GOVERNMENT OF WESTERN AUSTRALIA

Department of Energy and Economic Diversification

Energy Policy WA

WEM Operation Effectiveness Report

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Working together for a brighter energy future.

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Glossary

Term	Definition
Business Day	A day that is not a Saturday, Sunday, or a public holiday throughout Western Australia.
Certified Reserve Capacity	Peak Certified Reserve Capacity or Flexible Certified Reserve Capacity or both (as the context requires).
Market Advisory	A Market Advisory is a notification published by AEMO on the WEM Website that there has been, or is likely to be, an event that AEMO reasonably considers may impact Power System Security, Power System Reliability or the operation of the Central Dispatch Process, the Real-Time Market, the Short Term Energy Market or the Reserve Capacity Mechanism.
Market Information	Any information or document that is required to be produced, provided or exchanged under these ESM Rules or a WEM Procedure.
Market Participant	A person who owns, controls or operates a Facility containing an Energy Producing System with a System Size that equals or exceeds 10 MW and is electrically connected to a transmission system or distribution system which forms part of the South West Interconnected System, or is electrically connected to that system, unless exempted under 2.28.16 of the Rules. Market Participant is a class of Rule Participant defined under section 2.28 of the Rules.
Market Service	Energy or any of the Frequency Co-optimised Essential System Services.
Network Constraint	A limitation or requirement in a part of a Network that may impact one or more Registered Facilities in the Central Dispatch Process, such that it would be unacceptable to transfer electricity across that part of the Network at a level or in a manner outside the limit or requirement.
Network Operator	A person who a person who owns, controls or operates a transmission system or distribution system who registers as a Network Operator, in accordance with clauses 2.28.2, 2.28.3 or 2.28.4. Network Operator is a class of Rule Participant defined under section 2.28 of the Rules.
Non-Scheduled Facility	A Facility that can be self-scheduled by its operator (with the exception that AEMO can direct it to decrease its output subject to its physical capabilities), and which is registered as such in accordance with clause 2.29.4G of the Rules.
Registered Facility	In respect of a Rule Participant, a Facility registered by that Rule Participant with AEMO in a Facility Class under Chapter 2 of the Rules. The Facility Classes are: Network, Scheduled Facility, Semi-Scheduled Facility, Non-Scheduled Facility, Interruptible Load, and Demand Side Programme.
RoCoF Safe Limit	Means the Rate of Change of Frequency Safe Limit referred to in Appendix 13 of the Rules.

Term	Definition
Rule Participant	Any person registered as a Rule Participant in accordance with Chapter 2 of the Rules and AEMO. The definition of Rule Participant includes three classes: Network Operator, Market Participant, and AEMO.
Scheduled Facility	A Facility that can respond to a Dispatch Target from AEMO such that it can maintain its Injection or Withdrawal within its Tolerance Range for a specified period and is registered as such in accordance with clauses 2.29.4G and 2.29.4I of the Rules.
Semi-Scheduled Facility	A Facility that can reduce the value of its Injection or increase the value of its Withdrawal to comply with a Dispatch Cap issued by AEMO and is registered as such in accordance with clauses 2.29.4G and 2.29.4I of the Rules.
Supplementary Capacity Contract	An agreement under which a service provider agrees to supply one or more Eligible Services to AEMO, entered into in accordance with section 4.24 of the Rules.

Abbreviations

Term	Definition
ACCC	Australian Competition and Consumer Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARF	Allowable Revenue Framework
AWST	Australian Western Standard Time
BAU	Business As Usual
BRCP	Benchmark Reserve Capacity Price
California ISO	California Independent System Operator
CBA	Cost Benefit Analysis
CER	Consumer Energy Resources
Coordinator	Coordinator of Energy
DCM	Dispatch Compliance Monitor
DER	Distributed Energy Resources
DSP	Demand Side Programme
DSR	Demand Side Response
EGF	Eastern Goldfields
EMM	Energy Market Management
ENAC	Electricity Networks Access Code
EOI	Expression of Interest
EPWA	Energy Policy WA
ERA	Economic Regulation Authority
ERCOT	Electric Reliability Council of Texas
ESM Rules	Electricity System and Market Rules
ESOO	Electricity Statement of Opportunities
ESR	Electric Storage Resources
ESS	Essential System Services
FCA	UK Financial Conduct Authority
FCESS	Frequency Co-Optimised Essential System Services
FERC	Federal Energy Regulatory Commission
GPS	Generator Performance Standards
GSI	Gas Service Information
GW	Gigawatts
IMS	Information Management System
IRCR	Individual Reserve Capacity Requirement

Term	Definition
ISP	Integrated System Plan
kV	Kilovolts
LOR	Lack of Reserve
LRC	Low Reserve Condition
LT PASA	Long-Term Projected Assessment of System Adequacy
MCCP Program	Major Customer Connection Process Program
MiFID	UK Markets in Financial Instruments Directive
Minister	Minister for Energy
MSDC	Market Surveillance Data Catalogue
MT PASA	Medium-Term Projected Assessment of System Adequacy
MVA	Megavolt-amperes
MW	Megawatts
MWh	Megawatt-hours
NCESS	Non-Co-optimised Essential System Services
NCS	Network Control Services
NEM	National Electricity Market
NER	National Electricity Rules
NER NT	National Electricity Rules – Northern Territory
NFIT	New Facilities Investment Test
NOM	Network Opportunity Map
NOS	Network Outage Schedule
NSCAS	Network Support and Control Ancillary Services
NT	Northern Territory
Ofgem	UK Office of Gas and Electricity Markets
Ontario IESO	Ontario Independent Electricity System Operator
PJM	PJM Interconnection, LLC
PSSR	Power System Security and Reliability
PSSR Standards Review	Power System Security and Reliability Standards Review
PV	Photovoltaic
REMIT	Regulation (EU) No 1227/2011 on wholesale energy market integrity and transparency
RCM	Reserve Capacity Mechanism
RIN	Regulatory Information Notice
RIT-T	Regulatory Investment Test for Transmission
RoCoF	Rate of Change of Frequency
RoCoF Control Service	Rate of Change of Frequency Control Service

Term	Definition
RTFS tool	Real-Time Frequency Stability tool
SCADA	Supervisory Control and Data Acquisition
SCED	Security-Constrained Economic Dispatch
SEO	State Electricity Objective
SESSM	Supplementary Essential System Service Mechanism
STEM	Short Term Energy Market
STOR	Suspicious Transaction and Order Reports
ST PASA	Short-Term Projected Assessment of System Adequacy
SWIS	South West Interconnected System
TAPR	Transmission Annual Planning Report
TCGS	Transmission Connected Generating System
TNSP	Transmission Network Service Provider
TSP	Transmission System Plan
TXIP	Transmission Infrastructure Plan
UK	United Kingdom
WA	Western Australia
WCAG	Web Content Accessibility Guidelines
WEM	Wholesale Electricity Market
WEMDE	WEM Dispatch Engine
WEMS	Wholesale Electricity Market System
WIC Review	WEM Investment Certainty Review

1. Executive summary

1.1 Background

Under clause 2.16.13A of the Electricity System and Market Rules (ESM Rules), the Coordinator of Energy (Coordinator) is responsible for the development of the market and, with the assistance of the Economic Regulation Authority (ERA) and Australian Energy Market Operator (AEMO), must monitor market design problems or inefficiencies.

In carrying out its responsibilities under clause 2.16.13A, the Coordinator must also monitor the effectiveness of certain functions of the market bodies.

The Coordinator is required to report to the Minister for Energy (Minister) on the above monitoring activities every three years, with the first such report due by 1 July 2025[1].

This is the first Wholesale Electricity Market (WEM) Operation Effectiveness Report developed by the Coordinator. Responsibility for the WEM Operation Effectiveness Report previously fell to the ERA and was transferred to the Coordinator on 1 July 2021.

The Coordinator has developed this WEM Operation Effectiveness Report (Report), which includes identified market design inefficiencies, an assessment of the effectiveness of the market bodies in undertaking their respective responsibilities under the ESM Rules and market trend analysis. The report also includes targeted discussion around key themes that have emerged from the analysis described in the report.

1.2 Approach

The design of the WEM changed fundamentally on 1 October 2023, centred around the introduction of the new Real-Time Market, to replace the Balancing Market, and Essential System Service (ESS) arrangements. Since the start of the new Real-Time Market, there have been several reviews undertaken or commenced to address early issues that have been observed (see section 2.2).

Given the immaturity of the new Real-Time Market, and the further changes that have been, and continue to be, made following its commencement, it is the Coordinator's view that there has not been sufficient time since market start to perform a detailed assessment of the effectiveness and efficiency of the new and evolving market mechanisms.

Instead, this report considers specific findings, including from the assessment of the market bodies' functions, in relation to the effective operation of the market, as well as some targeted market design matters raised by stakeholders, to identify a series of recommendations for incremental improvements in market effectiveness.

The Report also outlines the WEM reviews that have been undertaken since 1 July 2021, including the reviews started following the commencement of the new WEM on 1 October 2023, aimed at addressing those issues that were identified early in the development and implementation of the new Real-Time Market. It also outlines some additional WEM reviews aimed at addressing the specific findings considered in the Report.

[1] https://www.wa.gov.au/government/document-collections/electricity-system-and-market-rules

1.3 Findings and recommendations

The focus of this Report is to identify opportunities and actions to increase the effectiveness of the WEM based on the findings from the assessment conducted for each of the market bodies' functions and, where appropriate, considering peer organisations with comparable functions.

The Coordinator has identified two key themes for improving the effectiveness of in the WEM during the preparation of this Report: integration of the new State Electricity Objective (SEO) and enhanced transparency.

1.3.1 Integration of the State Electricity Objective

The SEO was introduced within section 3A(1) of the *Electricity Industry Act 2004* in February 2025.

While a line can be drawn from many of the market functions to the SEO, it is the Coordinator's view that more direct linkages may be required in the ESM Rules to increase the effectiveness of the market, especially in relation to the third environmental limb of the SEO.

Creating tangible links from specific ESM Rules requirements to the SEO will focus the efforts of the market bodies in performing their functions under the ESM Rules.

1.3.2 Transparency

A key theme that has emerged during the preparation of this Report is the need for greater transparency, including from the market bodies in performing their functions under the ESM Rules, to provide current and prospective participants with the complete information they require to make operational and investment decisions.

The Coordinator will consider any Rule changes necessary to ensure that both current and prospective WEM participants have adequate and timely access to such information.

Transparency ensures that current and potential Market Participants can effectively make investment decisions and operate within the WEM with full knowledge of what is required from them. This also gives greater clarity to potential investors about the operation of the WEM and investment opportunities, while providing comfort that the market is operating effectively and efficiently.

Several opportunities to improve transparency have become evident through the preparation of this Report, with the most notable seeking to address the following areas:

- ease of access to market data;
- general accessibility of market-related information;
- completeness and timeliness of WEM Procedures;
- availability of information regarding market surveillance and enforcement activities;
- network capacity and planning information; and
- cooperation and coordination between market bodies and the Coordinator on market design inefficiencies.

Table 1: Proposals to improve WEM effectiveness

Proposal	Rationale
General	
Proposal 1: State Electricity Objective The Coordinator will work with the market bodies and other stakeholders on how to integrate the SEO more broadly within the ESM Rules, and will monitor this in the next WEM Operation Effectiveness Report.	Such direct linkages with the SEO in the Rules can focus the efforts of the market bodies in performing their functions under the ESM Rules, especially in relation to the environmental limb of the SEO.
Proposal 2: Transparency The Coordinator and the relevant market bodies, where applicable, should develop appropriate measures to make improvements to transparency in the WEM and its associated processes, including the following: 2.1 Provision of further detail on the cause of any direction/intervention by AEMO. 2.2 Improvements in relation to operational forecasting. 2.3 Completion and publication of WEM Procedures in a timely manner, including prompt updates when required. 2.4 Making complete and verified market data available through the publicly accessible web portal in easily accessed data formats. 2.5 Proactive reporting of Market bodies on WEM design flaws and areas for improvement to the Coordinator and, where appropriate, the ERA. 2.6 Provision of clearer information to Market Participants regarding the current priorities and focus of the ERA's surveillance and compliance activities, noting that confidential information must be protected. 2.7 Transformation of the Transmission System Plan, in the medium term, into a broader Networks Plan that includes a complete transmission and distribution development roadmap, to provide an informed view of investment opportunities. Supporting information should include constraint data, cost-benefit analyses and improved distribution level heat maps. 2.8 Improvement of accessibility across all market bodies' websites and published materials.	Greater transparency will provide current and prospective participants with adequate information they require to make operational and investment decisions. The need for increased transparency has, in the opinion of the Coordinator, several contributing factors in the new Real-Time Market. For example, some of the issues detailed are a direct result of the volume of work that has been required by the market bodies to establish the new Real-Time Market, while others are a result of an adjustment period. Others still result from the pace of change of the energy market. Nevertheless, these are all issues that directly impact the effective operation of the market and have the potential to influence investment decisions by both current and prospective Market Participants.

2. Introduction

2.1 Structure of this Report

This report is presented in five sections:

- Chapter 2 provides the scope and focus of the Report and highlights the stakeholder consultation, both undertaken to date and to be undertaken;
- Chapter 3 discusses previously identified market design inefficiencies, including previous, current and further reviews, and stakeholder issues raised to date;
- Chapter 4 gives an overview of the key themes that have emerged from the analysis conducted in the formation of this Report;

2.2 Scope of this Report

Under clause 2.16.13A, the Coordinator of Energy (Coordinator) is responsible for the development of the market and, with the assistance of the ERA and AEMO, for monitoring market design problems or inefficiencies.

The Coordinator is required to report to the Minister for Energy (Minister) on the above monitoring activities every three years, with the first such report due by 1 July 2025[2].

This is the first Wholesale Electricity Market (WEM) Operation Effectiveness Report developed by the Coordinator. Responsibility for the WEM Operation Effectiveness Report previously fell to the ERA and was transferred to the Coordinator on 1 July 2021.

This Report meets the obligations of the Coordinator under Rule 2.16.13D to provide to the Minister a report dealing with the matters identified in clauses 2.16.13A and 2.16.13B which, when read together with 2.16.13E, form the basis for the scope of the Report.

Rule 2.16.13A

The Coordinator is responsible for the development of the market and, with the assistance of the Economic Regulation Authority and AEMO, must monitor market design problems or inefficiencies.

Rule 2.16.13B

In carrying out its responsibilities under clause 2.16.13A, the Coordinator must also monitor:

> *the effectiveness of the compliance monitoring and enforcement measures in the ESM Rules and Regulations, including, but not limited to:*
>
> > *the effectiveness of the Economic Regulation Authority's surveillance activities under sections 2.16A to 2.16D; and*
> >
> > *the appropriateness of the parameters for determining a Material Portfolio and Material Constrained Portfolio under clauses 2.16C.1 and 2.16C.2;*
>
> *the effectiveness of AEMO in carrying out its functions under the Regulations, the ESM Rules and WEM Procedures;*
>
> *the effectiveness of Network Operators in carrying out their functions under the ESM Rules and WEM Procedures; and*
>
> *the efficiency and effectiveness of the methodologies for determining the Market Price Limits and the Benchmark Reserve Capacity Prices.*

[2] https://www.wa.gov.au/government/document-collections/electricity-system-and-market-rules

Rule 2.16.13E

A report referred to in clause 2.16.13D must address, but is not limited to, the following matters:

a. market trends, which may include:

a summary of the information and data compiled by AEMO and the Economic Regulation Authority under clause 2.16.1; and

any other matter or information the Coordinator considers relevant and appropriate to include;

any recommended measures to increase the effectiveness of the market in meeting the Wholesale Market Objectives to be considered by the Minister.

The Coordinator has developed this WEM Operation Effectiveness Report (Report), which includes information on identified market design inefficiencies, an assessment of the effectiveness of the market bodies in undertaking their respective responsibilities under the ESM Rules, and market trend analysis. The report also includes targeted discussion around key themes that have emerged from the analysis described in the report.

This is also the first WEM Operation Effectiveness Report since the transition to the State Electricity Objective (SEO) in February 2025.

*The **State electricity objective** is to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity in relation to —*

a) the quality, safety, security and reliability of supply of electricity; and

b) the price of electricity; and

c) the environment, including reducing greenhouse gas emissions.

2.3 Focus of this Report

The design of the WEM changed fundamentally on 1 October 2023 (market start/new Real-Time Market start). The reformed WEM centred around the introduction of the new Real-Time Market, to replace the Balancing Market and introduce new Essential System Service (ESS) arrangements. Since new Real-Time Market start, there have been several reviews undertaken or commenced to address early design issues that have been observed.

Given the immaturity of the new Real-Time Market, and the further changes that have been, and continue to be, made following its commencement, it is the Coordinator's view that there has not been sufficient time since market start to perform a detailed assessment of the economic efficiency of the new and evolving market mechanisms.

Instead, this report considers specific findings from the assessment of the market bodies' functions in relation to the effective operation of the market, as well as some targeted market design matters raised by stakeholders, to identify a series of recommendations for incremental improvements in market effectiveness.

Section 3 of this Report also outlines the WEM evolution reviews that have been undertaken since 1 July 2021, including the reviews starting since the commencement of the new WEM on 1 October 2023, aimed at addressing issues that were identified early in the development and implementation of the new Real-Time Market. It also includes some recently commenced, or yet to be commenced reviews, aimed at addressing identified design inefficiencies.

The Coordinator expects to undertake a more fulsome review of the effectiveness of the new WEM design in the lead up to the next WEM Operation Effectiveness Report, which will include an assessment of the extent to which the market is meeting the SEO.

A key theme that has emerged through the analysis of the market bodies' effectiveness in undertaking their functions, which is being explored in some detail in this Report, is the need for greater transparency.

2.4 Stakeholder consultation

2.4.1 Consultation prior to the Report

There have been ongoing consultations since new Real-Time Market start with Market Participants through the Market Advisory Committee, and the Transformation Design and Operation Working Group. Market Participants have raised several issues through related meetings, including one-to-one meetings with Energy Policy WA (EPWA), that have been given consideration in the formation of this Report.

Some of the issues raised by stakeholders include pricing uncertainty, inefficient dispatch outcomes, access to market data, complexity of systems, administrative burden, Frequency Co-Optimised Essential System Services (FCESS) costs, and consideration of the wider impact of the WEM on the Western Australian (WA) economy.

While some of these issues have been dealt with through separate reviews (e.g., the FCESS Costs Review – Stage 1), and some are addressed directly in this Report (e.g., access to market data), the Coordinator considers that it is too early in the operation of the new Real-Time Market to properly assess other issues raised. The development and implementation of the new WEM has involved many years of combined effort by stakeholders and significant cost to consumers, and the Coordinator considers that a complete market design review or re-design at this stage would be inefficient, disruptive and premature.

As the market matures, and familiarity with systems and processes increases, the Coordinator expects that many of these issues will be adequately addressed. However, where issues persist over the medium term, the Coordinator will continue to examine them in greater detail.

Stakeholders have raised some specific issues that the Coordinator believes warrant further consideration in this Report, including:

- adjustment of load consumption in response to market prices;
- market participation barriers for inverter-based generators;
- constrained access for large loads; and
- monitoring and addressing Network Constraints.

Further detail on these issues is provided in section 2.5.

2.4.2 Consultation with market bodies

Some of the insights and findings of this report were gathered using both publicly available information and through a series of information requests made to AEMO and Western Power.

Only publicly available information was used in the assessment of the ERA's functions.

The market bodies were also given the opportunity to review and comment on the findings of the analysis of the effectiveness of their functions before the report was provided to the Minister.

3. Identified market design issues

3.1 Overview

This Chapter of the Report focuses on the market design issues that have been identified since the start of the new Real-Time Market. Some of these issues have already been the subject of reviews since the start of the new Real-Time Market, while others are still being considered by the Coordinator, as outlined in the sections below.

This is followed by an outline of the further reviews into aspects of the WEM design that have been undertaken since 1 July 2021.

3.2 Reviews commenced since the start of the new Real-Time Market

Since the start of the new Real-Time Market, the Coordinator has initiated a number of reviews to address particular design issues that have been identified. This report does not attempt to assess the effectiveness of these changes given their recent adoption.

A brief summary of each of these reviews is detailed below.

3.2.1 FCESS Costs Review – Stage 1

3.2.1.1 Purpose

The commencement of the new Real-Time Market saw a step change in FCESS costs, increasing nearly sixfold relative to the previous Ancillary Services framework from $17.1 million in Q3 2023 to $100 million in Q4 2023[3]. These costs grew further during the first half of 2024.

Due to these rising FCESS costs, the Coordinator with the assistance of AEMO and the ERA, initiated the FCESS Cost Review. While the review progressed a price ceiling was introduced through the Wholesale Electricity Market Amendment (Price Ceiling) Rules 2024 to minimise further cost increases.

Initial investigations by EPWA, AEMO and the ERA identified a range of contributing factors, including potential overcompensation of FCESS providers, aspects of the design of the dispatch algorithm, and interactions between participant bid parameters and market outcomes.

3.2.1.2 Outcomes

The review successfully identified several improvements that were implemented through the *Wholesale Electricity Market Amendment (FCESS Cost Review) Rules 2024*. The majority of the amendments commenced on 20 November 2024, with the final amendments commencing on 1 March 2025.
Key outcomes included to:

- require Market Participants to specify reasonable Start Decision Cutoff times in their Real-Time Market Submissions;
- clarify that Metered Schedules for Scheduled Facilities, Semi-Scheduled Facilities and Non-Scheduled Facilities are Public Information;

[3] These figures include constraint compensation in the old market and Energy Uplift in the new Real-Time Market, as the constraint compensation under the old market was also triggered in situations where out-of-merit dispatch was required to maintain Ancillary Services.

- improve the market power mitigation framework to enhance its effectiveness and improve market efficiency;
- make the current In-Service Capacity Only Scenario the Reference Scenario;
- rename the current Reference Scenario the Available Capacity Scenario;
- impose an obligation on Market Participants, who offer capacity as Available Capacity, to monitor for shortfalls and move capacity from Available Capacity to In-Service Capacity as required to alleviate any shortfalls;
- require Market Participants with Facilities accredited for RoCoF Control Service to offer their capacity into the Real-Time Market;
- introduce more efficient tiebreak methods for FCESS and energy;
- remove the payment of FCESS Uplift Payments for the provision of RoCoF Control Service;
- provide an alternative method of compensation through Energy Uplift Payments for Facilities constrained on by AEMO to provide RoCoF Control Service only;
- provide for Energy Uplift Payments for Facilities that are constrained on by AEMO during a period covered by a Low Reserve Condition Declaration; and
- modify the FCESS Uplift Payment calculations to avoid over-compensating FCESS providers.

3.2.2 ESS Framework Review

3.2.2.1 Purpose

The Coordinator initiated the Essential System Services (ESS) Framework review under clause 2.2D.1 of the ESM Rules in October 2024. The review aims to assess whether the existing framework for the Frequency Co-optimised Essential System Services is effective to ensure power system security and reliability can be maintained as the energy transition continues, while also ensuring the FCESS requirements are set by AEMO at an efficient level.

3.2.2.2 Outcomes

The review is currently progressing with the assistance of the Market Advisory Committee's ESS Framework Working Group.

3.2.3 Review of AEMO's Operational Forecasting

3.2.3.1 Purpose

The Coordinator initiated the AEMO Operational Forecasting review under clause 2.2D.1 of the ESM Rules in August 2024. The review aims to improve AEMO's forecasting ability relative to its current state given the increasing integration of Distributed Energy Resources (DER) such as rooftop solar and battery storage into the energy system.

3.2.3.2 Outcomes

The review is currently in progress. An inter-jurisdictional review identified current peer best practice with the NEM identified as the most relevant peer jurisdiction. EPWA presented draft recommendations at the 10 April TDOWG meeting. A consultation paper is planned to be published in mid-2025.

3.2.4 FCESS Costs Review – Stage 2

3.2.4.1 Purpose

In the light of some of the findings in this Report, the Coordinator is commencing Stage 2 of the FCESS Cost Review, which will also address issues that were not included within stage 1 of the FCESS Cost Review. The review aims to:

- consider if the purpose is clear or if any overlaps or inconsistencies are within the ESM Rules regarding AEMO's Directions;
- consider how AEMO manages each type of Directions and if transparency improvements are necessary;
- consider the purpose and rationale for AEMO Intervention Events and if the criteria in the ESM Rules for declaring an Intervention Dispatch Interval are appropriate;
- consider the impact of Intervention Pricing on Market Clearing Prices; and
- address any inefficiencies regarding real-time market shortfalls, and the need for more transparency about their causes.

3.2.4.2 Outcomes

The review is currently commencing with the assistance of AEMO and the ERA, and expected to be completed in the latter half of 2025.

A first outcome of the review was the development of a new payment allocation (the RCS Uplift Payment) that was introduced through the *Wholesale Electricity Market Amendment (Tranche 8) Rules 2025*.

3.3 RCM Evolution reviews

3.3.1 RCM Review

3.3.1.1 Purpose

The Coordinator initiated the review of the Reserve Capacity Mechanism (RCM) under clause 2.2D.1 of the ESM Rules. The review was undertaken to ensure the RCM remained fit for purpose considering the significant changes in the South West Interconnected System (SWIS) since the RCM was implemented in 2004.The RCM Review also incorporated the Coordinator's first review of the Planning Criterion under clause 4.5.15 of the ESM Rules.

The RCM Review's primary objectives were to:

- achieve system reliability at the most efficient cost for consumers for the current and the anticipated future system demand profiles; and
- addresses any reliability issues associated with the transformation of the energy sector.

3.3.1.2 Outcomes

The review successfully identified and implemented several improvements to the RCM framework. Key outcomes included:

- introduction of a flexible capacity product – commencing from the 2025 Reserve Capacity Cycle;
- changes to the Planning Criterion's reserve margin and reliability standard – commencing from the 2023 (reserve margin) and 2024 (reliability standard) Reserve Capacity Cycles;

- determination of the reference technology for the Benchmark Reserve Capacity Price by the Coordinator – first review undertaken in 2023;
- introduction of Capability Classes to replace previous concept of Availability Classes – commenced from the 2024 reserve Capacity Cycle;
- revised capacity allocation processes for Demand Side Programmes – commenced from the 2024 reserve Capacity Cycle;
- revised capacity allocation processes for intermittent generators – commencement depends on AEMO's ability to implement changes;
- changes to the capacity refund regime to distribute those refunds to Market Participants responsible for loads, rather than other capacity providers – commenced from the 2023 Reserve Capacity Cycle; and
- revised determination of the Individual Reserve Capacity Requirement - commencement depends on AEMO's ability to implement changes.

Further, the review outcomes highlighted the need for an WEM Investment Certainty Review.

3.3.2 Review of the BRCP Reference Technology

3.3.2.1 Purpose

The Reserve Capacity Mechanism Review provided for the introduction of clause 4.16.11 within the ESM Rules that requires the Coordinator to determine the Benchmark Flexible Capacity Provider for the new flexible capacity product and the Benchmark Peak Capacity Provider every three years or within six months of a revised Electric Storage Resource Duration Requirement.

The review was undertaken to provide sufficient incentives for investment in new capacity to maintain system security and reliability at efficient cost to consumers and implement the Peak and Flexible products.

3.3.2.2 Outcomes

The review identified and implemented several outcomes for the determination of the reference technology for the Peak and Flexible products that applied from the 2025 Reserve Capacity Cycle. Key outcomes included:

- the reference technology for the Peak and Flexible product was changed to a lithium battery energy storage system; and
- the Benchmark Reserve Capacity Price calculation is to use a gross capital cost of new entrant method.

3.3.3 WEM Investment Certainty (WIC) Review

3.3.3.1 Purpose

The Coordinator initiated the WEM Investment Certainty (WIC) review under clause 2.2D.1 of the ESM Rules following a package of WEM reform initiatives announced by the former Minister on 9 May 2023 and aims to improve investment certainty for renewable generation and new firming capacity. The review consists of the following five initiatives:

1. reviewing the Reserve Capacity Price (RCP) curve to determine if it needs to be adjusted to send sharper signals for investment when demand for new capacity is stronger;
2. a 10-year RCP guarantee for new technologies, such as long-duration storage;
3. a wholesale energy price guarantee for renewable generators, to top up their energy revenues as WEM prices start to decline, in return for them firming up their capacity;

4. emission thresholds for existing and new high emission technologies in the WEM; and
5. a 10-year exemption from the emission thresholds for existing flexible gas plants that qualify to provide the new flexibility service.

3.3.3.2 Outcomes

Final review outcomes for Initiatives 1 and 2 were implemented through the *Wholesale Electricity Market Amendment (RCM Review Sequencing) Rules 2025* with the majority of the amendments commencing on 15 January 2025 and others awaiting commencement. Work on Initiatives 3, 4 and 5 is progressing.

Key outcomes include:

- changes to the Reserve Capacity Price (RCP) curve (commenced) to:
  - increase the signal for investment in new capacity during a capacity shortfall while retaining a limit on consumers cost exposure to capacity oversupply;
  - reduce price volatility when capacity available is close to the Reserve Capacity Requirement;
  - provide investors with revenue certainty, while ensuring that customers are not overpaying for capacity during a capacity surplus;
- providing an investment signal for Flexible Capacity, even in the event of a shortfall in Peak Capacity (commenced);
- allowing any new Facility providing Flexible Capacity in Capability Class 1 to receive a fixed RCP for 10 years (commenced);
- allowing any new firm generation or storage Facility using a renewable energy source in Capability Class 1 and Capability Class 2 to receive a fixed RCP for 10 years; and
- allowing any new long-duration storage Facility that can provide firm output for the longest forecast ESR Duration Requirement over the ten-year horizon in the Electricity Statement of Opportunities to receive a fixed RCP for 10 years.

3.3.4 Cost Allocation Review

3.3.4.1 Purpose

The Coordinator initiated the Cost Allocation Review (CAR) under clause 2.2D.1 of the ESM Rules. The review was undertaken to align the allocation of Market Fees and Essential System Services (ESS) costs with the causer-pays principle, to the extent it is practicable and efficient. That is, that users that are causing costs on the system should pay for those costs, to the extent practicable and efficient.

3.3.4.2 Outcomes

The review successfully identified several improvements to the cost allocation method for ESS which are implemented through the *Wholesale Electricity Market Amendment (Cost Allocation Reform) Rules 2024* and the *Wholesale Electricity Market Amendment (Miscellaneous*

Amendments No 3) Rules 2024. These improvements have been gazetted, but not all amendments have confirmed commencement dates. Key outcomes included:

- retaining the current cost recovery methods to allocate:
  - Market Fees;
  - System Restart Service costs; and
  - Non-Co-optimised Essential System Services costs (noting that the allocation of the costs for Reliability Services procured through the NCESS mechanism was subsequently reviewed and changed on 1 October 2024);
- the introduction of a 'causer pays' method for the allocation of Regulation costs to:
  - provide incentives for Market Participants to minimise variability of their generation and loads; and
  - to incentivise renewable facilities to minimise (to the extent possible) the volatility of their generation.
- amending the cost allocation method for Contingency Reserve Lower (CRL) including:
  - changes to incentivise proponents to reduce the size of prospective loads connected to the SWIS to reduce their exposure to CRL costs. The requirements for CRL will increase significantly with large batteries and other large loads connecting to the SWIS;
- changes to the cost allocation method for Contingency Reserve Raise to:
  - allow AEMO to determine the method for calculating Single Facility Raise Risks (previously Facility Risks) on a case-by-case basis, more accurately reflecting the actual risk posed by the failure of a Facility; and
  - ensure that Distributed PVs cover some of the costs if they are part of the largest contingency.

3.3.5 Review of the Supplementary Capacity Mechanism

3.3.5.1 Purpose

Clause 4.24.19 of the ESM Rules previously required that after each call for tenders for supplementary capacity or otherwise acquiring Eligible Services by AEMO, the Coordinator must review the supplementary capacity provisions. Since 27 July 2024, the clause has been amended, leaving the undertaking of the review to the Coordinator's discretion.

The Coordinator has reviewed the supplementary capacity provisions under clause 4.24.19 twice with those reviews being completed on:

1. 23 September 2022; and
2. 11 August 2023.

3.3.5.2 Outcomes

The reviews successfully identified and implemented several outcomes to enhance the supplementary capacity framework through the:

- *Wholesale Electricity Market Amendment (Supplementary Capacity) Rules 2023* (commenced between 29 April 2023 and 1 July 2023)*;*
- *Wholesale Electricity Market Amendment (Supplementary Capacity No. 2) Rules 2023* (commenced between 22 July 2023 and 1 April 2024); and
- *Wholesale Electricity Market Amendment (Supplementary Capacity No. 3) Rules 2024* (with the majority of the amendments commencing on 27 July 2024 and the remainder to commence at a time specified by the Minister).

3.4 Other WEM Evolution reviews

3.4.1 Demand Side Response (DSR) Participation Review

3.4.1.1 Purpose

The Coordinator completed the Demand Side Response (DSR) review under clause 2.2D.1 of the ESM Rules. The review was undertaken to ensure that DSR has adequate incentives to participate in the WEM and is compensated appropriately for the provision of its services.

3.4.1.2 Outcomes

The review successfully identified and implemented several outcomes to enhance the participation of DSR through the *Wholesale Electricity Market Amendment (Miscellaneous Amendments No 3) Rules 2024* and the *Wholesale Electricity Market Amendment (RCM Review Sequencing) Rules 2025*. These improvements have been gazetted, but not all Schedules have confirmed commencement dates. Key outcomes included:

- improved transparency about constrained access loads and consideration of them in AEMO's planning processes that commenced on 1 January 2025;
- amendments to the *Electricity Industry (Metering Code) 2012* to allow better information sharing between Western Power and AEMO which commenced before the finalisation of the Review on 30 January 2024; and
- design of a dynamic baseline that commences on 1 October 2026.

3.4.2 Power System Security and Reliability (PSSR) Standards Review

3.4.2.1 Purpose

In 2021, the Energy Transformation Taskforce identified that reforms of Power System Security and Reliability (PSSR) standards and governance framework is required and recommended that all existing PSSR standards for the SWIS should be brought together into a consistent, single end-to-end PSSR Standard, regulated under a centralised governance framework.

The introduction of this framework was reliant on changes to the *Electricity Industry Act 2004* to allow the content of several different regulatory instruments to be brought into one. The necessary changes have since been made through the *Electricity Industry Amendment (Distributed Energy Resources) Act 2024*.

Consequently, the Coordinator, in consultation with the Market Advisory Committee, is conducting a review of the PSSR Standards in the SWIS (PSSR Standards Review). The purpose of the PSSR Standards Review is to implement the Energy Transformation Taskforce's recommendation. The revised framework will be implemented in the ESM Rules.

3.4.2.2 Outcomes

EPWA commenced the PSSR Standards Review in late 2023, and has been working closely with the AEMO and Western Power, and other interested stakeholders to develop a consultation paper with a set of proposals to consolidate, streamline and improve the PSSR Standards for the SWIS.

3.5 Specific market design issues raised by stakeholders

3.5.1 Overview

Since the start of the new Real-Time Market, stakeholders have raised several issues related to market design and performance through various forums and communication channels. This section provides consideration of these specific issues that have not been addressed through the rest of the analysis and recommendations of this Report, with any recommended actions noted below.

3.5.2 Adjustment of load consumption in response to market prices

The Coordinator recognises that different groups of customers face different levels of exposure to WEM prices to incentivise a response. Different customers also have varying capabilities and willingness to respond.

Wholesale customers, who are registered Market Participants in respect of their own loads, are (subject to any power purchase agreements) directly exposed to energy prices in the Short Term Energy Market (STEM) and Real-Time Market, and to the Reserve Capacity Price via their Individual Reserve Capacity Requirement (IRCR). Subject to the flexibility and controllability of their consumption, these customers have multiple options for market participation and could utilise one or more of the following:

- Off-market options:
  - monitoring Real-Time Market clearing prices and reducing consumption 'off-market' to avoid the costs associated with high price events;
  - monitoring peak demand events and reducing consumption 'off-market' during peak demand intervals to avoid IRCR costs.
- On-market options:
  - submitting STEM offers that reflect the price sensitivity of their load and adjusting consumption levels on the day to align with their net contract position;
  - registering their load as a Scheduled Facility, noting that this requires the load to be dispatched continually and to follow dispatch instructions;
  - participating as a Demand Side Programme (DSP), receiving Capacity Credits (subject to eligibility) in return for responding to curtailment dispatch instructions;
  - if eligible and technically feasible, seeking accreditation to provide FCESS;
  - if eligible, providing Supplementary Capacity or Non-Co-optimised Essential System Services (NCESS), noting that these services are intended to be utilised only occasionally to meet targeted power system requirements.

Retail customers theoretically have the same options for participation, however, their incentives to participate tend to be lower for various reasons:

- While the retailer is directly exposed to wholesale energy and capacity prices, retail contracts and tariffs often shield retail customers from price volatility, with many small consumers still subject to flat regulated tariffs.
- While it may be possible for a retailer and customer to enact commercial arrangements to share the benefit of the customer's price responsiveness, the incentive for the retailer to do so may be diluted, relative to a standalone wholesale customer, if:
  - the retailer also holds generation assets or power purchase agreements that reduce its financial exposure to wholesale prices; and/or
  - for larger retailers, load curtailment by one customer to avoid certain market costs (e.g. capacity costs) results in part of that avoided cost being allocated to other customers served by that retailer.

- For small customers, the setup costs for some forms of market participation (particularly those involving market registration) may exceed the potential benefits.

The Coordinator considers that retailers play an important risk management role on behalf of their customers, shielding customers from price volatility.

Further, DSR participation and cost allocation mechanisms in the WEM have recently been reviewed in the DSR Participation Review, the Cost Allocation Review and RCM Review, as noted in sections 2.3 and 2.4 above. The Coordinator considers that these mechanisms remain appropriate for the WEM at this time.

Further, it is recognised that work under the Distributed Energy Resources (DER) Roadmap and Project Jupiter provide the opportunity to explore market settings to improve the participation of flexible load in the WEM. These initiatives are continuing to explore opportunities to lower barriers to participation by small-use customers, and for retailers and aggregators to utilise innovative pricing and other incentive mechanisms to encourage retail customers to adjust consumption at times that benefit the power system as a whole.

The Coordinator will also continue to monitor developments in other jurisdictions to identify improvement opportunities for the WEM. Examples of recent developments in the National Electricity Market (NEM) include the following rule changes:

- The *Unlocking Consumer Energy Resources (CER) benefits through flexible trading* rule change aims to establish new metering arrangements that allow for the separation of 'flexible' DER from 'passive' loads[4].
- The *Integrating Price-responsive resources in the NEM* rule change creates a voluntary scheduling option for unscheduled resources, reflecting the ability and willingness of specific customers to participate in the central dispatch process[5].

3.5.3 Market participation barriers for inverter-based resources

Inverter-based resources, such as wind resources, solar resources and energy storage systems are typically characterised by their use of electronic power conversion, which allows them to interface with the grid more flexibly compared to traditional synchronous generation (like coal plants).

Inverter based resources participate in different ways in the WEM depending on their scale. Utility scale inverter based resources participate in both the Reserve Capacity Mechanism and the Real-Time Market.

3.5.3.1 Small-scale inverter-based DER

For **small-scale inverter-based DER**, work under the DER Roadmap and Project Jupiter is continuing to explore market settings to improve the participation of inverter-based DER in the WEM, including as aggregated virtual power plans. These initiatives seek to lower barriers to participation by DER owners, and to enable retailers and aggregators to utilise innovative pricing and other incentive mechanisms to encourage DER participation at times that benefit the power system as a whole.

[4] See Unlocking CER benefits through flexible trading | AEMC

[5] See Integrating price-responsive resources into the NEM | AEMC

3.5.3.2 Utility scale inverter-based resources

Utility-scale inverter-based generators have been registered and operated in the SWIS since before the commencement of the original WEM in 2006. However, as the energy transition has progressed, the WEM has become characterised by increasing amounts of inverter-based resources. Of particular note is the rapidly increasing levels of Electric Storage Resources and the emergence of grid-forming inverters that can provide valuable services to maintain the security and reliability in the grid. Consideration is being given to the connection standards for grid forming inverter-based resources, and the frameworks for participation in market services.

The current technical requirements in Appendix 12 in the ESM Rules were not developed with new technologies such as grid-forming inverters in mind and it can be difficult for these technologies to meet some of these requirements. The PSSR Scope notes that:

> *The new [PSSR Standards] framework needs to be appropriate for both energy production and network assets, and new technologies that work together to deliver the services required for efficient and effective operation of the system and the services required for all energy producing systems and load.*

A key part of the PSSR Standards Review is to consider the current technical standards outlined in Appendix 12 of the EMSR to understand the current challenges new technologies may have in meeting the existing requirements, and consider how a new framework could facilitate the adoption and connection of new technologies, such as grid-forming inverters.

The Coordinator notes that some Electric Storage Resources, such as the KWINANA_ESR1 and COLLIE_ESR1 batteries, have been accredited to provide FCESS[6], but that no applications have yet been submitted to AEMO for accreditation of a Semi-Scheduled or Non-Scheduled inverter-based resources[7]. The Coordinator recognises that the provision of many FCESS services can be technologically and financially challenging for Semi-Scheduled or Non-Scheduled Facilities, and that AEMO may face some challenges enabling a precise quantity of FCESS from a Semi-Scheduled Facility with uncertain energy output.

The ESS Framework Review is examining the potential gap between the number of ESS-capable facilities and the number of facilities accredited to provide FCESS.

3.5.4 Constrained access for large loads

The SWIS is one of the largest isolated electricity networks in the world, sparsely populated outside the Perth and Peel regions, and with long distances between population centres. This can present particular challenges when demand growth leads to transmission lines approaching their capacity limits, as the unconstrained connection of a new generator or customer may require expensive augmentation.

The New Facilities Investment Test (NFIT), which is set out in the Electricity Networks Access Code (ENAC), is used to estimate the extent to which an augmentation project would deliver net benefits to all grid customers. This portion of a project cost may then be added to the Regulated Asset Base of the Network Operator and recovered through tariffs levied on all users. Any residual cost must be recovered from the connection applicant who is effectively deemed to be the sole beneficiary of the remainder of the project cost. In this way, the NFIT seeks to avoid socialising the cost of network assets (or portions of network assets) that effectively benefit a single network user.

Rather than funding a significant proportion of a major network augmentation in order to minimise the impact of network constraints on their projects, some new connection applicants – including generators and customers – have instead opted for tailored connection arrangements that accept a level of constraint in return for lower grid connection costs. This has increasingly been the case for

[6] See AEMO | Current FCESS and RoCoF Ride-Through Accreditation Parameters

[7] Based on information provided by AEMO to the Coordinator in February 2025.

new loads connecting to the SWIS in the Goldfields region, which has faced a level of constraint due to the single-circuit 220 kilovolt (kV) transmission link between Merredin and Kalgoorlie.

The Coordinator notes that the current arrangements for charging of connection costs are consistent with the pricing principles set out in the ENAC, and that previous decisions by connection applicants to accept constrained access have made economic sense for the individual projects.

As recognised in the SWIS Demand Assessment[8] and the SWIS Transmission Planning Update[9], the transformation of the SWIS will require the significant augmentation of the transmission network to accommodate demand growth and new sources of generation.

Western Power conducted a Registration of Interest (ROI) process during 2023 with the aim of improving confidence regarding future major connections to the SWIS that would inform transmission expansion plans and priorities. The ROI process also flagged the potential for changes to capital contributions by project developers to provide stronger indications of commitment by developers, and to balance costs and benefits between project developers and energy consumers more broadly.

In addition, PoweringWA has commenced community engagement for the development of a stakeholder-led solution for the Goldfields Regional Network, which seeks to provide the Goldfields region with more reliable access to low-emissions energy and support decarbonisation of the industrial loads in the region.

As part of the transition of the existing ENAC into the ESM Rules[10], the Coordinator will undertake a review of the ENAC to consider whether the arrangements remain fit for purpose for the transitioning power system.

3.5.5 Monitoring and addressing Network Constraints

The new Real-Time Market has enabled increased transparency regarding Network Constraints. New processes set out in the ESM Rules require Western Power to provide Limit Advice to AEMO, which then develops Constraint Equations for use in dispatch and planning processes. AEMO also publishes a Congestion Information Resource[11] as required under section 2.27B of the ESM Rules, including a Constraint Library, information about binding Network Constraints and various reports. This data can be valuable for both existing and prospective Market Participants.

The Real-Time Market also calculates the marginal cost of binding Network Constraints, which can support business cases for efficient network investments that would alleviate constraints to lower overall costs for consumers[12].

The Coordinator considers that the frameworks for Network Constraints set out in the ESM Rules, which were developed following research into approaches used in other jurisdictions, are fit for purpose. However, as outlined in the Appendices to this report, there are opportunities for market bodies to improve their processes to increase transparency and predictability in relation to Network Constraints, which will support greater market efficiency in planning and operational timeframes.

As analysis on the economic cost of binding Network Constraints was not included in the 2023 and 2024 Transmission System Plans (TSPs). The Coordinator expects that analysis of the economic cost of binding Network Constraints will be incorporated into future Transmission System Plans

[8] Available at https://www.wa.gov.au/government/document-collections/swis-demand-assessment

[9] Available at https://www.wa.gov.au/government/document-collections/swis-transmission-infrastructure-planning-update

[10] The consolidation of electricity regulatory instruments into the ESM Rules has been enabled by the *Electricity Industry (Distributed Energy Resources) Act 2024*.

[11] Available at AEMO | WEM Congestion Information Resource

[12] Such investments may be additional to those that are required to satisfy reliability and security standards.

(TSPs) and network investment planning processes, to support the identification of efficient network investments that yield economic benefits. The Coordinator has also made further recommendations in relation to the TSP to maximise transparency over Western Power's plans for the development of its network.

The accuracy of Limit Advice and Constraint Equations is critical for the efficient and secure dispatch of the power system, and to inform efficient investments. EPWA previously audited Western Power's Limit Advice and, following this, Western Power has updated its related internal processes, including making greater use of peer review. The extent of revisions to RCM Limit Advice that have been made concurrently with AEMO's assessment of Network Access Quantities suggests that there are further opportunities to improve the accuracy of Limit Advice. The Coordinator will continue the effectiveness of Western Power's updated processes.

Finally, as observed in section 4.3.2, the frequency of manual intervention, which involves the application of manual constraints, in the dispatch process by AEMO has been greater than expected. Such interventions can reduce transparency and confidence in the market, particularly if stakeholders are unable to understand the trigger events.

The Coordinator will continue to liaise with AEMO to understand the trigger events that are being experienced and identify whether changes to the WEM Dispatch Engine algorithm may allow it to account for such events in the automated dispatch and pricing mechanisms. As outlined in section 3.2.4, the Coordinator is commencing the FCESS Costs Review – Stage 2, to improve the transparency around the continuing Market Services shortfalls and the reasons for AEMO's directions.

4. Key themes emerging from this review

4.1 Overview

The focus of this Report is on identifying inefficiencies in the new Real-Time Market arrangements, largely based on the findings from the effectiveness assessment conducted for each of the market bodies' functions and, where appropriate, with reference to peer organisations with comparable functions.

As a result of the assessment undertaken, the key themes that have emerged are integration of the SEO and transparency, which are discussed in the following sections.

These key themes and proposals form a summary view of the priorities the Coordinator believes need to be addressed in the near term to improve the effectiveness of the WEM.

4.2 Integration of the State Electricity Objective

4.2.1 Overview

The SEO was introduced within section 3A(1) of the *Electricity Industry Act 2004* in February 2025.

*The **State electricity objective** is to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity in relation to —*

a) the quality, safety, security and reliability of supply of electricity; and

b) the price of electricity; and

c) the environment, including reducing greenhouse gas emissions.

While a line can be drawn from many of the market functions to the SEO, it is the Coordinator's view that more direct linkages may be required in the ESM Rules to increase the effectiveness of the market, especially in relation to the environmental elements of the SEO.

Creating tangible links from specific ESM Rules requirements to the SEO will focus the efforts of the market bodies in performing their functions under the ESM Rules.

The Coordinator will monitor this trend in the lead up to the next WEM Operation Effectiveness Report, and will work with the market bodies and other participants on how to integrate the SEO more broadly within the ESM Rules.

4.2.2 Proposal

Table 2: Proposal for integration of the State Electricity Objective

Proposal 1 – State Electricity Objective
The Coordinator will work with the market bodies and other participants on how to integrate the SEO more broadly within the ESM Rules, and will monitor this in the lead up to the next WEM Operation Effectiveness Report.

4.3 Enhanced WEM Transparency

4.3.1 Overview

As is evident from the individual assessments of functions, a key theme that has emerged from the assessment of WEM effectiveness is the need for greater transparency to provide current and prospective participants with the complete information they require to make operational and investment decisions.

Clear transparency ensures that Market Participants can effectively operate within the WEM with full knowledge of what is required from them. This also gives greater clarity to potential investors about the operation of the WEM, and the certainty that it is being operated effectively and efficiently.

Several examples of a lack of transparency have become evident through this Review, with the most notable detailed below. The Coordinator will continue to focus on these areas, in collaboration with the market bodies, between this and the next WEM Operation Effectiveness Report.

The need for increased transparency has, in the opinion of the Coordinator, several contributing factors in the new Real-Time Market. For example, some of the issues detailed below are a direct result of the volume of work that has been required by the market bodies to establish the new Real-Time Market, while others are a result of an adjustment period. Others still result from the pace of change of the energy market.

Nevertheless, these are all issues that directly impact the effective operation of the market and that can influence investment decisions by both current and prospective Market Participants.

The Coordinator will consider any Rule changes resulting from the findings of this Report to improve transparency and, therefore, necessary for the effectiveness of the market.

4.3.2 Market Services shortfalls and interventions

In instances when insufficient volumes of energy or FCESS are forecast to be available, as assessed through market offers, AEMO has the responsibility to intervene in the market through a range of measures. These include issuing directions to Rule Participants, recall of outages, or dispatch of Supplementary Capacity.

Interventions may be indicative of a shortfall in the availability of services or limitations in the Security-Constrained Economic Dispatch (SCED) algorithm if the algorithm is not adequately accounting for a particular power system state or requirement. Such interventions can result in facilities being dispatched out of merit if AEMO needs to work around the new Real-Time Market's SCED algorithm, such as through the input of a manual constraint into the algorithm.

Market Advisories indicate that interventions and directions have occurred regularly since the commencement of the new Real-Time Market, but that the causes were often not communicated clearly to the market.

Up to 31 December 2024:

- A number of Market Advisories provide limited information to the market, describing the issuance of directions or constraining of generators “in order to maintain Power System Security and Reliability”, without providing details on the cause of the intervention.
- 45 directions were issued to facilities in November and December 2024 to address shortfalls in Rate of Change of Frequency (RoCoF) Control Service.

The Coordinator notes that directions and interventions have remained during the early months of 2025. Analysis of Market Advisories[13] finds a further 43 directions issued to Facilities to address reported shortfalls in RoCoF Control Service or reported breaches of the RoCoF secure limit, and a further 23 Market Advisories reporting the invocation of constraints on generators to ensure that networks limits are not breached[14].

A SCED algorithm is ideally designed to be able to determine the optimal dispatch of the power system, with manual intervention required in a small number of circumstances such as service shortfalls or immediately following a contingency event.

Interventions can impact market effectiveness due to the potential for divergence that can arise between market dispatch and pricing when facilities are dispatched out of merit, and the potential reduction in stakeholder confidence in the operation of the market.

The Coordinator understands completely that intervention powers are a critical backstop role for AEMO to perform, and that AEMO should intervene when PSSR is at risk. However, information released to Market Participants does not clearly explain why interventions have been necessary, or the nature and source of the shortfalls causing the need for interventions, and why interventions and shortfalls continue.

This is an area that requires more attention in the near term. The Coordinator is working with AEMO to better understand the issues and consider whether particular changes may be needed to the systems, the procedures or the ESM Rules to ensure that instances of shortfalls and intervention decrease and, where they are required, transparency is provided to the Coordinator and Market Participants on the cause. This transparency will assist in preventing shortfalls and interventions, and also support more efficient investigations when events do occur.

In particular, the Coordinator is of the view that closer attention needs to be given to the following matters to improve transparency:

- the identification of Constraint Equations used by AEMO to facilitate directions to provide RoCoF Control Service;
- clear information provision to the market by AEMO in relation to directions – especially the communication of the direction to a participant regarding the required actions and when the direction ends, and the information provided to other participants regarding the direction;
- in relation to AEMO Intervention Events, their purpose and rationale and the expected impact of Intervention Pricing on Market Clearing Prices for a range of typical AEMO Intervention Events; and
- the potential for a more formal obligation on AEMO to investigate and provide information on real-time market shortfalls, including consideration of the specific obligation and the party to whom AEMO should provide the results of its investigations.

To achieve these outcomes, the Coordinator is commencing the FCESS Costs Review – Stage 2 to improve the transparency around the continuing Market Services shortfalls and the reasons for AEMO’s directions (see section 3.2.4 on the scope of this review).

[13] From 1 January 2025 to 24 March 2025, inclusive.

[14] 18 of these Market Advisories refer to the risk of N-1 thermal overload.

4.3.3 Operational Forecasting

The Coordinator has identified that there have been issues present in the market in relation to operational forecasting. This has an impact on market effectiveness as variations in demand and generation forecasts from actual levels can increase the uncertainty for participants and the costs associated with managing power system operations.

Significant factors associated with forecast error in operational timescales include:

- variations in actual temperature from temperature forecasts leading to under- or overestimation of the demand of temperature-dependent loads, such as residential air-conditioning;
- the reliability of wind resource forecasts;
- complexity and uncertainty in solar irradiance over rooftop solar installations, including:
  - distribution: i.e., uncertainty of the total size of solar resource located behind each transmission node identifier or network constraint that limits the ability to forecast aggregate output in that area; and
  - dynamic changes: i.e., cloud cover resulting in sudden changes in output from rooftop solar installations in different areas of the SWIS.

To address market effectiveness issues relating to operational forecasting, the Coordinator, with the support of AEMO is reviewing the potential for changes to the relevant processes (potentially including Rule changes) to improve market operation. Some of the matters under consideration include:

- AEMO collaborating with weather providers to improve quality, frequency, granularity and understanding of uncertainty around forecasts;
- the potential for centralising intermittent generation forecasts, similar to developments with the NEM Variable Renewable Energy Forecasting System; and
- maintaining and publishing measures of forecast/backcast error for demand forecasts, as is done by the Electric Reliability Council of Texas (ERCOT).

4.3.4 Procedures Adequacy

WEM Procedures explain the relevant processes and provide the detailed requirements that a Rule Participant (including Market Participants and AEMO) must adhere to in order to meet the requirements and intent of the ESM Rules. As such, WEM Procedures provide an important source of information for ongoing operational decisions, compliance and for prospective participants to understand the full requirements for participation.

The Coordinator acknowledges that, in preparation for the new Real Time Market that commenced on 1 October 2023, AEMO was required to update and develop a large number of WEM Procedures. The Coordinator notes, however, that at the time of writing this report it has been over 18 months since the commencement of the new ESM Rules and nine procedures[15] remain unpublished. These include critical procedures related to Short-Term and Medium-Term Projected Assessment of System Adequacy (ST PASA and MT PASA respectively), the Supplementary Essential System Service Mechanism (SESSM) and Lack of Reserve (LOR) conditions.

These procedures are necessary to allow Market Participants to optimise their WEM participation, and there have been calls from stakeholders for their prompt publication. Additionally, recent WEM development reviews indicate that, of the procedures that are published, not all provide current or prospective Market Participants with the full set of required information (which can be magnified by the transparency issues identified in section 0 below).

[15] Publications were deemed to be late if they had been published after the new WEM commencement date of 1 October

Delays in the publication of procedures, and incomplete procedures, result in a lack of transparency and clarity for Market Participants or potential investors regarding the WEM operational and other requirements. This uncertainty can cause investors to lose confidence in the market, which could subsequently lead to a decrease in essential investment as the risk of market participation increases.

While the Coordinator recognises the considerable challenge that was laid before AEMO to publish all 52 procedures prior to the commencement of the new WEM, there is now a pressing need for AEMO to both publish the outstanding procedures and rectify the issues with those procedures that are incomplete or include limited detail.

The Coordinator also recognises that the timing of including the heads of power for the relevant Procedures in the ESM Rules, the subsequent development of those Procedures as well as the development of the various systems and modules implementing the Procedures did not necessarily allow for practical feedback loops during the implementation of the new Real-Time Market. This has the potential to have caused inadequacies or incompleteness in the existing Procedures or their heads of power, which need to be addressed.

To assist in addressing this issue, the Coordinator is also commencing, together with AEMO, a review of both the existing heads of power for the WEM Procedures and the WEM Procedures themselves to ensure both of these are adequate and to enhance transparency in the WEM.

4.3.5 Availability of market data through AEMO's website

The availability of readily accessible market data is essential for current and prospective participants to make both investment and ongoing operational decisions.

The Coordinator observes that the accessibility of market data that is made available by AEMO since new Real-Time Market start is inferior to that of the market data that was available through AEMO in the old market, and that the extent of data published on the market data dashboard has reduced.

Data files have been found to contain incomplete data, and many data series are only available in .json format, which can be a stumbling block for existing and prospective participants – especially smaller organisations seeking to enter the WEM. In contrast, the data provided by AEMO for the NEM is presented as a more user-friendly dashboard, with downloadable files accessible via Excel. The Coordinator notes that AEMO has commenced a body of work to seek feedback from stakeholders on the data dashboard to make improvements.

Additional information can be made available through information requests to AEMO. The Coordinator acknowledges that work is being undertaken to increase efficiency of information delivery. However, AEMO's internal processes for assessing confidentiality and approving the release of market information are likely to be restrictive. While the Coordinator recognises that Market Information requests have been fulfilled, the complicated decision-making process increases the time required to release any information, having a potential impact for those who may require the data to progress projects.

To address some of the potential barriers to the release of market related data, including any perceived confidentiality restrictions, the Coordinator plans to commence a Market Information review.

In summary, data availability and quality inconsistencies risk creating particular issues of transparency for current and prospective participants in the market, potentially dampening overall investment in the WEM and hindering broader policy development.

4.3.6 Surveillance and enforcement activities

The Coordinator has found that there is room for improvement in the approach taken in the WEM to surveillance and enforcement activities to improve transparency, when compared to peer regulatory mechanisms in in the NEM and the United Kingdom (UK).

For example, the ERA's Public Register of Investigations, which is required under the ESM Rules, does not currently provide the market with information about the nature, status, progress or outcomes of investigations. While the ERA is also required under the ESM Rules to publish a Public Register of Breaches, no register had been published on the ERA's website before 8 May 2025. On 8 May 2025, the ERA published a public register of breaches with three AEMO breaches dating back to 31 October 2023.

It is the Coordinator's view that compliance and enforcement should be about prevention of non-compliant or inappropriate behaviour. This can be achieved by the ERA publishing its current priorities or areas of focus for both its compliance monitoring and its market surveillance activities.

Public Registers and Market Rules Compliance Reports should be utilised to make it clear to the market what matters have been, and are currently, under investigation; what matters have been found to constitute contraventions of the ESM Rules and why; and what actions are being taken to enforce the ESM Rules and remedy breaches. In doing so, organisations the subject of investigations should be de-identified where this is required to preserve the integrity of the investigation.

There are several examples of peer regulatory bodies that, in the Coordinator's view, have greater transparency in this area. The UK's Office of Gas and Electricity Markets (Ofgem) provides an example of transparency in communicating with the market about its compliance and enforcement activities. Ofgem's website includes a database of all investigations, provisional and final orders, and penalty notices issued in its oversight of electricity market conduct in the UK, which is searchable by publication date, licence type, publication type and investigation status[16].

This database also includes notices for open investigations that communicate the date Ofgem initiated each investigation, the relevant industry sector, the subject of the investigation (in general terms), and, where appropriate, the name of the organisation being investigated and the specific obligations in relation to which it is being investigated. The Coordinator notes that, at the time of writing, Ofgem's database included ten notices of open investigations, of which only one omitted the name of the organisation and the specific matters in relation to which it was being investigated.

The Australian Energy Regulator's (AER) annual compliance and enforcement reports provide specific details about the matters on which the AER is monitoring compliance and pursuing enforcement action to ensure the NEM operates efficiently and competitively. These reports include information about the parties and matters against which the AER has instituted Federal court proceedings, penalties, infringement notices and accepted court-enforceable undertakings. They also reiterate the outcomes that the AER has achieved for energy consumers in the NEM, as well as its compliance and enforcement priorities for the next financial year.

The Coordinator is of the view that the ERA should regularly highlight to the market its key areas of focus for the upcoming period, noting that these will not be the only areas of focus, in a similar manner to that of other market regulators. Such proactive measures can encourage participants to undertake their own internal compliance due diligence, and can help to prevent issues from reaching the stage where the ERA is required to intervene.

[16] Office of Gas and Electricity Markets (Ofgem), *Compliance and enforcement: Investigations, orders and penalties*, Ofgem, UK Government, n.d., accessed 12 March 2025.

This approach is used by the AER in the NEM to advise the market of the AER's enforcement work and proactive compliance, highlight key risk areas and signal areas where the AER considers that behavioural change is required[17].

Providing information to the market on both current investigations, and on priority focus areas for the ERA, can help prevent current Market Participants from being in breach of the ESM Rules. It also sends a strong signal to prospective participants on the rules of engagement for participation in the WEM.

The Coordinator also considers that to increase WEM efficiency, AEMO must play a more proactive role in the surveillance of the WEM, in particular relating to high prices and the bidding behaviour of Market Participants. This is because AEMO as the market operator, is best placed to identify any issues early so they can be addressed as quickly as possible.

4.3.7 Transmission and distribution system planning

The Coordinator has observed that there is a general lack of visibility in the market about the capacity of both the distribution and transmission networks, and specific constraints and/or opportunities for new investment in each region. This has led to feedback from Market Participants and project developers regarding difficulties that are frequently being encountered during the project development and connection processes.

Western Power has advised that it is actively working to improve its methodology, data quality, and overall outcomes. Ongoing efforts are focused on refining the underlying datasets and analytical approaches to ensure continuous improvement and alignment with best practice.

Western Power has published TSPs in 2023 and 2024, following the introduction of new rule requirements in February 2022. The intent of the TSP is to provide sufficient information about Western Power's intentions for the development of the SWIS to enable Market Participants and potential new entrants to make informed investment decisions. However, neither publication has been able to adequately achieve this intent.

Generally, the TSP documents have so far been unable to satisfy the content requirements under section 4.5B of the ESM Rules. For example, the 2023 and 2024 TSP documents have not considered the market impacts of Network Constraints when proposing options for network development.

The Coordinator acknowledges that the 2023 TSP was published before the commencement of the new WEM, and that reliable data on the market impacts of Network Constraints was not available at that time. It is also acknowledged that Western Power is implementing a number of actions to mitigate this issue in future TSPs, including developing a detailed PLEXOS model that will allow constraint-related information to be calculated directly in the 2025 TSP. Western Power has also sought expressions of interest for the provision of PLEXOS modelling services[18].

The inclusion of analysis on the market impacts of Network Constraints in future TSPs is necessary to demonstrate that Western Power has given due consideration to the potential for efficient network augmentation projects to alleviate constraints, and lower emissions and overall costs for consumers.

Western Power has advised that it conducts comparative cost-benefit analysis, however, this could be more transparently reflected in the TSP. Improvements can be leveraged from comparable peers.

The AER's Cost Benefit Analysis (CBA) Guidelines require networks in the NEM to include constraint costs in the cost-benefit analysis of development options to ensure a comprehensive

[17] AER Compliance and Enforcement Priorities - 2024-25 | Australian Energy Regulator (AER)

[18] See Tender | Expression of Interest (EOI) PLEXOS Modelling

evaluation of how investments will affect network performance and efficiency. Transmission Network Service Providers in both the NEM and Northern Territory (NT) are also required to conform to the AER's Transmission annual planning report (TAPR) guidelines, which set out the AER's expectations for providing consistent and usable information on the emerging limitations of the transmission network in each network's annual transmission planning report.

Western Power's peers in the NEM, such as Powerlink and Transgrid, demonstrate the consideration of constraint costs in their TAPRs in the context of evaluating investment options in order to assess the overall benefits and impacts of different projects.

The TAPRs from the NEM network operators also contain dedicated sections detailing potential non-network solution opportunities that are anticipated to become available over the next five years, with tables summarising key information about non-network opportunities for easy visibility.

In the NT, the Power and Water Corporation has provided details of its proposed programs to address asset condition, capacity, voltage and fault limitations in Part D of its Transmission and Distribution Annual Planning Report 2024[19], grouped by asset type and constraint type. Subsections include an in-depth discussion of the proposed investment and details of any other options that have been considered in the analysis, supported by quantitative tables in an appendix.

This information provided in the NEM and NT TAPRs has allowed non-network service providers, and interested parties more broadly, to better understand and engage with network planning decisions and propose alternative options to address identified needs.

While Western Power's TSPs, Network Opportunity Maps (NOMs) and supporting documentation include heat maps, these do not provide participants and investors with clear signals regarding the most beneficial and cost-effective places to invest in the transmission or distribution networks. This may, for example, disadvantage distributed storage providers, such as community batteries and DER aggregators, from making investment decisions about future flexibility services in the WEM. Such information would assist all parties to optimise investment in network, generation and storage capacity in the SWIS and service the long-term interests of energy consumers.

The Coordinator acknowledges that Western Power does have a public, ArcGIS-enabled Network Capacity Mapping Tool with layers that show forecast network capacity over the period to 2034. This needs to be complementary to, and harmonised and co-located with, the information presented in the TSP and distribution planning documents.

Powerlink provides an excellent example of how to implement this, with its TAPR Portal providing a live map of every line and substation in Powerlink's network which users can interact with to view details on forecast capacity constraints for each network element and their predicted impacts, as well as Powerlink's recently commissioned, committed and proposed network projects.

4.3.8 Cooperation and coordination

Ongoing cooperation, coordination and collaboration are essential ingredients to make the new Real-Time Market both successful and more transparent. While it is only early in the life of the new WEM, there are signs that collaboration between market bodies should be improved to promote the effective operation and continued development of the market.

In October 2024, Clause 2.16.3A of the ESM Rules was implemented, requiring AEMO to report to the Coordinator and the ERA as soon as practicable after it becomes aware of the issue having an adverse effect on the operation of the WEM. The inclusion of a clause mandating AEMO's role in identifying inefficiencies can be considered reflective of the crucial role AEMO plays in assisting in the development of new ESM Rules and WEM Procedures. Based on experience with issues in the WEM that have been emerged since the commencement of the new real time market, the

[19] Power and Water Corporation, *Transmission and Distribution Annual Planning Report 2024*, Power and Water Corporation, n.d., accessed 11 March 2025.

Coordinator considers that there is opportunity for both AEMO and the ERA to be more proactive in identifying and sharing inefficiencies and suggestions for increasing the effectiveness of the market.

Unlike the mandatory cooperation by AEMO required by Clause 2.16.3A, Clause 2.16.13C states that the ERA "may" provide to the Coordinator and the Minister a report describing any market design problems or inefficiencies it identifies. To ensure that the ERA is more proactively identifying and sharing incidents of inefficiencies and market design flaws, it is the opinion of the Coordinator that the clause should be amended to require as is the case for the ERA under Rule 2.16.11, but only in relation to investigations of specific market behaviour the ERA to provide such a report instead of leaving it to the ERA's discretion.

The Coordinator is also of the view that a similar provision should be introduced for Western Power, so that all market bodies are required to proactively bring to the attention of the Coordinator inefficiencies and market design flaws.

The Coordinator considers that there is scope for market bodies to be proactive in bringing to the Coordinator's attention WEM design flaws and areas for improvement. Greater transparency in this area will lead to more efficient regulatory reviews and Rule change processes, and a more effective market.

4.3.9 Accessibility

In line with the general theme of transparency, the Coordinator undertook a high-level review of the accessibility of materials published by the Coordinator, the ERA, AEMO and Western Power against the principles of accessibility, as described the WA Government's Accessibility and Inclusivity Standard[20].

The purpose of this Standard is to:

- Ensure WA Government agencies adopt a minimum accessibility standard when designing, developing and delivering digital products, services and content;
- Ensure a consistent approach is taken across government so that the community can expect the same minimum standards no matter which agency is providing the digital product, service or content;
- Strengthen the accessibility of all government digital products, services and content; and
- Provide a single point of reference for digital content authors, developers and designers.

This standard requires government publications to adhere to Web Content Accessibility Guidelines (WCAG) 2.1 Level AA[21] (the standard).

While this standard requires government publications to adhere to the standard, non-government agencies (including the ERA, AEMO and Western Power) are responsible for implementing their own standards for accessibility.

For consistency in this report, the Coordinator has undertaken a high-level assessment of accessibility against the four pillars of WCAG Level AA[22].

[20] Accessibility and Inclusivity Standard

[21] World Wide Web Consortium (W3C), Web Content Accessibility Guidelines (WCAG) 2.1, 12 December 2024

[22] Please note that this is not intended to be a full accessibility review and so not every element of the accessibility standard has been assessed here. Please refer to the Standard and to each organisation's own accessibility policy for a full set of criteria.

In summary, the four pillars of accessibility outlined in the standards are that publications should be:

Perceivable – information and user interface components are presented to users in ways they can perceive – e.g.:

- Text alternatives are provided for any non-text content (including captions for all tables and images)
- Content follows a clear semantic structure and is sequenced logically
- Content can be displayed on different hardware (e.g., can be viewed on a phone) without loss of information or functionality

Operable – user interface components and navigation are operable – e.g.:

- Full functionality can be achieved using a keyboard only
- Web pages and documents have titles that describe the topic or purpose
- The purpose of each link can be determined from the link text alone
- More than one way to locate each Web page or document is available

Understandable – information and the operation of the user interface is understandable:

- The default language of each Web page and document can be recognised by assistive technologies
- A mechanism is available for identifying specific definitions of words or phrases used in an unusual or restricted way, including idioms and jargon
- A mechanism for identifying the expanded form or meaning of abbreviations is available

Robust – content is robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies:

- Content is compatible with current and future user agents, including assistive technologies
- PDF content is available in another format such as HTML or Word
- All PDFs and Word documents are accessible files
- Excel documents are only published if there is a strong user need

Summary of findings on accessibility

This Review has only taken a high-level view of accessibility to understand if there are some broad issues that need to be addressed across the publications of the market bodies.

While market bodies appear to be generally meeting accessibility standards, as assessed against WCAG Level AA, there has been found to be some room for improvement that can increase overall accessibility of publications for audiences, including the better organisation of information on websites, publication of documents in multiple formats and updates to content to ensure that it is both complete and readable to text-to-speech software.

It is recommended that an in-depth review of accessibility is undertaken prior to the next WEM Operation Effectiveness Report by each of the market bodies, to address these, and any other identified, areas for improvement.

4.3.10 Proposal

Table 3: Proposals to improve transparency of the WEM and its associated processes

Proposal 2 – Transparency
The Coordinator and the relevant market bodies, where applicable, should develop appropriate measures to make improvements to transparency in the WEM and its associated processes, including the following: 2.1 Further detail on the cause of any AEMO direction/intervention needs to be provided. 2.2 Improvements need to be made in relation to operational forecasting. 2.3 Procedures should be complete and published in a timely manner, and updated promptly when required. 2.4 Complete and verified market data should be made available through the AEMO publicly accessible web portal in easily accessed data formats. 2.5 Market bodies should be proactive in reporting WEM design flaws and areas for improvement to the Coordinator and, where appropriate, the ERA. 2.6 Clearer information should be provided to Market Participants regarding the current priorities and focus of the ERA's surveillance and compliance activities, noting that confidential information should remain as such. 2.7 The TSP should be transformed, in the medium term, into a broader Networks Plan that includes both the transmission and distribution networks that provides an informed view of investment opportunities, including a complete transmission and distribution development roadmap. Supporting information should include constraint data and cost-benefit analysis, and improved distribution level heat maps. 2.8 A review of accessibility across all market bodies' websites and published materials is likely to be required.

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