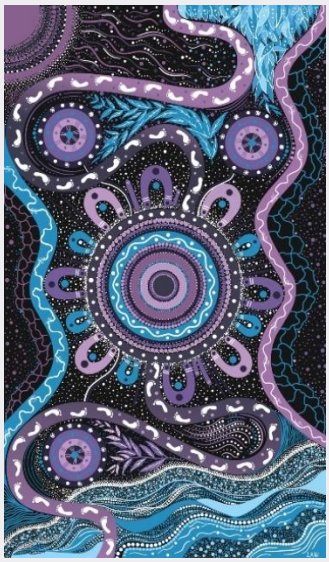
AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Engineering Roadmap

FY2026 Priority Actions

A report for the National Electricity Market and the South West Interconnected System



We acknowledge the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and continuing connection to Country; and hope that our work can benefit both people and Country.

'Journey of unity: AEMO's Reconciliation Path' by Lani Balzan

AEMO Group is proud to have launched its first Reconciliation Action Plan in May 2024. 'Journey of unity: AEMO's Reconciliation Path' was created by Wiradjuri artist Lani Balzan to visually narrate our ongoing journey towards reconciliation - a collaborative endeavour that honours First Nations cultures, fosters mutual understanding, and paves the way for a brighter, more inclusive future.

Important notice

Purpose

This report outlines activities the Australian Energy Market Operator (AEMO) plans to undertake in the 2025-26 financial year (FY2026) to advance operational capability for times of high renewables, keeping the National Electricity Market (NEM) and South West Interconnected System (SWIS) ahead of engineering challenges of the energy transition before they emerge operationally. The report continues the *Engineering Roadmap to 100% Renewables* work by reviewing actions undertaken in the 2024-25 financial year, and complements the annual *Transition Plan for System Security* that AEMO is required to publish annually by 1 December.

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Version control

Version	Release date	Changes
1	17/07/2025	Initial publication

Executive summary

AEMO's Engineering Roadmap program[1] aims to prepare Australia's power systems for operation at times of high renewables contribution.

This Priority Actions report outlines AEMO's progress in the 2024-25 (FY2025) financial year against committed actions[2], and the commitments AEMO is making for the upcoming 2025-26 financial year (FY2026) to deliver actions identified in the *NEM Engineering Roadmap to 100% Renewables*[3] (NEM Roadmap) and the *SWIS Engineering Roadmap*[4] (SWIS Roadmap).

Over the past year, AEMO has delivered 33 of the 37 actions committed for FY2025 in the NEM, including:

- providing guidance on quantifying synthetic inertia from grid-forming (GFM) batteries,
- contributing technical advice to the Reliability Panel's review of the System Restart Standard (SRS), and
- implementing new minimum system load (MSL) frameworks for Victoria and South Australia market regions.

Four actions remain ongoing, with residual work informing development of priority actions for FY2026.

In Western Australia's South West Interconnected System (SWIS), AEMO released the inaugural *SWIS Engineering Roadmap* in August 2024 that established a new framework to drive dedicated engineering initiatives for power system operational readiness. Activities in the SWIS in FY2025 included:

- reviewing the Rate of Change of Frequency (RoCoF) Safe Limit,
- implementing Non-Co-optimised Essential System Services (NCESS) contracts to manage minimum system load, and
- assessing system strength in conjunction with the SWIS network operator Western Power as part of the 2025 Wholesale Electricity Market (WEM) *Electricity Statement of Opportunities* (ESOO)[5].

Progress over the past year revealed several areas in both the NEM and SWIS that require continued and additional work, informing development of FY2026 actions. Candidate activities were identified by performing gap analysis on critical Engineering Roadmap pre-conditions, followed by prioritisation of shortlisted actions through assessment against the principles of value, urgency, minimised regrets, leveraging of existing processes, and available funding and resourcing.

For FY2026, AEMO is committing to 29 priority actions across the NEM and the SWIS. These actions, a number of which will be jointly progressed across the NEM and SWIS, span three planning horizons and target initiatives to:

1. uplift operational capabilities,
2. prepare for transition points,
3. integrate consumer energy resources (CER) and larger distribution-connected distributed energy resources (DER), and
4. enable new technologies.

[1] See https://aemo.com.au/initiatives/major-programs/engineering-roadmap.

[2] See https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/nem-engineering-roadmap-fy2025-priority-actions.pdf.

[3] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2022/engineering-roadmap-to-100-per-cent-renewables.pdf?la=en.

[4] Athttps://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/swis-engineering-roadmap.pdf?la=en.

[5] At https://aemo.com.au/-/media/files/electricity/wem/planning_and_forecasting/esoo/2025/2025-wem-electricity-statement-of-opportunities.pdf.

Detailed examples include:

- transition point planning analysis, including planning for coal retirement, periods of high distributed PV generation, and conditions where the power system is operating with up to 100% renewables,
- advancing understanding of future technology capabilities, including analysis of fault current contributions from GFM battery energy storage systems (BESS), and
- reviewing market settings in the WEM for operational storage requirements, dynamic load contingency limits, and RoCoF limits.

As the energy transition accelerates, AEMO is seeking to streamline communications for stakeholders and is considering a combined approach for its Engineering Roadmap, *Transition Plan for System Security* (Transition Plan), and system security planning publications[6] in 2026. AEMO intends for a combined, annual system security report to be the primary vehicle for communicating transition readiness in the NEM, with this report being the final Engineering Roadmap priority actions publication. The most appropriate format for future reporting of SWIS Roadmap activities will depend on the outcomes of the Power System Security and Reliability Standards Review[7] currently under consultation by Energy Policy WA.

[6] See https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/system-security-planning.

[7] See https://www.wa.gov.au/system/files/2025-06/pssr_standards_review_consultation_paper_0.pdf.

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1 Progress on the Engineering Roadmap

This Engineering Roadmap *FY2026 Priority Action* report outlines progress made in FY2025 and the activities committed to by AEMO for FY2026. These activities aim to deliver on actions identified in the *NEM Engineering Roadmap to 100% Renewables*[8] (NEM Roadmap) and the *SWIS Engineering Roadmap*[9] (SWIS Roadmap).

The engineering actions described in these reports are required to enable a secure and reliable energy transition to a high renewables energy system. Roadmap actions seek to prepare Australia for operation at times of high renewables contribution, keeping the system ahead of the engineering challenges of the energy transition before they emerge operationally.

The transformation of the power system from one dominated by centralised thermal baseload synchronous generation, to one with variable and distributed inverter-based technology, necessitates a fundamental shift in how the system is operated.

Both NEM and SWIS power systems are undergoing substantial change, evidenced by continued breaking of renewable contribution records, as the growth of distributed PV (DPV), and grid-scale solar, wind and BESS continue to displace thermal generation. In the past year, the NEM reached a record renewable contribution on a half-hourly basis of 75.6% on Wednesday 6 November 2024. Shortly after, the SWIS experienced its highest peak renewable contribution of 85.1% on 17 November 2024[10]. These records are a result of strong progress and collaboration across the energy sector, with several critical operational preconditions being met over the past three years.

Looking ahead to the next five to 10 years, AEMO expects Australia's energy systems to encounter several transition points[11] – events and milestones that require material changes in the operational approach to managing power system security. Examples include:

- forecast retirements of coal-fired power stations, including Eraring and Yallourn Power Stations in 2027 and 2028 respectively, Collie Power Station in 2027 and all remaining state-owned coal-fired power stations in Western Australia by 2030[12], which represent a substantial reduction to baseload synchronous generation,
- operation of NEM regions such as South Australia at times without any synchronous generation,
- operation with large amounts of grid-following (GFL) BESS, noting that in the SWIS, BESS capacity will soon exceed SWIS average demand,
- provision of system strength and inertia services shifting from traditional large-scale generation towards GFM BESS and synchronous condensers, and

[8] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2022/engineering-roadmap-to-100-per-cent-renewables.pdf.

[9] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/swis-engineering-roadmap.pdf.

[10] See https://aemo.com.au/-/media/files/major-publications/qed/2024/qed-q4-2024.pdf.

[11] The 2024 *Transition Plan for System Security* introduced the concept of transition points as events and milestones that require material changes in the operational approach to managing power system security. This may include major changes to the asset mix, technical envelope, or configuration in the NEM/SWIS, such as retirement of large synchronous generators; threshold events, such as projected seasons where operational demand could drop below minimum levels; and operational shifts as changes in available security mechanisms allow relaxation of constraints, such as minimum numbers of online synchronous generators.

[12] See https://www.wa.gov.au/government/announcements/state-owned-coal-power-stations-be-retired-2030-move-towards-renewable-energy.

- higher levels of participation from consumer and distributed energy resources (CER and DER)[13], where growing volumes of DPV continue to drive down operational demand – South Australia market region has already experienced periods of negative operational demand[14], Victoria market region is forecast to reach periods of negative operational demand by 2027[15], and in the SWIS, without support from scheduled loads such as BESS, or use of Emergency Solar Management to turn down or switch off DPV, minimum operational demand from the entire system could fall to zero by 2029.

Activities to uplift technological and operational capabilities need to be actioned now to prepare for future known transition points across short-, medium-, and long-term horizons.

1.1 Progress made in FY2025

1.1.1 NEM Roadmap

In FY2025, AEMO identified 37 actions from the NEM Roadmap that targeted progress across the three focus areas of:

- delivering foundational transition enablers,
- providing long-range investment visibility, and
- progressing operational readiness.

Of the committed activities, 33 have been completed and the remaining four have been partially completed, with the remaining work informing the development of the priority actions for FY2026. **Figure 1** shows the status of each of the FY2025 actions, and rest of this section provides a summary of key achievements from activities over the past financial year. Detailed outcomes for all 37 actions are provided in Section 2.

NEM Roadmap activities achieved in FY2025 were enabled by a commitment of up to $15 million in grant funding from the Australian Renewable Energy Agency (ARENA)[16] over an 18-month period between 1 January 2024 and 30 June 2025. This support allowed a step change in new resources to be allocated to Roadmap efforts, enabling AEMO to expand and accelerate FY2025 activities towards preparing the NEM for high renewables contribution. In addition to advancing on FY2025 actions, the ARENA funding has also set up an enduring business commitment to work programs and resources that uplift prerequisite technical and operational capabilities for securely and reliably operating a net zero energy system.

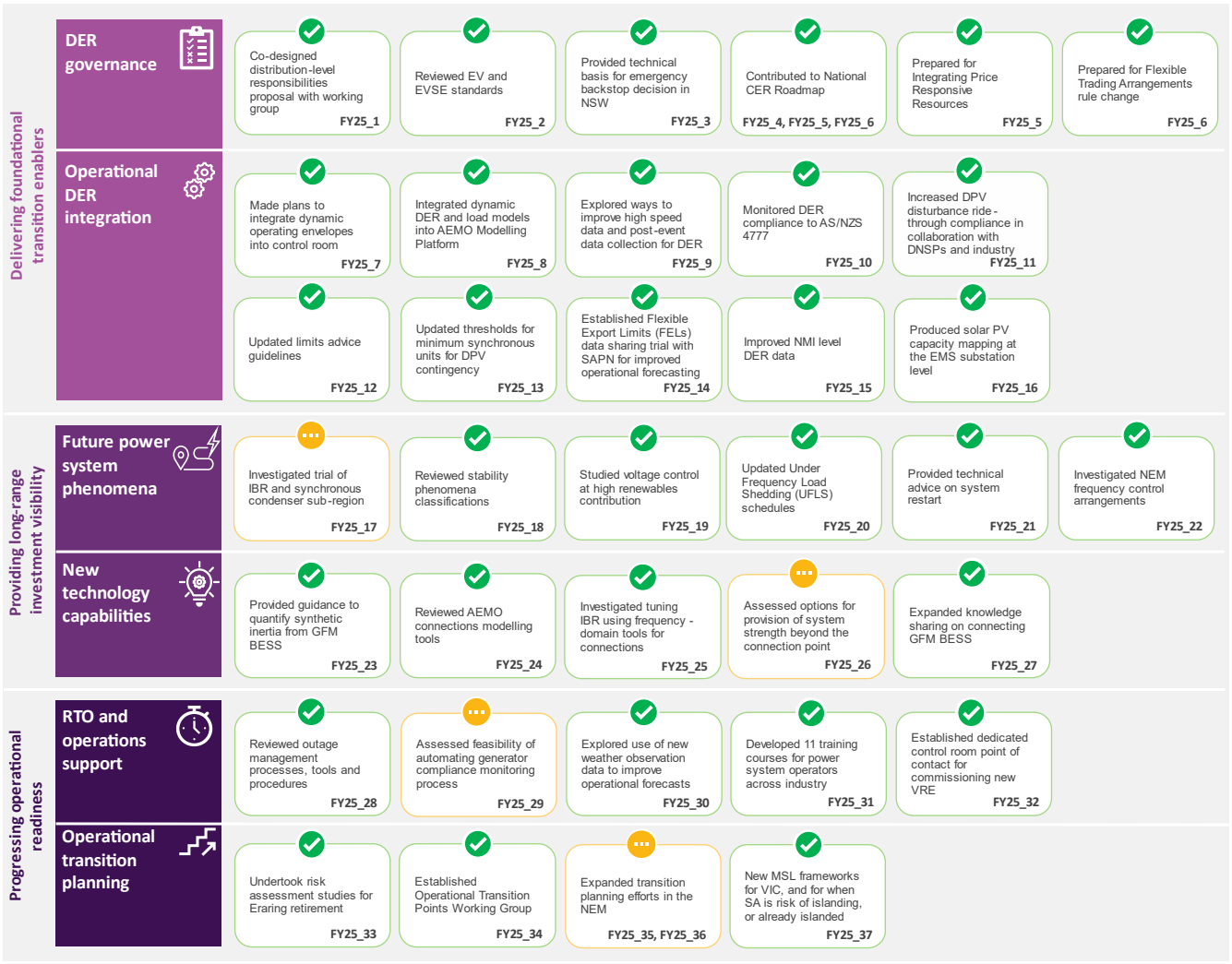
[13] This report refers to both small-scale CER, such as rooftop solar, home batteries, and electric vehicles (EVs), and also larger DER embedded within the distribution network, such as community batteries. These larger resources are not strictly "consumer-owned" but are still geographically dispersed and connected to the distribution network, and interact differently with the power system than large-scale generation and load. DER is referred to explicitly where relevant for considerations of size, coordination, or system-interaction.

[14] South Australia reached a minimum operational demand record of -205 megawatts (MW) on 19 October 2024.

[15] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-electricity-statement-of-opportunities.pdf.

[16] See https://arena.gov.au/projects/aemo-accelerating-the-engineering-roadmap/.

Figure 1 FY2025 NEM priority action status



Delivering foundational enablers

This workstream focused on supporting the establishment of industry-wide governance to support CER and DER integration, enabling market participation by consumers, and enhancing predictability to ensure secure operation. Achievements included:

- progress on establishment of enduring market frameworks for CER operation via the National CER Roadmap[17] (T1, T2, M2, M3, P5 workstreams[18]), including significant input into the consultation papers on CER Data Sharing Arrangements and Roles and Responsibilities for Power System and Market Operations in a High CER Future [FY25_4, FY25_5],

[17] See https://www.energy.gov.au/sites/default/files/2024-07/national-consumer-energy-resources-roadmap.pdf.

[18] MP2: https://consult.dcceew.gov.au/national-cer-roadmap-data-sharing-arrangements-m2.
M3/P5: https://consult.dcceew.gov.au/national-cer-roadmap-redefine-roles-m3-p5.

- progress on the Integrating Price Responsive Resources into the NEM (IPRR)[19] and Unlocking CER Benefits Through Flexible Trading[20] rule changes [FY25_6],
- improved visibility of CER and DER, whereby dynamic DER and load models have been integrated into the AEMO Modelling Platform (AMP), informing updates to Limits Advice Guidelines[21] and constraint equations, increasing line flows and helping reduce the number of binding constraint intervals [FY25_8, FY25_12], and
- mechanisms and requirements to support secure operation of a power system with high contributions of distributed PV, including uplift of CER compliance with AS/NZS 4777 "Grid connection of energy systems via inverters" [FY25_4, FY25_10], publishing guidelines on *Technical Requirements for 200kW-5MW DER connections*[22] [FY25_11], and providing technical advice[23] to support emergency backstop mechanisms aimed at uplifting compliance and effective operation in South Australia, Victoria and Queensland, and implementation in New South Wales and the Australian Capital Territory [FY25_3].

Providing long-range investment visibility

Efforts were directed towards identifying future power system needs and defining capability of new inverter-based technologies to meet those needs. Achievements included:

- increasing visibility to stakeholders on the potential capabilities of GFM batteries through published guidance on *Quantifying Synthetic Inertia from GFM BESS*[24] [FY25_23],
- providing greater clarity on future system requirements and operating frameworks, including review of NEM frequency performance [FY25_22][25], and system restart capabilities as part of the Reliability Panel's review of the System Restart Standard (SRS)[26] [FY25_21], and
- improving learnings of GFM BESS capability for managing grid disruptions, and published findings in *Analysis and modelling of GFM BESS during a system incident*[27]. This study was completed in addition to the committed FY2025 actions.

Two actions remain in progress:

- AEMO has identified the suitable sub-region to conduct a live demonstration of operating the power system in a secure state using a combination of IBR and synchronous condensers is likely to be within the SA region. AEMO has developed a conceptual Test Plan but deferred the prospective field trial to FY2026 due to the need to progress network commissioning and system security contracting activities in SA first. [FY25_17]

[19] See https://aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/integrating-price-responsive-resources-into-the-nem.

[20] See https://aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/flexible-trading-arrangements.

[21] See https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/congestion-information/2025/limits-advice-guidelines.pdf.

[22] See https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/aemo_technical-requirements-for-200kw-to-5mw-der-connections_sept-2024_final_.pdf.

[23] See https://aemo.com.au/-/media/files/initiatives/der/managing-minimum-system-load/supporting-secure-operation-with-high-levels-of-distributed-resources-q4-2024.pdf.

[24] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/quantifying-synthetic-inertia-from-gfm-bess.pdf.

[25] See https://www.aemo.com.au/initiatives/major-programs/engineering-roadmap/engineering-roadmap-execution-reports.

[26] See https://aemo.com.au/-/media/files/initiatives/engineering-framework/2025/system-restart-technical-advice.pdf.

[27] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/analysis_and_modelling_of_dalrymple_bess_performance_december_2023_events.pdf.

- AEMO is also assessing options for provision of system strength beyond the connection point, and will consult with stakeholders on potential amendment of the System Strength Impact Assessment Guidelines (SSIAG) [FY25_26].

Progressing operational readiness

AEMO prioritised its core role of maintaining power system security in real-time operation (RTO) under unprecedented levels of variable, inverter-based, and distributed resources. Achievements included:

- facilitating improved industry capability for operating a high renewables system through development of an 11-module operator training course for industry [FY25_31],
- strengthening transmission network service provider (TNSP) collaboration through formation of the Operational Transition Points Working Group (OTPWG) and Future Transition Points Working Group (FTPWG) [FY25_34] to address transition points, supported by the inaugural *Transition Plan for System Security*[28] (Transition Plan), and
- preparing for upcoming transition points by implementing new MSL frameworks for Victoria and for South Australia, at times when South Australia is at risk of islanding (when a portion of the system is disconnected from the rest of the network and operates separately) or already islanded [FY25_35, FY25_36].

Two actions remain ongoing:

- AEMO has conducted preliminary assessment of options to automate monitoring of generator non-compliance [FY25_29] and will continue to explore avenues to increase efficiencies in workflows.
- AEMO has made operational plans to reduce the number of synchronous generating units required to be online in South Australia to reduce to a single unit [FY25_35] and will progress this once it is assessed to be technically and operationally safe.

1.1.2 SWIS Roadmap

In FY2025, AEMO published the first *SWIS Engineering Roadmap*[29] report, building on the themes explored in AEMO's 2019 *Integrating Utility-scale Renewables and Distributed Energy Resources in the SWIS*[30] report and 2021 *Renewable Energy Integration – SWIS Update report*[31].

In FY2025, ARENA contributed funding towards Western Australia's leading DER orchestration enablement project, Project Jupiter, under the WA DER Roadmap. In turn, AEMO's available funding and resourcing provisioned for FY2025 under the Allowable Revenue Framework has necessitated a highly targeted delivery approach in the past year, focusing on critical reforms being progressed under the Power System Security and Reliability Standards Review[32], the Frequency Control Essential System Services (FCESS) Cost Review - Stage 2, and Operational Forecasting Review, as well as DER-related initiatives.

In the near term, with consultation from stakeholders, AEMO aims to build resource capability to progress a broader range of SWIS Roadmap actions to uplift prerequisite capabilities for securely and reliably operating the SWIS with greater

[28] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/transition-planning/aemo-2024-transition-plan-for-system-security.pdf.

[29] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/swis-engineering-roadmap.pdf.

[30] At https://aemo.com.au/-/media/files/electricity/wem/security_and_reliability/2019/integrating-utility-scale-renewables-and-der-in-the-swis.pdf.

[31] At https://aemo.com.au/-/media/files/electricity/wem/security_and_reliability/2021/renewable-energy-integration--swis-update.pdf.

[32] See https://www.wa.gov.au/government/document-collections/power-system-security-and-reliability-standards-review.

renewable contribution. Existing NEM processes and knowledge exchange will also be leveraged where possible to ensure the SWIS Roadmap is delivered efficiently.

Delivering foundational enablers

In FY2025, AEMO undertook a feasibility study and developed a proof of concept for inhouse modelling of SWIS reliability. As the energy transition progresses, more frequent and detailed modelling will be needed to assess power system security and reliability performance, capacity forecasts, WEM outcomes and emerging risks. This modelling will provide valuable insights to AEMO to assess power system risks and opportunities and emerging phenomena over the transition.

Alongside this, AEMO, Western Power, Synergy and Energy Policy WA commenced Project Jupiter to develop the infrastructure required to enable virtual power plants (VPPs) at scale in the SWIS. Project Jupiter will build on the success of Project Symphony, accelerating the integration of rooftop solar, home and community batteries[33] as part of the WA DER Roadmap[34]. This project is partly funded by a $20.8 million grant from the Federal Government's ARENA Advancing Renewables Program.

AEMO also supported Energy Policy WA in the development of the Power System Security and Reliability Standards Review[35] Consultation Paper which includes proposals to remove barriers to new battery and renewable energy technologies seeking to connect to the SWIS, and a new system strength framework to clarify roles and responsibilities to maintain system strength.

Providing long-range investment visibility

AEMO, in consultation with Western Power as part of the 2025 WEM ESOO[36], undertook an initial assessment of system strength in sub-regions of the SWIS based on existing and committed supply (less expected retirements) and committed network capacity to highlight the potential risks of declining system strength and opportunities for investment in mitigations.

AEMO identified that system strength is projected to decline sharply in key locations as synchronous generation retires and inverter-based resources (IBR) are connected. In the South-West region, Shotts Terminal (a substation located near Collie) is forecast to shift from being one of the strongest areas of the SWIS to a weak area, due to the closure of coal-fired power stations and connection of approximately 650 megawatts (MW) of GFL battery storage by 2027. Further studies are required to identify appropriate solutions to mitigate emerging system strength risks.

One proposal being explored in the Power System Security and Reliability Standards Review[37] is the implementation of centralised planning and investment functions for system strength. This planning would focus on facilitating new connections in the SWIS and supporting GFM inverters. AEMO plans to assess available mitigations of system strength issues following the completion of this review.

[33] See https://aemo.com.au/initiatives/major-programs/wa-der-program/project-jupiter

[34] Seehttps://www.wa.gov.au/government/distributed-energy-resources-roadmap

[35] See https://www.wa.gov.au/system/files/2025-06/pssr_standards_review_consultation_paper_0.pdf.

[36] See https://aemo.com.au/-/media/files/electricity/wem/planning_and_forecasting/esoo/2025/2025-wem-electricity-statement-of-opportunities.pdf.

[37] See https://www.wa.gov.au/system/files/2025-06/pssr_standards_review_consultation_paper_0.pdf.

Progressing operational readiness

In FY2025, AEMO uplifted operational capabilities by mitigating SWIS minimum demand issues. This was achieved by operationalising NCESS Contracts entered into with Market Participants in prior years and implementing new tools for Emergency Solar Management.

AEMO also uplifted operational forecasting by enhancing weather modelling capability and situational awareness through partnering with a weather forecast provider. Alongside this, AEMO also implemented many changes relating to SWIS operational limits, including:

- managing voltage through periods of minimum demand,
- dynamic monitoring of load contingencies for frequency stability using SCADA, and
- revisions to the real-time intervention processes for managing RoCoF during periods of minimum demand and Lack of Reserve with higher levels of IBR.

Additionally, AEMO commenced an assessment of whether the RoCoF Safe Limit in the SWIS Frequency Operating Standards could be relaxed, resulting in more efficient operation of the WEM. The outcomes of this assessment will be included in the Coordinator of Energy's review of the Frequency Co-optimised Essential System Service Framework.

1.2 Priority actions for FY2026

For the upcoming financial year, AEMO has prioritised 29 Engineering Roadmap activities across the NEM and SWIS. Section 3 has a detailed list of the FY2026 priority actions that AEMO is pursuing.

Development of FY2026 actions was guided by readiness efforts to date alongside the Engineering Roadmap, including progress made in the past year. Ongoing insights from operating an evolving power system, and further stakeholder feedback received through the 2024 Transition Plan[38] were also considered.

The preconditions that must be met to operate the NEM and SWIS power systems with high contributions from renewables are a key reference for determining priority focus areas. The NEM Engineering Roadmap defines 41 preconditions for the NEM, while the SWIS Engineering Roadmap defines 34 preconditions for the SWIS. Many of the preconditions are shared across the two power systems.

The Engineering Roadmaps also defined a set of prioritisation principles shown in **Figure 2**, used to inform priorities for the year ahead.

Figure 2 FY2026 prioritisation framework

Figure 3 outlines the 10 preconditions determined to merit the most attention in FY26. Gap analysis conducted on each precondition informed a long list of candidate activities for FY2026. AEMO then assessed these against the prioritisation framework principles and against resource availability to define the final set of actions.

AEMO acknowledges that prioritisation of efforts amidst the complexity of the energy transition is not an exact science, and has identified the highest priority areas based on information currently available. Due to the dynamic nature of the energy transition, these priorities are subject to review as the year progresses and AEMO welcomes stakeholder feedback and suggestions on priority focus areas.

[38] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/transition-planning/aemo-2024-transition-plan-for-system-security.pdf.

Figure 3 Critical Engineering Roadmap preconditions informing FY2026 priority actions

Theme	Precondition
Power system security	Ability to keep system frequency within defined limits following credible and non-credible events, including RoCoF containment and effective emergency frequency control arrangements
	System strength requirements met by alternatives to system configurations that require minimum loading on synchronous fossil fuel generators
	Effective restart arrangements, plans and procedures in place for first 100% renewables period, including adequate system restart-capable plant built in suitable locations
System operability	Ability to securely and reliably manage planned outages for maintenance and augmentation required in the transition to 100% renewables
	Reserve assessment and management processes in place to balance VRE variability and uncertainty, with the ability to account for energy limitations
	Future system studies to assess the secure technical envelope of the power system with decreasing, and eventually no, synchronous fossil fuel generation online
Resource adequacy and capability	Clearly defined operational roles and processes for managing system security and coordination across parties at times of high DER contribution
	Basic level of controllability for a sufficient proportion of the DPV fleet
	DER behaviour during disturbances quantified and managed
	Enabling consumer participation and provision of demand side flexibility

VRE: variable renewable energy.

Figure 4 presents actions for FY2026. These include combined priorities for the NEM and SWIS, where a collaborative approach to action delivery will be adopted to ensure knowledge sharing and efficient resource allocation between both systems.

The FY2026 actions span three planning time horizons, defined per the planning horizons framework first introduced through the 2024 Transition Plan:

- **Horizon 1** – operational planning for known transition points arising over the next two years which must be managed predominantly with today's assets and technology. In this horizon, operational tools and procedures for operating need to be newly established or updated to ensure readiness.
- **Horizon 2** – identifying potential future transition points in the two-to-five-year planning horizon to enable early preparation and defining capabilities and progressing understanding of the security capabilities and services that will be required to manage them.
- **Horizon 3** – progressing understanding of all elements of a low- or zero-emissions power system, initiating long lead-time (5+ years) activities that will enable preparation and investment in solutions to meet emerging needs.

Efforts to address engineering challenges across all three planning horizons need to progress in parallel for timely and ongoing delivery of appropriate solutions throughout the course of the energy transition. This Priority Actions report identifies work needed over the next financial year to support progress through upcoming operational transition points and to enable investments and new technologies needed over coming horizons.

While these timeframes have been used for FY2026 prioritisation below, AEMO notes that:

- horizon timeframes will continue to be reviewed through ongoing work and assessments of relevance to investment and planning decisions, and
- immediate actions are required for all horizons to support adequate preparation for the longer-term energy transition.

Across the different horizons, actions are designed to address known upcoming power system challenges associated with the transition, including retiring thermal coal fleet, greater participation of CER and increasing likelihood of MSL events, dependency on new technology for system security, and emergence of new power system phenomena. These are expected to feature both stepwise and gradual evolution of technology type, fuel mix, and new system phenomena.

To enable the transition to occur in an orderly, safe and secure manner, FY2026 activities will focus on initiatives aimed at the following:

- **Uplifting operational capabilities** – building and uplifting the modelling, forecasting and analysis tools and processes required to enable AEMO's RTO and supporting functions to manage a high renewables system with greater certainty.
  - These activities are relevant to Horizon 1 and address immediate power system challenges. They include enhancing modelling of under-frequency load shedding (UFLS) schemes, planned outages, and DPV generation. AEMO is also undertaking SWIS activities that will review current market settings for operational storage requirements, dynamic load contingency limits, and RoCoF limits.
- **Preparing for transition points** – forming a step-by-step plan to proactively identify barriers, prerequisites, and solutions to enable upcoming transition points across the three time-horizons, and initiate pathways for implementation.
  - This includes activities such as developing and implementing emergency mechanisms to manage MSL issues at times of high DPV generation and low demand in the NEM, navigation of key transition points and substitution of the synchronous capacity of retiring coal-fired generation in both the SWIS and the NEM, and defining power system requirements for scenarios when the grid is running with 100% IBR contribution. AEMO, in collaboration with Western Power, will also review system strength requirements and mitigations options in the SWIS.
- **Integrating CER**[39,40] – enabling higher levels of CER contribution by improving CER visibility, predictability and controllability.
  - Horizon 1 activities aim to equip system operation with enhanced operational forecasts by onboarding CER data streams that are available now, including dynamic operating envelope data from SA Power Networks (SAPN) and Energy Queensland (EQL). Networks containing high levels of distributed generation will be characterised by power flows in reverse of traditional direction of flow and frequent occurrence of low demand (minimum system load) which reduces the provision of system services from synchronous generation. Horizon 2 activities aim to improve CER data quality, enhance data streams for analysing CER response to system disturbances, and explore pathways for resumption of distributed PV during system restart.

[39] This relates to integrating CER and distribution-connected DER in both the NEM and SWIS. This report refers to CER unless a specific application of DER is relevant.

[40] In addition to Engineering Roadmap actions, AEMO is either contributing to or leading several workstreams under the National CER Roadmap, including for interoperability standards, data-sharing arrangements, distribution-level roles and responsibilities, national regulatory framework, and EVSE standards for power system security. These actions are not explicitly included in the Engineering Roadmap, to avoid duplication. Likewise, there is no single activity for managing CER cybersecurity, with this critical element being embedded in each of the National CER Roadmap workstreams, with consideration of the *Cyber Security Act 2024*, the *Security of Critical Infrastructure (SOCI) Act*, and the Australian Energy Sector Cyber Security Framework (AESCSF). AEMO also continues to contribute to the Standards Australia Roadmap for CER cybersecurity.

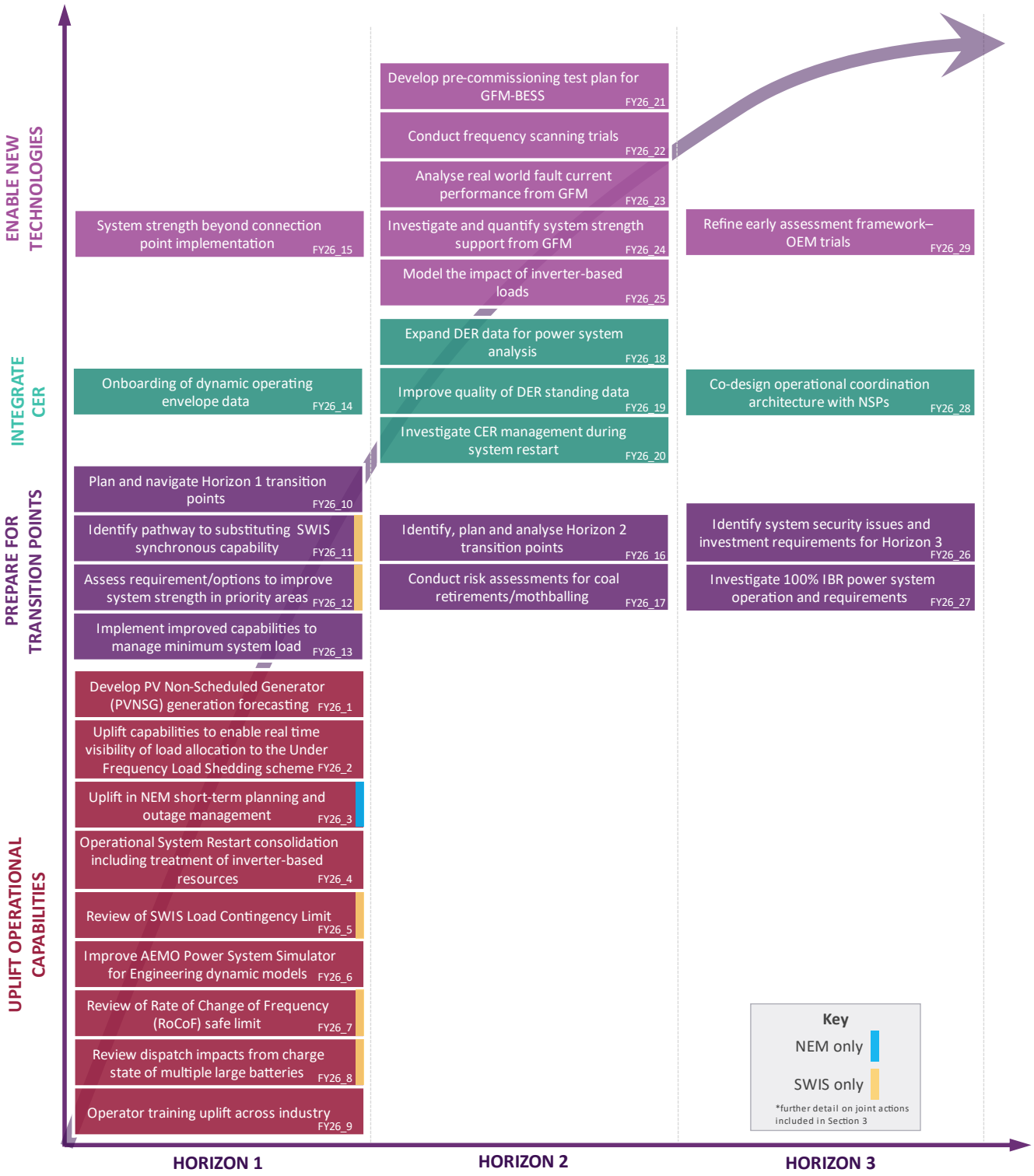
  - In the SWIS, AEMO will continue to contribute to the coordinated program of work under the Western Australian Government's DER Roadmap as reported in the *Distributed Energy Resources Roadmap Third Progress Report*[41]. AEMO is a continued partner of Project Jupiter[42], supported by ARENA and accelerating opportunities for Western Australian households to join VPPs and participate in the energy transition. These initiatives are complementary to the SWIS Engineering Roadmap activities, which prioritise investigations on CER response to system restoration and low system strength, and assessment of any need to expand requirements for backstop solar capabilities.

- ***Enabling new technologies*** – reducing barriers to connect emerging technology types onto the grid, with a focus on GFM technologies.
  - Activities to enable new technologies span each horizon, including desktop demonstration studies, historical analysis and current trials of GFM BESS and inverter based loads through to investigation and development targeting Horizon 2 and Horizon 3. Activities also aim to develop ways to improve the connections process for GFM BESS through trialling new commissioning procedures and tuning tools.

[41] At https://www.wa.gov.au/government/publications/distributed-energy-resources-roadmap-third-progress-report#:~:text=The%20Distributed%20Energy%20Resources%20%28DER%29%20Roadmap%20is%20in,and%20outlines%20what%20lays%20ahead%20for%20DER%20integration.

[42] https://arena.gov.au/projects/project-jupiter/.

Figure 4 Engineering Roadmap priority actions for FY2026

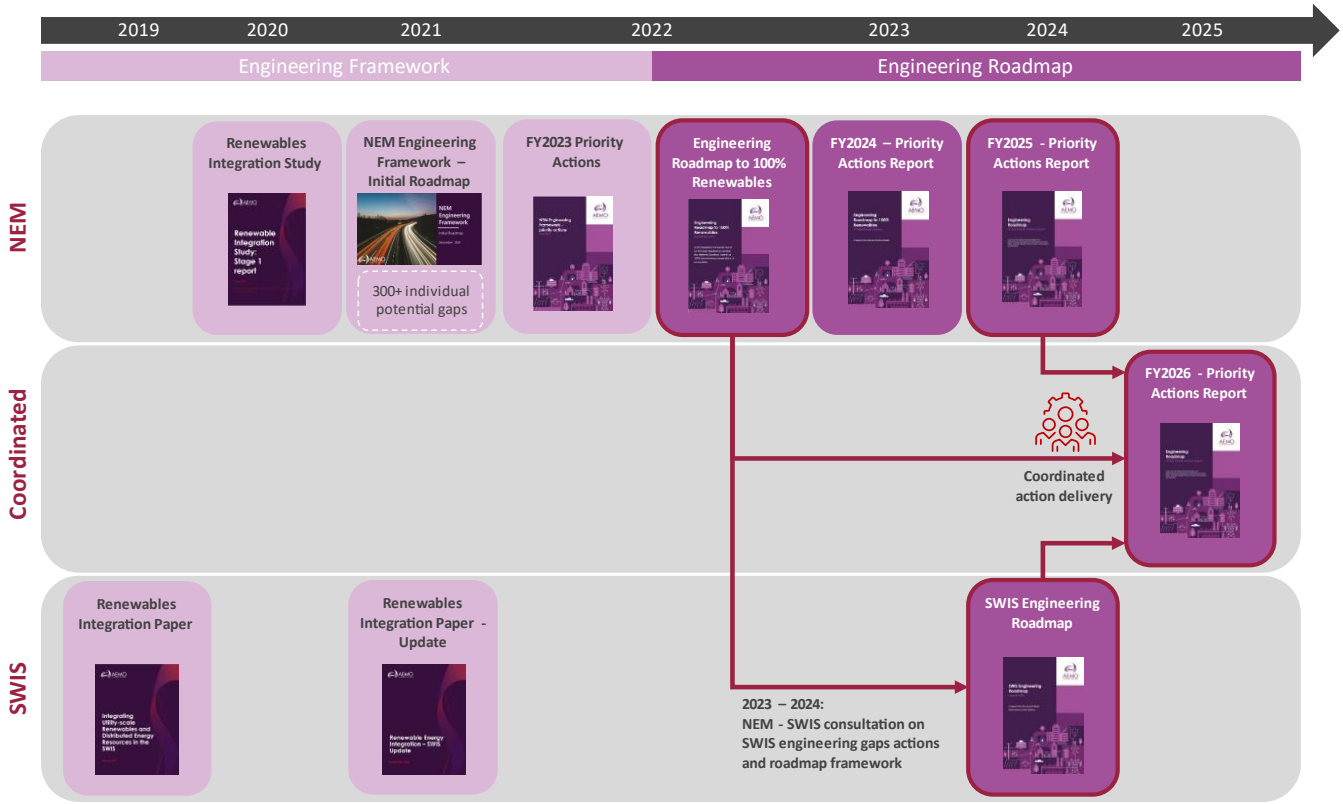


Note: FY2026 priority actions include initiatives that service both the NEM and SWIS. Given the distinct design of these electricity markets, some actions are unique to one system, while others will benefit both. The coloured bars above indicate the relevance of actions to each system: yellow bars denote relevance only to the SWIS, and blue bars indicate relevance only to the NEM. The absence of any coloured bar indicates joint relevance. For example: AEMO will engage in Horizon 1 transition planning for both the NEM and SWIS systems; PV Non-Scheduled Generation (PVNSG) generation forecasting improvements will target NEM regions, although with potential applications in the SWIS; and review of the RoCoF safe limit is specific to the SWIS.

1.3 The evolution of the Engineering Roadmap

The continued acceleration of the energy transition requires sustained effort across the energy sector in planning, trials, investments, studies, research, and development of new tools or processes. Targeted and coordinated action is particularly required across AEMO, network service providers (NSPs), and the broader energy industry to collectively progress through key milestones and operational transition points.

Figure 5 Progress of the Engineering Roadmap



The evolution of AEMO-led initiatives is outlined in **Figure 5**, with AEMO's 2020 *Renewable Integration Study*[43] defining the requirements for securely operating the power system at very high instantaneous contributions of IBR, followed by the 2021 *NEM Engineering Framework Initial Roadmap*[44] that used a future-back approach to review present day capabilities against a set of future operational conditions, identifying over 300 potential gaps. The 2022 *Engineering Roadmap to 100% Renewables*[45] reviewed these gaps, further establishing the preconditions and actions that must be met to operate the NEM at high renewables, and subsequent annual Priority Actions reports have communicated work done to support this delivery. In 2024, AEMO developed a corresponding *SWIS Engineering Roadmap*[46]. Recognising the opportunity to share learnings

[43] At https://aemo.com.au/energy-systems/major-publications/renewable-integration-study-ris.

[44] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2021/nem-engineering-framework-initial-roadmap.pdf.

[45] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2022/engineering-roadmap-to-100-per-cent-renewables.pdf.

[46] At https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/swis-engineering-roadmap.pdf.

across the major Australian electricity networks and deliver initiatives that benefit both systems, this FY2026 Priority Actions report collectively details activities planned and achieved in the SWIS, in addition to those in the NEM.

1.3.1 The *Transition Plan for System Security*

In December 2024, AEMO published the inaugural edition of the *Transition Plan for System Security*[47] (Transition Plan). This is a new annual reporting obligation under the Improving Security Frameworks for the Energy Transition (ISF) rule change in 2024[48] that requires AEMO to convey its understanding of the power system and how these needs may evolve. The rule change also included several measures to address system security issues efficiently and proactively through the transition.

NER 5.20.8 Publication of the Transition Plan for System Security

(a) AEMO must publish annually by 1 December the Transition Plan for System Security on its website.

(b) The purpose of the Transition Plan for System Security is to make available to Market Participants and other interested persons an analysis of:

(1) how AEMO is planning to maintain power system security through the transition to a low- or zero- emissions power system; and

(2) AEMO's current technical understanding of what is needed to achieve power system security in a low- or zero-emissions power system and the work AEMO is undertaking to improve this understanding and to specify the range of services that will be required in a low- or zero-emissions power system.

The Transition Plan represents a new vessel for delivery and communication on progress made to enable the energy transition and provides a structured planning approach to prepare the power system for key transition points across three planning horizons spanning operational, transitional, and planning timeframes.

Also introduced by the ISF Rule change as National Electricity Rules (NER) 3.11.11, Type 2 Transitional Services provide a new mechanism for AEMO to trial and procure innovative system security services that are not currently covered by existing market arrangements. These services are intended to accelerate the demonstration and scalable deployment of new technologies to support secure operation of the power system under future conditions.

AEMO is establishing governance processes to support the prioritisation, procurement, and evaluation of these services and is working to align the reporting and communication of these efforts within the broader context of the Transition Plan.

AEMO recognises the objective of the Transition Plan – to maintain power system security through the transition to a low emissions power system – intersects with the original intention of the Roadmap to *"identify and prioritise the critical engineering actions required to advance operational capability of Australia's largest power systems to securely and reliably operate at times of high renewables contribution"*.

As the energy transition accelerates, AEMO is seeking to streamline communications for stakeholders and is considering a combined approach for Engineering Roadmap, Transition Plan, and system security planning publications in 2026. AEMO intends for a combined, annual system security report to be the primary vehicle for communicating transition readiness in

[47] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/transition-planning/aemo-2024-transition-plan-for-system-security.pdf.

[48] See https://www.aemc.gov.au/rule-changes/improving-security-frameworks-energy-transition.

the NEM, with this report being the final Engineering Roadmap priority actions publication. The most appropriate format for future reporting of SWIS Roadmap activities will depend on the outcomes of the Power System Security and Reliability Standards Review currently under consultation by Energy Policy WA.

Coordinated and collaborative engagement across the entire energy sector is vital to deliver an effective, efficient, and timely transition. AEMO welcomes feedback from any interested stakeholders on its approach and this report to inform development of AEMO efforts. There will be further opportunities to engage with AEMO and inform the content and approach of both the Engineering Roadmap and *Transition Plan for System Security*. Interested parties are encouraged to contact futureenergy@aemo.com.au to register for updates.

2 FY2025 Priority Action Status

2.1 NEM[49]

Table 1 FY2025 NEM completion statements

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_1	Establish roles and responsibilities between AEMO, DNSPs, TNSPs and participants for managing bulk power system security in a high DER future, and associated planning and operational processes.	Assess and progress actions necessary to meet agreed functional requirements in collaboration with DNSPs and TNSPs. Feed into and participate in national reform processes focused on operational roles and responsibilities.	Progress through National CER Roadmap workstream on roles and responsibilities for power system operation. Continued engagement with TNSPs and DNSPs on Transmission and Distribution (T-D) coordination actions necessary to meet functional requirements	COMPLETE: AEMO facilitated the establishment of an agreed concept of operations for CER management between AEMO, DNSPs, and TNSPs. In collaboration with the NSPs and targeted stakeholders, AEMO developed the high-level system design specifications for operating a high CER system, including requirements for the T-D interface, and organisational roles and responsibilities. Through engagement in CER Roadmap workstreams and other policy forums, AEMO identified required policy and regulatory arrangements and ensured these would be established to support the agreed concept of operations. AEMO delivered the high-level design specifications to relevant development team(s) for detailed design and implementation. This work is now being carried through by the National CER Taskforce workstream led by the AEMC, with significant AEMO input, with a consultation paper published early in FY2026[50].
FY25_2	Determine appropriate EV and EVSE technical standards for grid operation.	Establish disturbance ride-through and other performance standards for EV and EVSE to consider opportunities where there may be benefits offered by these devices to bulk power system operation.	Identify requirements, and initiate pathways to incorporate bulk power system needs into international and domestic standards committee discussions for EVs and EVSE.	COMPLETE: AEMO has completed a detailed technical review of international and Australian standards for electric vehicles (EVs) and EV supply equipment (EVSE) to support grid stability and security, with a focus on their ability to support bulk power system stability through disturbance ride-through and other grid-support functions. The review identified key standards—such as ISO 15118, IEC 61851, and AS/NZS 4777.2—and assessed their readiness to enable EVs as interoperable DER. Gaps were identified in certification and compliance pathways as well as implementation and regulatory support. AEMO is working towards mapping the Standards identified with industry work already underway to ensure that gaps are addressed, and that the operational needs of the Australian power system are met.

[49] As AEMO published the first SWIS Engineering Roadmap report in FY2025, no SWIS-related actions were included in the FY2025 Priority Actions Report. Details of progress during FY2025 is included in Section 1.1

[50] https://consult.dcceew.gov.au/national-cer-roadmap-redefine-roles-m3-p5

Action ID	Activity Name	Description	Committed Output	Completion Statement
				This work will help ensure EVs contribute positively to grid resilience and unlock new value streams for consumers. In FY2026, AEMO will focus on formal standards engagement, support for pilot demonstrations, and development of guidance to inform national adoption and implementation.
FY25_3	Emergency backstop for DPV across NEM mainland regions.	Collaborate with stakeholders to identify options to enable and implement robust and reliable emergency DPV curtailment for all systems to manage system security during times of high DPV penetration in all NEM mainland regions	Pathways in place for emergency backstop mechanisms across all NEM mainland regions, with appropriate measures to ensure effectiveness, including compliance frameworks.	COMPLETE: Emergency backstop mechanisms have been implemented, at varying levels of volume and compliance in SA, VIC and QLD. Pathways are in place for backstop mechanisms to be implemented in NSW and ACT, with engagement progressing in QLD on extending the mechanism to all systems. AEMO continues to collaborate with jurisdictions in QLD, NSW and ACT, providing feedback on lessons learnt and highlighting the importance of timing of implementation along with a focus on planning, technology, execution and compliance. It is expected implementation of emergency backstop will begin in NSW and ACT early 2026.
FY25_4	Governance frameworks for DER compliance with AS/NZS4777 & backstop.	Advocate for establishing strong governance frameworks for assessing and enforcing ongoing compliance of DER inverters to meet technical performance requirements, through the National CER Roadmap. Includes governance of compliance with disturbance ride-through requirements as well as compliance with backstop functions.	Clear pathway in place towards establishing governance frameworks that will deliver enduring solution(s) to DER performance management. Recommendations and next steps (e.g. regulatory change) determined.	COMPLETE: AEMO has engaged in the National CER Roadmap T1 and T2 workstreams to develop nationally consistent standards. This includes providing extensive input on interoperability ecosystem mapping, which will support the next stage of the workstream. AEMO is also preparing analysis and insights on compliance with AS/NZS4777 as well as governance challenges. AEMO has shared insights on the progress being made on emergency backstop compliance through published reports[51] and submissions to jurisdictional consultations on emergency backstop implementation within the National CER Roadmap.
FY25_5	Mechanisms for active CER to be recognised and integrated within	Foundational requirements for enabling: • Visibility, predictability, and controllability of	National CER roadmap reform priorities relating to: roles and responsibilities for power system and market operation and data sharing	COMPLETE: AEMO has collaborated with the AEMC and the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on the M3 and P5 National CER Roadmap workstreams[52] to develop a capability framework for distribution-level power

[51] https://aemo.com.au/-/media/files/initiatives/der/managing-minimum-system-load/supporting-secure-operation-with-high-levels-of-distributed-resources-q4-2024.pdf

[52] https://consult.dcceew.gov.au/national-cer-roadmap-redefine-roles-m3-p5

Action ID	Activity Name	Description	Committed Output	Completion Statement
	power system and market operation.	active CER for power system operation. • Coordination across parties to effectively integrate and respond to active CER participation within market operation through customer relationships. • Industry and market actors to be able to deliver this integration from customer to system and wholesale market.	arrangements to inform planning, enable future markets, and support effective power system operation. Progress Integrating Price Responsive Resources (IPRR) rule change supporting enhanced transparency regarding behaviour of aggregated CER and other currently non-scheduled price responsive resources.	system and market operations, including over 230 use cases and role assignments across planning, operations, and emergency response scenarios. Engaging closely with DNSPs and other stakeholders, AEMO has also progressed development of a national CER data strategy as part of the M2 workstream[53], including creation of a detailed industry capability model and a catalogue of current and future data use cases, identifying key producers, consumers, and data exchange requirements. Draft consultation papers are planned for release in early FY2026. Further, AEMO supported the AEMC throughout the IPRR rule change process, leading to AEMC's final determination in December 2024. Since then, AEMO has progressed rule change implementation[54,55], including publishing a High-Level Implementation Assessment (HLIA) and Voluntary Scheduled Resources (VSR) guidelines.
FY25_6	Participation pathways and incentives encouraging active CER participation.	Establishing frameworks and incentives to encourage uptake of CER responding to market, network, and tariff signals. Examples include: • Aggregated CER participating in the energy market. • DNSP provision of flexible export options for CER customers.	Progress Unlocking CER Benefits for Flexible Trading rule change enabling flexible CER to be identified and managed separately from other 'passive' consumer loads. Progress Integrating Price Responsive Resources rule change enabling aggregated CER participation in central dispatch and scheduling processes and consideration of appropriate incentives. National CER Roadmap national reform priorities relating to enabling	COMPLETE: AEMO actively engaged with the AEMC throughout the Unlocking CER Benefits for Flexible Trading rule change process, leading to the AEMC's final determination in August 2024. Since then, AEMO has progressed rule change implementation[56, 57], including publishing a High-Level Implementation Assessment (HLIA) and consulting on new procedures required to implement the Rule. Progress made on the IPRR rule change is described under FY25_5 above. Further, as part of its contribution to the M1 National CER Roadmap workstream, AEMO has participated in the AEMC's Pricing Review[58] and is represented on the Stakeholder Reference Group. This review is examining how markets and regulatory frameworks can provide the products and services that best match consumer preferences.

[53] https://consult.dcceew.gov.au/national-cer-roadmap-data-sharing-arrangements-m2

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

[55] https://aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/integrating-price-responsive-resources-into-the-nem

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

[57] https://aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/flexible-trading-arrangements

[58] https://www.aemc.gov.au/market-reviews-advice/pricing-review-electricity-pricing-consumer-driven-future

Action ID	Activity Name	Description	Committed Output	Completion Statement
		• Arrangements for community batteries and managed EV charging.	new market offers and tariff structures to extract greater benefits from CER, accelerating DNSP implementation of flexible export arrangements and consumer access to information to empower informed decision making.	AEMO also supported DNSP implementation of flexible export arrangements, with engagement via forums and submissions informing the AER's final export limit guidance note[59] released in October 2024.
FY25_7	Trial the integration of dynamic operating envelopes (DOE) into the NEM dispatch engine (NEMDE).	Investigate integration of SA Power Network's Flexible Exports implementation with NEMDE, utilising DOE capability within transmission-level constraints.	Pilot feasibility outline completed for processes and systems to integrate DOEs into AEMO scheduling for South Australia.	COMPLETE: The pilot feasibility work plan outline has been developed as part of the proposal for the Operations Technology Program, uplifting AEMO systems capabilities for automated management of DER scheduling. This includes integration of dynamic operating envelopes (DOE) into the NEM dispatch engine (NEMDE). The proposed scope includes for the investigation of SA Power Network's (SAPN) Flexible Exports implementation with NEMDE and the utilisation of DOE capability within transmission-level constraints. The proposal to launch this work as part of the Operations Technology Program will facilitate AEMO to trial the integration of DOE into NEMDE, with planning beginning in FY2026.
FY25_8	Integrate DER & load models into AEMO systems.	Integrate DER & Load models into AEMO operational systems so they can be used consistently & robustly for operational studies.	Support DER and load models to provide improved accuracy and data in the AEMO Modelling Platform (AMP). Established capabilities, for AEMO to assess future network conditions, and identify remedial actions.	COMPLETE: AEMO has completed the integration of DPV and load models into AEMO's operational systems, facilitating consistent and robust use for operational studies. These models are now integrated within the AEMO Modelling Platform (AMP), enabling assessments of network conditions and the identification of remedial actions. Operational teams are now embedding the use of these models into their business-as-usual responsibilities. A wider range of power system studies now can accurately factor in the dynamic responses of DPV and load models in high PV periods, yielding results that more closely align with real-world power system disturbances.
FY25_9	Improve post event data collection for DER - device level data & high-speed data.	Identify sources of DER device level active/reactive power datasets, and suitable high-speed data from distribution levels, for disturbance analysis, incident	Pilot feasibility outline completed for provision of DER device-level active and reactive power datasets and high-speed datasets for disturbance analysis.	COMPLETE: A pilot feasibility work plan has been developed as part of the Operations Technology Program proposal, for the improvement of post-event data collection for DER device-level data and highspeed data. The pilot feasibility work plan identifies a need for uplift of sources for DER device-level active and reactive power datasets, and suitable highspeed data from distribution levels. The datasets are intended for disturbance analysis, incident review, and integration into AEMO analysis tools.

[59] https://www.aer.gov.au/news/articles/communications/aer-releases-final-export-limit-guidance-note

Action ID	Activity Name	Description	Committed Output	Completion Statement
		review & AEMO analysis tools.		Launching this work as part of the Operations Technology Program will allow AEMO to move into planning and delivery to improve post-event data collection for DER in FY2026.
FY25_10	Assessment and short-term rectification of DER compliance with AS/NZS4777.	Uplift of tools and datasets for monitoring and reporting of DER compliance with AS/NZS4777 to i) reduce uncertainty associated with times of high DER penetration; and ii) reduce operating margin required. Collaborate with stakeholders to improve compliance under present frameworks as much as possible in the near term.	Regularly updated DER compliance data, streamlined tools & processes. Improved compliance with AS/NZS4777 ride-through requirements.	COMPLETE: AEMO has successfully completed the assessment of DER compliance with AS/NZS 4777 "Grid connection of energy systems via inverters". Assessment was performed by engaging over 10 Original Equipment Manufacturers (OEMs) to collect detailed data on compliance during installations. The findings on inverter performance are scheduled to be published in mid-2025. Actionable recommendations have been shared to stakeholders, driving improvements in adherence to AS/NZS 4777 and enhancing ride-through performance. Additionally, efforts to lower disconnection rates during disturbances achieved significant results, contributing to improved grid stability and system reliability.
FY25_11	Compliance with AS/NZS4777 - coordinate DNSP uplift.	Coordinate with the Energy Networks Association (ENA) and DNSPs to implement consistent best practice approaches and work programs to monitor and improve compliance with AS/NZS4777 to necessary levels.	Effective & consistent DNSP practices implemented for managing AS/NZS4777 compliance is commenced. Establish compliance monitoring framework.	COMPLETE: AEMO has engaged with DNSPs to identify and progress pathways to uplift compliance monitoring and rectification capabilities. AEMO has also continued to analyse post-event data to validate response of DPV to disturbances, with particular focus on 30-200kW systems, which appear to have a higher rate of disconnection. Previous work in this area has been detailed in two key reports[60, 61]; a further update has been drafted, showing that compliance for newly installed systems now exceeds 90%, meeting AEMO's target. Focus has now shifted to the regulatory framework via the National CER Roadmap, to ensure that compliance remains high. AEMO is currently drafting learnings for regulators and policymakers, which identify the best practice approach and future objectives.
FY25_12	Apply Power System Simulator for Engineering (PSSE) DER	Integrate the latest dynamic DER and load models into studies informing operational limits advice and FCAS	Updated operational limits advice and established processes for ongoing update. Support for TNSPs in doing the same.	COMPLETE: AEMO performed limit analysis and development tasks to integrate the latest dynamic DER and load models into its operational processes. Key achievements include: • Published updated limits advice guides[62], incorporating input from TNSPs.

[60] https://aemo.com.au/-/media/files/initiatives/der/2023/compliance-of-der-with-technical-settings.pdf

[61] https://aemo.com.au/-/media/files/initiatives/der/2023/oem_compliance_report_2023.pdf

[62] https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/congestion-information/2025/limits-advice-guidelines.pdf

Action ID	Activity Name	Description	Committed Output	Completion Statement
	and load models in operational processes.	requirements. Establish processes for ongoing update to reduce required operating margin. Support TNSPs in updating their limits.		• Established systems and procedures to review, verify, and communicate limits advice from TNSPs. • Automated processes with Python, including: – Integrating DER models into PSSE dynamic studies. – Integrating outages and committed projects to AEMO's system normal model. – Processing bulk power system studies for load flow and dynamic simulations, and extracting power system simulation results and data. – Comparing predicted limits with study limits. – Benchmarking limits and identifying reoccurring binding constraints. • Performing limits due diligence, reviewing and updating limits advice, and continually communicating TNSPs. Translated limits into constraint equations for increased line flow, and reduced binding constraint intervals.
FY25_13 *	Operational assessment of system security thresholds under high DPV conditions.	Operational assessment thresholds relating to minimum synchronous generation unit commitment required for system security and managing risk of DPV disconnection during disturbances Assessment of current operational ability to manage the system within these thresholds.	Updated thresholds for all NEM regions across the plausible range of operational conditions. Suitable procedures & operational tools to operate the system with high penetrations of DPV, in regions where thresholds are likely to be crossed.	COMPLETE: AEMO has calculated thresholds across all NEM mainland regions across the range of plausible operational conditions. Adequate procedures and operational tools have been developed to support system operation under high penetrations of DPV in regions where thresholds are expected to be exceeded. The operational procedures and tools required to manage high DPV contributions and minimum system load are documented and accessible for use by AEMO Power System Operations (PSO) controllers.
FY25_14	Improvements to Operational Forecast to integrate backstops and flexible export limits (FELS).	Complete scoping and feasibility study for integrating backstops and flexible export limits into operational forecasts and nowcasts.	A completed summary of findings, strategic options and recommendations for designing, implementing and operating robust systems to facilitate secure inter-operation of DER (including FELS and backstops) by AEMO.	COMPLETE: In consultation with DNSPs, AEMO explored use cases for SA Power Networks' (SAPN) Flexible Export Limits (FELs) data and its compliant backstop capability to improve operational forecasts. An assessment was then made of how this data (both estimated actuals and forecast outcomes) would be used in AEMO's downstream processes. Through engagement with SAPN, currently available FELs data, including FELs that are used for backstop, was identified and documented. This was supplemented by a gap analysis between the current state and desired state as defined by the use case analysis. This informed a strategic roadmap and a list of recommendations for next steps.

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_15	Improve DER Register data quality	Work with DNSPs to improve the quality of data input to the DER Register. Ensure data is fit for purpose following close of small-scale renewable energy scheme (SRES) datasets and add data on DER replacements. May require improvements to governance arrangements.	Improved quality of data in the DER register on new installations and DER replacements.	COMPLETE: AEMO has enhanced the accuracy of DER Register data by improving installed capacity and device related information at the NMI level. This enhancement brings various sources of data by linking data between Market Settlement and Transfer Solutions (MSATS) Standing Data, Clean Energy Regulator SRES, and DER registered data. The enhanced DER Register data supports both short-term and long-term forecasting by improving the accuracy and visibility of DER forecasts. AEMO continues to work with DNSPs to feedback insights to improve the information within their DER Register data.
FY25_16 *	DNSP data on DPV installed at each transmission node.	Collection of DNSP data on aggregate DPV installed at transmission-distribution interface points, and input to AEMO's Energy Management System (EMS).	Updates of EMS data on DPV installed capacity received from DNSPs annually.	COMPLETE: A comprehensive solar PV capacity mapping at the EMS substation level was successfully delivered in June 2025 for all NEM mainland regions. This mapping has significantly improved visibility of DPV at the substation level. This uplift supports the assessment of power system conditions in AEMO's EMS through more accurate modelling on the distribution of DPV.
FY25_17	Transition to fewer synchronous generators (South Australia).	Detailed design of a trial in South Australia where generation and load characteristics enable evaluation of operational needs for operation of a part of the NEM supported mainly by IBR and synchronous condensers.	Full transition plan for trial operation in South Australia, outlining the tests to be performed while under this controlled environment.	PARTIALLY COMPLETE: AEMO has completed analysis to demonstrate that, under certain conditions, the power system may be capable of operating in a secure state using a combination of IBR and synchronous condensers. Following a review of relevant international trials to confirm the value of further live demonstration, AEMO investigated various locations within the NEM to determine whether this concept could be trialled without materially impacting the broader NEM or customers. AEMO identified that the suitable sub-region to conduct the trial is likely to be within the SA region. To progress this work, AEMO has been engaging with relevant stakeholders to design and deliver a controlled system trial on a sub-regional basis. Using a risk management approach, AEMO has developed a conceptual Test Plan that is consistent with AEMO's Inter-Network Testing risk guidelines. Considering the PEC Stage 2 completion timeline, as well as completion of the SA Network Support and Control Ancillary Services (NSCAS) gap contracting in SA, the timing for the prospective field trial was deferred to FY2026. In FY2026, AEMO plans to continue this work by seeking stakeholder endorsement for the trial, including further risk workshops, engagement with relevant stakeholders, identifying specific dates for the trial, and progressing detailed test plan development with relevant

Action ID	Activity Name	Description	Committed Output	Completion Statement
				stakeholders. AEMO is also exploring opportunities to expand the scope of this trial to test novel approaches to system restart in line with the findings from action FY25_21.
FY25_18	Study new forms of stability phenomena at high renewable penetrations.	Targeted stability studies to better understand power system performance during times of high renewable and low synchronous generation.	Technical insights paper to inform the development of future power system performance and stability under high IBR conditions.	COMPLETE: AEMO engaged Monash University to carry out an extensive review of the stability phenomena experienced by international system operators, utilities and researchers to assess whether any gaps exist in AEMO's current approach to stability classification. The report did not identify any material gaps in the stability phenomena that AEMO currently considers while assessing system security with high shares of IBR. Based on this, no further immediate work is required under this activity. The report recommended AEMO continue monitoring international developments related to integration of new large loads such as data centres. While not a new stability phenomenon, one emerging stability question AEMO is looking to examine is how power system damping would change in system conditions with high shares of IBR and large numbers of synchronous condensers.
FY25_19	Study voltage control at high renewable penetrations.	Investigation of voltage control studies for a high IBR NEM. This will consider impacts of IBR voltage control capability in the power system compared to capability of synchronous machines.	Technical insights paper outlining assumptions, methodology and assessment outcomes for voltage control analysis under high IBR conditions.	COMPLETE: AEMO undertook a case study to assess the adequacy of slow and fast dynamic voltage control capability for a power system with high share of variable IBR generation. The analysis was based on the South Australian region given its high share of IBR compared to average demand, and covered a study horizon out to 2029-30. Several worst-case scenarios were studied, including a range of large active power generation changes (ramping) from transmission and distribution connected IBR over five-minute periods. Under most conditions, no issues with dynamic voltage control capabilities were identified. Under one extremely rare condition – when operational demand is low and a contingency event occurs towards the end of a ramping event – there is a risk of post-contingent thermal overload. The assessment outcome was incorporated in the 2024 NSCAS report[63].
FY25_20 *	Emergency controls and overall system resilience.	Assessment of existing and projected UFLS performance and availability, considering impact of increased DPV penetration and BESS installations.	Assessment of UFLS adequacy now and in the future to identify deficiencies and targeted areas for further AEMO study. Initial findings and identification of low-cost options NSPs should take now to enhance UFLS effectiveness in future high DPV scenarios.	COMPLETE: AEMO has prioritised working with NSPs to obtain updated UFLS information for each mainland NEM region, resulting in updated UFLS schedules being established for all mainland regions. The updated schedules allow AEMO to have greater understanding of potential major event impacts due to a timely, accurate picture of UFLS settings; and enables timely progression of the next UFLS review. AEMO has commenced collaboration with NSPs as part of UFLS review, targeted to be completed by Q3 2026.

[63] https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.pdf

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_21 *	System restart standard.	Investigate system restart requirements during periods where large synchronous generators are not available to initiate and/or support the restart process, assess options to meet those requirements using new technology and approaches.	Insights paper detailing system requirements and options assessment, potential for holistic review of System Restart regulatory environment.	COMPLETE: AEMO developed a Technical Advice report[64] on System Restart to inform the Reliability Panel's review of the System Restart Standard (SRS). The report includes an assessment of priority and immediate challenges in the System Restart process, and potential changes to the SRS or broader framework that can help address them, along with forward looking analysis of technical requirements needed when restarting a power system with less thermal generation and higher amounts of IBR. The report also includes the outputs from modelling of potential restart pathways, including with the use of restoration support services in each NEM region for the 2027 procurement round. AEMO will continue working with the Reliability Panel and AEMC to support the SRS review and assessment of the broader system restart framework, and intends to undertake priority technology trials to identify where new technologies could support the restart process.
FY25_22	Monitor and review of frequency control landscape.	Review NEM frequency control performance following implementation of recent reforms and determine any required changes to existing measures in light of anticipated higher IBR conditions. Conduct study to estimate future available primary frequency response (PFR) on the system following decommitment of synchronous generation and replacement with IBR.	Insights paper on performance of current frequency control landscape and potential changes required for future conditions.	COMPLETE: A report on the frequency control landscape has been prepared and will be published 17 July 2025[65]. This report provides technical insights regarding the frequency control landscape as the NEM transitions to future operational conditions. Key insights demonstrate that the current frequency performance is satisfactory and existing NEM frequency control arrangements in place are proving sufficient for AEMO to procure requisite services, and adaptable to new technologies and risks. Maintaining satisfactory frequency performance into the future may require further evolution of existing frequency control arrangements.

[64] https://aemo.com.au/-/media/files/initiatives/engineering-framework/2025/system-restart-technical-advice.pdf

[65] https://aemo.com.au/initiatives/major-programs/engineering-roadmap/engineering-roadmap-execution-reports

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_23	Investigation of synthetic inertial response.	Investigate the ability of GFM inverter BESS to provide synthetic inertial response and thereby displace or reduce requirements for synchronous inertia	Technical insights report on synthetic inertial response and development of AEMO's view of the ability of synthetic inertial response to deliver power system needs.	COMPLETE: AEMO published[66] findings from preliminary analysis to quantify the synthetic inertia of a GFM BESS. The analysis finds that the synthetic inertia of a GFM BESS is variable and dependent on the pre-contingent operating point of the BESS, the size and location of the contingency the BESS is responding to, and the overload capacity of the BESS. The analysis did not propose a direct replacement of synchronous inertia with synthetic inertia. Further work is required to understand the interrelationship and interchangeability between synthetic inertia and synchronous inertia, and the split between synthetic inertia and synchronous inertia required to operate the power system. Building on the preliminary analysis, further assessments identified that the synthetic inertial response from GFM BESS is highly dependent and sensitive to the underlying BESS control system design, and varies across OEMs. AEMO is undertaking additional analysis to quantify synthetic inertia from GFM BESS, seeking to contrast a range of methodologies.
FY25_24 *	Connections tools review.	Review AEMO's power system modelling tools, their interoperability, and processes used to assess new and modified connections to the NEM. The objective is to describe fit for service tools and systems that allow AEMO to continue to efficiently assess connections, to operate the power system securely and to store, manage and secure data efficiently.	Draft report and implementation plan on the preferred tools and systems	COMPLETE: A comprehensive review of AEMO's modelling tools used in generator connection assessments and operation of the electricity grid has been performed by an independent consultant with extensive industry experience. The review included a detailed internal assessment and engagement with multiple international grid operators. A report[67] has been produced detailing short-term (1-2 year) tactical initiatives and long-term (2-4 year) strategic initiatives focused on data and model management.

[66] https://aemo.com.au/-/media/files/initiatives/engineering-framework/2024/quantifying-synthetic-inertia-from-gfm-bess.pdf

[67] https://wa.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/power-system-analysis-tools/power-system-analysis-tools--future-requirements---independent-review.pdf

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_25	Impedance scan based frequency-domain controller design and implementation.	Implementation of a new impedance-scan-based frequency domain controller-design approach to optimise the connection process of IBR. Implementation will validate the potential of impedance scan-based design in the frequency domain to ensure robust control settings which may ultimately reduce issues arising during wide area simulation studies and plant operation.	1. Development of a frequency-domain controller design proof of concept. 2. Engagement with NSPs to understand challenges with frequency domain controller design.	COMPLETE: AEMO has developed a proof-of-concept (PoC) aimed at assessing whether control systems for IBRs can be robustly set using frequency-domain (FD) methods based on impedance-scan techniques. The primary goal of the PoC is to confirm that frequency-scan-based FD tools will allow proponents to tune their IBR controllers in a manner that reduces the risk of stability problems from control system interactions. This will enhance the connection process by introducing a methodical tuning process that reduces the risk of issues being uncovered in wide area Electromagnetic Transient (EMT) studies during the TNSP's full assessment (FA) process and AEMOs' due diligence process. The PoC to-date has shown merit in improving the tuning of IBR controllers using FD methods and is now progressing trials using real projects in the generator connections pipeline with NSPs and project proponents.
FY25_26	Quantification of system strength provision beyond the connection point.	Conduct studies, undertaking modelling and analysis on the quantification of System Strength Services (SSS). Connections developers are requesting the ability to remediate system strength impacts in front of their connection point, which is not currently possible under the System Strength Impact Assessment Guidelines (SSIAG). These studies and analysis will investigate and quantify this provision	Technical note on the provision of system strength in front of the connection point. Consultation undertaken for amendments to the SSIAG.	PARTIALLY COMPLETE: AEMO has completed studies and engaged with NSPs on options for provision of system strength beyond the connection point, to support proposed amendments to the SSIAG. Studies have investigated the feasibility of system strength provision beyond the connection point under certain scenarios, factors influencing the quantification of system strength provision, and indicative grid-forming inverter contributions. Final recommendations from this engagement will inform the updated SSIAG. AEMO will conduct formal consultation with feedback sought from stakeholders and implement agreed changes as appropriate following conclusion of the consultation process.

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_27	Performance of GFM BESS.	Continuation and expansion of the GFM-BESS program which focused on studying the behaviour patterns of GFM-BESS and sharing the learnings with industry to assist in the generator connections process. This includes additional studies for GFM-BESS OEMs not selected in the original program. This will provide the industry with information to assist in overcoming technical challenges in connecting GFM-BESS to the grid.	1. Technical findings report on the studies performed. 2. Stakeholder Reference Group established to share findings. 3. Public Knowledge Sharing Report summarising Grid Forming performance.	COMPLETE: AEMO has continued and expanded its GFM BESS knowledge sharing program through technical assessments of an additional OEM technology, Hitachi (eks) Energy. This builds on earlier work completed with Tesla and Power Electronics. A technical report has been developed outlining key tuning parameters, system strength contributions, and associated trade-offs with Generator Performance Standards (GPS) under the NER. A Stakeholder Reference Group, consisting of AEMO and NSPs, has been established to share insights and support industry understanding to assist proponents in navigating technical challenges when connecting GFM BESS to the grid.
FY25_28 *	Uplift in NEM short-term planning and outage management.	Uplift in short term planning and outage management to facilitate a grid with increasing numbers of new connections so that AEMO's procedures, processes and tools transition as the network evolves.	Review and realign current operational procedures, processes, and tools to capture changes in the network. This may include internal and external procedures. The work will include ongoing uplift to business-as-usual activities that are required to capture changes to the network. This may include new control schemes, incorporating new/changing functionality in current processes/tools, developing new ways of working more efficiently with the NEM Connections teams/commissioning process, updating operational procedures (including reflection of new studies),	COMPLETE: AEMO has successfully identified and initiated additional operational work necessary for the transition to 100% renewables in the NEM. AEMO has performed regular review and updates of operational processes, tools, and procedures to reflect changes in the network and new augmentations, including new terminal stations in Victoria and new control schemes to support the addition of renewable generation. Additionally, AEMO established updated requirements for conducting technical assessments to ensure power system security, and applying these to manage outages of transmission lines and other changes to the network. To adapt to these changes, further operational training has been provided for the electricity control room team members. In parallel, a consultation is being run in relation to the Congestion Information Resource (CIR) Guidelines which is seeking to strengthen the information requirements to extend lead times for outage management information and assessment.

Action ID	Activity Name	Description	Committed Output	Completion Statement
			developments in new renewable energy zones.	
FY25_29	Conduct scoping study for automated compliance monitoring processes.	Uplift of compliance monitoring process to improve efficiency of process with increasing number of generators in system and greater complexity of non-compliance.	Project scope developed to deliver an automated platform and storage system to replace current manual compliance monitoring process.	PARTIALLY COMPLETE: AEMO has completed a preliminary assessment of generator performance standards compliance automation feasibility and developed an outline for a scoping study. This has included research on available commercial products and approaches used by international operators. AEMO continues to review existing non-compliance workflows to improve efficiencies. This work will enable AEMO to pursue opportunities for automation, including adapting its processes to best realise these.
FY25_30	Observation Hub – Improved weather data for Operational Forecasts.	Uplift operational forecasting through partnering with a weather forecast provider to enhance weather modelling capability and situational awareness.	Options analysis developed that examines the costs, benefits, and risks of acquiring, curating and releasing existing and new weather observations to provide enhanced nowcasts (short term forecasts from now until 3-6 hours afterwards) and forecasts for the energy sector. Funding proposal(s) submitted if required.	COMPLETE: An options analysis examined various methods for sharing and utilising weather observation data with relevant entities, such as weather providers. This aimed to understand the benefits this data could bring to improved weather forecasts and thereby enhanced operational forecasts. AEMO continues to collaborate with weather forecast providers to identify potential gaps in the observation network, and assess whether existing energy sector weather data can improve forecasts, or if new weather observation infrastructure is needed. The options analysis also explored the benefits and risks of publicly sharing energy sector weather observation data. The costs estimates have been prepared for establishing an Observation Hub to release existing weather observations, as well as installing and maintaining new weather observation infrastructure. Several funding options have been identified to support these initiatives.
FY25_31	Operator training uplift across industry.	Collaborate with NSPs and participants to develop standardised, industry accredited operator training modules for an increasingly decentralised and renewable power system.	Delivery of Pilot Power systems operator training course (11 courses).	COMPLETE: With industry input, 11 courses were selected to address a diverse range of topics spanning basic and more complex subject matter. Focus was on practical development of content for deployment within a commercial Learning Management System. AEMO engaged RelyOn Australia to develop the courseware modules and collectively worked with industry to review and test the modules. The pilot outcomes have been well-accepted by all stakeholders involved. There is opportunity now to continue module development and strategically release the courseware in consultation with industry.

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_32	Conduct scoping study for RTO renewables scheduling desk.	Develop business case to employ dedicated control room staff to manage efficient scheduling of resources to meet system needs for secure operation of a variable renewable energy (VRE) based power system.	Feasibility study report and plan for next steps.	COMPLETE: A new Principal Engineer role was defined and successfully recruited, as part of the control room staff, to lead the secure operation of a high renewables power system. A dedicated workstream was established to support the control room during the commissioning process, including the development of a new procedure tailored to this function. In addition, existing processes and tools were reviewed and updated to better manage commissioning activities. The Principal Engineer has taken on the role of technical lead and primary point of contact, working closely with the electricity control room during commissioning and inter-network testing.
FY25_33	Future operational transition point identification – key coal stations.	Assess system preparedness for changing operational patterns of key coal power stations in the NEM in the upcoming 5 years, including decommitment, potential outage, and retirement.	Evaluation of operational preparedness and risks associated with changing operations of key coal stations. This will identify critical system configurations, with findings reported in the Transition Plan for System Security and/or other relevant AEMO publications.	COMPLETE: AEMO has considered upcoming retirements of generation and undertaken prioritisation of coal plants for detailed power system studies. In particular, AEMO has explored operational preparedness for Eraring retirement through review of planning documentation and operational readiness risk assessment studies. Studies considered the ability of the power system to meet plausible but low probability boundary conditions that could occur in the year immediately following Eraring retirement (assumed for August 2027). This included coincident high demand, low variable renewable generation conditions, and major transmission and other coal plant outages or decommitments. Findings suggest that in the absence of further action there could at times be challenges to power system operation due to energy adequacy and system security constraints. AEMO is engaging with NSP and government stakeholders to explore risk mitigation options including acceleration of projects already in the pipeline. A risk register was produced that summarises this to help identify actions required in planning for Eraring retirement as a Horizon 1 operational transition point in the 2025 Transition Plan. Early work is underway to apply a similar approach for other forthcoming coal retirements such as Yallourn power station.
FY25_34 *	Develop governance process for system operational transitions.	Develop standardised governance process for identification, preparation and operation of the system through operational transition points such as critical low synchronous	Standardised governance process for the identification of and preparation for operational transition points. This governance approach will be shared with industry stakeholders for feedback.	COMPLETE: AEMO has developed an initial governance process for the application of the transition planning process. The process is designed to ensure that the decision to progress beyond a transition point, and the associated control actions, have been based on robust engineering analysis and subject to a risk assessment process. AEMO is continuing to develop and refine this process and an Operational Transition Point Working Group (OTPWG)[68] has been formed to facilitate TNSP input into the transition point planning process, including the declaration of transition points and associated processes and risk assessments (where relevant).

[68] https://aemo.com.au/-/media/files/stakeholder_consultation/working_groups/other_meetings/nemoc/operational-transition-points-working-group-otpwg-terms-of-reference.pdf

Action ID	Activity Name	Description	Committed Output	Completion Statement
		machine, high IBR configurations.		
FY25_35	Preparing and implementing operational transition points (within South Australia).	Operational transition planning, detailed operations procedures, operational constraints, engagement with NSPs and stakeholders in South Australia.	Processes and procedures are developed and communicated that detail how AEMO intends to securely navigate Operational Transition Points for all operational transition activities related to South Australia.	PARTIALLY COMPLETE: AEMO has completed analysis to demonstrate that, under certain conditions, the South Australian power system may be secure and able to remain in a satisfactory state after a credible contingency event with one synchronous unit in operation. The transition to one synchronous unit occurs concurrently to commissioning of Project EnergyConnect (PEC) phase 1 and contracting of NSCAS. The transition represents a material shift to current operations, and AEMO is still completing due diligence. Implementation of the transition to one synchronous unit may happen Q3 2025 if it is technically and operationally suitable to do so. AEMO has determined the criteria that need to be met to allow operation with fewer than 2 synchronous units. All necessary control room process tools have been updated, with the exception of outage management processes which are currently being finalised. The Transition Plan[69], issued on 2nd December 2024, outlines the process AEMO developed to identify and address Operations Transition Points. The initiatives identified for Horizon 1 (operational timeframe) in South Australia cover the transition to one synchronous generator, and the minimum demand transition points. A new MSL framework has been developed to address system security concerns during periods of minimum system load, including at times when South Australia is at risk of islanding, or already islanded (when a portion of the system is disconnected from the rest of the network and operates separately).
FY25_36	Preparing and implementing operational transition points (outside South Australia).	Operational transition planning, detailed operations procedures, operational constraints, engagement with NSPs and stakeholders (outside South Australia).	Processes and procedures are developed and communicated that detail how AEMO intends to securely navigate Operational Transition Points for all other operational transition activities (outside South Australia).	COMPLETE: The Transition Plan[70], issued on 2nd December 2024, outlines the process AEMO developed to identify and navigate through the Operations Transition Points. The initiatives identified for Horizon 1 (operational timeframe) cover the minimum demand transition points and the retirement of coal units. For minimum demand in Victoria, a new MSL framework has been developed to address system security concerns during periods of minimum system load.

[69] https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/transition-planning/aemo-2024-transition-plan-for-system-security.pdf

[70] https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/transition-planning/aemo-2024-transition-plan-for-system-security.pdf

Action ID	Activity Name	Description	Committed Output	Completion Statement
FY25_37	Implement screening studies of future system operational transition points.	Identify upcoming operational transition points in the NEM by undertaking screening studies to identify potential operational readiness risks.	Screening study outcomes of future operational transition points are reported in the Transition Plan and/or other relevant AEMO publications.	COMPLETE: AEMO has received expert advice based on engineering judgement on potential operational transition points for the NEM across the next 2-5 years where enhanced operational readiness activities may be required to manage the identified transition points: • Retirement of Eraring and Yallourn Power stations • Development of Central-West Orana (CWO) and Southern Queensland (SQLD) Renewable Energy Zones (REZs) • Widespread deployment of system strength solutions • Widespread BESS deployment providing fast frequency response (FFR) and FCAS across the NEM • Operation of single NEM regions without synchronous generation. Further detailed studies are now underway to identify operational risks associated with retirement of Yallourn and entry of new REZs, including analysis of the impact of and influence on network constraints resulting from these transition points. Findings from this work will be incorporated into the 2025 Transition Plan.

***** Please be advised that the design of some actions have changed since their initial definition. The initial activity comments made can be found in the FY2025 Priority Actions report.

3 Priority Engineering Roadmap actions for FY2026

3.1 Horizon 1

ID	Activity name	Description	Proposed outputs for FY2026	Scope
FY26_01	PV Non-Scheduled Generator (PVNSG) generation forecasting.	Development of Proof of Concept (PoC) generation forecasting model for 100 kW to 30 MW PVNSG installations, using the same spatial and temporal resolution as AEMO's Distributed Renewable Energy Forecasting System (DREFS), and using existing or easily obtainable data sources. This includes addressing (or identifying options to address) the current issues with managing distribution constraints for distribution connected PVNSG and semi-scheduled generation.	Proof of concept of PVNSG generation forecasting model, including data streams, established on AEMO's data science platform. Productionising is proposed as part of stage 2 of Project Fusion.	NEM delivery with SWIS relevance
FY26_02	Uplift capabilities to enable real time visibility of load allocation to the Under Frequency Load Shedding (UFLS) scheme.	Establish pathway for AEMO real time visibility of load on UFLS relays and update schedules and procedures to manage dynamic capability.	Progress uplift on AEMO's UFLS monitoring systems so that it is capable of displaying real time visibility across all mainland NEM regions, where facilitated by NSP inputs.	NEM delivery with SWIS relevance
FY26_03	Uplift in NEM short-term planning and outage management.	Uplift in short-term planning and outage management to facilitate a grid with increasing numbers of new connections so that AEMO's procedures, processes and tools transition as the network evolves.	Development and implementation of a regular review process to review and ensure procedures / processes / tools are kept fit for purpose as changes occur across the NEM network. Updates to control scheme, regional and outage management procedures. Technical input into development of renewable energy zones. Adjustments to operational tools and processes. Finalisation of Congestion Information Resource (CIR) Guidelines consultation.	NEM only

ID	Activity name	Description	Proposed outputs for FY2026	Scope
FY26_04	Operational System Restart consolidation including treatment of inverter-based resources.	Revision of current System Restart pathways and gap analysis. Note that the pathways are specific to the SWIS and the approach is impacted by the ESM Rules.	Updated System Restart Plan (required under the SWIS Electricity System and Market Rules (ESM Rules)) incorporating both increased speed of restoration and strategies for managing grid-following inverter-based resources.	SWIS delivery with NEM relevance
FY26_05	Review of SWIS Load Contingency Limit.	Expansion of SWIS Frequency control framework to support dynamic optimisation of largest load contingencies as a result of new large batteries in the SWIS.	Revised ESM Procedures for Essential System Service Quantities and Dispatch Algorithm Formulation and operating processes.	SWIS only
FY26_06	Improvements to AEMO Power System Simulator for Engineering (PSSE) dynamic models.	Converting PSSE dynamic models to enable future versions of the PSSE software	Updated PSSE models to newer version. This improvement will save time and efficiency of AEMO operations and future version upgrades.	NEM delivery with SWIS relevance
FY26_07	Review of Rate of Change of Frequency Safe Limit.	Changes to SWIS Frequency Operating Standards to relax the Rate of Change of Frequency Safe Limit.	Technical report to support rule change proposal.	SWIS only
FY26_08	Review of impacts on dispatch from charge state of multiple large batteries.	A study into the incentives and obligations for storage participating in the WEM, to inform revision to assumptions for WEMDE and the SWIS operational intervention protocol, and to identify any risks associated with existing frameworks (including the Reserve Capacity Mechanism) as storage becomes a material quantity of SWIS capacity.	Published report following consultation.	SWIS only
FY26_09	Operator training uplift across industry.	Collaborate with NSPs and participants to develop standardised, industry accredited operator training modules for an increasingly decentralised and renewable power system.	Provide access to and continued development of industry accredited power system operator training framework to support TNSP, DNSP and renewable control room operations.	NEM and SWIS delivery
FY26_10	Horizon 1 transition point planning and analysis.	Identify the system risks related to Horizon 1 transition points in all regions across the NEM and the SWIS and propose possible solutions to mitigate them. This includes the retirement of synchronous generation such as coal or gas, reduction in minimum SWIS demand, significant network augmentations and material connections of grid-	Develop regional transition timelines for Horizon 1, identifying and preparing for transition points and key activities that need to occur, and publish including as part of the Transition Plan or other AEMO reports, with consideration of publicly available information and identification of difficult operational periods.	NEM and SWIS delivery

ID	Activity name	Description	Proposed outputs for FY2026	Scope
		following inverter-based resources such as batteries, wind and solar.		
FY26_11	Pathway to substituting synchronous capability in the SWIS.	Building on learnings from grid-forming inverters and synthetic inertia, identification of any SWIS-specific barriers or impediments, as well as the pathway to resolution, to grid-forming inverters or other capabilities which can substitute for some or all of the range of services provided by synchronous generation such as coal or gas.	Published report following consultation.	SWIS only
FY26_12	Assess requirement and options for improving system strength in priority areas.	Undertake detailed system strength studies (focussing on at-risk areas identified in the 2025 WEM ESOO) to identify requirements and mitigating options. Note the type of mitigations available may vary due to introduction of a system strength regime in the ESM Rules.	Completion of modelling and identification of priority mitigations required.	SWIS only
FY26_13	Improved capabilities to manage minimum system load.	Backstop mechanisms implemented in all NEM mainland regions, with capabilities to test functionality, monitor curtailment capability, validate curtailment delivery, and monitor compliance. Average compliance >50%.	Deliver advice to stakeholders outlining status and gaps with respect to the requirements set out in AEMO's 2024 report, *Supporting secure operations with high levels of distributed resources*[71].	NEM delivery with SWIS relevance
FY26_14	Onboarding of dynamic operating envelope data.	Continuation of FY25_14, continuing the work with South Australia Power Networks (SAPN) to understand and onboard their flexible export limits (FELS) data, while identifying AEMO data they need too (e.g. for Voluntary Scheduled Resources (VSR)). Start working with Energy Queensland (EQL) on Flexible Import Limits.	Collaborate with SAPN to agree a data format for FELs. AEMO will seek to onboard at least one live FELs data stream from a DNSP. This will be collaborated on with the CER Data Exchange Project work where relevant.	NEM delivery with SWIS relevance
FY26_15	System strength beyond connection point	Continuation of FY25_26, focusing on the practical implementation of system strength provision beyond connection point for potential application in NEM projects. The work supports potential amendments to System Strength Impact Assessment Guidelines (SSIAG).	Progress consultation with NSPs and other stakeholders on implementation of system strength provision beyond the connection point. Incorporate recommendations into the SSIAG.	NEM delivery with SWIS relevance

[71] https://aemo.com.au/-/media/files/initiatives/der/managing-minimum-system-load/supporting-secure-operation-with-high-levels-of-distributed-resources-q4-2024.pdf

3.2 Horizon 2

ID	Activity name	Description	Proposed outputs for FY2026	Scope
FY26_16	Horizon 2 transition point planning and analysis.	Assess future system operation related to Horizon 2 transition points and propose possible solutions to mitigate any identified challenges.	Develop regional transition timelines for Horizon 2, identifying potential transition points and key activities that need to occur, and publish in the Transition Plan and other relevant documents.	NEM and SWIS delivery
FY26_17	Coal retirement assessment.	Assess system risks that may eventuate from the retirement of coal-fired power stations across the NEM (e.g. Eraring and Yallourn) and the SWIS (e.g. Collie and Muja D) to inform readiness activities for these upcoming transition points.	Key insights from the assessment will be summarised in the Transition Plan and other relevant reports, highlighting timing, potential system impacts, and actions needed to support secure operation through these transitions.	NEM and SWIS delivery
FY26_18	DER data for power system analysis.	Identify new sources of data to monitor DER response to system disturbances and support system studies of emerging phenomena	Definition of DER data needs for analysis of system disturbances, recommendations for sourcing data, via commercial or regulatory means.	NEM delivery with SWIS relevance
FY26_19	Improve quality of DER standing data.	Improve the completeness and quality of data added to the DER register; source standing data on electric vehicles (EVs) and EV supply equipment (EVSE), and DER management; investigate alternative processes for collection and management of DER standing data.	Analysis of DER register status and gaps, with recommendations for scope of DER register data; provide materials supporting the integration of the NSW installer portal with DER register; recommendations for EV standing data (outside of DER register).	NEM delivery with SWIS relevance
FY26_20	CER/DER management during system restart.	Identify and assess the feasibility of different pathways to achieve a controlled resumption of distributed PV generation during system restart.	Recommendations for preferred pathway(s), developed through engagement with industry and other stakeholders.	NEM and SWIS delivery
FY26_21	Pre-commissioning test plan for GFM-BESS.	Create and trial a standardised hardware-in-the-loop (HIL) pre-commissioning test procedure to validate GFM-BESS functionality prior to grid connection.	Publish a formal "GFM-BESS Pre-Commissioning Procedure" to support efficient project commissioning and ensure compliance with grid-forming criteria.	NEM delivery with SWIS relevance
FY26_22	Frequency scanning trials.	Collaborate with NSPs to conduct trials on active projects in the connections process to evaluate the benefits of using the frequency scanning method for designing and tuning IBR control schemes.	Deliver recommendations and learnings for implementation of the frequency scanning method into the connections process.	NEM delivery with SWIS relevance
FY26_23	Analyse fault current performance from GFM.	Investigate potential for GFM BESS to provide protection quality fault current, including obtaining and analysing fault current data from commissioned GFM BESS to build understanding of their responses during faults.	Determine whether GFM BESS may be suitable for consideration for contributing to minimum levels of system strength, and identify any further work required to prove out this capability.	NEM delivered with SWIS relevance

ID	Activity name	Description	Proposed outputs for FY2026	Scope
FY26_24	Quantifying system strength support from GFM.	Investigate and potentially quantify the role and contribution of GFM IBR and synchronous condensers to support stable operation of GFL IBR.	Determination of the required size and optimal location of GFM needed to support stable operation of GFL IBRs. The outcome will inform the procurement of the amount of GFM IBR to support stable operation of GFL IBRs.	NEM delivery with SWIS relevance
FY26_25	Inverter-based load modelling.	Conduct studies to model the behaviour of inverter-based loads (IBL), including data centres, hydrogen electrolysers and EV chargers. This includes analysing dynamic responses and their impact on grid stability during disturbances.	Develop technical notes and connection guidance for emerging IBL technologies. Share findings with NSPs and the broader industry to inform future grid planning and technical requirements for connection.	NEM delivery with SWIS relevance

3.3 Horizon 3

ID	Activity name	Description	Proposed outputs for FY2026	Scope
FY26_26	Horizon 3 analysis to identify system security issues and future investment requirements.	Identify future power system requirements, risks, and opportunities relating to Horizon 3 transition points, and foundational system security needs with support from emerging technologies.	Guidance for investors and decision-makers published in the Transition Plan, including investigation of emerging technological capabilities and their relative maturity for application in the NEM for future system security.	NEM delivery with SWIS relevance
FY26_27	Investigate 100% IBR power system operation and requirements.	Identify and assess operating conditions where the grid is running with 100% IBR contribution in terms of energy production (synchronous condensers included) and assess stability requirements of such scenarios.	Preliminary analysis of damping trends and needs in a scenario where synchronous condensers are the dominant rotating masses in the power system.	NEM delivery with SWIS relevance
FY26_28	Co-design operational coordination architecture with NSPs.	Co-design operational coordination architecture with NSPs to support capabilities that meet the functional requirements of a high-CER system supporting the uplift required in AEMO and NSP systems and processes for urgent near-term priorities and long-term foundational capabilities for a high-CER system.	Complete Model-Based Systems Engineering (MBSE) assessment and concept of operations report for system architecture required to meet functional requirements for a high-CER system	NEM delivery with SWIS relevance
FY26_29	Early assessment framework – OEM trials.	Partner with OEMs and NSPs to test new products/models through AEMO's Early Assessment Framework (EAF). Collect feedback and refine the assessment approach.	Refined Early Assessment Framework based on OEM and NSP feedback enabling early engagement with innovative technologies seeking grid connection.	NEM delivery with SWIS relevance