

2025 IASR Scenarios

Consultation paper

17 July 2024

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New South Wales | Queensland | South Australia | Victoria | Australian Capital Territory | Tasmania | Western Australia

Australian Energy Market Operator Ltd ABN 94 072 010 327

Explanatory statement

This consultation paper commences initial consultation on scenarios for AEMO's Draft 2025 Inputs, Assumptions and Scenarios Report (IASR).

Work is now underway to develop the Draft 2025 IASR, which is set for release in December 2024. The purpose of this initial consultation is for stakeholders to provide feedback to AEMO on how the **2023 IASR scenarios** should evolve to best fit the purpose of modelling Australia's energy future. This consultation paper provides indicative considerations of how AEMO expects the existing scenario collection could develop to continue to meet AEMO's scenario planning purposes and to remain relevant for stakeholders' needs, including considerations of the scenario narratives and key parameters.

Consultation notice

AEMO invites written submissions from interested stakeholders on the topics raised in this paper to forecasting.planning@aemo.com.au by 5:00 pm AEST on 13 August 2024.

Submissions may make alternative or additional proposals that stakeholders consider may better meet the objectives of this consultation and the national electricity objective in Section 7 of the National Electricity Law (please include supporting reasons).

Before making a submission, please read and take note of AEMO's consultation submission guidelines, which can be found at <https://aemo.com.au/consultations>. Subject to those guidelines, submissions will be published on AEMO's website.

Please identify any parts of your submission that you wish to remain confidential, and explain why. AEMO may still publish that information if it does not consider it to be confidential, but will consult with you before doing so. Material identified as confidential may be given less weight in the decision-making process than material that is published.

Submissions received after the closing date and time will not be valid, and AEMO is not obliged to consider them. Any late submissions should explain the reason for lateness and the detriment to you if AEMO does not consider your submission.

Interested stakeholders can request a meeting with AEMO to discuss particularly complex, sensitive or confidential matters relating to the proposal (please refer to National Electricity Rules (NER) 8.9.1(k)). Meeting requests must be received by the end of the submission period and include reasons for the request.

We will try to accommodate reasonable meeting requests but, where appropriate, we may hold joint meetings with other stakeholders or convene a meeting with a broader industry group. Subject to confidentiality restrictions, AEMO will publish a summary of matters discussed at stakeholder meetings.

Note that this document uses terms defined in the NER, which are intended to have the same meanings. There is a glossary of additional terms and abbreviations in Appendix A1.

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1. Scenario planning and consultation process

AEMO typically applies a scenario planning approach when executing its forecasting and planning functions. The use of scenario planning is an effective practice when planning in highly uncertain environments, particularly through disruptive transitions.

AEMO is consulting on the scenarios to be used in its forecasting and planning in 2024-25 and 2025-26. These scenarios are used in executing AEMO's electricity and gas statutory functions in the National Electricity Market (NEM), including the Electricity Statement of Opportunities (ESOO)¹, Gas Statement of Opportunities (GSOO)² and Integrated System Plan (ISP)³.

As required under the National Electricity Rules (NER), for the ISP's purposes, all scenarios in the scenario collection apply relevant policies that meet public policy criteria, including international commitments (such as to the Paris Agreement) and legislated policies that are quantifiable within AEMO's modelling scopes. AEMO will outline the public policies that meet these criteria, and guidance for their eligibility, as it develops the 2025 IASR.

The scenarios, and the inputs and assumptions that apply in each scenario, will be published in the 2025 Inputs, Assumptions and Scenarios Report (IASR) and consulted on in accordance with the single stage consultation process outlined in Appendix B of the Australian Energy Regulator's Forecasting Best Practice Guidelines (FBPG)⁴.

The indicative process and timeline for this initial scenario consultation is outlined in Table 1 below. Dates may be adjusted and additional steps may be included as the consultation progresses.

Table 1 Engagement opportunities on scenarios

Consultation steps	Dates
2025 IASR Scenarios consultation paper published	17 July 2024
Discussion at a Forecasting Reference Group meeting	31 July 2024
Submissions due on consultation paper	13 August 2024
Consultation update at a Forecasting Reference Group meeting	28 August 2024
Draft 2025 IASR published	11 December 2024
Submissions due on draft report	11 February 2025
Final IASR published	31 July 2025

The purpose of this consultation is to gather feedback on high-level scenario design, to inform AEMO's development of the 2025 IASR scenarios.

Stakeholders should be aware of upcoming consultations that may complement this consultation:

¹ NER 3.13.3A(b)

² Gas Statement of Opportunities in accordance with section 91DA of the National Gas Law and Part 15D of the National Gas Rules.

³ National Electricity Law Section 49(2)

⁴ Available at <https://www.aer.gov.au/system/files/AER%20-%20Forecasting%20best%20practice%20guidelines%20-%2025%20August%202020.pdf>.

- **ISP Methodology** (late 2024) – the most relevant consultation to provide feedback on the ISP, its purpose and design, including the process of using scenarios to produce the optimal development path (ODP).
- **Electricity demand forecasting methodology** (late 2024) – the most relevant consultation to provide feedback on the methods for forecasting electricity consumption and demand for each of the scenarios.
- **Draft 2025 IASR** (late 2024) – the most relevant consultation to provide feedback on specific parameter forecasts of the scenarios that have been developed.

2. Background

2.1. Context of the 2025 IASR scenarios

The 2025 IASR scenarios will inform the execution of AEMO's forecasting and planning functions, including the 2025 ESOO, 2025 GSOO and 2026 ISP.

AEMO notes that its scenarios are used beyond its planning functions, and may provide a reference for stakeholders to use for regulatory, investment and planning purposes. Given this, AEMO recognises the critical importance that the scenarios play in supporting the energy transition, and the importance of collaborating with stakeholders in their development.

2.2. Scenarios and sensitivities

AEMO uses a scenario planning approach to examine a range of possible and plausible 'futures' when planning for the future needs of the energy system.

There are many possible futures for Australia's energy system, and the goal of scenario development is not to determine which future will occur, but to develop a discrete set of scenarios that embody and communicate key uncertainties. Scenarios need not be normative, that is, describing visions of preferred futures, and do not tend to explore specific solutions (such as high adoption of a particular technology); the impact of specific uncertainties may be explored through sensitivity analysis.

The 2023 IASR's scenario collection used the following narratives to cover three possible futures:

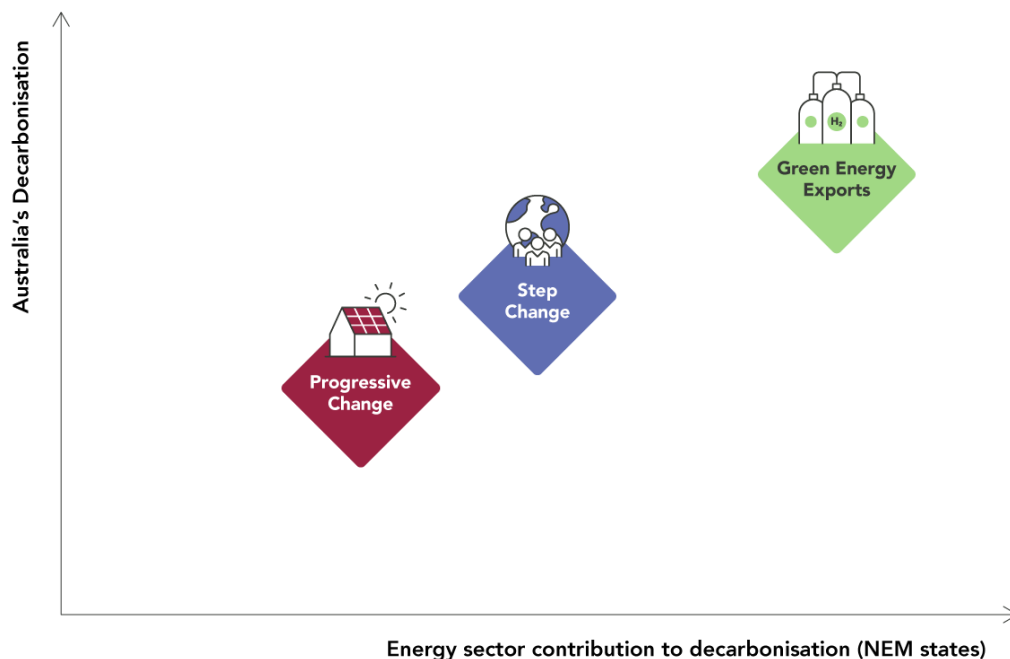
- **Step Change** – achieves a scale of energy transformation that supports Australia's contribution to limiting global temperature rise to below 2°C by 2100 compared to pre-industrial levels. The electricity sector plays a significant role in decarbonisation and the scenario assumes the broader economy utilises the electricity sector's low emissions footprint to decarbonise through electrification. The electricity sector's contribution may be compatible with a 1.5°C abatement level, if stronger actions are taken by other sectors of Australia's economy simultaneous with the electricity sector's transition. Consumers provide a strong foundation for the transformation, with rapid and significant continued investments in coordinated consumer energy resources (CER), including electrification of the transportation sector.
- **Progressive Change** – meets Australia's current Paris Agreement commitment of 43% emissions reduction by 2030 and net zero emissions by 2050. This scenario has more challenging economic conditions, higher relative technology costs and more supply chain challenges relative to other scenarios.
- **Green Energy Exports** – reflects very strong decarbonisation activities domestically and globally aimed at limiting temperature increase to 1.5°C by 2100, resulting in rapid transformation of Australia's energy sectors, including a strong use of electrification, green hydrogen and biomethane. The electricity sector plays a very significant role in decarbonisation.

The scenario collection spans a range of futures, considering a broad set of inputs and assumptions across a number of key dimensions. The scenarios include consideration of the role and influence of regulatory, commercial and consumer decisions on the pace and breadth of the energy transition, and the scenario narratives respect both domestic and international influences, such as population growth,

consumer investments, sector coupling, and emerging green energy opportunities (domestically and internationally).

Figure 1 below shows the relationship between these scenarios from a decarbonisation perspective, as a key dimension that differs between the scenarios.

Figure 1 2023 IASR scenarios



The role of sensitivity analysis

Sensitivities work alongside scenarios to support the overall scenario planning approach.

Where scenarios are broad and embody many parameters relevant to the energy transition, sensitivities are typically used to explore the impacts of a single parameter or a small subset of related parameters. This allows them to test specific uncertainties within the dimensions of a given scenario, and thus quantitatively support decisions and investments.

This consultation is not seeking specific feedback on key sensitivities to apply in its planning functions. AEMO will develop these with regards to the purpose of each application of these scenarios, and will provide opportunity for stakeholder engagement as relevant for the function (for example, as part of the IASR, ISP Methodology or Draft ISP consultation processes).

2.2.1. Scenario parameters and principles

Scenario parameters (or components) are descriptions of key drivers for each energy future, such as the pace of economic development or the uptake of energy efficiency.

AEMO adopts the following principles when developing the collection of scenarios, and each scenario's individual parameters:

- **Internally consistent** – the underpinning assumptions in a scenario must form a cohesive picture in relation to each other
- **Plausible** – the potential future described by a scenario narrative could come to pass.

- Rather than applying a minimum ‘likelihood’ threshold for each individual parameter, plausibility considers the likelihood and significance of the impact of the uncertainties on planning outcomes, and the degree of stakeholder interest.
- **Distinctive** – individual scenarios must be distinctive enough to provide value to AEMO and stakeholders.
- **Broad** – the scenarios explore a diverse range of possible futures that could be achieved over the planning horizon.
- **Useful** – particularly for AEMO’s ISP planning requirements, the scenarios explore the risks of over- and under-investment.

Each scenario applies relative levels of each scenario parameter, while ensuring the combined parameters are internally consistent, and consistent with the scenario purpose described in the scenario narrative. The latest available data point for each scenario parameter is used to calibrate each parameter forecast, and each parameter may continue, or adjust, the observed historical trend of the parameter in accordance with the scenario’s narrative.

3. Evolution of AEMO's scenarios

3.1. What has changed since the 2023 IASR

AEMO notes several market, policy and regulatory changes since the 2023 scenarios were developed:

- **Policy development** – increased policy development to support emissions reduction, including renewable energy targets and emissions targets, as well as new settings that support industrial decarbonisation, gas fuel-switching, capacity development incentives, and broad support for consumer investments affecting CER, energy efficiency and vehicle emissions standards.
 - For AEMO's planning purposes, particularly to meet Rules obligations, AEMO's scenarios do not seek to evaluate the appropriateness or value of government policies; rather, they apply the policies to effectively identify the investments needed to achieve relevant policy objectives or the impact to broader investment needs for the energy transition having regard to policy.
 - For the ISP, AEMO's scenarios consider qualifying public policies that meet the public policy criteria (NER 5.22.3(b)), or are included in the Australian Energy Market Commission (AEMC) *Emissions Targets Statement*. These policy considerations may narrow the breadth of futures available to the scenario collection for some scenario parameters (for example, the pace of the transition may be influenced by meeting renewable energy targets and emissions reduction commitments in all scenarios).
- **ISP Review** – AEMO acknowledges the recent review conducted by the Energy and Climate Change Ministerial Council (ECMC) of the scope of the ISP⁵. This review identified a number of recommendations and actions for AEMO to deliver for future ISP's. AEMO does not consider that these recommendations necessitate a change in the scenario planning approach, or in the scenario collection, but they will influence AEMO's forecasting and planning methodologies. AEMO will develop and consult on these methodologies separate to this initial scenario consultation.

Question

- **Since the 2023 IASR publication, what changes (such as environment, social, policy) do you consider most impact scenario development for the 2025 IASR scenarios?**

3.2. Stakeholder engagement conducted prior to this consultation

The table below lists sources of scenario-related stakeholder feedback that AEMO has considered in developing its position on the scenario collection presented in this consultation paper.

⁵ See <https://www.energy.gov.au/energy-and-climate-change-ministerial-council/energy-ministers-publications/review-integrated-system-plan>.

Table 2 Sources of prior feedback in relation to scenarios

Source	Reference
2023 IASR submissions and stakeholder engagement	https://aemo.com.au/consultations/current-and-closed-consultations/2023-inputs-assumptions-and-scenarios-consultation
2023 Delphi panel to identify scenario likelihood	See the “Dephi Panel” section at https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp/current-inputs-assumptions-and-scenarios
Draft 2024 ISP consultation submissions, where relevant to ISP scenarios	https://aemo.com.au/consultations/current-and-closed-consultations/draft-2024-isp-consultation

AEMO has also conducted early engagement with the ISP Consumer Panel, and with key planning bodies such as transmission network service providers (TNSPs) ahead of this consultation. Key insights from these groups include:

- Scenario consistency is valuable for all stakeholders and users.
- Existing scenarios need to be reexamined against all possible futures.
- New information and developments need to be incorporated.

3.3. AEMO’s proposed scenarios for the 2025 IASR

AEMO recognises the value of scenario continuity in planning processes that are refreshed frequently (annually in many instances), and proposes to broadly retain the scenario collection that was defined in the 2023 IASR.

In retaining the scenario collection, AEMO recognises that the scenario collection may benefit from some refinement of the parameters to ensure the breadth of futures examine uncertainties appropriately.

AEMO proposes to:

- Broadly retain the scenario narratives for the *Progressive Change* and *Step Change* scenarios, with some minor amendments as shown in Table 3 below.
- Adjust the *Green Energy Exports* scenario narrative to increase focus on the domestic opportunities created by a rapid energy transition, including emerging opportunities in ‘green’ industry developments such as minerals processing, manufacturing and other emerging industrial developments. This adjustment reflects stakeholder feedback that hydrogen industry assumptions have focused on export opportunities, and that the scale of difference between the scenario and others in the scenario collection reduces its degree of usefulness.

The proposed scenario collection therefore recognises:

- The *Progressive Change* scenario remains characterised by a slow rate of transformation, featuring more challenging conditions that necessitate decarbonisation efforts being deferred to their latest practical point to achieve the intent of relevant policies.
- *Step Change* remains characterised by a level of energy transition that is consistent with policy including Australia’s commitments to international climate obligations.

- *Green Energy Exports* continues to reflect a high growth case, where economic and technological opportunities support a rapid and significant scale of energy system transformation.

To support stakeholder understanding of the dimensions of the scenarios, and the differences that exist between them, AEMO has provided a high-level comparison below of the key dimensions influencing each scenario's future conditions. AEMO will consult on the specific forecast trends of each parameter in the Draft 2025 IASR consultation, with preliminary opportunities for engagement prior to this via AEMO's Forecasting Reference Group.

As required under the NER, for the ISP's purposes, all scenarios in the scenario collection apply relevant policies that meet public policy criteria, including international commitments (such as to the Paris Agreement) and legislated policies that are quantifiable within AEMO's modelling scopes. AEMO will outline the public policies that meet these criteria, and guidance for their eligibility, as it develops the 2025 IASR.

Table 3 below shows key scenario parameters, with the 2023 IASR scenario parameter settings in black, and proposed changes for the 2025 IASR scenarios in red. It is adapted from Table 4 of the 2023 IASR.

The table uses a five point scale of *lower, low, moderate, high and higher* to describe proposed scenario parameter settings within a plausible range of values. Some parameters include descriptions of distinctions between shorter-term and longer-term trends, reflecting a recognition of how current conditions such as economic or supply chain challenges may impact that parameter over time.

Table 3 Proposed amendments to scenario parameters

Parameter	<i>Progressive Change</i>	<i>Step Change</i>	<i>Green Energy Exports</i>
National decarbonisation target	At least 43% emissions reduction by 2030, Net Zero by 2050	At least 43% emissions reduction by 2030, Net Zero by 2050	At least 43% emissions reduction by 2030, Net Zero by 2050
Global economic growth and policy coordination	Slower economic growth, lesser coordination	Moderate economic growth, stronger coordination	High economic growth, stronger coordination
Australian economic and demographic drivers	Lower	Moderate economic growth, with near-term economic growth impacted by current economic challenges⁶	Higher, with near-term economic growth impacted somewhat by current economic challenges (partly driven by green energy)
Electrification	Electrification is tailored to meet existing emissions reduction commitments, with slower adoption given weaker economic circumstances	High electrification to meet emissions reduction commitments, with pace of adoption reflecting economic conditions	Higher electrification efforts to meet aggressive emissions reduction objectives, with faster pace of adoption
Emerging commercial loads	Emerging sectors such as data centres experience lower growth as weaker economic circumstances limit technology uptake	Emerging sectors such as data centres match opportunities associated with moderate domestic economic drivers	Emerging sectors such as data centres match opportunities associated with higher domestic economic drivers

⁶ It is recognised that cost of living challenges have grown since the 2023 IASR. See <https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/selected-living-cost-indexes-australia/latest-release>.

Parameter	Progressive Change	Step Change	Green Energy Exports
Industrial Load Closures	Weak economic conditions provide challenging commercial conditions, resulting in load closures across key commercial and industrial facilities	No specific load closures	No specific load closures
Demand side participation uptake	Lower	Moderate	Higher
Consumer energy resource investments (batteries, PV and EVs)	Lower	High	Higher
Coordination of CER (VPP and V2G)	LowerLow long-term coordination, with gradual acceptance of coordination	HighModerate long-term coordination, with gradual acceptance of coordination	HigherHigh long-term coordination, with faster acceptance of coordination
Energy efficiency	Lower	Moderate	Higher
Hydrogen use and availability	Low production for domestic use, with no export hydrogen	Moderate-low production for domestic use, with minimal export hydrogen	Faster cost reduction. High production for domestic industries, with high/moderate exports in the short term, and high exports in the longer term
Renewable gas blending in gas distribution network^A	Up to 10% (hydrogen), with unlimited blending opportunity for biomethane and other renewable gases	Up to 10% (hydrogen), with unlimited blending opportunity for biomethane and other renewable gases	Up to 10% (hydrogen), with unlimited blending opportunity for biomethane and other renewable gases
Supply chain strength influencing demand forecasts	Low	Moderate	High
Global/domestic temperature settings and outcomes^B	Applies Representative Concentration Pathway (RCP) 4.5 where relevant, consistent with a global temperature rise of ~ 2.6°C by 2100	Applies RCP 2.6 where relevant, consistent with a global temperature rise of ~ 1.8°C by 2100	Applies RCP 1.9 where relevant (~ 1.5°C), consistent with a global temperature rise of ~ 1.4°C by 2100
IEA 2021 World Energy Outlook scenario alignment	Stated Policies Scenario (STEPS)	Sustainable Development Scenario (SDS)	Net Zero Emissions (NZE)

PV: photovoltaics, EV: electric vehicle, VPP: virtual power plant, V2G: vehicle-to-grid.

A. Hydrogen blending into the gas distribution network will need to accommodate the technical requirements of distribution pipelines, as well as the capabilities of connected gas appliances. Higher blends than ~10% by volume are assumed possible for industrial use but may require equipment change and/or shifts to dedicated hydrogen transmission pipelines.

B. RCPs were adopted in the IPCC's first Assessment Report, see <https://www.ipcc.ch/report/ar5/syr/>.

Specific scenario narratives will be developed to complement the above proposed parameter settings, taking into account feedback from this consultation.

Questions

- Is AEMO’s proposal as described above a suitable evolution of each scenario’s parameters that will effectively support AEMO’s functions in planning the transition?
- What additional changes should be considered?

Changes that have been considered, but are not recommended

In considering the above adjustments to each scenario's parameters, AEMO has considered the following suggestions to adjust the scenario collection, individual scenarios, or scenario objectives. AEMO's current considerations are that suggestions such as those outlined below would not appropriately assist in achieving a more robust, plausible, or diverse scenario collection for AEMO's scenario planning purposes, and would not be an appropriate adaptation to the scenarios, but may provide considerations in sensitivity analysis, where appropriate.

- **Compressing the scenario collection** – some stakeholders have suggested that *Step Change* could be adjusted to lessen the pace of the transition. AEMO does not consider this to be an appropriate change, as it would narrow the breadth of futures assessed by the scenario collection.
- **Delaying the transition by applying deliverability constraints or ignoring policy timeframes** – AEMO is bound by the NER to consider policies that meet the relevant public policy criteria, and considers that identifying the necessary investments to achieve these policies is an appropriate and important insight from the scenario planning process. Applying the scenarios to identify investments or actions that are optimal in the event of policy failure, or project execution delay, are not appropriate for AEMO's planning functions, under the Rules and Guidelines that AEMO is required to meet. AEMO will provide increased guidance on the requirements for jurisdictions to provide policy detail sufficient for inclusion in AEMO's planning functions.
- **Scenarios that focus on a specific parameter (such as CER) or a specific technology outcome** – AEMO does not consider that the scenarios should be defined by technology outcomes (such as a high development of electrical storage, or a specific and isolated focus on CER). A scenario's narrative and its parameters may lead to specific outcomes, but constraining the scenario to develop a specific solution is not consistent with the principles of scenario planning, which is to identify optimal planning outcomes given a collection of internally consistent scenario parameters and assumptions.
 - AEMO has proposed several adjustments to parameters in response to some stakeholder feedback regarding CER coordination, and recognises that, when applying these scenarios, methodology changes may be necessary to achieve the objectives of the ISP Review (to optimise CER and distributed resources more holistically within the ISP). AEMO may continue to develop CER-related sensitivities to test and evaluate consumer investment uncertainties.

3.4. Seeking stakeholder feedback on the proposed adjustments

AEMO has proposed to retain the underlying scenario narratives of the 2023 IASR scenario collection while applying several adjustments to each scenario's parameters. These adjustments maintain or improve connectivity to continued market or technology observations since the 2023 IASR was developed, or maintain and/or improve the internal consistency of each scenario.

AEMO considers that this approach balances stakeholder needs for continuity and transparency, while providing appropriate adjustments considering stakeholder feedback in various consultations since the 2023 IASR was concluded.

AEMO seeks stakeholder responses to the following consultation questions (as outlined earlier in this paper):

- **Since the 2023 IASR publication, what changes (such as environment, social, policy) do you consider most impact scenario development for the 2025 IASR scenarios?**
- **Is AEMO’s proposal as described above a suitable evolution of each scenario’s parameters that will effectively support AEMO’s functions in planning the transition?**
- **What additional changes should be considered?**

As outlined in Section 1, this initial scenario consultation will be complemented by other opportunities for engagement on AEMO’s Electricity Demand Forecasting Methodology, ISP Methodology, and the broader Draft 2025 IASR throughout 2024-25. These additional consultations will provide appropriate opportunity for stakeholders to consider and provide feedback on each of their respective consultation purposes.

Submissions to this consultation should be sent to forecasting.planning@aemo.com.au by 13 August 2024.

AEMO thanks stakeholders in advance for taking the time to engage at this important stage of developing the 2025 IASR.

A.1 Glossary

Term or acronym	Meaning
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CER	Consumer Energy Resources
ECMC	Energy and Climate Change Ministerial Council
ESOO	Electricity Statement of Opportunities
FBGP	Forecasting Best Practice Guidelines
FRG	Forecasting Reference Group
GSOO	Gas Statement of Opportunities
IASR	Inputs, Assumptions and Scenarios Report
IPCC	The Intergovernmental Panel on Climate Change
ISP	Integrated System Plan
NER	National Electricity Rules
NZE	Net Zero Emissions
RCP	Representative Concentration Pathway
SDS	Sustainable Development Scenario
STEPS	Stated Policies Scenario
VPP	Virtual Power Plant
V2G	Vehicle-to-grid