 5 of 10 and 10 of 10 baseline calculation

Purple highlighted cells identify the kWh values from the highest five consumption days of the previous ten days as an input for the High 3 and 5 of 10 calculation. The baseline calculations are unadjusted.

Day	Interval 1	Interval 2	Interval N	Average usage (for day)
1	2000	2100	2000	2033
2 (High 5)	2100	2200	2100	2133
3	2000	2100	2000	2033
4 (High 3, High 5)	2200	2500	2200	2300
5	2000	2100	2000	2033
6 (High 5)	2100	2200	2100	2133
7 (High 3, High 5)	2400	2300	2400	2367
8	2000	2100	2000	2033
9 (High 3, High 5)	2600	2700	2600	2633
10	2000	2100	2000	2033
High 3 of 10 baseline	**2400**	**2500**	**2400**	
High 5 of 10 baseline	**2280**	**2380**	**2280**	
10 of 10 baseline	**2140**	**2240**	**2140**	

Source: adapted by AEMO from EnerNOC "The Demand Response Baseline White Paper".

Because the structure of AEMO's WDRM is quite different to other international demand response programs, AEMO will need to work through how a High X of Y baseline methodology would be integrated into the existing baseline eligibility and compliance framework.

AEMO will consult further on potential options for High 5 of 10 baseline methodologies.

[11] See also: https://www.naesb.org/pdf4/dsmee_group3_100809w3.pdf and https://www.wa.gov.au/system/files/2021-05/EnerNOC%20-%20Relevant%20Demand%20Presentation.pdf

[12] See, for example: NYISO SCR Baseline Study Analysis, NYISO Management Response to the NYISO's SCR Baseline Study Analysis and Report and IESO Hourly Demand Response Baseline Methodology Review.

3.4 Costs & Benefits

3.4.1 Implementation costs

The cost and timeframes for implementation will depend on the range of settings and/ or new baselines that are introduced. While AEMO's initial estimate of the time required to implement the changes is four to five months, the timing of commencement of changes will need to be determined through the broader prioritisation and implementation process within AEMO's NEM Reform Program structure. This is to ensure that appropriate resourcing can be made available for planning, implementation and testing of the changes, in the context of AEMO's existing and relatively congested pipeline of industry-wide reform projects. This includes processes for business case development, industry consultation and coordination of opportunities for bundling with other changes to ensure efficient delivery and management of cost and impacts.[13]

The initial estimated cost of implementing the proposals is approximately $550,000 +/- 40%. This estimate includes system changes (development, environments and testing for retail and portfolio management system changes) and business costs (including user acceptance testing of new baselines, training on new baselines, consulting on and updating procedures, PoL tool changes, and updating internal processes). These costs will need to be refined prior to the final determination and are subject to change. Further consideration will also need to be given to any additional ongoing operational or system costs that can be expected from increased participation and administration of additional baselines.

3.4.2 Benefits

Reduced compliance costs

AEMO does not anticipate that there will be material compliance cost reductions associated with introducing new baseline methodologies. Compliance costs are generally low in the WDRM and the introduction of new baseline methodologies is unlikely to reduce instances of non-compliance or the cost of managing compliance.

Spot price reductions

Although there is potential for spot price reductions associated with increased participation in the WDRM, limitations such as low active participation relative to baseline eligibility rates make it challenging to assess and quantify these impacts. It is difficult to determine the degree to which expansion in eligibility would result in material increases in active participation to drive spot price benefits as AEMO has limited information on the number, type and size of sites that would seek to participate in WDRM under the proposed new baseline settings. As such, we consider that sufficient information is not available to credibly quantify spot price reductions resulting from the baseline proposals but are interested in stakeholder feedback around the potential extent of additional participation and associated spot price impacts.

[13] See https://aemo.com.au/en/initiatives/major-programs/nem-reform-implementation-roadmap

Other benefits

AEMO considers that there may be other market benefits associated with introducing new baseline methodologies if additional WDRM participation is supported. These benefits depend on the extent to which new baseline methodologies drive more active participation in the mechanism. AEMO is seeking feedback on the potential materiality of these benefits as part of this consultation, including:

- Operational efficiency benefits from increased operational visibility, predictability and dispatchability of demand response for AEMO as system operator, relative to off-market demand response programs (e.g. RERT). Additional demand response available in the NEM has the potential to support avoidance of unserved energy or to displace more expensive generation.
- More flexibility and active participation of sectors such as commercial buildings and commercial refrigeration in the energy market, particularly during high-demand periods, driven by better accommodation of loads that are temperature-sensitive, seasonally varying, or have solar PV.
- Additional choice and competition for a broader range of large customers in opportunities to engage in demand response activities.
- Supporting the entrance of new participants by accommodating more load types may address concerns with existing baseline methodologies.

4 Draft decision

AEMO seeks stakeholder feedback on the following draft decisions:

Draft decision	Explanation
1. **Approve** new All Days 10 of 10 baseline methodology options with a 20-day lookback period and **consult on** negative adjustment floor options including: a. standard negative adjustment floor (-20%) b. lower negative adjustment floor (e.g., -200%).	AEMO considers that there is value in providing baseline methodology options with a shorter 20-day lookback period for eligibility and compliance to better accommodate seasonally varying loads. AEMO will consult on negative adjustment floor options to accompany this methodology. AEMO's view is that a new baseline option should be introduced rather than applying new settings to existing methodologies. This is because shorter lookback period and/or lower negative adjustment floor settings do not necessarily provide for better accuracy and bias results for all load types.
2. **Not approve** new High 3 of 10 baseline methodologies.	While AEMO agrees there may be value in a "High X of Y" baseline methodology option to better accommodate temperature-sensitive loads, it does not consider that High 3 of 10 baseline methodologies strike the right balance between baseline accuracy and alignment to conditions under which dispatch is most likely to occur.
3. **Consult on** introduction of new High 5 of 10 baseline methodologies with a 20-day lookback period, including: a. All Days, with standard negative adjustment floor (-20%) b. Business Days, with standard negative adjustment floor (-20%) c. All Days, with lower negative adjustment floor (e.g., -200%) d. Business Days, with lower negative adjustment floor (e.g., -200%).	AEMO is consulting on whether introducing alternative "High 5 of 10" baseline methodology options for accommodating temperature-sensitive loads is likely to support additional participation in the mechanism. This approach utilises more data in calculating the baseline (relative to High 3 of 10 options) whilst also recognising that WDR dispatch events are more likely occur on days when consumption is higher than usual for some loads. AEMO proposes that, if supported, these new methodologies could be accompanied by a 20-day lookback period setting and is seeking stakeholder feedback on negative adjustment floor options. These methodologies will be more resource intensive for AEMO to implement and will require AEMO to further consider how any new "High X of Y" baseline methodology would be incorporated into its eligibility and compliance processes if implemented.
4. **Not approve** open End of Period Date selection for compliance assessment.	AEMO does not consider it is appropriate for WDRM participants to have choice over compliance testing timeframes, particularly in combination with a short lookback period.

5 Consultation questions

Consultation questions – baseline methodologies

1. To what extent would introducing the new baseline methodologies outlined in the draft decision, including temperature-sensitive methodologies, support additional participation in the WDRM?
2. Do you support the draft decision to introduce new 10 of 10 baseline methodology options that include a shorter 20-day lookback for eligibility and compliance? Why or why not?
3. Do you support the introduction of baseline methodology options that include a lower negative adjustment floor (e.g. -200%)?
    a. What negative adjustment floor options should accompany the new 10 of 10 baseline methodology proposal under draft decision (1)?
    b. Does the proposed -200% negative adjustment floor strike the right balance to support load types that benefit from this setting, or would a different floor work better (e.g. -50%, -100%) and why?
    c. Can you share examples of other scenarios or load types that would be suitable for participation in WDRM with a lower negative adjustment floor?
    d. Has AEMO adequately captured the risks and benefits associated with this setting?
4. Do you agree with AEMO's draft decision to reject a High 3 of 10 baseline methodology and instead consult on introduction of High 5 of 10 baseline methodology options?
    a. Does a High 5 of 10 methodology strike a better balance between incentivising participation and managing risks of gaming compared with High 3 of 10? If not, why?
    b. Are there alternative approaches that better achieve this outcome?
    c. Which High 5 of 10 methodology options are likely to support additional participation?
5. Are there alternative standard compliance periods which may better accommodate seasonality while also fulfilling AEMO's operational and compliance requirements?
6. Are there any risks that AEMO has not considered, particularly with respect to the combination of settings for these baseline methodologies?
7. Do you have any other comments about AEMO's approach or draft decisions?

Consultation questions – costs & benefits

1. Do you agree with the costs and benefits outlined?
2. What are your views on the materiality of:
    a. Potential for reduced spot prices from the proposed changes.
    b. The other benefits outlined.
3. Do you consider that, on balance, AEMO should introduce new baseline methodologies?

6 Next steps

AEMO is interested in stakeholder feedback on the draft decisions and consultation questions outlined in Section 5 of this report by Thursday 24 October 2024. Feedback may be provided via wdr@aemo.com.au.

AEMO will publish a Final Report by Thursday 21 November 2024 taking into consideration the content of stakeholder submissions and any additional analysis it considers should be undertaken to inform its final decision.

Milestone	Date
Initial assessment	Thursday 4 July 2024 (complete)
Draft Decision communicated to proponent	Thursday 1 August 2024 (complete)
Publish Draft Report & consultation commences (this document)	Thursday 26 September 2024
Submissions due	Thursday 24 October 2024
Publication of Final Report & Decision	Thursday 21 November 2024

Abbreviations

Term	Definition
AEMC	Australian Energy Market Commission
ARE	Average Relative Error
C&I	Commercial and Industrial
CAISO	California Independent System Operator
DRSP	Demand Response Service Provider
EPWA	Energy Policy Western Australia
GWh	Gigawatt hour
kWh	Kilowatt hour
MW	Megawatt
MWh	Megawatt hour
NEM	National Electricity Market
NMI	National Metering Identifier
NYISO	New York Independent System Operator
PoL	Predictability of Load
RERT	Reliability and Emergency Reserve Trader
RRMSE	Relative Root Mean Squared Error
TI	Trading interval
WDR	Wholesale demand response
WDRM	Wholesale Demand Response Mechanism
WDRU	Wholesale Demand Response Unit