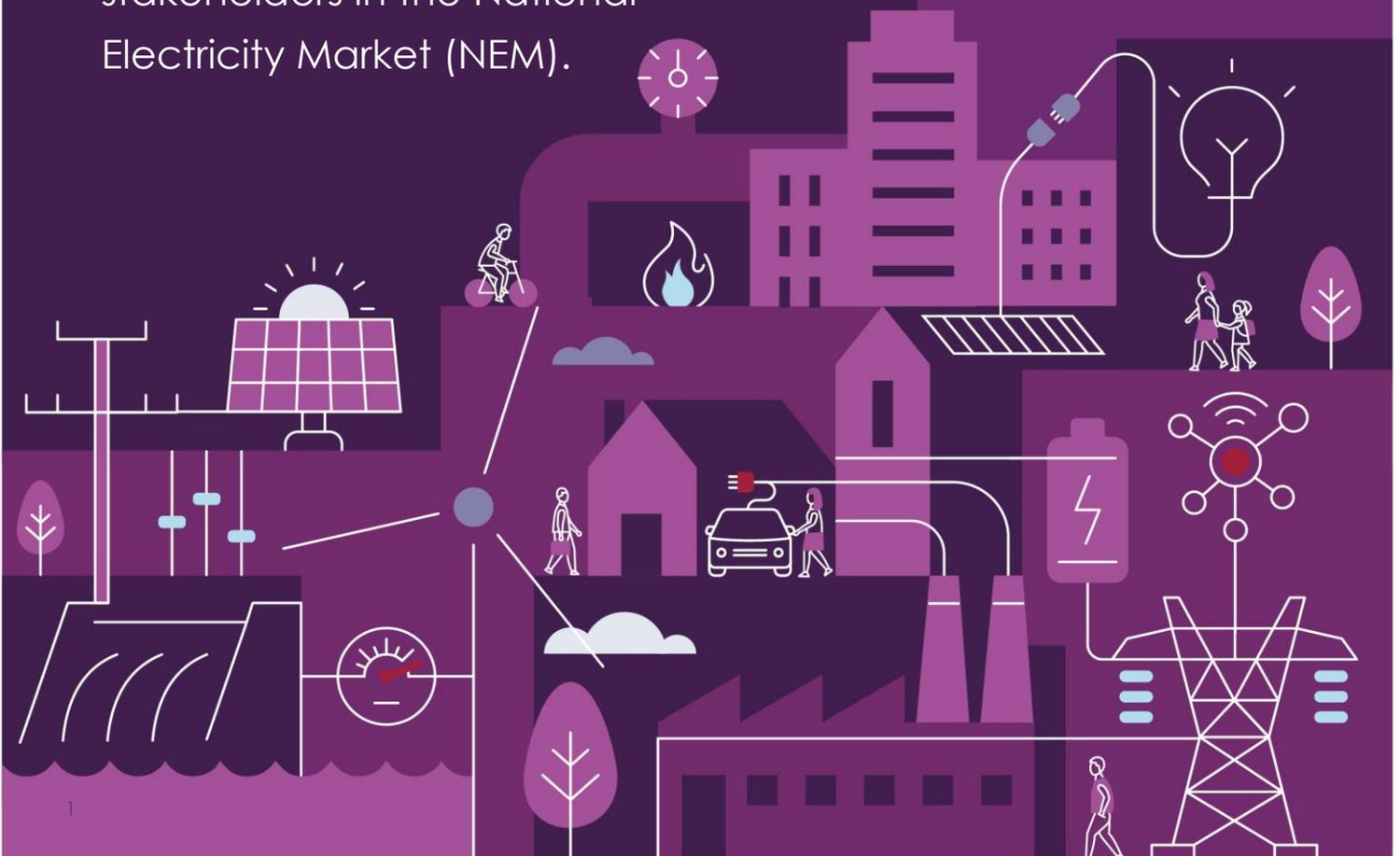
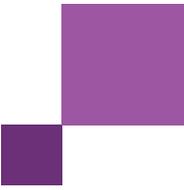


# Enhancing Reserve Information – High Level Implementation Assessment Final

12 July 2024

Prepared for participants and  
stakeholders in the National  
Electricity Market (NEM).





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# 1 High Level Implementation Assessment (HLIA) purpose and overview

This HLIA has been produced as the first stage of the Enhancing Reserve Information (ERI) reform implementation process. This HLIA outlines the proposed changes that will be required to the capabilities, systems and operations required to give effect to the new rules. This HLIA also provides a general assessment of what these changes may mean for participants.

By publishing at the start of the reform implementation process, and inviting participant feedback, the HLIA is intended to enable:

- efficient planning and cost-minimisation in AEMO's implementation of the ERI reform
- participants and other stakeholders to understand and plan for system, process and operational changes they will be required to consider and implement
- stakeholders to provide input on the early implementation design, including whether AEMO's proposal is compliant with the rules.

## 2 Changes between the Draft and Final HLIA

AEMO published a Draft ERI HLIA for consultation on 7 June 2024 for stakeholder comments invited for two weeks. Written feedback was received from one participant, EnergyAustralia. Comments on the Draft HLIA were also received at the June meetings of AEMO's Participant Consultative Forum (PCF) and Electricity Wholesale Consultative Forum (EWCF).

Following that feedback and AEMO's continued consideration of ERI's implementation, the following additions have been made to Final HLIA.

1. Table 1 has been added to Section 3, providing a summary of the ERI impacts.
2. The part titled 'Changes to generator Daily Energy Constraint bids that are above maximum daily output' has been added within subsection 3.2.2, to outline an issue not discussed in the Draft HLIA.
3. The part titled 'Timing of system deployment and implementation of Change 3' within subsection 3.2.3 has been rewritten to state that AEMO intends to voluntarily begin publishing aggregated state of charge data for grid-scale batteries from 1 July 2025, in all regions except Tasmania. The corresponding section of the Draft HLIA canvassed the possibility of AEMO doing so. A corresponding change has also been made to the summary of new measures in Section 3.1.
4. The part titled 'Changes required for non-battery BDUs to provide daily energy limits', within section 3.2.2, has been deleted. AEMO no longer expects to make such changes as part of the ERI reform.
5. The implementation timeline (Section 4) has not changed, although text has been amended to make clear that the ERI system and data model changes will be deployed into pre-production one month before go-live, to allow industry to test their consumption of the new data.
6. Section 5, 'Proposed industry readiness approach', has been added, including discussion of readiness criteria, industry testing approach and participant development support, and transition and go live.

The section inviting stakeholder comment on the Draft HLIA has also been removed from this final version.

## 3 The ERI reform – Key changes and impacts

### 3.1 The AEMC’s final rule change determination

The Australian Energy Market Commission (AEMC) made a [final determination in the ERI rule change](#) on 21 March 2024. The AEMC had consolidated two separate proposals from [Iberdrola Australia](#) (for the introduction of a dynamic operating reserves market) and [Delta Electricity](#) (for the establishment of 30-minute ramping services within the existing Frequency Control and Ancillary Services (FCAS) framework).

Following extensive consideration and consultation, the AEMC made a final determination not to introduce a new operating reserves market. Instead, changes will be made to improve the transparency of energy availability across the NEM. This will allow participants to make more informed decisions about their own behaviour, including when periods of tighter supply-demand balance (that is, higher prices) are anticipated.

Three new measures will be introduced:

**1. Publication of the previous trading day’s 5-min data for batteries<sup>1</sup>**

From 1 July 2025, AEMO is required to publish the energy availability for batteries, by Dispatchable Unit Identifier (DUID) and for each 5-minute trading interval (TI), at the end of the trading day, for the previous trading day.

**2. Publication of daily energy limits (total availability) for scheduled generators and bidirectional units (BDUs) that are not batteries**

From 1 July 2025, AEMO is required to publish the daily energy limits (total availability) of scheduled generators and scheduled BDUs that are not batteries (i.e. pumped hydro production units), aggregated by region, at the start of the trading day. As outlined in section 2.2.2, AEMO proposes to publish this information every 30 minutes, for both the current trading day and the next trading day, as part of the pre-dispatch (PD) process.

**3. Publication of aggregated state of charge of batteries**

From 1 July 2027, AEMO will be required to publish energy availability of batteries (i.e. state of charge in MWh), aggregated by region, each TI. As discussed in section 3.2.2, AEMO intends to voluntarily commence publishing this information from 1 July 2025.

An additional change is also part of the ERI rules, with a new item added to the Scheduled Bidirectional Unit Data table in Schedule 3.1 of the National Electricity Rules (NER), meaning:

**4. Scheduled BDUs to provide Maximum Storage Capacity**

From 1 July 2025, BDU operators will be required to provide their maximum storage capacity (MWh) to AEMO.

#### Possible changes to operational forecasting not in scope of this HLIA

AEMO recognises the requested engagements and potential improvements to operational forecasting included in the AEMC’s final determination. However, as there are no specific requirements or impacts that

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<sup>1</sup> Within the ERI rules (section 3.7G of the NER, see [Final rule published by the AEMC](#)), “**battery** means a *scheduled bidirectional unit*, excluding a pumped hydro production unit” (NER 3.7G(a)).

are defined at this time, they have not been included in the scope of the ERI project. Therefore, any possible changes to operational forecasting have not been addressed in this HLIA.

For more information to address specific concerns, please contact [op.forecasting@aemo.com.au](mailto:op.forecasting@aemo.com.au).

## 3.2 Changes and impacts

Summary of changes required to implement the ERI rules

The following subsections detail changes to the NEM Electricity Market Management System (EMMS) Participant Data Model (DM) and NEM Reports that will be required to implement the ERI reform.

Updates will also be required to the NER Schedule 3.1 collection process, but no software changes will be involved. An associated addition will be made to the NEM Participant registration form and accompanying explanatory material.

Impacts to AEMO’s internal processes and teams are considered to be moderate and will not impact readiness preparations for this initiative.

There are no changes to any NEM procedures required, noting that AEMO is still exploring how to accommodate the capping of energy availability by Maximum Storage Capacity, as discussed in section 3.2.2, below.

**Table 1 Summary of impacts**

Impacted area	Heat map rating	Impact description
EMMS participant data model	Low	Configuration changes and new columns added to some tables, as outlined in the following subsections.
NEM Reports	Low	A new report will be added to the Next Day reporting event, as outlined below.
Grid-scale batteries	Low	Operators will be required to provide their Maximum Storage Capacity to AEMO. This figure will be subject to annual confirmation.
AEMO registration management system and guide	Low	Changes to accommodate capping availability by maximum storage capacity.
Other AEMO systems	Low	Changes to accommodate capping availability by maximum storage capacity.
Scheduled generators who cannot submit a NULL value for their bid Daily Energy Constraint.	Medium	Currently, some participants cannot enter a NULL value when not energy constrained (and instead enter a ‘flood’ value such as 999999 to ensure they can be dispatched to their full capacity). To ensure the ERI figure for such generators is meaningful and useful, changes are necessary to prevent the submission of such values. The exact nature of the changes is still being considered.

### 3.2.1 Change 1: Publication of previous trading day’s 5-min data for batteries

NER clause 3.13.4(p) requires AEMO to publish different categories of data about the previous trading day’s wholesale market activity, including final dispatch offers, bids and generator availability. The ERI rules add a new sub clause, (9), to 3.13.4(p), which will see AEMO publish “in respect of a scheduled bidirectional unit,

excluding a pumped hydro production unit, the actual state of charge in each trading interval in respect of each [DUID].”

### Changes to EMMS Participant Data Model

As part of the IESS reforms, battery operators are required to provide the necessary state of charge data to AEMO. The data is contained in the EMMS DM field Initial\_Energy\_Storage in the DISPATCHLOAD table.

Implementing ERI Change 1, therefore, requires a configuration change to NEM Reports, to add this data to the NextDay.UnitSolution table.

### 3.2.2 Change 2: Publication of aggregated energy limits (total availability) of scheduled generators and non-battery BDUs

Rule 3.7G(c1) introduces a new requirement for AEMO to publish, at the start of the trading day, the combined total daily energy availability (in MWh), aggregated by region, of all scheduled generating units. Subclause (c2) adds scheduled BDUs that are pumped hydro production units (i.e. non-battery BDUs) to the aggregation in each region. This information (combined with the maximum scheduled capacity in each region) will allow participants to identify the extent of any reductions in capacity available from scheduled plant (excluding batteries, which are reported separately) in each NEM region.

AEMO’s view is that this information should be provided every 30 minutes, as part of the PD process. PD covers the remainder of the current trading day and the whole next trading day, broken down into 30-minute periods. Therefore, for the pre-dispatch runs between the start of the trading day (0400) and 1230, AEMO would publish energy availability for that trading day, with figures provided for every 30-minute period, each of which can be updated every PD run. For the pre-dispatch runs between 1230 and 0400, AEMO would publish energy availability for the remaining intervals of the current trading day and for all intervals of the next trading day.

### Changes to AEMO systems to accommodate the capping of energy availability by Maximum Storage Capacity

Under the IESS reform, AEMO has introduced a profiled energy limit model as an optional feature. This means energy availability calculated in PD could continue to grow into negative or beyond the Maximum Storage Capacity (see section 3.2.4) if the participant has not opted in to provide energy limits. To address the risk of accumulated errors compromising this element of the ERI reform, AEMO is considering capping the energy availability by Maximum Storage Capacity for all relevant BDUs.

AEMO is still conducting a full options assessment regarding how this can be achieved. At this stage, all options impact internal AEMO systems only, and would not see changes to participant systems or the EMMS DM. AEMO will engage with industry, via the regular forums listed in Section 7, as these options are considered and a preferred approach is selected.

### Changes to NEM Reports

AEMO proposes to publish aggregated energy availability data (for units other than batteries) by adding a new report to the Next Day reporting event in NEM Reports.

**Table 2 NEM Reports changes for Change 2**

DATA_MODEL_TABLE	EVENT_ID	FILE_ID	REPORT_ID
DISPATCHREGIONSUM	DISPATCH	DISPATCHIS	DISPATCHIS_DISPATCHREGIONSUM_8
P5MIN_REGIONSOLUTION	P5MIN	P5MIN	P5MIN_REGIONSOLUTION_9
PREDISPATCHREGIONSUM	PREDISPATCH	PREDISPATCHIS	PDIS_PREDISPATCHREGIONSUM_8
	PREDISPATCH	PREDISPATCH_LATEST	PREDISPATCH_PDREGION_5
	PREDISPATCH	PREDISPATCH	PREDISPATCH_PDREGION_5
DISPATCHREGIONSUM	MONTHLY_DVD	DVD_DISPATCHREGIONSUM	DVD_DISPATCHREGIONSUM
P5MIN_REGIONSOLUTION	MONTHLY_DVD	DVD_P5MIN_REGIONSOLUTION_ALL	DVD_P5MIN_REGIONSOLUTION_ALL
P5MIN_REGIONSOLUTION	MONTHLY_DVD	DVD_P5MIN_REGIONSOLUTION	DVD_P5MIN_REGIONSOLUTION
PREDISPATCHREGIONSUM	MONTHLY_DVD	DVD_PREDISPATCHREGIONSUM_D	DVD_PREDISPATCHREGIONSUM_D
PREDISPATCHREGIONSUM	MONTHLY_DVD	DVD_PREDISPATCHREGIONSUM	DVD_PREDISPATCHREGIONSUM

### Changes to EMMS Participant Data Model

To implement this change, the field DEC\_Residual\_Energy will be added to the tables:

- DISPATCHREGIONSUM
- P5MIN\_REGIONSOLUTION
- PREDISPATCHREGIONSUM

This will be calculated as a running total over successive periods.

### Changes to generator Daily Energy Constraint bids that are above maximum daily output

As part of the NEM’s transition from 30-minute to five-minute settlement, a change was also made to how scheduled generators bid their daily energy constraint (that is, inform AEMO of any reductions in their available capacity below their nominal maximum for 24 hours). Previously, generators would enter a number to represent the extent of the constraint (0 = no constraint). Now, generators submit a figure that represents their constrained availability (0 = no output), with a NULL value used to indicate that a generator is not constrained.

However, the software used by some operators is only able to submit a numeric value (and so cannot submit NULL). In order to avoid their plant being treated as constrained, some operators submit figures such as ‘999999’ or others that exceed their possible maximum output over 24 hours. If these figures were used in the ERI calculation process, the outcome would not be useful or meaningful to participants. As a result, changes will be necessary to ensure the figure for each generator accurately reflects its availability. AEMO began engaging with industry participants on the best approach to this issue in June 2024 and will continue to do so until a solution is chosen, including via the forums listed in Section 7.

### 3.2.3 Change 3: Publication of aggregated state of charge of batteries each TI

Rule 3.7G(d) introduces a requirement for AEMO to publish the state of charge (in MWh) of all batteries, aggregated by region, as close to real time as practicable, but at least once in each TI.

AEMO proposes to publish battery state of charge once each TI, as part of the data provided immediately following the completion of the dispatch run.

#### Changes to EMMS Participant data model

As part of the IESS reforms, the column BDU\_Energy\_Storage has been added to the AEMO internal database tables:

- DISPATCHREGIONSUM
- P5MIN\_REGIONSOLUTION
- PREDISPATCHREGIONSUM

Implementing this change, therefore, requires a configuration change in NEM Reports to amend the conditions currently placed on concealing real-time state of charge data (that is, rather than only seeing their own state of charge, participants will also see regional aggregations).

#### Timing of system deployment and implementation of Change 3

Rule 3.7G(d) comes into effect on 1 July 2027. This effective date was set to allow the number of batteries in each NEM region to reach a level that would mean aggregated figures could be published without revealing individual positions to competitors. In the Draft ERI HLIA, and at the June 2024 meetings of the PCF, EWCF and Implementation Forum, AEMO expressed an intention to explore voluntarily publishing aggregated regional state-of-charge data each TI before the 3.7G(d) obligation commences. The single written submission to the Draft HLIA supported the voluntarily publication of aggregated state of charge data and no objections were raised at the forums.

AEMO, therefore, will commence voluntarily publishing the aggregated state of charge of grid-scale batteries each TI from 1 July 2025, in regions with at least three independent operators of such facilities. Where this threshold is met, the publication of an aggregated figure does not risk revealing the state of charge of an individual facility to its direct competitor. Currently, all NEM Regions except Tasmania meet this criteria.

AEMO will deploy and test Change 3 along with the other ERI changes discussed in this HLIA, ahead of commencing in all NEM regions other than Tasmania on 1 July 2025. Appropriate re-testing and communication will also precede the commencement of reporting on 1 July 2027 in Tasmania (or later if three independent grid-scale battery operators enter the market (noting that there are currently none operating or proposed, according to AEMO's generation information page).

### 3.2.4 Change 4: Battery operators to provide Maximum Storage Capacity

The ERI rule change adds *maximum storage capacity* (in MWh) to the Bid Validation Data required from scheduled BDUs under Schedule 3.1 of the NER. This means that this data is collected at the time of registration and subject to annual confirmation by the registered participant.

### New element to Schedule 3.1 Bid Validation Data for BDUs

Maximum Storage Capacity will be added to AEMO’s Integrated Resource Provider registration form and associated explanatory guide. AEMO’s associated Registration Manager Client system will also be updated accordingly.

From 1 July 2025, registered BDUs will be required to include Maximum Storage Capacity in their annual Schedule 3.1 data confirmation process.

## 4 Implementation timeline

The following timeline has been developed to meet the commencement dates published in the AEMC’s final determination. Due to the relatively simple nature of the changes in this reform, AEMO does not recommend formal industry testing but rather will deploy the changes into pre-production approximately one month prior to the commencement dates. This will allow participants to receive the additional reports and test their ability to ingest and use the reports within their systems.

As discussed in section 3.2.3, above, AEMO will commence voluntarily publishing aggregated state of charge for grid-scale batteries from 1 July 2025, in all regions except Tasmania. Prior to the commencement of this reporting for Tasmania, appropriate testing and other preparatory activities will be undertaken. These activities will take account of the fact that the functionality will already have been operating in other regions for almost two years (and the requirements for testing may therefore be limited).

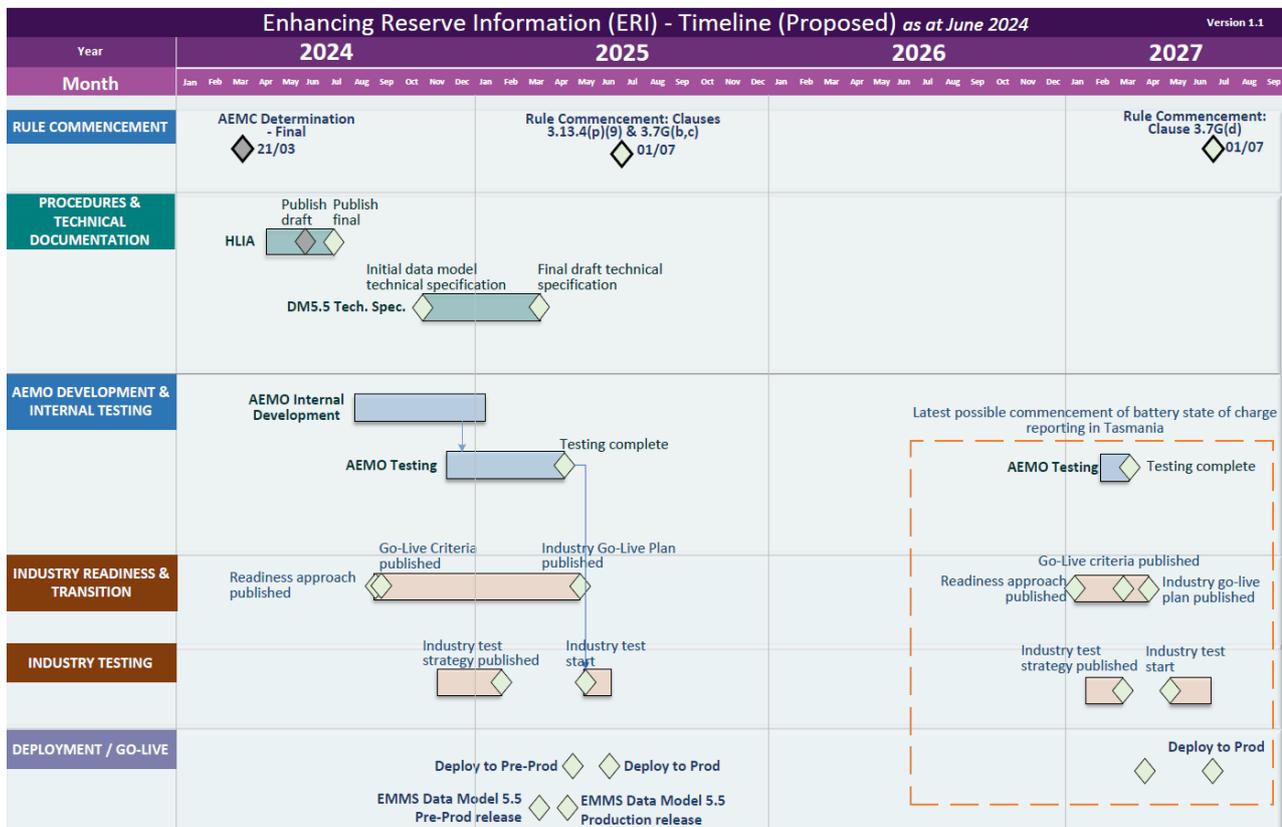


Figure 1 ERI implementation timeline

## 5 Proposed industry readiness approach

The following sections represent AEMO’s initial view for the readiness approach to be taken for the release of ERI-Reporting on 1 July 2025 noting that the readiness approach for 1 July 2027 rule commencement will be prepared separately when go-live and delivery milestones have been confirmed for Change 3. The readiness approach and milestone dates will be confirmed, after consultation with participants, with the issue of the Readiness Approach final version tentatively targeted for 30 August 2024.

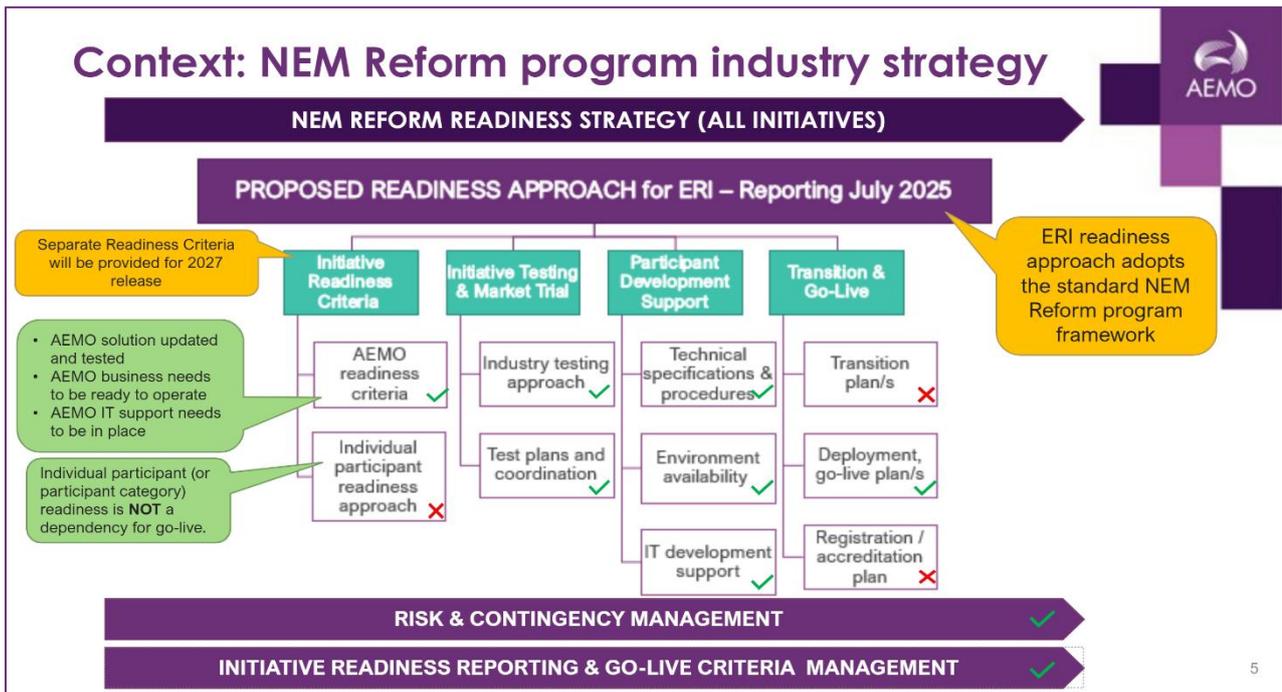


Figure 2 Proposed Readiness Approach for ERI Rule Commencement 1 July 2025

### 5.1 Indicative readiness criteria

It is proposed that ERI-Reporting go-live criteria will reflect technical readiness for go-live and AEMO preparedness to support the solution. The AEMO solution needs to be tested in line with ERI Rule changes covered in section 2.2. AEMO business operations needs to be in place to support changes to business processes and Digital operations needs to be ready to provide ongoing technical support.

Impacted participant readiness will not be considered a dependency for go-live and AEMO does not propose to monitor participant readiness activities. However, impacted participants must provide and maintain accurate Maximum Storage Capacity data via the BDU Registration process and annual Schedule 3.1<sup>2</sup> data confirmation process under the new rule.

AEMO will report to industry, progress against confirmed L1/L2 milestones and on contingency checkpoints. Tentative dates for Industry Test and Go-live checkpoints are 30 April and 28 May 2025 respectively.

<sup>2</sup> [https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/information-for-current-participants/change-schedule-3\\_1-bid-and-offer-validation-data](https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/information-for-current-participants/change-schedule-3_1-bid-and-offer-validation-data)

Formalised participant readiness reporting is not proposed as there are no participant activities that if not complete would stop the solution going live.

## 5.2 Industry testing approach and participant development support

The informal industry testing approach proposed in Section 4 will be scoped and planned in consultation with participants. AEMO does not anticipate the need for a development support environment (PDSE) based on participant impacts being limited to report/data model changes. The Industry Test Strategy will confirm the agreed approach, tentative publish date 31 Jan 2025.

AEMO's Preproduction environment will be made available for 1 month to allow participants to receive the additional reports and test their ability to ingest and use the reports within their systems. Tentative dates for initial and final versions of the EMMS Data Model v5.5 technical specification containing changes to support ERI-Reporting are 31 October 2024 and 31 March 2025 respectively. MSUG sessions will provide support for technical specification updates aligned to release dates of the draft and final specification.

Technical implementation support will be via Q&A sessions and the ITWG, timings to be confirmed in the test strategy.

## 5.3 Transition and go-live

Transition plans are not required as there are no obligated transitional requirements for rule commencement on 1 July 2025. From 1 July 2025, registered BDUs will be required to include Maximum Storage Capacity in their annual Schedule 3.1 bid and offer data confirmation process. This additional data is now captured as part of the BDU registration process introduced by the IESS initiative (effective 3 June 2024) so no additional registration activity is anticipated for ERI go-live.

Additionally, Accreditation Plans are not required as there are no changes to MDP / MP requirements that would drive the need for accreditation.

Draft and final Go-live Plans for the ERI-Reporting production release will be needed to provide timings of data model and reporting changes. (Tentative dates – 1 May 2025 and 16 May 2025).

# 6 Interdependencies

As detailed in Section 2, some measures required to give effect to the ERI reform have been developed as part of the IESS rule change, effective 3 June 2024. As a result, there is no dependency or impact to IESS development. ERI will "extend" upon functionality delivered by the IESS initiative, but the interdependency is only one way.

The ERI reforms would be deployed in parallel with changes currently being considered to the Short-Term Projected Assessment of System Adequacy (ST PASA) arrangements and Frequency Performance Payments (FPP) project. There are no functional interdependencies between these reforms. However, the potential impacts and risks associated with deploying the changes in parallel will be assessed and managed.

## 7 Ongoing engagement with the ERI implementation process

Engagement with participants and other stakeholders on the implementation of ERI will occur through the regular monthly forums that AEMO conducts as part of the NEM Reform Program, especially:

- [The Program Consultative Forum \(PCF\)](#)
- [The Electricity Wholesale Consultative Forum \(EWCF\)](#)
- [The Implementation Forum](#)

More information about any of the forums, including invitations, is available by contacting [NEMReform@aemo.com.au](mailto:NEMReform@aemo.com.au).

Any questions regarding this HLIA or the ERI reform in general, can also be sent to [NEMReform@aemo.com.au](mailto:NEMReform@aemo.com.au).