

14 November 2025

Anna Collyer
Chair
Australian Energy Market Commission

By online submission

Dear Ms Collyer,

Amendments for the efficient and timely management of system security needs through the energy transition

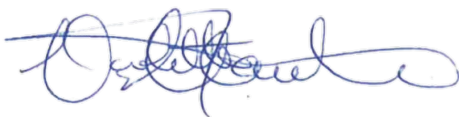
AEMO is requesting the Australian Energy Market Commission (AEMC) amend the National Electricity Rules' (NER) planning and procurement frameworks for system strength and inertia to support the efficient and timely deployment of resources required to meet system security needs over the energy transition.

AEMO acknowledges that significant work has been done to date to establish the planning frameworks, including completion of the first system strength Regulatory Investment Tests for Transmission (RIT-T) and that they are still settling and in the early stages of implementation. Accordingly, this rule change request focuses on options to evolve the frameworks and address the issues observed to date, so they are better positioned and ready for the next planning cycle.

AEMO's focus in making the rule change request is on achieving a range of outcomes that will support the efficient and timely management of system security needs through the transition. The options that AEMO proposes are changes to enable system strength and inertia shortfalls to be declared and managed more effectively and changes to improve planning certainty and timeframes to better align resource entry and exit. AEMO considers that there are a range of options that could achieve the intended outcomes and looks forward to continued collaboration with the AEMC and stakeholders across the energy sector on this rule change.

Please contact Hannah Heath, Group Manager of Strategic Market Reform, at hannah.heath@aemo.com.au should you wish to discuss this proposal.

Yours sincerely,



Violette Mouchaileh
Executive General Manager – Policy and Corporate Affairs

Attachment: *Electricity Rule Change Proposal – Amendments for the efficient and timely management of system security needs through the energy transition*



Electricity Rule Change Request

Efficient and timely management of system security needs through the energy transition

November 2025

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

AEMO is requesting the Australian Energy Market Commission (AEMC) amend the National Electricity Rules' (NER) planning and procurement frameworks for system strength and inertia to support the efficient and timely deployment of resources required to meet system security needs over the energy transition.

To support the National Electricity Market's (NEM) transition of the energy system to away from large synchronous generating units (e.g. coal) to one supplied predominantly by inverter-based resources (e.g. solar, wind, storage), it will be essential for planning frameworks to deliver resources in the appropriate sequence and to be sufficiently flexible to respond to evolving system needs, policy settings and technology capabilities. System strength (i.e. minimum three phase fault levels and stable voltage waveforms), in particular, is a core component of security.

How efficiently the planning frameworks deliver these outcomes has a direct impact on end use consumers. These frameworks are trying to balance between the costs and benefits of multiple dynamics: over vs under investment, early vs late, existing or potential-yet-currently unproven technologies, network owned assets vs competitive services. It is a complicated equation with many moving parts, no clear-cut solution and consumers ultimately left with the consequences of these decisions.

While significant work has been done to date to establish the planning frameworks, including completion of the first system strength Regulatory Investment Tests for Transmission (RIT-T), they are still settling and in the early stages of implementation. Accordingly, this rule change request focuses on options to evolve the frameworks and address the issues observed to date so they are better positioned and ready for the next planning cycle. The aim of this rule change request is to ensure the frameworks facilitate the timely and cost-efficient investment in system security capabilities so that they enable AEMO to operate the power system and markets efficiently, reliability and securely they transition to a predominately renewable energy-based system, and (3) deliver outcomes in both the investment and operational timeframes that are in the long-term interest of consumers.

1.1. Statement of issue

As the system reaches transition points where large synchronous power plants retire, there are a range of technical prerequisites that must be satisfied for AEMO to operate and maintain a reliable and secure power system. These include network projects, generation capacity and resources that provide system strength (i.e. minimum three phase fault current levels and stable voltage waveforms), which must be sequenced and delivered prior to the generator's exit. Importantly, system security and its core system strength components of minimum fault levels and voltage waveform stability are fundamental operating conditions that must always be satisfied. The task for the regulatory frameworks is therefore to (1) ensure investment in sufficient resources happens in advance so they are available when required in operational timeframes to maintain system security, and (2) that these are provided on a cost-effective basis.

The planning frameworks for system strength and inertia in their current form do not provide sufficient time or the flexibility needed to respond to the range of variables that can materially alter system operating conditions through the transition and the resources available to AEMO to keep the system secure. This is caused by the following factors:

1. **Mismatch in exit and entry timeframes:** There is a fundamental mismatch between the relatively short timeframes within which system step changes can become known (e.g. coal exit notice of 3.5 years) and the longer lead times within which approval (approximately three years), procurement and commissioning activities (approximately three to four years) by network service providers and market participants can respond.
2. **Extended investment approval process:** Transmission Network Service Providers (TNSPs) in their roles as System Strength Service Providers and Inertia Service Providers are responsible for meeting whole of network requirements and are subject to RIT-T for any proposed network investment for these requirements. The RIT-T provides an important due diligence process to ensure network investment is economically efficient. The application of the RIT-T, in its current form, to assess system strength investment and procurement requires significant time and resources, which are additional to the long lead times for new resources. This creates challenges for considering short-term security needs independently of long-term needs and delivering these resources in a timely manner in the interests of consumers.
3. **Limitations on early works:** There are limited incentives for TNSPs to undertake early works where new investment is required (mostly for fault current) prior to obtaining funding, which delays investment decisions and commissioning for any new resources.
4. **Constraints on managing shortfalls:** AEMO has limited ability to ensure any identified system strength shortfalls are remediated prior to the time of need.
5. **Investment coordination:** Timing of non-TNSP (e.g. generator) project development and TNSP procurement for system security services can be misaligned, with limited price signals provided to the market for specific system services. This can result in missed opportunities to co-optimize investment for an incoming energy resource to incorporate system service capability in its design.

These are material issues that warrant changes to the NER. There is an asymmetry of risk between over- and under-procurement, and early and late delivery of resources to provide system strength and inertia services. In the short-term, these risks are particularly acute for minimum fault levels required for protection systems. As the transition progresses and the system becomes increasingly reliant on variable renewables (and less able to rely on gas) to meet demand, the risks associated with managing voltage waveform stability will also become more acute.

While over-procurement carries the possibility of consumers bearing additional costs, the risks and costs of under or late procurement are much higher. Potential consequences include unserved load and system black outs. Inadequate resources for system strength can also lead to higher wholesale market costs and emissions and create uncertain conditions for new investment, resulting in worse outcomes for consumers.

Poorly coordinated investment in new resources can also lead to duplicate and inefficient investments (e.g. building a firming gas plant in one location and a separate synchronous condenser at the system strength node close by), resulting in additional delays and costs for consumers. This investment coordination challenge is created by the physical unbundling of services in a mainly inverter-based system and may require more substantive changes to the regulatory frameworks to better enable market led investment.

1.2. Proposed rule

In its current form, the updated security frameworks aim to recognise the asymmetry of risks of over and under procurement through 10-year forecasts and binding requirements three years ahead for

TNSPs. However, the issues discussed in this rule change indicate the framework may not be achieving the right balance between short- and long-term planning outcomes.

Enhancements to the frameworks that accelerate the ability to deliver resources needed for system security, while preserving due diligence and oversight of network expenditure, are required to better manage the risk asymmetry and deliver on the National Electricity Objective. Given the significant body of work to establish the system strength and inertia frameworks, AEMO considers measures that enhance the current frameworks are best suited to address the statement of issue set out above. Outcomes that AEMO seeks to achieve through the proposed rule change process are:

1. Firmer oversight of TNSP planning, with forecast shortfalls able to be declared by AEMO
2. Sufficient time provided for approval, procurement and commissioning to be completed for any new resources required to manage shortfalls
3. TNSPs are incentivised to take earlier action so that resources are committed by time of need, while retaining flexibility to respond to evolving system needs and technology capabilities
4. Greater certainty for the market on when and how much resources are needed, with an overall improvement in the alignment of exit and entry timeframes
5. Regulatory processes for investment and expenditure;
 - a. appropriately assess options to ensure they are in the long-term interests of consumers
 - b. are streamlined and incentivise both network and non-network solutions to (1) enable TNSPs and the market more flexibility to respond to emerging needs, system conditions and technology capability and (2) reduce the likelihood of late delivery of resources.
6. Anticipated shortfalls can be contracted for and resources scheduled in operational timeframes to provide certainty for the market, transparency for the market on the cost of services and reduce the need for use of directions.

A requirement for a rule change request is to include a description of the Rule being proposed to address the identified issue. To meet this requirement, AEMO puts forward the below proposals that could achieve these objectives and address the issues statement above. AEMO acknowledges there may be alternative ways to address these issues and welcomes engagement through the AEMC rule change process to explore and assess all possible enhancements.

1) Changes to enable system strength and inertia shortfalls to be declared and managed more effectively

- a) Amend the definition of 'NSCAS need' in Chapter 10 of the NER:
 - i) in relation to inertia and system strength to remove the requirement for AEMO to have revised the inertia requirements or minimum three phase fault level as a precondition for declaring a Network Support and Control Ancillary Services (NSCAS) gap;
 - ii) in relation to system strength to add all elements of system strength (i.e. both minimum three phase fault level and stable voltage waveform, not just minimum three phase fault level as is currently the case);
- b) Amend the definition of 'NSCAS gap' for system strength and inertia in Chapter 10 of the NER to extend the timeframe under which NSCAS gaps of any type can be declared to match the length of commissioning new resources to meet the identified NSCAS need;

- c) Allow plant that is required to address an NSCAS gap declared by AEMO to undergo a streamlined investment approval process, with access to early works that enables investment and commissioning in long lead items by time of need;

2) Changes to improve planning certainty and timeframes to better align resource entry and exit:

- a) Extend the notice of closure outlook obligations in NER 2.10.1(c2) for relevant exiting plant to five years to align with NSCAS gap declaration timeframes;¹
- b) Extend the timeframe for compliance with the system strength standard specification in NER S5.1.14 and the binding inertia requirements in NER 5.20B.2(g)-(h) from three years to five years;
- c) TNSP procurement for system strength and inertia be subject to a streamlined or alternative process to the RIT-T that would
 - i) appropriately assess procurement and investment options to ensure they are in the long term interests of consumers; and
 - ii) better facilitate timely and efficient investments in both network and non-network solutions that are critical to system security over the course of the energy transition
 - iii) provides more flexibility to respond to evolving system conditions (i.e. levels of inverter based resource connection) and technology capability that is proven at the time of investment decisions.

¹ Note that the intention would be to apply the change to the notice timeframe requirements only and that other provisions in NER2.10.1 may require amendments to limit the application of the clause's other requirements with respect to the extended notice period.

2. Relevant background

2.1. Maintaining system security through the transition is feasible but increasingly complex

Keeping the power system secure through the energy transition is complex. Long- and medium-term planning and procurement, as well as real-time operations, need to anticipate and manage a range of uncertainties and risks, including those that arise from:

- retirement and decommissioning of synchronous plant (including outages and mothballing of aging plant)
- increasing levels of new inverter-based generation and energy-limited storage displacing synchronous generation
- entry and exit of large loads
- delays in generation and network projects
- proliferation of consumer and distributed energy resources (CER/DER), and
- a much wider range of system operating conditions as the ‘norm’ – for example low and high demand extremes occurring frequently.

Currently, the power system is reliant on large-scale synchronous plant to deliver a range of system security services, including fault current, voltage waveform stability, inertia, ramping capability, and system restoration. This reliance poses significant risks of security shortfalls as these plants operate less – for example due to:

- plant retirement and prolonged outages, including through unplanned circumstances such as major plant failure
- economic decommitment or maintenance outages towards end-of-life, and/or
- low operational demand conditions which do not support a plant’s minimum safe operating level.

Inverter-based resources have recently been proven capable of effectively contributing to the provision of some system security services, including inertia and voltage waveform stability. However, other essential system services such as protection quality fault current and system restart capability require further technology development, power system modelling and in-field demonstrations before they can be relied upon – each of which presents uncertain timelines. AEMO recently released four statements of need for Type 2 Transitional Services to test various conditions and capabilities related to inverter-based resources. These are the provision of protection quality fault current from grid forming inverters, black start capability from inverter-based resources, system restart under high DPV conditions and trialling an islanded zone of the network with zero synchronous resources.²

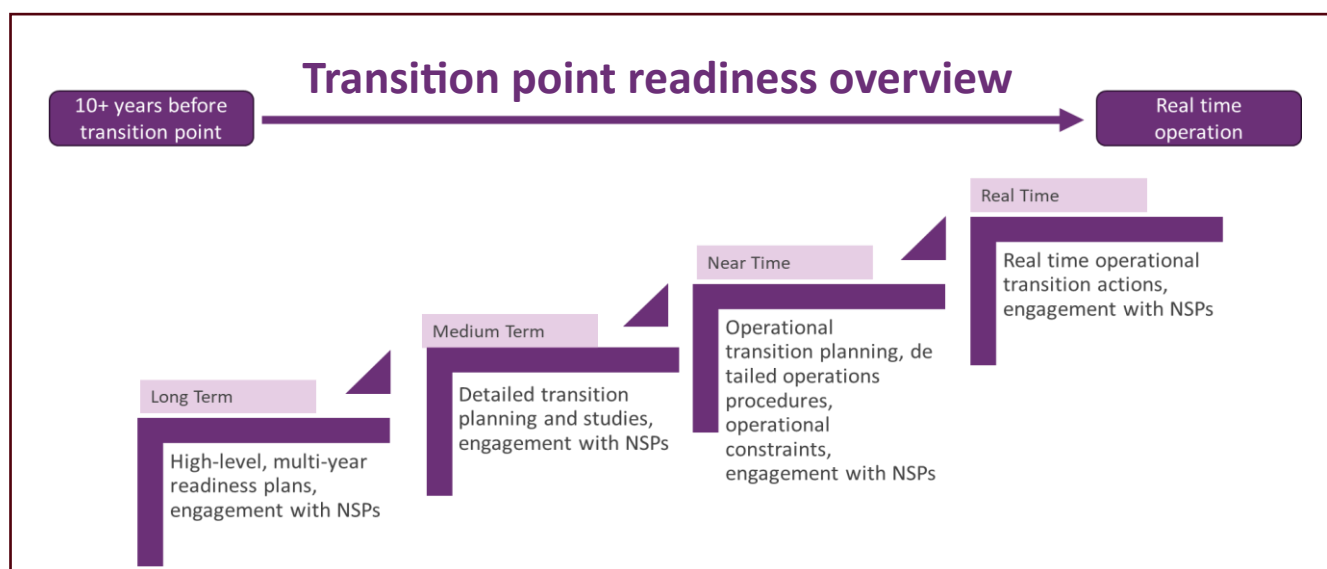
² AEMO is implementing a program of works to support and demonstration, see AEMO, 2025, Engineering Roadmap - FY2026 Priority Actions, available at <https://www.aemo.com.au/initiatives/major-programs/engineering-roadmap>. Statements of need are available at <https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/transition-planning/transitional-services---type-2-services>

2.2. Planning and regulatory frameworks are forward-looking to manage risks

AEMO conducts significant system security planning through its system security reports, the Transition Plan for System Security, and joint planning with TNSPs. The schematic below shows AEMO's approach to planning for 'transition points' - major changes in the availability or operation of assets that the power system relies on for system security or reliability or when its evolution reaches a critical threshold, such as coal plant retirement.

Technical work by AEMO through its Engineering Roadmap, as well as TNSPs, ARENA projects, and others, is a component of system planning as it helps determine how to manage security with a changing technology mix.

Figure 1 Overview of transition point readiness planning approach



The security frameworks have evolved to support the transition and seek to enable more proactive management of system security requirements and recognise risk asymmetry. As part of recent reforms, the AEMC concluded that the long-term interests of consumers are best served by a forward-looking procurement approach that, in the case of system strength, aims to provide:³

1. for the minimum three phase fault current level required for network protection systems to operate; and
2. an 'efficient' level of system strength that provides for voltage waveform stability to support future increases in inverter-based resources.

The **system strength** and **inertia** frameworks were recently updated to require AEMO to forecast needs 10 years in advance, which TNSPs are responsible for meeting either through investing in network solutions or procuring non-network solutions (e.g. service contracts with generators). For compliance purposes, the binding requirement for TNSPs is the third year before each relevant year identified in the forward forecast window (this applies on a rolling basis). The inertia framework also allows AEMO to specify a NEM-wide inertia 'floor' as well as higher inertia needs in regions at risk of islanding. Further, it requires procurement in all regions from 2027 (rather than just where there are

³ AEMC (2024) *Improving security frameworks for the energy transition – Rule determination*

shortfalls). If AEMO revises minimum levels of system strength or inertia upwards within the next three years, it can declare an NSCAS Gap. Any other NSCAS gaps can be declared within a planning horizon of at least 5 years.

The RIT-T process and AER oversight of TNSP expenditure through Contingent Project Applications, Revenue Determinations and efficiency sharing schemes adds accountability, incentives for prudent expenditure and processes to revisit decisions to account for changes in technology costs and capabilities.

2.3. System strength is a critical component of system security and a key enabler for the transition

2.3.1. System strength is a mandatory operating condition

System strength (minimum three phase fault levels and stable voltage waveforms) are fundamental operating conditions that must always be satisfied to keep the system secure. A 'satisfactory operating state' exists where the power system is within prescribed operating limits. A 'secure operating state' exists where the power system will remain satisfactory following a credible contingency.

AEMO is required under the NER to maintain the power system in a secure operating state and must take measures to return the power system to a secure operating state after any credible contingency event or protected event. If the system is no longer secure, actions can include network reconfigurations and de-energising large parts of the network. A failure to maintain the power system in a secure operating state in extreme cases can expose the system to cascading failures and black outs (e.g. the Iberian Peninsula Blackout incident in April 2025).

In some regions, AEMO is managing a power system that is operating close to the minimum synchronous resources required to meet minimum three phase fault levels.⁴

2.3.2. Solutions for system strength are available but come with challenges

Outside of synchronous generators, synchronous condensers are currently the most widespread, technically proven option available to provide protection quality fault current. However, procuring these resources in time for expected retirements is proving challenging. There is increasing global demand for synchronous condensers from a relatively small pool of Original Equipment Manufacturers (OEMs), of which Australian demand, particularly for individual TNSPs, is small. Although TNSPs are moving through procurement processes, lead times of three to four years for synchronous condensers mean there are risks to meeting minimum three phase fault level requirements.

Existing synchronous generators can be retrofitted (e.g. with a clutch) to operate in synchronous condenser mode, but this option can have technical and commercial barriers. For new incoming synchronous generators, the addition of clutches can materially affect project design. Where TNSP procurement cycles do not align with project development cycles, this can result in lost opportunities for more coordinated and efficient investment that meets multiple system needs.

The capability of inverter-based resources to provide minimum protection quality fault current and the operational risks of doing so have not yet been demonstrated and tested with in-field testing. AEMO is seeking to enter Type 2 Transitional Services contracts to test and demonstrate grid forming inverter

⁴ See for example NSW on 5 October 2025 where AEMO made directions for system strength, AEMO Market Notice for 5 October 2025 - Direction - NSW region to Snowy Hydro Limited - MURR2-2 MURRAY2, available at <https://www.aemo.com.au/market-notices?marketNoticeQuery=direction&marketNoticeFacets=>

(GFM) capabilities for system security services in the field, including the provision of protection quality fault current and system restart capability.⁵

2.3.3. TNSPs have completed RIT-Ts for system strength

TNSPs have now completed Project Assessment Conclusion Reports for their first system strength RIT-Ts under the new frameworks. With the exit of coal generation, TNSPs are looking to procure synchronous solutions to meet minimum three phase fault level requirements in the short-term and have planned investment to 2033/34, which accounts for most of the minimum fault level required in the NEM. These investments and procurement decisions include:

- synchronous condensers
- contracts with synchronous generation (opportunities for which are limited due to retirements), and
- some TNSPs and developers are looking to take opportunities to add clutches to new and existing synchronous generation.⁶

To support increasing levels of inverter-based resources (i.e. the efficient level of system strength), TNSP RIT-Ts have tended to make provision for a much greater share of contracting with grid forming inverters to provide for stable voltage waveforms.⁷

⁵ AEMO, 2025, Engineering Roadmap - FY2026 Priority Actions, available at <https://www.aemo.com.au/initiatives/major-programs/engineering-roadmap>. Statements of need are available at <https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/transition-planning/transitional-services---type-2-services>

⁶ The AEMC is currently considering a rule change request from CS Energy to remove registration barriers to converting existing synchronous generators into synchronous condensers. More information can be found on the [project page](#).

⁷ Transgrid, 2025, *Critical grid stabilising batteries to charge NSW energy transition* – available at <https://www.transgrid.com.au/media-publications/news-articles/critical-grid-stabilising-batteries-to-charge-nsw-energy-transition/>

3. Statement of issue

3.1. Balancing risks of over and under procurement to enable the transition

The challenge at the heart of any planning framework is to promote efficient investment by network service providers and market participants by appropriately balancing the risks of over and under procurement. Decisions made today on the procurement of new resources will influence how system strength is provided in the future and may somewhat cement current solutions.

There is a trade-off between investing in resource types and quantities at the time of the prevailing planning decision cycle, versus deferring procurement to later in anticipation of greater certainty regarding needs, available and proven technology capabilities, and least cost options. The former will provide greater certainty of meeting system security needs and establish cornerstone system properties to inform the design of future control systems but may not be the optimal cost outcome. The latter may have more optimal cost outcomes but creates risks of security shortfalls due to insufficient resources being available.⁸

The risks of under procurement for system strength and inertia within the context of the transition are substantial and can obstruct the transition from progressing. Minimum three phase fault levels must be met at all times (otherwise large sections of the system must be constrained or de-energised), so resources must be in place not only before coal plants exit, but through their decommitment, before material changes in operational profiles and even the fleet's end of life in case of unplanned outages or early exits. Likewise, resources providing stable voltage waveforms for inverter-based renewables that are replacing coal plant capacity need to be available prior to the connection of the renewables.

Ensuring consumers are paying for the cost efficient and prudent level of system strength and inertia through the transition means ensuring the required resources for entry and exit conditions are readily available.

3.2. Planning for remaining system strength and inertia needs

The planning frameworks in their current form aim to balance this tension by providing for a 10-year forward planning horizon, with a three year ahead binding requirement. Outcomes from the system strength RIT-Ts indicate portfolio scale investments in synchronous condensers to meet minimum three phase fault levels are the most favourable option. As TNSPs have accounted for the anticipated minimum three phase fault current requirements for the current forward planning window, the frameworks moving forward need to be effective at facilitating timely investment and delivery of resources for:

1. the remaining minimum three phase fault current needs (including any potential changes in operating conditions that change requirements);
2. procurement for the efficient level of system strength (i.e. stable voltage waveforms); and

⁸ Deferring investment decisions may ultimately not be more cost effective after factoring in prolonged coal plant operation and relying on existing synchronous generation to meet system strength needs – see discussion in Section 6 below.

3. any procurement required for binding inertia requirements.

3.3. Issues that require resolution

3.3.1. Mismatch between timeframes for system step changes and response

There is a fundamental mismatch between the relatively short timeframes within which system step changes can occur and the longer lead times within which approval, procurement and commissioning activities can respond. Coal plant exit notice requirements are 3.5 years, but the RIT-T process for system strength has taken more than three years to complete and the delivery and commissioning of new resources can take several more years beyond that.⁹ Enhancements to the framework to address these issues could include:

- **Shorter approval processes/timeframes for procurement** of system strength and inertia that assess cost effectiveness in the interests of consumers, but can agilely secure new resources (including both network and non-network solutions) within the timeframes they are required,
- **Longer notice requirements** for planned exits to provide longer and more certain periods within which to procure replacement resources are required,
- **Access to early works funding** for TNSPs to decrease total lead times (i.e. concurrent action across investment approval and procurement), and
- **Enhanced management of shortfalls** through identification and expedited procurement pathways for remediation action.

3.3.2. Is the RIT-T process suited to supporting rapid investment in a quickly evolving and globally competitive market?

TNSPs are responsible for meeting network requirements for system strength and must satisfy the RIT-T process prior to investing in any plant to meet these requirements.¹⁰ It is important that TNSPs undertake a process to identify the most efficient options to address system strength and inertia requirements. Transparency, accountability and the opportunity to scrutinise expenditure are essential safeguards to ensure costs are prudent for consumers.

However, the RIT-T process, considered as part of the broader regulatory process for transmission investment, does not appear suitable for assessing network and non-network solutions for system security where prompt investment is required or where system conditions can change quickly. There are four considerations, each explored further below:

1. RIT-T timeframes and processes are generally time and resource intensive, particularly for system strength when assessing market benefits and costs through detailed market modelling.
2. The requirement to complete RIT-Ts in their current form and the limited transparency in system strength and inertia service revenue creates challenges for synchronising a TNSP's procurement decision with investment in new plant that could provide multiple services (e.g. clutch fitted gas turbine).

⁹ See for example Transgrid System Strength RIT-T, available at <https://www.transgrid.com.au/projects-innovation/meeting-system-strength-requirements-in-nsw/>, and AEMO Victoria Planning System Strength RIT-T available at <https://www.aemo.com.au/initiatives/major-programs/victorian-system-strength-requirement-regulatory-investment-test-for-transmission>

¹⁰ If planned investment exceeds \$8 million, see <https://www.aer.gov.au/industry/registers/resources/reviews/2024-cost-thresholds-review-regulatory-investment-test>

3. The time and resource intensive process lends itself to considering a whole of network portfolio solution rather than isolating urgent short-term needs/opportunities and considering them concurrently with long term needs.
4. The regulation of network revenue and incentives can provide guardrails for efficient and prudent expenditure.

Regulatory investment timeframes and application

TNSPs have now published Project Assessment Conclusion Reports for their system strength RIT-Ts, which involved a resource and time intensive process to assess a highly complex investment and procurement challenge. Below is a summary of the process and timeframes for the TNSPs to complete the system strength RIT-Ts, which illustrates the challenges the RIT-T in its current form provides for meeting system security needs through a rapidly evolving energy transition and within the context of increasing long lead times for procurement of new resources.

	Transgrid	AVP	Powerlink	Tas Networks
Project Specification Consultation Report (PSCR)	Dec 2022	Jul 2023	Mar 2023	Aug 2023
Project Assessment Draft Report (PADR)	Jun 2024	Apr 2025	Nov 2024	Nov 2024
Project Assessment Conclusions Report (PACR)	Jul 2025 ¹¹	Aug 2025	Jun 2025	Jun 2025

Following the finalisation of the RIT-T, TNSPs also need to submit a contingent project application to the AER that would adjust their revenues to fund investment in system strength. It is uncertain when these processes will conclude and when TNSPs will have certainty of funding under the NER.

Through the RIT-T process, TNSPs are assessing network-wide market benefits, which requires extensive analysis and market modelling to support findings in addition to consultation with the market. This process is also far more complicated for system strength, where granular dispatch outcomes need to be evaluated to quantify contracting requirements and costs,¹² as opposed to evaluating overall outcomes as would occur when assessing a conventional network augmentation project. Contracting costs estimated through the market modelling process are also only indicative based on short run marginal cost and wholesale electricity price outcomes. Payments made to synchronous generators are treated as wealth transfers,¹³ so the assessment of credible options at the time of the RIT-T does not reflect the costs consumers would incur from non-network contracts procured from synchronous generators.

System strength (both minimum three phase fault levels for a secure system and stable voltage waveforms to support renewables to meet government emissions reduction targets under the NEO) are obligations necessary for the system to be kept secure and operating. The primary issue for meeting an obligation with an asymmetric risk profile should not be whether there is a net market benefit, but whether a proposed solution is cost effective for consumers. A simpler assessment process

¹¹ Transgrid's RIT-T is subject to dispute and the AER has extended the timeframes to make a dispute resolution determination given the complexities involved, see <https://www.aer.gov.au/news/articles/communications/aer-receives-dispute-notice-transgrids-meeting-system-strength-requirement-nsw-rit-t>

¹² See for example AEMO Victoria Planning, 2025, *System Strength Study for Victoria: Modelling Report*, available at <https://www.aemo.com.au/initiatives/major-programs/victorian-system-strength-requirement-regulatory-investment-test-for-transmission>

¹³ AER (2024) *Guidance Note: The Efficient Management of System Strength Framework*

that focuses the evaluation of costs and benefits was taken previously for the investment in synchronous condensers in South Australia to meet system strength requirements,¹⁴ and is applied for Reliability Corrective Action RIT-Ts.¹⁵

Aligning procurement and project development cycles

The time intensive nature of completing RIT-Ts means TNSPs as procurers of system strength and inertia will often be out of sync with project development cycles for new incoming resources. Unit prices for system strength nodes that are published by TNSPs for system strength nodes will also not provide the same type of price information that an open market will provide prospective participants. This mutes investment signals by limiting the ability for TNSPs and project developers to capitalise on coordinated investment opportunities for relatively low-cost incremental system service capability during project design, resulting in a smaller pool of resources available to TNSPs to procure non-network solutions.

Approach of TNSPs to undertaking the RIT-T

To manage the costs of undertaking the RIT-T and risks of the RIT-T process, TNSPs have adopted a portfolio approach that considered whole of network needs rather than short-term needs on an iterative basis.

This process does not lend itself to carving out urgent investments or considering procurement options at a high cadence. These can be essential given the asymmetric risk of system security, the eroding system strength headroom under which the energy system is operating and the system's rapidly evolving needs. The effect has been to defer investment decisions while the system approaches hard deadlines to replace minimum fault levels for exiting coal plant. Looking forward, the risk is that this outcome is repeated for:

1. minimum three phase fault levels for planned coal exits from 2033/34 onwards, and/or
2. stable voltage waveforms for increasing levels of inverter-based renewables that compromises either reliability or emission reductions targets

The application of the broader economic regulatory framework and incentives

The RIT-T is one part of the broader economic regulatory framework for investment in network infrastructure. Other aspects of this framework include 5-year revenue determinations, contingent project assessments, and incentive schemes such as the Capital Expenditure Sharing Scheme (CESS) and the Efficiency Benefit Sharing Scheme (EBSS).

The regulatory investment test is intended to facilitate investment through an assessment of the economic efficiency of proposed investment options. However, other aspects of the economic regulatory framework also check for prudent expenditure and create incentives to pursue efficiency improvements to the benefit of both TNSPs and network users. For example:

- Regardless as to whether a RIT-T is completed, the efficiency of forecast expenditure is still considered in the context of the AER's revenue determinations and/or in the assessment of contingent project applications.

¹⁴ AER, 2019, Final Decision – ElectraNet Contingent Project Main Grid System Strength, available at <https://www.aer.gov.au/news/articles/news-releases/aer-approves-electranet-spending-south-australia-system-strength>

¹⁵ NER 5.15A.1(c)

- Under the CESS, TNSPs are allowed to retain a proportion of underspends against their expenditure forecasts creating an ex-ante incentive for TNSPs to invest efficiently during a regulatory control period.¹⁶
- The AER can undertake ex-post assessments of capital expenditure overspends.¹⁷

If a streamlined or alternative process to the RIT-T can identify the most credible and cost-effective option, the other components of the economic regulatory framework can function to incentivise efficient and prudent expenditure.

3.3.3. Access to early works funding

There are limited incentives for TNSPs and potential service providers to undertake early works costs or commit capital to additional system strength capability prior to receiving funding. TNSPs are limited in their ability to recover early works costs for significant capital expenditure and typically wait until the AER has determined funding via a contingent project decision before committing to significant works.

However, long lead times and international competition for resources such as synchronous condensers require significant upfront deposits to secure places in the procurement queue. These costs are in addition to typical early works costs for siting new resources. Through the system strength RIT-Ts, AEMO has observed a reluctance from TNSPs to initiate early works due to uncertainty regarding cost recovery. This extends timeframes as the delivery of replacement resources follows a sequential process, rather than concurrent workstreams.

3.3.4. Identifying and managing shortfalls

In operational timeframes, AEMO can only manage the system with the resources available at the time. From 2 December 2025, AEMO will be responsible for enabling system strength and inertia contracts under its scheduling functions, as well as other NSCAS and transitional services contracts at its discretion.¹⁸ AEMO's operational enablement of these services will be guided by principles specified in the rules, including that contracts should:¹⁹

- Be enabled to meet power system security requirements at the lowest cost;
- Be enabled as close to real-time as practicable but not more than 12 hours ahead of time;
- Only be enabled to meet operational security gaps; and
- Only be enabled to maintain the stable voltage waveform and host the projected level of IBR in circumstances where enabling those contracts would not result in a significant adverse effect on emissions or efficiency.

While this new scheduling tool provides AEMO with additional levers to manage system security, it still requires the resources and capabilities to be available in operational timeframes. It is therefore essential for the planning frameworks to deliver any necessary investment to meet minimum system security requirements. If they do not, AEMO will not be able to keep the power system secure without

¹⁶ AER, *Capital Expenditure Incentive Guidelines for Electricity Network Service Providers*, August 2025, p. 2.

¹⁷ AEMC, *Rule determination, National Electricity Amendment (Managing ISP project uncertainty through targeted ex post reviews) Rule 2024*, August 2024.

¹⁸ AEMO Improving Security Frameworks for the Energy Transition project page: <https://www.aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/improving-security-frameworks-for-the-energy-transition>

¹⁹ AEMO Security Enablement Procedures (SO_OP_3720) version 2, 31 August 2025. Available: https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/procedures/so_op_3720-security-enablement-procedure.pdf?rev=382ccee862a045799ccc8a4061c8414e&sc_lang=en

de-energising large parts of the network, because even directions will have limited use if there are not enough resources to call upon.

Under the frameworks, AEMO sets the system strength and inertia requirements and TNSPs are obliged to use reasonable endeavours to make resources or services available to AEMO to meet these requirements. If TNSPs fail to use reasonable endeavours civil penalty provisions apply. AEMO has some procurer of last resort and transitional procurement powers, however these are limited in their ability to have anticipated shortfalls remediated within the time of need. The powers AEMO does have are also intended to contract with existing resources, not facilitate or speed up investment in new resources. For example:

- AEMO's last resort NSCAS procurement powers (which can be used for system strength and inertia) are only activated if there has been a revision in the requirements
- The NSCAS last resort procurement powers for system strength and inertia can only be used for gaps within the next three years (which given the lead times for procuring and commissioning replacement resources is too short to address a shortfall)
- Type 1 Transitional Services exclude procuring system strength and inertia services under the NER and are too short in duration to enable contracting for new resources (they expire in 2029)

4. Proposed rule

4.1. Objectives

To deliver on the National Electricity Objective and bearing in mind the remaining risks of over procurement, AEMO's proposed rules seek to achieve the following:

1. Firmer oversight of TNSP planning, with forecast shortfalls for system strength and inertia able to be declared by AEMO
2. Sufficient time provided for approval, procurement and commissioning to be completed for any new resources required to manage shortfalls
3. TNSPs are incentivised to take earlier action so that resources are committed by time of need, while retaining flexibility to respond to evolving system needs and technology capabilities
4. Greater certainty for the market on when and how much resources are needed, with an overall improvement in the alignment of exit and entry timeframes
5. Regulatory processes for investment and expenditure are;
 - a. appropriately assess options to ensure they are in the long-term interests of consumers
 - b. are streamlined and incentivise both network and non-network solutions to (1) enable TNSPs and the market more flexibility to respond to emerging needs, system conditions and technology capability and (2) reduce the likelihood of late delivery of resources.
6. Anticipated shortfalls can be contracted for and resources scheduled in operational timeframes to provide certainty for the market, transparency for the market on the cost of services and reduce the need for use of directions.

Collectively, these will ensure frameworks are efficient and flexible, and capable of responding to shifting system conditions, while allowing for efficient procurement that is in the long-term interests of consumers.

4.2. Description of the proposed rule

This rule change request proposes the below options to achieve these objectives and address the issues statement above. AEMO acknowledges there may be alternative ways to address these matters and welcomes engagement through the AEMC rule change process.

#	NER provision	Change	Effect
1. Changes to declare and effectively manage shortfalls			
A	Paragraph (b) and (c) in definition of 'NSCAS need' in Chapter 10	Amend definition to remove the requirement for AEMO to have revised the inertia requirements or minimum three phase fault level for a system strength node as a precondition for declaring an NSCAS gap.	Enables AEMO to declare shortfalls (i.e. NSCAS Gap) that require remediation action from TNSPs in circumstances where the forward planning is not expected to deliver the necessary level of resources or within the timeframes required (e.g. unexpected delays in planning/

#	NER provision	Change	Effect
			commissioning or changes to planned coal plant closure dates).
B	Paragraph (c) in definition of 'NSCAS need' in Chapter 10	Amend definition to add all elements of system strength (minimum three phase fault level and stable voltage waveforms), not just minimum three phase fault level as is currently the case.	Ensures AEMO can identify shortfalls and require remediation action for all system strength components. This will be essential to ensure the pace of investment in new generation to achieve sustainability targets under the NEO can be achieved.
C	Definition of 'NSCAS gap' in Chapter 10	Amend the definition to extend the timeframe under which NSCAS gaps of any type (i.e. system strength and inertia) can be declared to timeframes that match the length of commissioning new resources to meet the identified NSCAS Need.	Ensures planning timeframes to address expected shortfalls are long enough to take remediation action and commission any new required resources by the time of need.
D	New provision	Insert new provision that allows plant that is required to address an NSCAS gap declared by AEMO to undergo a streamlined investment approval process, with access to early works funding (if required) that enables investment and commissioning in long lead items by time of need.	Minimises the impact of investment approval and procurement processes on timeframes for replacement resources urgently required for system security and reliability.

2. Changes to improve planning certainty and timeframes

A	2.10.1	Extend the notice of closure outlook obligations for exiting plant to five years. ²⁰	Provides longer time and certainty to the market and TNSPs on when resources are required to meet minimum fault levels (and greater levels of IBR for any associated reliability requirements) and aligns these with commissioning timeframes for replacement resources.
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²⁰ Note that the intention would be to apply the change to the notice timeframe requirements only and that other provisions in NER2.10.1 may require amendments to limit the application of the clause's other requirements with respect to the extended notice period.

#	NER provision	Change	Effect
B	S5.1.14 – Definition of ‘system strength standard specification’	Amend the references to ‘three years’ to ‘five years’.	Provides longer time and certainty to the market and TNSPs on when resources are required to meet system strength requirements.
C	5.20B.2(g)-(h) – Binding inertia requirements	Amend the references in these paragraphs to ‘three years’ to ‘five years’.	Provides longer time and certainty to the market and TNSPs on when resources are required to meet inertia requirements.
D	New provision	TNSP procurement of system strength and inertia services be subject to a streamlined or alternative process to the RIT-T that: (1) provides consumers with assurance that proposed expenditure is cost effective (2) appropriately incentivises both network and non-network solutions (3) provides price signals to the market for services procured.	Provides for an agile approval and procurement process that can: (1) identify cost effective options for consumers; (2) flexibly procure required services in a transparent manner, including provision of price signals for services to the market; (3) incentivise efficient and prudent investment in both network and non-network solutions; and (4) increase the pool of resources available to provide system strength and inertia services.

5. Expected impacts of the proposed changes

The proposed changes aim to provide for greater resilience in the power system so that the change and uncertainty associated with system security can be managed more simply, while ensuring planned investment and procurement is in the long-term interests of consumers.

AEMO's proposed enhancements seek to address the fundamental mismatch between the current timeframes within which system step changes can occur and replacement resources approved, procured and commissioned. This proposal seeks to ensure:

1. There are enough resources available to AEMO in operational timeframes to meet minimum security requirements (i.e. avoid load shedding scenarios and mitigate system black risks).
2. There are enough resources available to ensure the efficient dispatch of available generation today and the pace of investment in new generation is not inhibited by concerns regarding risks of curtailment from system security maintenance.
3. Planned investment and procurement is cost effective and in the long-term interests of consumers.

By addressing this mismatch and enabling the timely and cost-efficient delivery of resources to provide system strength and inertia, the security frameworks can enable the energy transition and support the delivery of the National Electricity Objective. Specifically, the proposal seeks to achieve this by:

1. Providing a longer and more certain lead time for upcoming system step changes that require investment in new resources for system strength and inertia – this will improve planning certainty and provide more time for any necessary replacement resources to be commissioned.
2. Encouraging earlier action by TNSPs – so that resources are more likely to be delivered by time of need.
3. Decreasing the timeframes required to approve investment and procurement for system strength and inertia, while still providing for measures that incentivise efficient and prudent expenditure – this increases the likelihood of resources being delivered by time of need and provides greater ability to adopt emerging and proven technologies under shorter time frames.
4. Positioning AEMO to identify system strength shortfalls and time critical investments and ensuring the responsible entity is empowered and has enough time to facilitate the required new investment – so that sufficient resources are available in operational timeframes to meet system strength requirements.

6. How the proposed rule contributes to the National Electricity Objectives

Before the AEMC can make a change to the NER it must apply the rule making test set out in the NEL. This requires an assessment of whether the proposed rule will, or is likely to, contribute to the national electricity objective (NEO).

Section 7 of the NEL states the NEO is: ... *to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to –*

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

(b) the reliability, safety and security of the national electricity system; and

(c) the achievement of targets set by a participating jurisdiction –

(i) for reducing Australia's greenhouse gas emissions; or

(ii) that are likely to contribute to reducing Australia's greenhouse gas emissions.

AEMO considers that the proposed changes would contribute to the achievement of the NEO in the ways set out in the following sections.

6.1. Improved price outcomes

This rule change request proposes to retain appropriate measures that assess cost effectiveness for planned investment and procurement in the long-term interests of consumers. The additional expected benefits of this rule change proposal are:

- reducing the likelihood of dispatching or directing energy out of merit order to maintain system security
- increasing the competition between network and emerging non-network options
- reducing the reliance on synchronous generators with minimum power generation requirements, thereby reducing risks of Minimum System Load (MSL) interventions such as Type 1 Transitional Services contracts and curtailment of rooftop solar.

To meet minimum three phase fault level requirements, higher cost synchronous plant needs to be dispatched up to the minimum level, with greater levels of renewables only able to be dispatched if there is sufficient and cost-effective stable voltage waveform resources available. Delayed delivery of the appropriate mix and quantity of resources that facilitates the competitive and efficient delivery of system strength and inertia results in costs that manifest through:

1. directions currently and will soon also be reflected in the cost of contracts between TNSPs and synchronous plant scheduled by AEMO under the *Improving security frameworks for the energy transition* (ISF) rule
2. curtailed renewables (including rooftop solar during MSL events) and the associated opportunity cost.

Looking internationally, in the Spanish electricity system, consumers paid an additional EUR 2.059 billion in 2024 for dispatching out of energy merit order, an increase from EUR 1.898 billion in 2023.²¹ Following the Iberian Peninsula blackout, consumers have seen an electricity bill increase of 11% to manage system security risks.²²

In the two years before synchronous condensers were installed in South Australia, to maintain system security consumers paid \$140 million in directions for the operation of four synchronous generators²³ and \$343 million in lost savings from curtailed renewables.²⁴ By contrast, the synchronous condensers procured by ElectraNet came at a net capital cost of \$169.4 million.²⁵

By ensuring sufficient resources are committed and available in the system, consumers will benefit from greater levels of renewables providing energy and the cheaper provision of system strength services than would otherwise be provided by existing thermal synchronous generators.

6.2. Reliability, safety and security of supply of electricity

The proposed rule should substantially mitigate against risks of system failures, risks to the operation of protection systems, risks from MSL events and risks of unserved energy. This would be achieved by:

- reducing the likelihood there are insufficient resources available in operational timeframes for AEMO to meet minimum fault level requirements and maintain system security
- reducing the quantity of synchronous generators with minimum power generation requirements that must be relied on to maintain system strength during MSL events (which reduces the likelihood of MSL events occurring).

In NSW, the system has already required directions to manage system strength due to unplanned coal plant outages,²⁶ illustrating the declining head room available in real time operations for system strength. This headroom will continue to decline following the planned exit of Eraring in 2027, introducing significant risks of de-energising large sections of the network. AEMO has forecasted that following the closure of Eraring, directions or scheduling for system strength purposes will be required for approximately 30% of the time in NSW to maintain minimum fault levels.²⁷ Depending on outage scenarios, there may be approximately three days out of the year in NSW where there will be insufficient resources available in the system to meet minimum fault levels and major interventions such as network reconfigurations or de-energisation would be required:

²¹ Red Elctrica, 2025, *Overview of adjustment services*, available at: <https://www.sistemaelectrico-ree.es/es/informe-del-sistema-electrico/mercados/servicios-ajuste/resumen-servicios-ajuste>

²² CYE Energia, 2025, *Costs of adjustment services: what they are and why they have risen after the blackout*, available at <https://cye-energia.com/costes-servicios-de-ajuste-sistema-electrico/>

²³ The number of synchronous generators required to maintain system security for purposes other than system strength reduced to two following the installation of the synchronous condensers

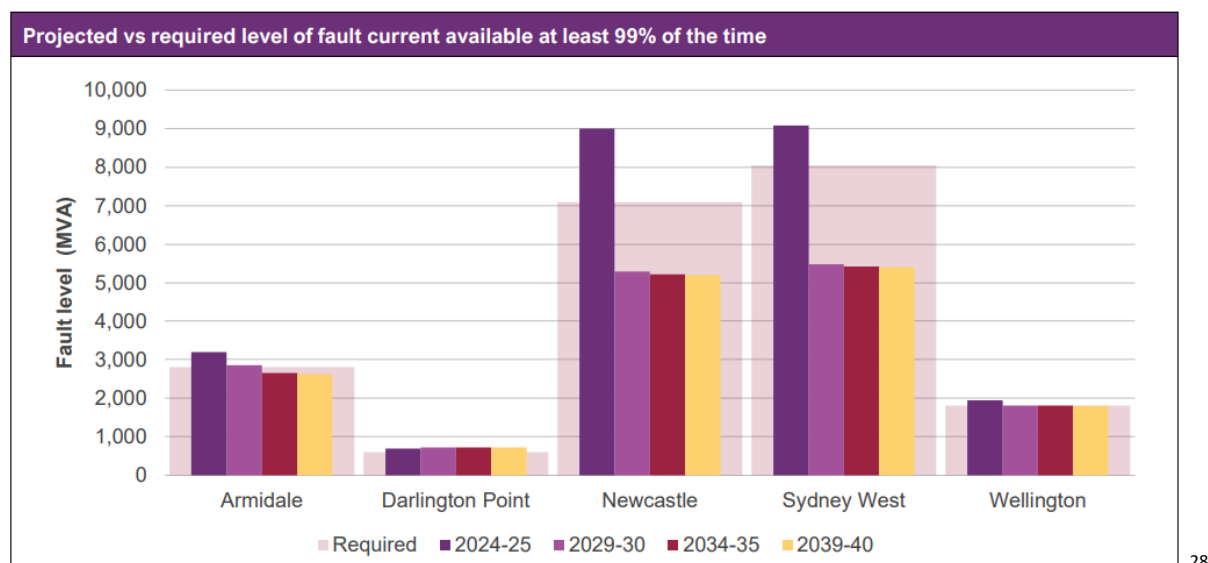
²⁴ AEMO, 2021, *Quarterly Energy Dynamics Q4 2021*, see figures 60 and 63

²⁵ AER, 2019, *Final Decision ElectraNet Contingent Project Main Grid System Strength*, available at <https://www.aer.gov.au/industry/networks/contingent-projects/electranet-main-grid-system-strength-contingent-project>

²⁶ See AEMO Market Notice for 5 October 2025 - Direction - NSW region to Snowy Hydro Limited - MURR2-2 MURRAY2, available at <https://www.aemo.com.au/market-notice?marketNoticeQuery=direction&marketNoticeFacets=>

²⁷ AEMO, 2024, *2024 System Strength Report*, see page 15 available at <https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/system-security-planning>

Figure 2 Projected vs required fault level availability – ISP System Security Appendix 7



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AEMO's forthcoming Transition Plan for System Security, to be published on 1 December 2025, will provide updated metrics of declining security and operability in the NEM and the latest analysis of security risks and readiness for transition points.

6.3. Achieving emissions targets

Until more zero emissions resources for system strength are widely available in the NEM (e.g. synchronous condensers and grid forming inverters), most system strength needs must be met through fossil-fuelled synchronous generators. As with consumer price considerations, meeting system strength requirements will result in dispatch out of merit order from an emissions perspective, which includes curtailment of rooftop solar in MSL conditions. This leads to greater emissions in both real time operations but can also lead to greater emissions overall if coal plant operations are extended beyond planned closure dates.

Using NSW as an example, meeting minimum fault level requirements from coal plant would require approximately 20% of annual wholesale energy generation.²⁹ Considering plant capacity factors, the share of renewables in the wholesale market when relying on coal plant only for minimum fault levels would be unlikely to exceed 65% of annual generation.

Measures that improve the availability of zero emissions system strength resources prior to or before planned coal plant exits will enable both the retirement of coal plant and dispatching greater levels of renewables. This will support achieving government emissions reduction targets under the NEO.

²⁸ AEMO, 2024, ISP Appendix 7. System Security, see page 25 available at <https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp>

²⁹ Applying minimum power generation requirement of 200 MW and 6.97 coal equivalent units for minimum fault level from Transgrid Transfer Limits Advice – System Strength, available at <https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/congestion-information-resource/limits-advice>

7. Expected benefits and costs of the proposed Rule

7.1. Expected benefits

The primary benefit of the proposed changes is increasing the certainty of an efficient level of resources being available to manage power system security in operational timeframes through the transition. As discussed in the previous section, AEMO expects this will benefit consumers through:

- enabling investment in and procurement of emerging proven and cost-effective technologies closer to investment timeframes
- reducing RIT-Ts for bulk solutions that could lock in existing technologies at an opportunity cost
- greater competition in service provision by making the investment and procurement process more accessible and open for market participation
- reduced costs of directions and dispatching out of merit order (i.e. reducing curtailment of zero or low short run marginal cost renewables), while ensuring planned procurement and investment remains efficient and prudent
- reducing the likelihood of unserved energy through corrective action to maintain system security and the risk of black outs arising from system security events.
- enabling the timely exit of coal and greater levels of renewables to reduce the overall emissions intensity of energy in the NEM.

7.2. Expected costs

The expected costs will vary depending on the final changes to achieve the proposed outcomes in this rule change request. If the rules identified in this request by AEMO proceed, AEMO expects the direct costs of implementing them to be minimal as they are variations to existing processes under the frameworks. AEMO and TNSPs already conduct planning activities to identify and address both needs and shortfalls, and TNSPs already conduct economic assessments of costs and benefits associated with investment options. The proposal seeks only to augment the timeframes and administrative obligations for these processes.

Any costs that materialise from the proposal are potential opportunity costs that could arise from over-procurement and/or committing to technologies that become less cost effective over time. However, these are no different to the risks within the current frameworks, which could be more likely to manifest given the long timeframes required to complete RIT-Ts. A more agile and responsive framework that preserves the oversight of TNSP investment to ensure it is efficient and appropriately incentivises both capital and operating expenditure can more effectively manage this risk.