



17 May 2023
The Clean Energy Council
Level 20, 180 Lonsdale Street
Melbourne VIC 3000

Submitted electronically.

Dear Ms Collyer,

Rule change request: Investor certainty in the R1 process

Australia's energy market is in transition. Unprecedented levels of investment in electricity generation and transmission are needed to reduce the carbon intensity of the power system, while continuing to ensure the energy needs of consumers are met.

The Clean Energy Council (CEC) and our members have proposed a number of changes to improve the process of connecting new generation and storage. This is the critical first step to delivering these critical volumes of generation and storage investment.

The CEC and the Australian Energy Market Operator (AEMO) in 2020 jointly commenced the Connection Reform Initiative (CRI), a coordinated whole-of-industry collaboration which examined connection concerns and potential solutions.

After a period of extensive industry consultation on the CRI, including with developers, investors, OEMs, network businesses and AEMO, in December 2021 the CRI published the Roadmap, which set out a series of key recommendations for reform of the connection process.

These recommendations included improvements to drive investment certainty, by clarifying the process and responsibilities for the assessment of a generator's ability to meet its performance standards as a requirement of market registration – known as the R1 process. The CEC continued its collaboration through 2022, and consequently prepared this rule change request.

The rule change request

The CEC requests, under clause 91(1) of the National Electricity Law, that the Australian Energy Market Commission (the "Commission" or "AEMC") to make a rule change to the National Electricity Rules (NER) to clarify the obligations and timeframes for the provision of updated technical models of expected generator performance (often referred to as "R1"), and the assessment of these by Network Service Providers (NSPs) and AEMO, as part of the registration and connection process.

The requested rule change promotes the National Electricity Objective (NEO), with a focus on enhancing investment efficiency and supporting power system security and reliability.

The rule change request is intended to reduce the uncertainty currently associated with the R1 stage of the connection process. This will in turn lower investment costs through reduced risk premiums, which will flow through to lower wholesale prices. Speeding up the connection of new generation will also help manage reliability risks. Finally, clear allocation of responsibility for management of system security and power quality issues, will help identify the most efficient solutions to manage these issues.

We welcome the substantial improvements to the connection processes that AEMO has already made. This includes the work that AEMO has undertaken through the streamlined connection process and ongoing improvements to how it applies the current NER.

We consider this rule change will complement these initiatives through further strengthening the regulatory certainty provided to investors and businesses in addition to improving how risks are managed.

We consider that avoiding unnecessary delays and better risk management in the connection process will be fundamental in facilitating decarbonisation of the power system in a cost-effective and timely manner.

We expect that the proposed amendment to the NEO to include emission reductions will be in place by the time this rule change is considered and made by the AEMC. We consider the rule change is consistent with the achievement of an eventual emissions reduction limb by increasing the speed of the connection process for new renewable generation and storage, accelerating the decarbonisation of the NEM.

The CRI process is considering other related changes to the rules, including potential amendments to the clause 5.3.9 and the process for NSPs to respond to changes to network conditions once the connection process of a generator is completed. If you wish to discuss this rule change request further, please contact Christiaan Zuur.

Yours sincerely

Christiaan Zuur
Director, Market Investment and Grid

Executive Summary

Issue under examination

The Clean Energy Council (CEC) and the Australian Energy Market Operator (AEMO) have been working with network service providers (NSPs) and members of the renewable energy industry on the Connections Reform Initiative (CRI). The objective of the CRI is to address concerns over delays, risk, and the increasing complexity in connections for new generation in the National Electricity Market (NEM).

We have identified that the National Electricity Rules (NER) are currently unclear on the requirements, process steps, and responsibilities associated with assessing and approving the performance of a generator under development in the period between the execution of its connection agreement and market registration. At this stage, applicants for generation must provide a series of models with supporting analytical studies of their expected plant's performance, known as the R1, or R1 package of models.

CEC members have raised concerns around uncertainty in the assessment process for the R1 submission, particularly around how decisions are made and under what timeframes. This has led to generators facing open-ended delays to connection and unmanageable risks. If the NSP and/or AEMO raises issues or concerns regarding the R1 studies, applicants are being required to re-do modelling and potentially having to undertake expensive changes to plant design.

The transparency, specification, and governance of how the NSPs and AEMO consider the R1 application, and reach their decisions, is unclear as it is not set out in the Rules. This uncertainty is leading to risks being borne by generation investors which they cannot manage.

Further, if during the R1 modelling phase, potential security or power quality issues on the power system are identified, the rules do not facilitate the identification of the most cost-efficient solution to resolve them. Often, the connecting generator is required to undertake significant additional new modelling in this period and sometimes to undertake retuning exercises.

Generation applicants caught in this process are effectively required to undertake actions to alleviate changing conditions elsewhere on the power system, which are often outside of their control.

This can also result in suboptimal solutions being developed to address the identified system issue. These solutions - such as lengthy remodelling processes and retuning of the connecting generator's response - can result in delays and therefore significant additional costs for connecting parties, which will ultimately be passed through to customers.

Beyond this, prospective investors in new renewable generation and storage will increase premiums on new investment, to account for these kinds of risks. This will markedly affect the total cost of the transition, over time.

Overall, these issues are leading to increased costs and decreased or delayed investment, which can have impacts for consumers through increased prices and reduced reliability.

This proposal seeks to improve the efficiency, certainty and transparency of process for how new generators are connected to the grid. This will help to ensure that the process works in the interests

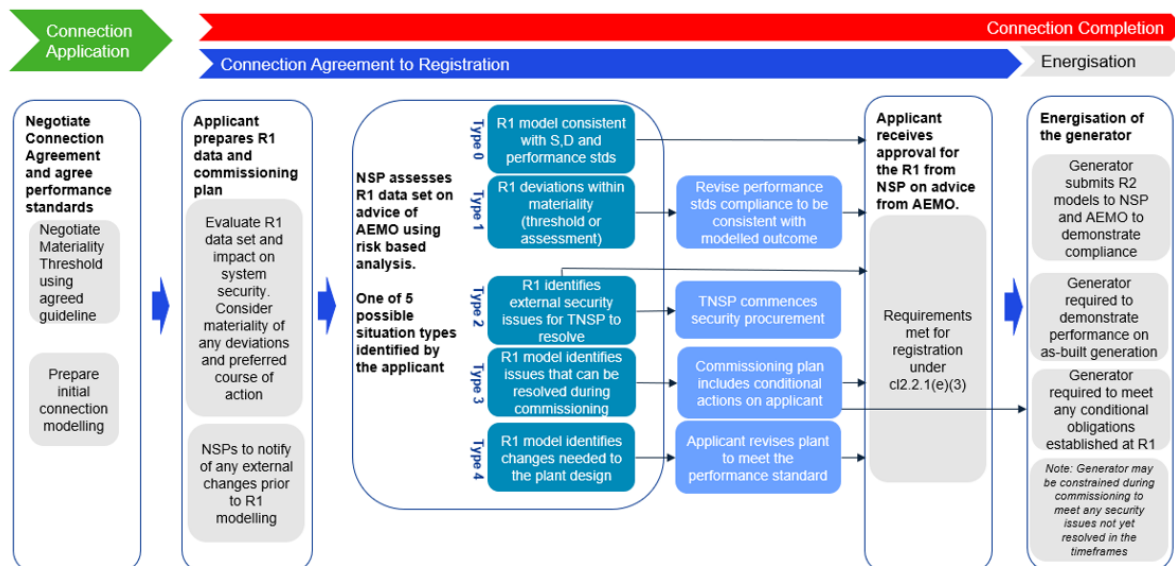
of customers and that the lowest cost solutions can be identified to manage the effects of a changing power system on new connecting generators.

The rule change complements the recent series of initiatives introduced by AEMO to improve the connection processes. We welcome AEMO’s commitment to work collaboratively with industry to resolve issues plus the assistance and transparency provided to developers through the Simulator Tool and Connections Scorecard.

This rule change request builds on the progress already being made, especially improvements made over the last 18 months, and seeks to strengthen the overall process through clarifying and codifying the arrangements to support efficient and secure connections in the interest of customers.

Description of the proposed rule

To resolve the issues identified, we propose the NER be amended to provide clarity across responsibilities, risk allocation and timeframes of approval of a connection applicant’s R1 model and associated studies. As this relates to the latter stages of the connection process, most of the proposed changes would be amendments of Chapter 5 of the NER. An overview of the proposed new process is set out in the diagram below:



The revised rules would confirm that the applicant submits its R1 model and an associated study of the proposed model, to the relevant Network Service Provider (NSP) and AEMO, for review and identification of any material issues requiring resolution prior to registration.

To facilitate the evaluation, the study from the connecting applicant would include information on:

- whether there is a material difference between the R1 modelled performance of the plant, and the negotiated access standard under the connection agreement;
- whether any material difference is due to amendments in project design (or any other on-site issue) *or* due to changes in external circumstances which are outside the influence of the applicant; and
- the level of security impact expected on the system as a whole, and whether the level is likely to be material or not.

It will be the responsibility of the NSP to provide approval of the R1 model, on the advice of AEMO (where relevant), based on the information provided by the applicant. Approval of the R1 model addresses one of the conditions essential for AEMO to register the applicant.

The rule change seeks to provide explicit flexibility in the registration process under Chapter 2, to allow AEMO to proceed with registration without the resolution of all issues, subject to a clear plan for satisfactory resolution of those issues within defined timeframes.

To provide more certainty on governance and process, we are proposing a time limit on AEMO to provide advice to the NSP, and in turn from the NSP to approve the R1 modelling data; plus adding more specification on how NSP makes its assessment.

Further, we are proposing to structure the connecting applicant's self assessment in accordance with five different Types of circumstances based on the R1 modelling, with different action paths to registration. The relevant Type will be proposed by the applicant during the R1 stage, and subsequently agreed or reject by the NSP in consultation with AEMO. The NSP would be required to provide clear and justified reasons to disagree with the applicant's proposed Type self classification, following consultation with AEMO.

The connecting party may self assess its proposal in accordance with the following Types:

- *Type 0: R1 modelling identifies no issues.* Under this type of outcome, the R1 model is consistent with the requirements of the negotiated access standard. The NSP would approve the R1 model, and the applicant's market registration would proceed quickly.
- *Type 1: Applicant has non-material differences from the requirements of the negotiated access standard.* The applicant's technical performance as outlined by the R1 model and associated studies does not strictly meet the negotiated access standards defined in the connection agreement and performance standards, but which is considered to not have material impacts on system security and operability.

The definitions of materiality are identified on a connection by connection basis, assessed in a risk-based manner in accordance with a NER defined Guideline and through negotiations at the connection process stage, or during preparation of the R1 package. This means that the applicant has the options to

- a) define the materiality range during the performance standard setting process under clause 5.3.4A, or
- b) identify non-material issues based on the R1 modelling at this stage of the connection process.

Given the range of different parameters included in a typical set of negotiated access standards, it is possible that applicants may pursue a combination of these two options.

If non-material issues are identified, the applicant is allowed to proceed to registration, with performance at this stage now becoming the performance standards that it must meet going forward. To allow for performance standards being modified in this way will require a change to the current restriction in NER sub-clause 5.3.4A(b)(1A), which requires any amended access standard to be no less onerous than the performance standard previously agreed in the connection agreement – even if there would be no detriment to system security or to consumer in such a relaxation.

- *Type 2: Applicant’s R1 model demonstrates material impacts which are due to changes in external network conditions.* This type applies to where an issue is identified that may pose a material risk to system security and operability, but where this is a result of a **change external to the development of the connecting applicant’s plant**, and which has occurred since the finalisation of the connection agreement under NER clause 5.3.4.

Under a new process developed in this rule change request, the NSP will approve the R1 model and the applicant can proceed to registration. The NSP will then examine options to resolve the issue identified, and to implement the most cost efficient solution.¹ Options could include procuring a non-network solution, such as undertaking a retuning exercise with the connecting applicant. We consider this can build upon the recently made rules relating to managing system strength and ensures a wider selection of options are explored to address such issues resulting in more efficient outcomes for customers.

- *Type 3: R1 model identifies one or more minor issues that can be resolved at a later point in time, such as during hold-point testing or commissioning. Conditional approval to progress to registration is provided.* The NSP and AEMO will have the flexibility to provide conditional approval of the R1 model and the applicant can proceed to registration, conditional on rectification of the identified issue within a defined timeframe. Once connected and registered, the connecting generator will need to meet the pre-arranged conditional obligations within an agreed timeframe (which may extend past commissioning).

Under this process, it would be crucial that a meaningful discipline remain on the connecting applicant to ensure that the rectification required under the conditional approval is in fact undertaken and completed to AEMO and the NSP’s satisfaction. The NER would therefore require a new framework for practical enforcements of conditional approval.

- *Type 4: The assessment demonstrates major issues with the applicant’s plant design that needs to be rectified before it can be registered.* NSPs will need to demonstrate how the applicant’s connection will lead to system security impacts, and why such a system security

¹ Where the NSP is a DNSP, responsibility for the resolving the external power system issue would be allocated to the relevant primary TNSP.

impact is not caused by changes to the external power system, before an R1 can be rejected or the application delayed. Under a Type 4 process, the applicant will need to bring its performance within the materiality threshold, such as by changing its design and/or by renegotiating its performance standards, before its registration can proceed.

In the event of a disagreement between the applicant and the NSP and/or AEMO about the Type to be followed, all parties will be required to work through the issues and negotiate in good faith. To support this outcome, a new facilitated discussion arrangement is proposed. This would be a low-cost, immediate and practical forum to explore and resolve any identified issues in a collaborative spirit. If all parties agree, a third party could be involved to help assist the discussions. If this is not successful in resolving the issue, the applicant still can seek resolution through the existing NER processes for dispute resolution. However, we believe that this discussion forum provides an easier to access process than the formalised dispute processes contained in the NER.

How our rule change request resolves the identified problem

The rule change request will provide a clear and effective framework for demonstrating the technical compliance of connection applicants before they register. The feedback from our members is that under the current arrangements most, if not all, connections applications are implicitly treated similar to a Type 4 process (major issues identified) with limited transparency and understanding on how risks are assessed.

We acknowledge that these processes have improved markedly over the past 18 months, due to the collaborative process of the Connections Reform Initiative. AEMO has also independently established projects to improve its own internal connection processes. These improvements have been welcomed by industry and the CEC, and we will continue to support AEMO as these reforms progress.

While the CRI and AEMO led reforms have been effective, we also consider there is clear benefit in formalising and codifying better R1 processes into the NER. This is critical so that the good work already undertaken through the CRI can be standardised and made transparent to all potential connecting parties.

This standardisation is critical to providing clarity to potential investors. The current NER frameworks provide little to no information about what a connecting applicant can be required to do, or how long a project may be held, at R1. This creates significant uncertainty for investors, who are increasingly concerned that projects they have funded will be materially delayed in completing connection and earning revenue. This in turn is reflected in increased risk premiums from investors, to cover these uncertainties, which ultimately flow through to the costs faced by consumers.

Improving the R1 process in the manner we have proposed will therefore promote the long-term interests of consumers by:

- speeding up the entry of new generators and firming storage, which will reduce wholesale prices through increased competition and lead to improved reliability and security outcomes;
- increasing certainty for investors, which will flow into reduced risk premiums on new investors and, consequently, reduced wholesale prices; and
- reducing the costs of managing wider power system issues, through allowing for the realisation of economies of scale and scope by NSPs to identify lowest costs solutions.

Through these benefits, the revised process would better support the timely transition from fossil

fuel generation to renewable generation and storage, consistent with governmental decarbonisation targets and the achievement of net zero.

Attachment 2 illustrates some of the potential impacts of the revised R1 process set out in the rule change on a number of recent generator connections where issues have been experienced.

Improving the timeliness of connection and entry

The revised R1 process proposed in the rule change will speed up connection timeframes, in particular lowering the risk that connecting generation and storage projects will face lengthy delays as a result of issues identified at the R1 stage.

Instead, the proposed framework will allow for the most efficient solution to such issues to be found, which may involve changing the plant's negotiated access standard, allowing for revisions to plant design post-energisation, or providing for the NSP to procure services from other providers.

This will be achieved through an improved process, featuring clearly specified timeframes, which will drive proportionate solutions to the type of system security issues identified under a defined framework which fosters a common understanding of those issues.

A more timely process will speed up the entry of new generators and storage projects, increasing supply-side competition and consequently placing downward pressure on wholesale prices. The accelerated entry of large volumes of bulk energy generation and firming storage will also lead to improved reliability outcomes and, in the case of storage in particular, has the potential to lead to the increased and earlier provision of system security services.

Removing substantial delays and uncertainty with the connection of this new generation will allow the system to be more resilient to the challenges expected during the energy transition as existing thermal generation exits the system.

Improving certainty for investors

The clearer and improved R1 process set out in the rule change request will provide more detail on who is responsible for decisions, how risks should be evaluated and the timelines to be followed, and these improvements will reduce uncertainty for connecting generators. In turn, this improved certainty will lower investors' cost of capital. For many developers, meeting registration requirements is a key milestone for financing and project timelines. Delays in market registration can result in additional costs and risks for businesses.

The reduced risk premiums for new investments would flow through into reduced wholesale market electricity prices, to the benefit of consumers. The more certain process could further encourage the entry of more Engineering, Procurement and Construction (EPC) contractors and therefore would be likely to increase competition in the construction of generation assets.

Reducing the costs of managing wider power system issues

The rule change will also leverage the advantages offered by having NSPs – and not generation proponents – manage wider power system issues that arise concurrently with the R1 stage of a generator's connection. NSPs have better information on the overall power system and are better placed to identify and implement holistic solutions than individual generators. By having NSPs resolve these broader power system issues, their economies of scale and scope can be leveraged, and lower cost solutions developed to the benefit of electricity consumers.

Under the current framework, connecting generators are effectively providing a service to the wider system, with each individual generator proponent bearing the risk that they may be chosen in response to a wider security issue on behalf of all participants. The rule change does not only remove the risk from the generator proponent, but also allows for greater choice of technical solutions. A generator only has its own assets to respond to a security issue, while the NSP can undertake developments on its own assets, as well as procure services from market participants.

This improved choice allows for more cost-effective and more coordinated system security actions, which will lead to lower priced solutions and, potentially, a more secure power system. Assigning the responsibility for wider power system issues to NSP will also represent a better allocation of costs and risks, which will act to further improve certainty and lower costs for generation developers, with these benefits flowing through to consumers through lower wholesale market prices.

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1 Background

1.1 The Connections Reform is addressing the challenges of connecting an unprecedented amount of renewable generation to the NEM

In early 2020, the Clean Energy Council (CEC) and the Australian Energy Market Operator (AEMO) brought together generators, developers, network service providers (NSPs) and other industry stakeholders to form the Connections Reform Initiative (CRI) to address concerns with the delays and the increasing complexity in connections for new generation in the National Electricity Market (NEM).

The CRI was established as it was recognised the connections framework set out in the National Electricity Rules (NER) must be urgently adapted to the challenges of processing a high volume of connections in an increasingly constrained network.

In the 2022 Integrated System Plan (ISP), AEMO identified the need for over 125 GW of additional renewable energy by 2050 under the most likely *Step Change* scenario.² This represents an unprecedented challenge, which requires input and collaboration from the whole industry and by policy makers. In the next five years, large numbers of thermal generators are scheduled to close, requiring a large amount of new renewable generation and storage to be installed to maintain reliability of supply.

The various working groups that made up the CRI engaged collaboratively to identify issues and test potential solutions from all the different viewpoints of the industry to improve the connection process. The Connections Reform Roadmap (Roadmap) published in December 2021 represented an important milestone, with industry participants working together to categorise issues in the market and provide solutions.

The CRI working groups explored over 100 initial ideas, which were refined and prioritised to develop a list of 11 recommended reforms for either further detailed exploration or direct implementation, as shown in Figure 1 Recommendations of the CRI Reform Roadmap.³

² AEMO, *2022 Integrated Systems Plan*, June 2022, p. 39.

³ Connections Reform Initiative, *Connections Reform Roadmap*, December 2021, p. 21.

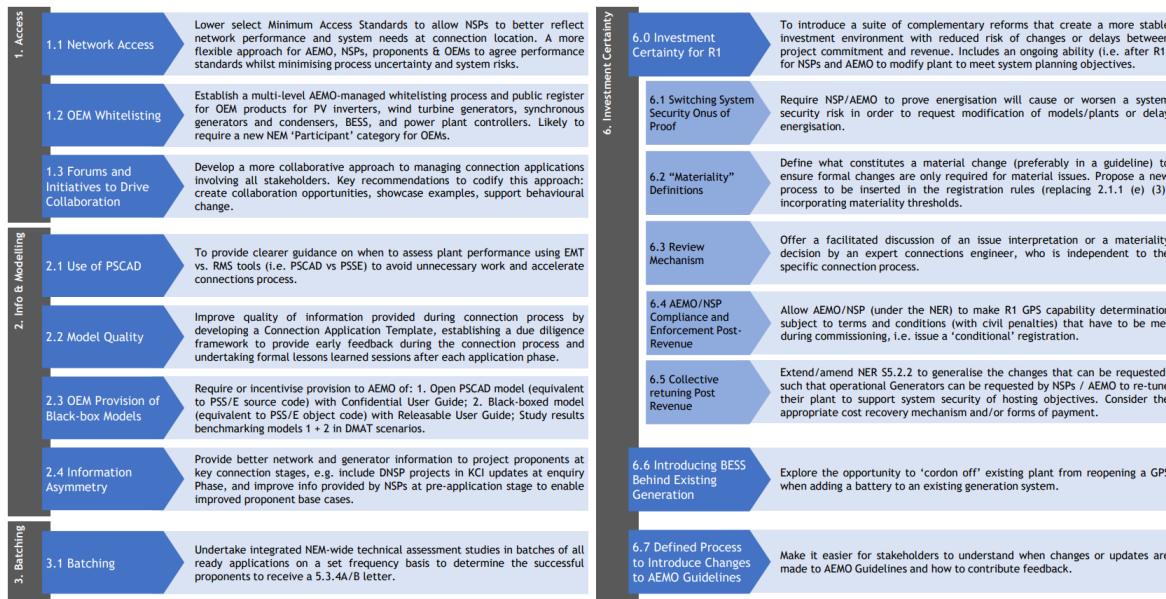


Figure 1 Recommendations of the CRI Reform Roadmap

Phase 3 of the CRI (“Sustaining the Momentum”), which is currently underway, has involved the progression and detailed development of these reforms. Actions of this phase have included the development of this rule change request, which seeks to implement four recommendations related to Investment Certainty for R1 (labelled recommendation 6.1 to 6.4 in Figure 1).

Recommendation 6.5 (labelled as Collective retuning Post Revenue in Figure 1) is still the subject of further development and may be progressed by way of a subsequent, separate rule change request if this is identified as being appropriate. The CEC is currently working with industry and our consultants to assess this issue and associated proposals for change.

1.2 Improving the connection process will improve investor certainty and help to reduce the costs of capital for new generation

Construction of new grid-scale generating systems requires substantial investments in new generation, energy storage and network infrastructure. To ensure the financeability of their projects, generation proponents must commit to contracts that are often worth hundreds of millions of dollars, such as:

- connection agreements with network service providers
- power purchase agreements with customers;
- debt financing agreements with financiers; and
- design and construction contracts.

Each of these contractual obligations have substantial financial implications for investors and developers of new generation. Many begin to bind once ‘final investment decision’ has been reached on a new generation or storage project, which typically happens around the time of connection agreement execution.

Connecting applicants therefore have a strong incentive to move their projects through the remainder of the connection process, to register and commission their asset, so they can commence to earn revenue to meet their contractual obligations.

Generators that are not constructed and connected in a timely manner will not be able to generate and therefore earn revenue. These generators may face significant penalties if they are unable to meet their contracted responsibilities.

Consequently, generator investors require the connections process to be predictable once contracts have been agreed, in order to minimise risk and costs. Reducing uncertainty means reducing the risk there will be material delays in earning revenue. Where these uncertainties can be effectively managed, through clarity around obligations and cost allocations, investors are able to offer finance and supporting contracts with a lower associated risk premium.

Reduced risk premiums for new generation and storage investment reduces the overall cost of building these new assets. Enabling new entrants to connect quickly and predictably therefore reduces the magnitude of investment costs that must be recovered by generators, through wholesale costs.

Of course, it is not acceptable for generation or storage assets to be connected that do not meet overall system requirements for security and operability. Speed of connection and energisation must therefore be balanced with ensuring these critical system criteria are maintained.

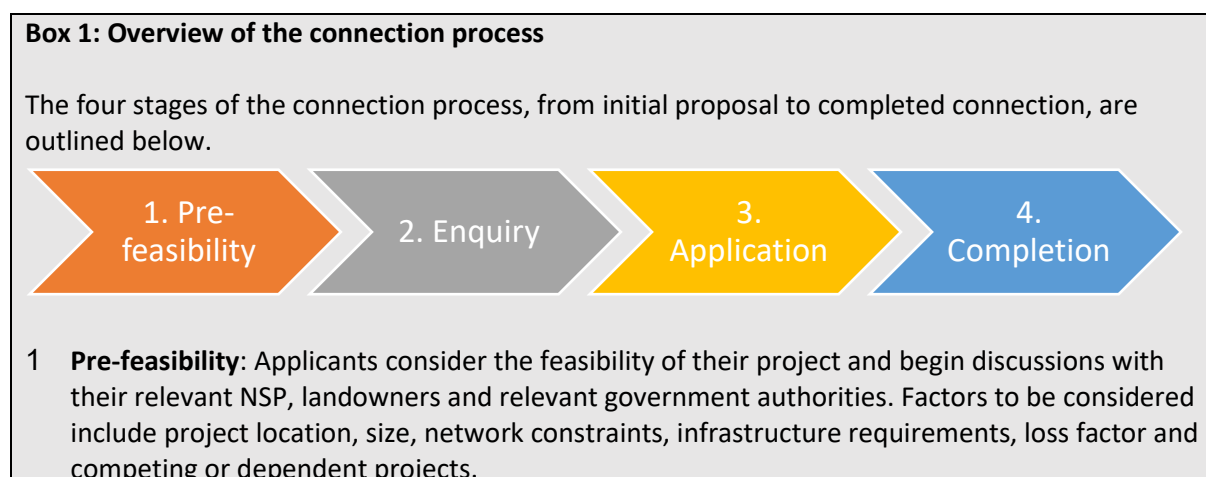
1.3 This rule change request focusses on the registration stage of the connection process

This rule change request relates to the stage of the connection process where the R1 model data package is assessed against the original modelling undertaken in the agreement of the original negotiated access standards. This stage of the connection process occurs once a connection agreement has been executed and negotiated performance standards have been agreed between the connecting applicant and the relevant NSP.

The policy focus of the CEC in proposing this rule change is to improve the connection process for generation and storage. However, we note that the changes proposed will also likely affect new large loads or Market Network Service Providers.

A generator is not permitted to register as a market participant, and therefore generate and export energy to the market, unless AEMO is satisfied that it is capable of meeting or exceeding the relevant performance standards agreed during the connection agreement stage.

The elements of the connection process as it relates to this rule change request is summarised in Box 1, below.



- 2 **Enquiry:** Applicants submit a connection enquiry to their connecting NSP, who responds in relation to:
 - the most suitable point of connection;
 - the information required to be submitted with the connection application; and
 - the scope and estimate of any required connection assets.
- 3 **Application:** Applicants submit an application to connect to the NSP. The technical performance and grid integration requirements are established in this phase. This stage finishes with the NSP (advised on some matters by AEMO) providing the applicant with an offer to connect, and an executed connection agreement, in accordance with clause 5.3.4 of the NER.
- 4 **Completion:** This phase involves market registration and commissioning of the applicant’s plant, overseen by both AEMO and the NSP. The phase seeks to confirm the applicant plant’s ability to meet performance standards specified in the connection agreement and to validate the model information used for planning and operational performance.

The completion stage of the connection process is summarised in more detail in Figure 2. It is defined by two steps that must be undertaken before the applicant’s plant can be fully energised. A key element of this processes is the applicant working through technical models of the expected performance with the NSP and AEMO, known as the “R1” and “R2” models.

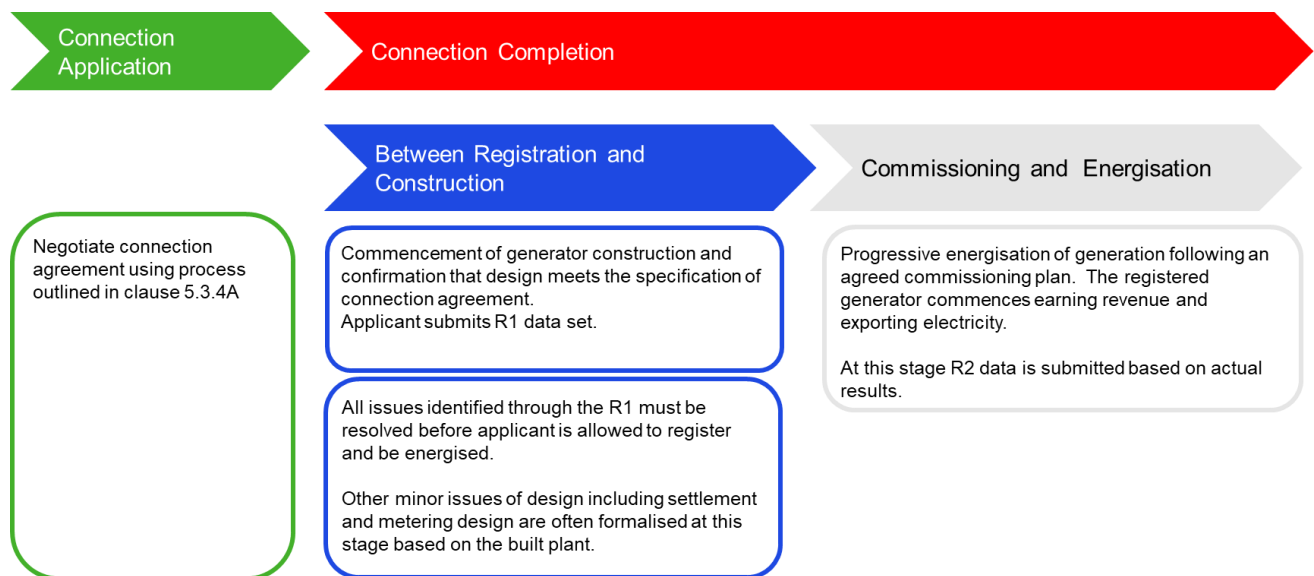


Figure 2: Outline of the completion stage of the connection process

The R1 and R2 models consist of two of four types of data specified in Schedule 5.5.2 of the NER. These are as follows:

- **Preliminary system planning data** is required for submission with the application to connect, to allow the NSP to prepare an offer to connect.⁴ This data is normally limited to the items denoted as Standard Planning Data (**S**) in schedules 5.5.3 to 5.5.5 and a number of specified guidelines.
- **Detailed registered system planning data** is the class of data which will be included in the connection agreement signed by both parties. It consists of the preliminary planning data plus those items denoted in the attached schedules as Detailed Planning Data (**D**).
- **Registered data** consists of data validated and agreed between the two parties, such data being:

⁴ The offer to connect becomes the connection agreement when signed by the connection applicant.

- (a) prior to actual connection, data derived from manufacturers' data, detailed design calculations, works or site tests etc. (R1); and
- (b) after connection, data derived from on-system testing (R2).

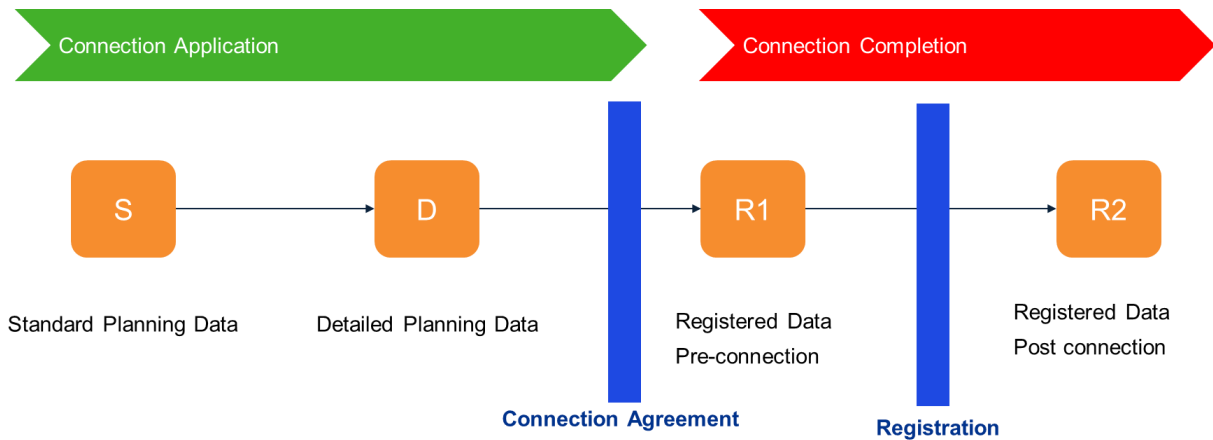


Figure 3: Evolution of data types over the connection process

Figure 3 outlines the data types that applicants prepare and supply over the course of the connection process. As the process is continued, the data and models applicants supply get increasingly more developed as they take in additional information and reflections on the performance of the plant design, as well as the wider network.

A key stage in the connection process comes between Connection application and connection completion – the execution of a connection agreement. At this stage in the connection process, the performance standards are negotiated and finalised, based on the modelling undertaken on the basis of the Detailed Planning Data. Typically, final investment decision (FID) occurs at this stage.

Box 2: Technical obligations of performance standards – the Generator Performance Standards

The performance standards for generators connecting to the power system relate to wide range of technical requirements set out in schedule 5.2 of the NER. They are agreed between the relevant NSP (on the advice of AEMO) and the applicant as part of the process of entering into a connection agreement, under a framework defined under the NER, as follows:⁵

- the performance standards generally form a range for negotiation between the level of a minimum access standard and an automatic access standard;
- for each technical requirement defined by the performance standards, a connection applicant must either:
 - meet the automatic access standard, in which case access will not be denied because of that technical requirement; or
 - propose a negotiated access standard that is at or above the minimum access standard (also, by implication, below the automatic access standard);
- after a negotiated access standard has been proposed, the applicant and the NSP negotiate a level of performance for that technical requirement, with the NSP taking advice from AEMO for access standards that are specified as AEMO advisory matters.⁶ The NSP must reject a proposed negotiated access standard if it considers it would adversely affect power system

⁵ Adapted from: AEMC, *Generator technical performance standards*, Rule determination, 27 September 2018, pp. 1-2.

⁶ The access standards specified in the NER as AEMO advisory matters generally relate to AEMO's system security functions under the National Electricity Law (NEL) and any matters in which AEMO has a role in schedules 5.1a, 5.1, 5.2, 5.3 and 5.3a of the NER. AEMO is not required to provide advice to the NSP for access standards that are not AEMO advisory matters.

security (where advised on this by AEMO on an AEMO advisory matter) or the quality of supply to other network users; and

- equipment that does not at least meet the minimum access standard will be denied access because of that technical requirement.

Once the connecting applicant has an executed connection agreement, the project moves into the next stage of development – registration and commissioning.

The R1 stage is the point of this process where the connecting applicant moves from having early stage, indicative plant and site design, through to the procurement and installation of physical assets and therefore, much more detailed models. Sometimes, the technical performance of these assets as modelled in the later data, may be different from that which had been assumed in the earlier data, and which was used as the basis for the connection agreement and performance standards.

For generation applicants, these differences in apparent plant performance between the R1 models and the D planning data models can mean that a generating system as built would no longer be able to meet all the GPS specified in the connection agreement as based on the original design.

These differences can arise because the connecting generator has made some changes behind the connection point of the generation or storage asset being connected. Changes to reticulation, transformer impedance or other significant changes in balance of plant, can all give rise to these apparent differences in performance.

However, sometimes, performance changes can come about due to changing network conditions, or other requirements which are outside of the control of the applicant. For example, connection of another generating system nearby, or the energisation of a new transmission asset.

Where a connection applicant submits R1 data that is different to the S and D data that was submitted previously (typically because at this stage the connecting applicant will have more certainty around the technical performance of the equipment that will be installed), it is necessary at this stage to ascertain whether it will still be possible to comply with the agreed performance standards.

This is currently done through a three-way discussion between the applicant, the relevant NSP and AEMO. However, the process, including how decisions are made and timeframes, is not clearly defined in the NER.

If AEMO or the NSP consider the previously agreed performance standards may no longer be met, either the applicant will need to modify the equipment it is intending to install to restore compliance with the agreed standards or the performance standards will need to be renegotiated.

However, this is often not a binary decision (with a clear yes or no answer), but rather a call based on engineering judgement which could be influenced by the views of individual staff members responsible for the assessment. Consequently, our members have indicated that having a decision made can take a period of months, with significant uncertainty around how issues are being considered and resolved. Often this has led to significant delays to the ability to bring an otherwise ready generating asset to market, and begin exporting energy to consumers.

1.4 The process for the completion stage of connection is not clearly defined in the rules

The processes for processing connection enquiries and connection applications, toward execution of a connection agreement and the finalisation of performance standards, is clearly set out in the NER.

In contrast, there is very little guidance provided around the process for verifying performance standards compliance in R1, including how decisions are made, by whom they are made and in what timeframe they must be made.⁷

The lack of clear process for the assessments during R1 places a large amount of uncertainty and risks on connection applicants. We understand that this lack of clear guidance on timeframes, technical requirements and obligations has resulted in some connection applicants being caught in a modelling loop, unable to verify compliance without lengthy delays or changes to the plant design. During this period, the process is also subject to the risk of changes to the external power system triggering the need for new modelling and changes in performance capability.

Therefore, one of the primary goals of this rule change request is to establish a clear process for decision-making in relation to R1 and the remainder of the connection finalisation process more generally.

Table 1 sets out the existing steps and obligations of the connection application, R1 and R2 process.

Table 1: Obligations during the existing connection process

	Stage 3: Connection Application	Stage 4: Connection Completion	
		R1 model	R2 model
Purpose of this stage	The applicant and NSP (on advice of AEMO, where relevant) negotiate access standards and agree the technical specification of the connecting plant.	Agreement of a commissioning program to allow the applicant to demonstrate that it can meet the requirements for registration and energisation.	Progressive energisation in accordance with the commissioning program.
Rules Guidance	Set out clear mechanisms for negotiating access and connection obligations. Mainly set out in clause 5.3.4, 5.3.4A and 5.3.4B.	Rules provide guidance that R1 model is required from the applicant, but minimal information on assessment and approval	The requirements of this stage are laid out in the commissioning program, which is negotiated alongside the R1 model.
Role of the applicant	Submit an application to connect which meets the obligations of clause 5.3.4(b). Submit a proposal for negotiated access standard under clause	Submit commissioning plan to NSP and AEMO under clause 5.8.4(a) not less than three months before proposed commissioning.	The generator demonstrates technical capability of plant by following the commissioning program, including commissioning

⁷ We note that the added clarity in the earlier stages of the connection process is not coincidental, but instead a deliberate policy outcome through rule change processes, such as the 2017 *Generator Technical Performance Standards* rule change.

	5.3.4A. Use the process outlined in the NER to then negotiate with the NSP based on this proposal.	For generators, NER S5.2.4 outlines the model information that must be provided at this stage.	tests, as agreed during the R1 stage.
Role of AEMO	Provide advice to NSP on negotiated access standards where relevant. Under clause 5.3.4A(d), AEMO must provide advice within 20 business days.	Within 15 business days, NSP and AEMO must agree or require changes to the commissioning program under clause 5.8.4(c).	Monitor the generator's performance the commissioning plan and provide advice to the generator and the NSP.
Role of NSP	Under 5.3.4A(e), reject or accept negotiated access standards within 30 business days.	For generation, AEMO needs to register the generator provided that, under clause 2.2.1(e)(3), it is satisfied that it will be capable of meeting its performance standards. Time frame for AEMO to make a decision on registration once application is complete is 15 business days (cl2.9.2)	If equipment does not meet requirements, provide feedback under clause 5.8.5(d).

The NER provide limited guidance on the requirements on parties during the R1 and R2 processes. In response, AEMO has published numerous guides and instructions for applicants to help with engagement with the process. These guides and their contents for both R1 and R2, many of which are not required by the NER, are listed in Attachment 4. The rule change does not seek to directly change these documents, though AEMO may need to revise these documents based on the greater clarity of the process in the rules.

1.5 Proof of technical standards is a key milestone

In the NEM, a party cannot connect a generating unit to the power system unless registered by AEMO as a Generator (or is exempted by AEMO from that requirement).

Registration as a generator is a key milestone in the connection process. Once the connection applicant has registered, and its commissioning program is approved, it can begin the process of being energised and therefore earn revenue.

As noted above, the Connections Reform Roadmap identified multiple, significant issues with the R1 assessment framework that underpins the current generator registration pathway.⁸

It is the responsibility of the applicant to prepare the application for registration, and AEMO assesses and approves the registration if the requirements are met. The decision to approve generation is undertaken by the Participant Registration Committee (PRC). The registration process is an

⁸ Connections Reform Initiative, *Connections Reform Roadmap*, December 2021, p. 75.

important element of the checks that AEMO undertakes to ensure that all participants are financially viable, technically proficient and have the systems in place to work with relevant market bodies to maintain a stable operating power system.⁹

As highlighted in Table 1 above, one of the requirements for registration as a Generator under the NER is that the applicant must “satisfy AEMO that each generating system will be capable of meeting or exceeding its performance standards”.¹⁰ (There are no equivalent requirements for large loads registering as Customers or for Market Network Service Providers.)

While the process for negotiating and agreeing performance standards for new connections is clearly set out in clause 5.3.4A of the NER, the governance framework and process by which AEMO satisfies itself that a generator at R1 will be capable of meeting its agreed performance standards – and what should happen if AEMO cannot satisfy itself – is much less clear. This inability for generators to proceed in the process can lead to a roadblock to registration.

In practice, connection applicants demonstrate their ability to continue to meet their performance standards by completing the R1 assessment. As the performance standards are set, any deviations or changes since the negotiation of the performance standards and connection agreement must be resolved solely through the developer changing its plant design or control settings to achieve technical compliance.

Therefore, new entrant generators are required to complete the R1 process as a requirement for their registration application to be considered complete, and they are unable to proceed to full energisation until the R1 stage of the connection process is accepted.

As explained in the following section, the obligation on applicants to provide R1 information to AEMO and the NSP under Chapter 5 of the NER does not functionally align with the obligations for AEMO to assess the information and assess performance standards capability under Chapter 2. While this rule change request contains proposals to improve the functioning of this process, it does not propose any substantial changes to registration requirements or processes themselves in Chapter 2 of the NER.

1.6 Once registered, generators are required to follow the commissioning program

Once an applicant seeking to connect generation has been registered as a generator, it is able to be energised following the steps agreed as part of the commissioning program. In general, the commissioning program sets out a series of hold points, so that the NSP and AEMO are able to assess the generator while monitoring actual performance. The data the generator supplies at this stage of the connection is known as the R2, or R2 package, which is based on actual performance of the plant.

The rule obligations and guidance at this stage of the process also lack clarity similar to the lack of clarity at the R1 stage. Under clause 5.8.4, generators are required to follow their commissioning plan agreed during the R1 process. In general, the main form of guidance for generators during this stage are the set of AEMO guidelines as outlined in Attachment 4.

Clarifying the R2 process is not the focus of this rule change request and is being pursued by AEMO as part of the wider CRI.

⁹ A full outline of the information AEMO requests that applicants for the registration of new generators include can be found in: AEMO, *Application Guide for Registration as a Generator in the NEM*, v5.1, 2022.

¹⁰ NER clause 2.2.1(e)(3).

2 Statement of the issues to be addressed

The CRI working group has identified deficiencies in the Rules framework at the R1 stage of the connection process which are causing significant uncertainty for new entrant generators thus leading to higher costs borne by these new entrants, flowing through to increased risk premia being levied by investors in subsequent developments.

This leads to inefficiently high generation investment costs, which ultimately flow through to consumer costs.

This section explains in more detail the issues identified, and how they are resulting in inefficient connection processes and higher costs for consumers:

- There is a lack of clear obligations and responsibilities on parties when standard compliance is demonstrated at the R1 stage
- There is a lack of clear timeframes for approval
- The framework is inflexible, leading to sub-optimal solutions being implemented
- The only solutions considered to address system security and operability issues identified in R1 are limited to changes made by the connecting party. This precludes identification of the lowest cost, most efficient solution
- Decisions are not easily reviewable, with limited recourse for effective collaboration between parties to address the identified issue.

This section further explores the consequences of the issues, both in terms of the risks they create for project developers and their broader impacts for electricity consumers.

2.1 There is a lack of clear obligations on parties

The process for the applicant to demonstrate generator performance as set out by the assessment of the R1 model is not clearly specified in the NER, nor is there a NER prescribed guideline that sets out these requirements. The R1 assessment process is therefore reliant on AEMO guides - which often have no official standing under the NER - past experience, and informal discussions.

The purpose or objective of the R1 data package acceptance stage is not set out in the Rules. However, as the R1 model acceptance is taken to be part of the required inputs before AEMO considers a registration application, approval of the R1 data package has become a major step in the process of generators being registered and commissioned.

Box 3: Current rule specifications of R1 process

AEMO's assessment of a generating system's capability to meet or exceed its agreed performance standards under clause 2.2.1(e)(3) is supported by the provision of registered planning data conforming to Power System Model Guidelines and Data Sheet requirements, as required by clause S5.2.4(b). When an applicant provides the R1 data set, there are no clear and express obligations specified in the NER for any party to assess this information and determine if it is incomplete or requires clarification.

Under clause 5.8.4(a), the applicant is required to provide both the local NSP and AEMO with a commissioning program before energisation. This commissioning program includes test procedures and proposed test equipment to be used in the commissioning and must be submitted

at least three months prior to commissioning.¹¹ We understand that applicants sometimes submit their R1 model alongside their commissioning program.

The assessment of the R1 model to allow for the generator to be registered and the commissioning program are not directly linked. For some projects, these occur simultaneously, for other projects these different approvals may be separated by months.

Despite the importance of this process, AEMO and the NSP are not subject to any NER obligations to provide reasons why they are not satisfied an applicant will be capable of meeting or exceeding its performance standards at the R1 stage. This contrasts with the responsibilities that AEMO has if it determines that a person is ineligible for registration as a Generator as part of the registration process.¹²

Similarly, AEMO and the NSP do not have clear obligations in relating to assessing the information that is provided by the applicant under clause S5.2.4(b) and determine if it is incomplete or contains information which requires clarification.

The lack of clarity around the R1 process means that there is uncertainty as to which party is responsible for assessing and approving the application. Currently this happens through an informal three-way dialogue between applicants, NSPs and AEMO. In practice, this can mean that both AEMO and the NSP assess the modelling and this may result in repeats of the connection studies, to check the performance with the R1 settings. Depending on the situation, original equipment manufacturers (OEMs) may also be called upon to provide technical information in support of the applicant. Our understanding is that AEMO's connection team internally informs the AEMO registration team when the applicant has their R1 accepted.

AEMO's role in market registration, its overarching responsibility for system security and the fact that the majority of the performance standards examined as part of connection form AEMO advisory matters mean that, in practice, it plays a leading role in the R1 process. However, primary responsibility for negotiating performance standards in the connection agreement rests with the NSP. Therefore, our proposed new rules include both parties as having a formal role in the R1 approval process to ensure decisions deliver a secure and operable power system.

There is further uncertainty how any changes are resolved in response to issues raised during the R1 model assessment. This is particularly the case when it is identified that changes to the performance standards set out in the connection agreement should be renegotiated.

We understand that a common current approach is to use the procedure set out in clause 5.3.9 which outlines how to alter a generator's performance standard. However, this can be a time-consuming process and, we understand, was originally intended to be used to manage alterations to generators already connected to the network and generating, not to revise performance standards for projects prior to connection.

¹¹ NER clause 5.8.4(b).

¹² Although it is understood that AEMO generally does provide informal feedback on the R1 modelling.

2.2 The framework is inflexible

There are two key elements of the current framework that are inflexible and give rise to a number of inefficiencies:

- The inability for AEMO to provide conditional approval for the R1 package
- The inability to undertake even minor reductions in the level of performance standard capability, between performance standard approval under 5.3.4A and energisation

Conditional approval

In engagement with stakeholders and AEMO, we understand that situations can arise in the R1 stage where projects are delayed from being registered due to relatively minor issues. In these circumstances, we understand that conditional approval of the remainder of the R1 package may be appropriate, subject to a clear pathway to rectification post registration. This allows otherwise viable projects to move to energisation, while allowing AEMO to ensure all issues are addressed where appropriate.

However, under the current NER, AEMO is not allowed to approve an application to be registered as a Generator subject to terms or conditions. This makes the process inflexible when issues arise at the R1 assessment phase. Any undertakings made by a proponent to AEMO or the NSP to rectify, after registration is achieved, an issue that was identified during the R1 assessment process, are unenforceable under the NER.

Consequently, NSPs and AEMO do not have the flexibility to provide applicants with conditional approval before the completion of R1. Generators are expected to fully resolve all issues, no matter how minor or inconsequential, before the NSP and AEMO are able to provide approval. Our members represent that this has led to substantial project delays because of the applicant's need to respond to minor non-compliance that could be easily resolved and doesn't negatively impact consumers. Given the nature of some of these issues, it would be more prudent and sensible to deal with them during the testing and energisation processes at the plant is being completed.

The requirement for AEMO's unconditional approval of the R1 package is inconsistent with AEMO's ability to impose terms and conditions to specified generating unit classification and aggregation approvals and Generator exemptions, under NER chapters 2 and 3.

Minor reduction in performance standard capability

A further issue relates to the inability to adjust a performance standard setting downwards during the R1 stage of connection, even where this brings with it no material impact on the system.

As part of the *National Electricity Amendment (Generator technical performance standards) Rule 2018 No. 10*, an amendment was made to clause 5.3.4A(b) of the NER that has had a major impact on the ability of new applicants to revise their agreed performance standards at the R1 stage.

Subclause 5.3.4A(b)(1A) of the NER provides that, where a generator proposes to amend the plant's *existing performance standards* through the clause 5.3.9 process, its new negotiated access standard *must be no less onerous than the existing performance standard*.

This amendment was introduced to address a concern in the 2018 rule change, that a generator could be restricted from being re-commissioned following the alteration of plant because it can no longer meet the minimum access standard, if the minimum access standard has changed (increased)

since the connection of plant.¹³ Consequently, the final rule included the new provision to “make it clear that, when a negotiation of performance standard relates to the alteration of equipment in clause 5.3.9, the negotiating range is *between the automatic access standard and the generator’s corresponding existing performance standard (rather than the corresponding minimum access standard in the NER)*”.¹⁴

This clause is intended to provide relief to operators of legacy plant who were going through a 5.3.9 process to renegotiate performance standards, to avoid a situation where the legacy plant would be unable to comply with the new more onerous minimum access standards.

However, this clause creates problems, when used in the context of new plant having to renegotiate performance standards during the R1 stage, where the clause 5.3.9 process was applied. By strictly preventing any reduction of the performance standards, this clause has stopped applicants, NSPs and AEMO adjusting performance standards to less onerous levels – even if these still exceed the level of the minimum access standard – where information that has come to light in the period after the connection agreement that suggests this would actually be appropriate from the perspective of system security and operability.

This inability to make minor downwards adjustments to performance standards can result in significant additional modelling and associated delays for connecting applicants, often for very limited or no benefit. As noted previously, this increases costs, which are ultimately passed through to consumers.

2.3 Generators are held responsible for changes outside of their control

Applicants face a key risk in that they are effectively held responsible for any external changes in conditions that occur in the time between finalisation of performance standards and execution of connection agreement, and the completion of the R1 assessment. This is because any external changes in the power system will be reflected in the R1 modelling, impacting on the ability to demonstrate compliance with the agreed standards.

These external changes in the power system may come from a number of causes, including:

- nearby generation or load modifying its technical settings
- closure of nearby generation, e.g. exit of thermal generation
- new generation or load connecting to the network nearby
- changes to network design due to new elements of the transmission grid.

Any of these changes that occur prior to the R1 assessment being finalised will impact on a connection applicant’s ability to meet its agreed performance standards. Consequently, many R1 delays are due to changing external conditions, which are well outside of the connecting applicant’s control.

In response to these changes, generators are often required to remodel their technical performance, incurring delays and potentially resulting in additional capital investment.

All parties need to bear some responsibility for ensuring ongoing system security in the face of the changing nature of the power system. However, placing this burden solely on individual new

¹³ AEMC, *Generator technical performance standards*, Rule determination, 27 September 2018, p. 250.

¹⁴ AEMC, *Generator technical performance standards*, Rule determination, 27 September 2018, p. 252.

connecting applicants is likely to be inefficient, if each applicant is individually tasked with making adjustments to its plant to manage the effects of broader changes on the power system.

This in also adds new risks that cannot be managed or mitigated by the developer, increasing risk premia required by investors.

We consider the effects of external power system changes are more efficiently managed where the full suite of solutions can be considered. Material system security and operability issues identified during an R1 assessment may be better resolved by collective action, or an action on the shared network, which is not a solution that is available to the applicant.

An example of the potential for changes to the technical settings of multiple generators for security purposes was identified through the AEMC's process in developing the *Efficient management of System Strength on the Power System Rule 2021*. As part of this, the AEMC considered that in some circumstances, the most efficient option for NSPs to meet their system strength obligations could be collective inverter retuning for multiple generators.

Such collective retuning would be coordinated by the NSP, with any costs incurred recoverable through the new system strength charging mechanisms. This is the kind of solution which we consider might form a more efficient solution that requiring each connecting applicant to manage the issues on an individual basis.

2.4 There is a lack of clear timeframes

The lack of clarity in the NER for the R1 process as well as reasons for potential non acceptance means that timelines for the assessment are open ended. This can lead to delays as registration of a generator cannot commence without proof of the generator being technically capable which, in practice, is through approval of the R1 model.

AEMO does have an obligation under clause 2.9.2 to assess a Generator registration application (see box below). However, we understand that if AEMO is not satisfied as to a generating system's capability to meet or exceed its agreed performance standards under sub clause 2.2.1(e)(3), AEMO considers any such registration application to be incomplete and, consequently, the timings under clause 2.9.2 are deemed not to have started. Therefore, any applicant that has not had approval of its R1 model is unable to register as a Generator.

Box 4: Timing obligations in the rules for registration

The NER provides clear guidance on the timelines and process for the assessment of the complete application of the request to be registered as a Generator, as follows:

- Under clause 2.9.1, AEMO has five business days to inform the applicant whether any further information or clarification is required in support of its application.
- In addition, clause 2.9.2 requires that, within fifteen business days of the receipt of a valid application, AEMO must either determine that the applicant is to be registered as a Generator or, if it determines that the applicant is not qualified to be registered, must provide reasons for that determination.

However, we understand that if AEMO is not satisfied as to a generating system's capability to meet or exceed its agreed performance standards under clause 2.2.1(e)(3), AEMO considers any such registration application to be incomplete and, consequently, the timings under clause 2.9.2 are deemed not to have started.

The lack of clear timeframes in the current process represents a large risk for generation applicants, which generally have contractual time-bound commitments for construction and energisation. Some of our members have raised concerns that projects have been held up for months or even years before they are able to be registered. This is because AEMO or the NSP have identified system security issues that impact on the ability of the newly connecting generator to be energised. However, these system security issues may be relatively minor, or outside of the generator’s control, being wider power system issues only being identified during the R1 modelling process.

Generally, by the time the R1 is being assessed, generators are well advanced in the design and financing of their projects and may have commenced construction of their assets. Figure 4 outlines the commercial stages of many projects against the regulatory stages. The interaction of regulatory and commercial stages means that applicants face large potential opportunity costs due to any changes at this stage delaying connection, which means that they are unable to meet their contracted obligations.

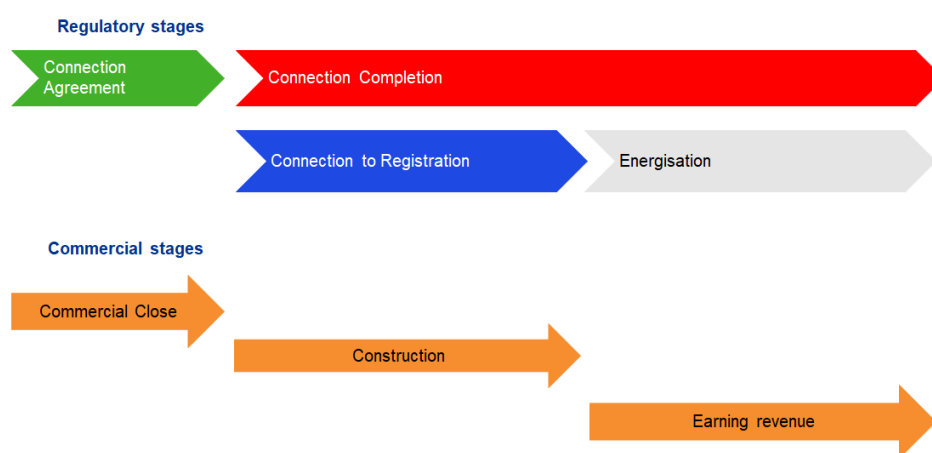


Figure 4 Comparing regulatory and commercial stages

As generator applicants are unable to proceed to full energisation until the R1 stage of the connection process is accepted and registration completed, financiers bear risks if there are any delays. In addition, the generator financiers bear risks due to the uncertainty that delays may occur for reasons outside the applicants’ control. These risks under the current arrangement will hence be priced into financial terms of the project, the cost of which must ultimately be recovered from consumers through higher energy charges.

2.5 Decisions are not reviewable

The finalisation of performance standards, and subsequent work to finalise the R1 package, requires extensive negotiation and engagement between connecting applicants, AEMO and NSPs. We understand that the iterative nature of these negotiations can break down from time to time, where intractable problems are identified.

The NER frameworks already contain a number of frameworks that are intended to provide recourse for market participants who find themselves in similar situations, particularly those parties engaging with NSPs and AEMO. These dispute resolution processes are intended to address the relative information asymmetries that exist in the NEM, particularly in processes where monopolies play a role.

However, it is not clear that any of the existing dispute resolution processes apply to a decision related to the R1 process, and there is limited ability for applicants to have any decisions made during this stage independently reviewed. We consider this lack of effective frameworks reduces the ability of all parties in an R1 package process from finding a sensible outcome.

As set out in the box below, the NER contains three dispute resolution processes relevant to connections: Independent Engineer (clause 5.4), Commercial Arbitration (clause 5.5), and Dispute Resolution (clause 8.2).

Box 6: Options available for dispute resolution			
An overview of the differences between the three mechanisms is set out below:			
Process	Independent Engineer	Commercial Arbitration	Dispute Resolution
Rule Clause	5.4	5.5	8.2
Binding	No	Yes	Yes
Application to connection disputes	Transmission outside of Victoria	Transmission outside of Victoria	Transmission in Victoria only and distribution in all regions
Costs	Borne equally by parties, unless otherwise agreed	Borne equally by parties, unless otherwise agreed or one party has unreasonably prolonged/escalated dispute	Borne equally by parties, unless otherwise agreed or one party has unreasonably prolonged/escalated dispute
Scope	Technical matters including technical issues related to a connection sought by a connection applicant	Any dispute over 'terms and conditions of access' including price.	Proposed access arrangements and connection agreements
Adjudicator	Agreed by the parties, otherwise appointed by the Dispute Resolution Advisor (DRA) ¹⁵ from pool of Independent Engineers (who may be individuals or firms)	Single arbitrator appointed by AER from arbitrators nominated by applicant and provider (2 each)	Panel (of 3 members unless otherwise agreed) appointed by DRA from Dispute Resolution Pool (individuals or firms)
The Independent Engineer process in rule 5.4 was introduced into the NER by the <i>National Electricity Amendment (Transmission Connection and Planning Arrangements) Rule 2017 No. 4</i>			

¹⁵ The Dispute Resolution Advisor is a person appointed from time to time by the AER with a detailed understanding and experience of dispute resolution practice and procedures which do not involve litigation. See NER clause 8.2.2.

(the TCAPA rule change). The process was introduced to provide advice pertaining to technical issues relating to connection where the services being provided by TNSPs are negotiated transmission services (e.g., connections). The scope of the independent engineer's role is limited to the provision of advice on technical issues only, and therefore does not include advice on the cost, commercial terms, process or timing of a connection.

The **Commercial Arbitration process** was previously found in Chapter 6A, Part K as clause 6A.30, and was relocated to clause 5.5 by the TCAPA rule change in 2017. Per clause 5.5.1(b), the Commercial Arbitrator can consider any dispute referred “which may arise between a TNSP [...] and a Connection Applicant [...] as to terms and conditions of access for the provision of prescribed transmission services, the provision of negotiated transmission services” (‘a transmission services access dispute’).

The **Dispute Resolution process** in clause 8.2 applies to proposed access arrangements or connection agreements for connection applicants for connection and access to distribution networks or to the transmission network in Victoria. Previously, there was scope to use this mechanism with regards to connections to the transmission networks in other regions, but this was amended by the AEMC in the TCAPA rule change.¹⁶ The AEMC considered that “parties involved in disputes arising from the provision of negotiated transmission services [...] are likely to be well-resourced and therefore do not require access to the prescriptive process set out in Chapter 8.” The Commission also noted that “the independent engineer process is more fit-for-purpose compared to the mediation and scoping stages provided for in the Chapter 8 process, since any disagreements are likely to be technical in nature.”

There are a number of issues associated with the application of the current dispute resolution mechanisms to the R1 process.

Firstly, it is unclear which of the three mechanisms apply to decisions made by NSPs and AEMO over the course of the R1 process. As outlined in the box above, the scope of the Independent Engineer process contained in clause 5.4 covers ‘technical matters’, which are set out in clause 5.4.1(b) and which relate mainly to the design of, and delineation between, identified user shared assets, designated network assets and dedicated connection assets. As per clause 5.4.1(c), a technical matter does not include the costs or commercial terms of; the process relating to; or the timing of the connection.

The commercial arbitration process set out in clause 5.5 focusses more directly on commercial matters. Under clause 5.5.1, the mechanism applies to any dispute regarding the terms and conditions of access, which comprise the price of the services offered by the TNSP and other terms and conditions for the provision of those services. It is not clear whether a technical assessment of a generator’s ability to comply with its performance standards would fall within the terms and conditions of access.

The scope of the dispute resolution process contained in clause 8.2 includes the proposed access arrangements or connection agreements of a connection applicant for connection and access to the network. This would appear to encompass the assessment of a project’s ability to comply with its performance standards. However, as highlighted in the box above, following the TCAPA rule change, this process only applies to connections to distribution networks or to the transmission network in Victoria.

¹⁶ The elements of the TCAPA rule change relating to connections do not apply in Victoria.

Outside of the legal complexity of the dispute resolution process, our members are concerned about the delays that the process would entail. The formal nature of the existing dispute resolution would be highly likely to be time consuming for applicants before a decision is made. For applicants, the risk and cost of this delay is such to make formal dispute resolutions inappropriate.

Additionally, to the extent they do apply, none of the existing dispute resolution processes are seen to be readily usable. Parties may be unwilling to raise disputes because of the risk of delaying the connection process or damaging their relationship with AEMO or the relevant TNSP.

Finally, under the current R1 process, it would likely be difficult to get any decision reviewed, because decision points are often not clearly defined. For example, when an applicant provides R1 planning data to AEMO under schedule 5.2.4(b), AEMO has no clear and express obligation to assess this information and determine if it is incomplete or if it contains information upon which AEMO requires clarification. While AEMO does have clear obligations under clauses 2.9.1(b) and 2.9.2(b) with regards to assessing registration applications, the process under clause 2.2.1(e)(3) by which AEMO satisfies itself that the generating system will be capable of meeting or exceeding its performance standards is not clear. Given the opaque nature of the process, it would be difficult for a connection applicant to determine exactly what should be reviewed under the NER processes.

2.6 AEMO recent initiatives have improved situation, but uncertainty and risks remain

The CEC acknowledges that AEMO has undertaken extensive work with industry to improve the experience of generators in the connection framework, and that great strides have been made especially over the last 18 months. One clear example of this has been AEMO's integral role in the CRI initiatives, including leading workstreams to identify where improvements can be made.

Other areas where AEMO have developed the communication between generators and transmission planners include:

- The introduction of the Connections Simulation Tool, which provides new entrants with the ability to run studies against AEMO's four-state model whilst protecting plant confidentiality.
- Publishing a regular connection scorecard to improve market understanding of trends, volumes and timeframes of new connection.
- Continuous improvement in how information and concerns are raised with generators when it becomes available.

The CEC welcomes and support the extensive efforts by AEMO to improve the process for all parties. Considering the breadth of ongoing reforms, this rule change request is designed to be complimentary of these ongoing efforts to improve the connection experience. The purpose of this rule change request is to acknowledge and embed these changes in the NER and provide a clear signal to investors of the permanence of changes to approach. Further, our proposed changes recognise the importance of on-going engagement and collaboration across all parties throughout the connection process so that issues can be quickly identified and constructively resolved.

Providing a rule framework that highlights AEMO's improvement in cooperative action for new connections will provide for increased confidence in the connection process. It will also demonstrate the market bodies commitment to ongoing improvement. In addition, a rule change to improve the flexibility and clarity of the R1 assessment process will provide guidance to AEMO on the direction of future improvement to the overall connection process.

3 What are the issues to be addressed by the proposed rule

The issues outlined in Section 2 reduce the overall efficiency of the market and can lead to poor outcomes for new entrants, NSPs and AEMO. The material uncertainty created by these issues can result in higher costs for consumers.

Resolving these issues would lead to better outcomes for the market across all participants, better enable the transition to net-zero and thus contribute to meeting the NEO. Failure to adequately address these issues will create a risk that we do not see sufficient investment in the required generation and storage for an effective and balanced transition to a decarbonised system.

The main impacts that we have identified for consumers through the operation of the existing process are:

- Risks borne by applicants leading to projects being delayed or not proceeding resulting in higher wholesale prices as applicants seek to recover the associated extra costs
- Delays in new entry of generation and storage assets resulting in greater supply side concentration, reducing wholesale market competition and driving inefficiently high wholesale market price outcomes.
- Potential for reliability issues due to delays of the connection process. Without significant investment, AEMO has identified risks of not meeting the reliability standard towards the end of the decade.¹⁷
- The current process leads to the development of less efficient solutions to address issues identified in the R1 stage, leading to higher overall costs.

3.1 Generator risks impacting on consumer costs

At the point of the connection process where an applicant provides its R1 model package, it will have already incurred significant costs in developing the project. Typically, the project will also have reached final investment decision, with key contracts executed.

Furthermore, as construction of the plant may be well advanced by this stage, the applicant incurs risks of uncertain project delays before it is energised that it is not able to mitigate.

The existing R1 process can also lead to requests for plant design changes and additional expenditure after final investment decision.

Placing increased costs on new entrants reduces the competitive pressure that new low-cost generation can provide in the wholesale market. Further, the perception of this possibility of additional costs being imposed at the R1 stage adds to uncertainty for investors and increases risk premiums.

We also consider the risks associated with the existing R1 process may have contributed to several developers and Engineering, Procurement and Construction (EPC) contractors to either exit the Australian market or choose not to enter. Therefore, there is a reduction in the extent of the competition in the market for generation developers and contractors, which is placing an upward pressure on project costs.

¹⁷ AEMO, Update to 2022 Electricity Statement of Opportunities, February 2023, p.5.

3.2 New entrants are needed to maintain supply during the energy transition

All mainland NEM states require considerable additional investment to continue to ensure a level of supply for consumers that meet the reliability standard. Over the next five years, there is an expectation of the closure of numerous thermal generation plants such as Liddell, Eraring and Yallourn. To meet the pressures of the energy transition, a large number of timely generation connections is needed to respond to this potential supply gap.

As can be seen in **Error! Reference source not found.** the 2023 update to the ESOO published by AEMO shows that new entrants are required to maintain reliability going forward and impeding this has potential to impact on future reliable supply.

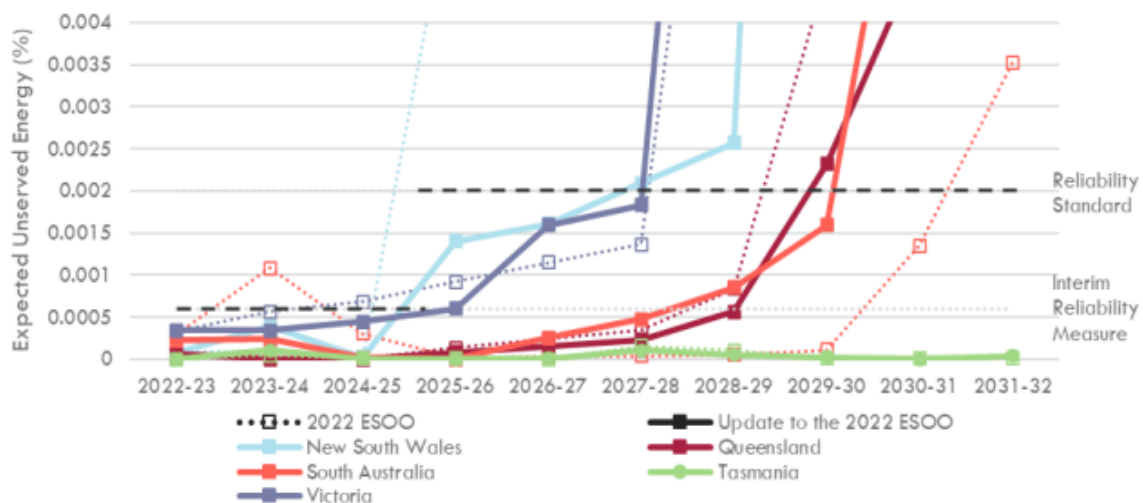


Figure 5: AEMO's Reliability forecast identifying need for new entrants¹⁸

Obviously, the ability to bring new generation and storage to energisation, as quickly as possible, is key to addressing these reliability issues.

3.3 Inefficient choices are being made on security procurement

The R1 modelling process can identify power quality or system security issues associated with the connecting applicant's plant capability and performance.

These issues can sometimes be caused due to a change made by the connecting applicant to its plant. In other cases, it may be due to changes in the external power system.

These issues are typically resolved in a potentially inefficient manner, resulting in technically and financially sub-optimal choices in maintaining the power system.

For example, when an applicant's R1 model identifies a potential power quality or system security issue, regardless of cause, it becomes the responsibility of the connecting generator to resolve the issue in a way that brings its modelled plant capability back into compliance with the negotiated access standard, to address the identified power system security or quality issue.

This responsibility places the cost on the connection applicant, who will face strong incentives to do the minimum required to address the identified issue. The connecting applicant will also have access

¹⁸ AEMO, 2023, Update to 2022 Electricity Statement of Opportunities, pg 4.

to a much smaller set of potential solutions to address the identified issue, typically limited to undertaking extensive remodelling and retuning exercises.

All applicants face the risk that their R1 model will identify these issues. Box 6 on harmonic distortion provides an example of the sort of power quality issues that can be identified by a generator during the R1 process, but which are caused by effects across the wider network. Requiring connecting applicants to address these power quality issues individually may result in the development of inefficient solutions.

Box 7: Harmonic distortion, an example of a wider power system issue identified through R1 modelling

Harmonic distortion is a periodic change in the electricity voltage waveform which could be caused by connected electronic circuitry. Such connected technologies could be inverter-based renewables, but also customers using power electronic based appliances. Large magnitude distortion can cause damage to NSP or customer equipment.¹⁹

Due to concerns with potentially worsening harmonics across the NEM, the University of Wollongong examined the issue with support from ARENA, NSPs and generation developers.

The study generally identified that centrally developed solutions may result in more efficient outcomes, as opposed to installing equipment to manage the issue at each connection point.²⁰

Harmonic distortion is an example of one of the issues that the R1 modelling commonly identifies with the connection of a new generator, which the connection applicant is then required resolve. As outlined by the University of Wollongong this may be better handled at the network level rather than at the plant that undertook the R1 model which identified an issue.

The interest of consumers would be better served with a coordinated and comprehensive approach that accounts for the need of the system as a whole and evaluates all options instead of viewing resolution from the perspective of meeting the compliance obligation for a single connecting generator applicant. Additionally, NSPs and AEMO can have a holistic view of the needs of the system and may have access to solutions not available to the applicant (i.e., capital work on the network, or collective retuning of multiple generation assets) which may more effectively resolve the option that the applicant's R1 has identified.

4 Description of the proposed rule change

4.1 High level outline of the proposed completion stage

In response to the identified issues, the CEC proposes changes to the NER that will provide greater clarity about the connection completion process, particularly in the R1 stage, including the obligations and timeframes for all participants. There are three key pillars to the rule change proposal:

- Formalise the R1 assessment process in the NER to clarify what is being decided upon, including specifying responsibilities and timeframes, in alignment with other stages of the connection process.

¹⁹ University of Wollongong, 2022, *Harmonic Study – Large Renewable Energy Generators*, p.6.

²⁰ *Ibid*, p.101.

- Support the development of more efficient solutions, by introducing arrangements for NSPs to evaluate and resolve any identified power system security or power quality issues, external to the applicant, as identified in the R1 modelling.
- Improve risk management by ensuring every party to the R1 assessment process has the tools and information to make decisions at the appropriate time and allocate risks to the parties best able to alleviate them.

A high-level overview of the proposed R1 process is provided in Figure 6.

This Chapter details the proposed process resulting from the suggested NER drafting changes presented in Attachment 1.

While the rule change has been developed in response to the issues being experienced by connecting generators, we propose that the new and amended processes should also apply to any relevant large loads and Market Network Service Providers.

Loads do not generally register as market customers in their own right, with the possible exception of grid-scale batteries²¹. However, to exclude large loads and Market Network Service Providers from the scope of the rule change could leave uncertainty as to how the R1 process should be applied for them and may increase the complexity of the rules if parallel processes were required.

Given that most affected large loads would likely be batteries that would also be undertaking the R1 process as a generator, it would likely minimise costs if the same process were to be followed by applicants for load as for generation.

However, in recognition of the lesser likely numbers of large loads and Market Network Service Providers as compared to generators, and the less involved performance standards to be met by these projects, much of the following commentary focuses on issues associated with generators.

The remainder of this Chapter steps through the key design elements of the proposed rule, including:

- Applicants will initiate the R1 process by providing an initial self-assessment
- The proposed rule change will give clear obligations and timeframes to all parties involved in the R1 process
- The proposed rule change will allow all parties improved flexibility to find the best outcome for each individual connection

We then provide an overview of the key element of the rule change, being the classification of multiple pathways to registration in accordance with predefined Types.

²¹ We note the new processes for registration of storage assets as integrated resource providers. We do not consider this new category will change the specific R1 processes for connecting applicants.

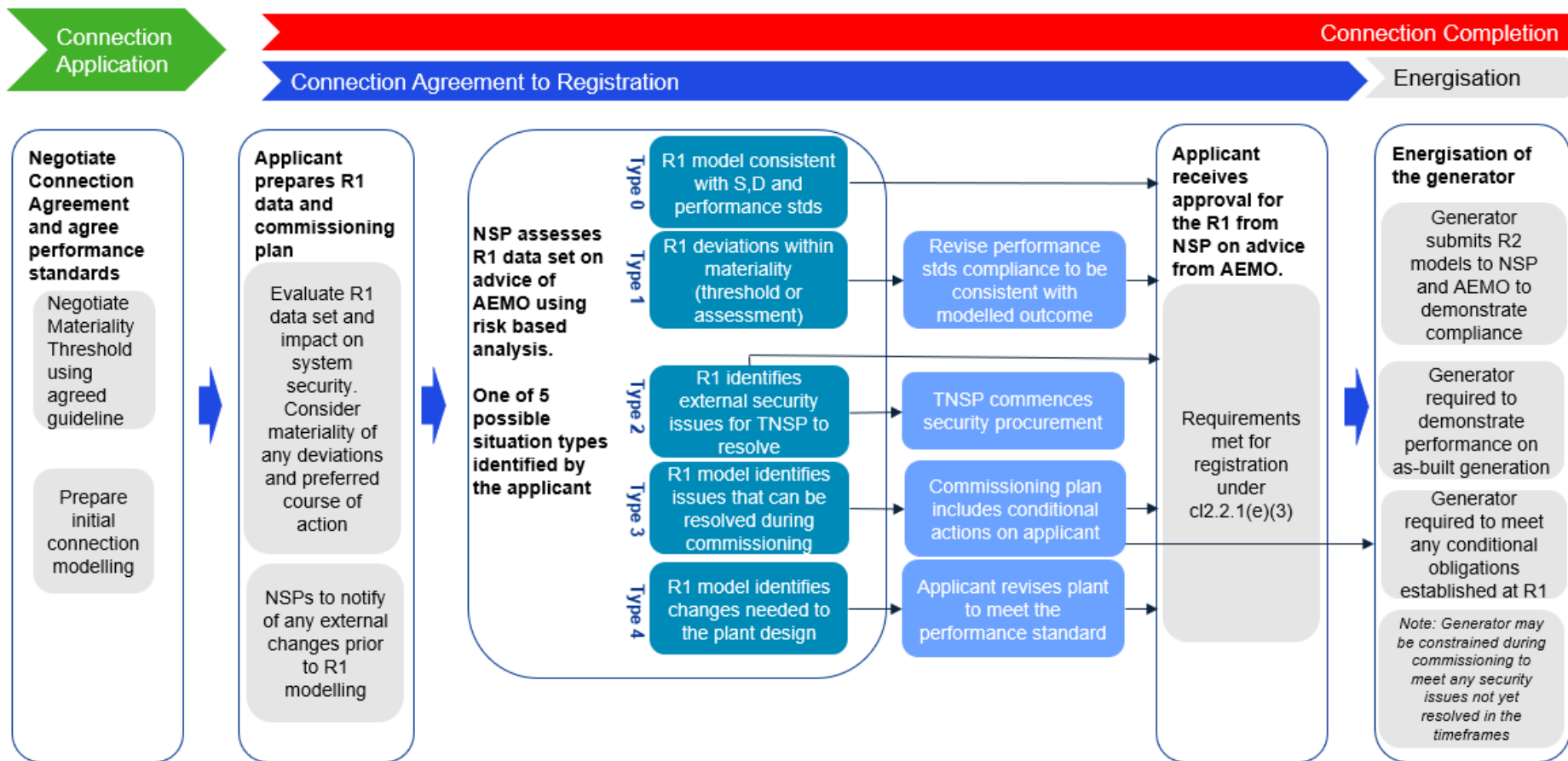


Figure 6: Overview of proposed R1 process

4.2 Applicants will initiate the R1 process by providing an initial self-assessment

The first key design element of the proposed rule change is that connecting applicants will be responsible for undertaking a self assessment of their plant capabilities and associated modelling, at the commencement of the R1 process.

This is intended to resolve a key information asymmetry that currently exists at the start of the R1 process. This occurs where AEMO, NSPs and the connecting applicant all work in parallel, based on a constantly changing power system. Under the current process, NSPs and AEMO prepare their own assessment using modelling, with applicants unable to directly assess these models to identify issues.

We propose to address this by introducing a formal first step, where the applicant begins a process of self-assessment, likely underpinned by its own modelling.

The R1 process is formally initiated by the applicant providing its R1 model. We propose that this should now include an applicant developed assessment report (the **R1 assessment report**). The R1 assessment report would consider the plant's performance and the extent to which it will continue to meet the originally agreed performance standards.

Where any issues are identified, the connecting applicant will consider:

- materiality of the impact on the broader power system, with recommended actions to mitigate or resolve these impacts
- whether the identified issues might be safely resolved in a later stage of the connection process
- whether the identified issues are due to a change in the applicant's plant, or due to changes on the external power system.

On the basis of this self-assessment, the connecting applicant will recommend that it progress on one or more of the pre-determined pathways to registration – described as Type 0 to 4 and discussed in more detail below.

This R1 assessment report is provided to the NSP as part of the package of R1 materials.

The onus will then be on the NSP, in consultation with AEMO, to demonstrate its reasons for disagreeing with the applicant's analysis set out in the R1 assessment report, if this were to result in delays or rejection of registration of the generating system.

Classification into Types

The key outcome of the R1 assessment report would be a self-determination by the connection applicant as to how the generating system falls into several predetermined category Types. This would then determine how the applicant progresses through the remainder of the registration process.

These category types are set out below:

Type 0: If the R1 model provided by the applicant aligns with obligations agreed through the negotiated access standard and *no issues are identified*. This would be a **Type 0** process (see section 0)

Type 1: Where discrepancies are identified, the report would identify whether these are within a pre-negotiated *materiality threshold* and thus non-material, allowing the plant to have its performance standards readjusted to reflect the new capabilities as defined in the R1 package. This follows a **Type 1** process (as described in section 4.5.2)

Type 2: Where material discrepancies between the R1 and the negotiated access agreement are identified, the self-assessment would then determine whether these are due to *design changes of the plant*, or due to *external changes to the power system*. Where it is identified that these discrepancies were due to changes in the external power system, this would be a **Type 2** process (see section 4.5.3)

Type 3: Where non-material discrepancies are identified and which can be rectified through minor changes at a later point in time, AEMO will be allowed to provide a *conditional registration*. This would be dependent on the connecting applicant providing a clear pathway to rectification, as well as a clear pathway for enforcement of any commitments made by the connecting applicant as part of the conditional approval. This would be a **Type 3** process (outlined in section 4.5.4)

Type 4: Where material discrepancies are identified and these are due to a design change of the plant, changes are required to plant design. This would be a **Type 4** process (as outlined in section 4.5.5).

The level of analysis that the applicant will undertake will be proportionate to its views on the materiality of any identified issues and with being able to demonstrate compliance.

It would be possible for a connecting applicant's issues to reflect a combination of different Types – for example, some issues which are within the scope of materiality (Type 1) and other issues which can be resolved through conditional approval (Type 3). Each of the issues would be dealt with through the relevant pathway, with the timing of the overall assessment being determined by the slowest pathway that was triggered.

4.3 The proposed rule change will give clear obligations and timeframes to all parties involved in the R1 process

A key problem with the current NER frameworks for R1 is the lack of clarity around the responsibilities of different parties.

We therefore propose the NER be amended to formalise the R1 process, placing clear obligations on all relevant parties, including with regard to the content required and timing of actions.

Applicant obligations: The process must ensure AEMO and the NSPs are satisfied the applicant can meet its negotiated performance standards without significantly impacting power system security and power quality. Under our proposed rule, between the finalisation of the connection agreement and full energisation, the applicant will therefore continue to be responsible for resolving any material discrepancies between the negotiated access standard and its modelled outcome, *where this is due to changes in plant design or any other on-site issues*.

We also consider that connecting applicants should face clear obligations in regards to Type 3 conditional registration processes. Firstly, connecting applicants will be required to demonstrate to

AEMO what efforts have been made to address an identified discrepancy between the performance standard modelling and R1. Secondly, connecting applicants will be required to set out a clear pathway to rectification of any issues that have been allowed for as part of the overall conditional approval. Finally, we propose that a new enforcement power be introduced to ensure that connecting applicants meet these rectification obligations.

New timeframes for registration approval: We propose introducing a new, time-limited process to identify and assess any discrepancies in modelled behaviour between R1 and the earlier negotiated performance standards.

This is consistent with other elements of the connection process. For example, under clause 5.3.4A, it is the responsibility of NSPs to either reject or approve the negotiated access standard proposed by the applicant, with reference to advice from AEMO if relevant.²² There are clear allocations of responsibility in this process, coupled with defined timeframes. For consistency, we propose the implementation of a similar process for the revised R1.

We propose making the R1 process consistent with the 5.3.4A process, in terms of mandated timelines for assessment. Once an applicant submits its R1 package and R1 assessment report with all necessary supporting studies, it will need to be assessed within a fixed timeframe. The onus will be on the applicant to provide quality, correct data and models plus to resolve any identified issues in order to benefit from these new timeframes.

Requests for further modelling: Our proposal also clarifies the situation where requests for further modelling could be warranted. A request from an NSP for further modelling would need to be accompanied with *clear evidence* that the applicant's self-assessment of the R1 model and determination of Type classification is incorrect, and that there is a material risk of an impact on system security or stability if connection were to continue.

AEMO's role: We propose that AEMO will be required to provide advice to NSPs on AEMO advisory matters, within 20 business days of the submission of the R1. The NSP will be required to complete its review of the R1 model within 30 business days.²³

We note that there should be preliminary discussions and collaboration between all parties in advance of the formal submission, which will help to facilitate these proposed timeframes. NSPs and AEMO should be informed in advance of when applications and R1 assessment reports will be submitted. Equally, connecting applicants should be informed ahead of time of any changes to network conditions that are likely to have an impact on the assessment of the R1 model.

NSP roles: The primary decision of the NSP in the timeframe is to decide whether to accept the applicant's self-assessed Type classification, which will need to be followed on the R1 model that is provided. In making its decision, the NSP would consider the applicant's self-assessment (as supplemented by any information) and advice received from AEMO, in respect of AEMO advisory matters.

Once a decision is made, the NSP would provide the applicant either with its R1 approval, which can be used to demonstrate compliance under clause 2.2.1(e)(3), or the onus would be on the NSP to provide proof why the applicant should not be approved (and therefore registered) without design

²² See clause 5.3.4A(f).

²³ These timeframes are consistent with those in clauses 5.3.4A(d) and (e).

changes (as described in section 4.5.5) or to be labelled a different Type and go through a different process.

4.4 The proposed rule change should be high level to allow parties flexibility

The rule change seeks to establish a new concept of **materiality** for assessment of the R1 modelled performance of a plant, against the negotiated access standard.

As discussed above, we propose the NER be amended to include five different assessment Types, representing different pathways to R1 approval - and, where relevant, registration - on the connecting applicant's self-classification of a project into each Type.

To enable this process of classification into Types, guidelines will need to be developed to provide further detail and clarity. This is important, as we expect that the application of materiality will be matter of continued learning and refinement as the new arrangements are applied.

It is not technically possible for the NER to account for and define all the distinctions applying to all new plant types and sizes, and the network conditions they face. Instead, relevant parties should have the flexibility to assess and determine, based on the size, location and technology type, the thresholds for materiality of deviations either as part of the individually negotiated performance standards or as part of the R1 process. This is explained in more detail below.

4.5 Types used in the connecting applicant's self assessment

The ability for a connecting applicant to self-classify itself in accordance with several pre-determined Type pathways to registration is a key element of this rule change request.

We consider this Type self-classification process to be the best possible regulatory framework to realise the underlying policy principle – namely, that risks in the R1 stage of the connection process should be allocated to those parties that can manage them at the lowest possible cost to consumers.

The Type process allocates these costs and risk by developing clearly defined roles and responsibilities, enabling new technical solutions to manage issues and introducing new governance frameworks.

This section steps through each of the Type channels, describing how each operates. In practice, we consider that any individual connection may utilise one or more of these Types. How this applies will be determined in a case by case basis.

4.5.1 Type 0: A fast-tracked process for applicants who meet the obligations of their negotiated access standard

In cases where the applicant's R1 model aligns directly with the previous supplied S and D model, and performance against the relevant performance standards - as defined by the negotiated access standard - the NSP can agree to quickly accept the applicant's proposal.

In these cases, it should be a relatively straightforward process for AEMO to be satisfied the plant can meet its agreed negotiated performance standard, allowing (where relevant) for the applicant's market registration to be confirmed quickly.

We recognise that, in practice, there may not be many projects that will actually meet the requirements of this Type. That is, we understand that most connections typically exhibit some differences between the models used to agree performance standards through the 5.3.4A process and the R1 package. In those cases, one or more other Type processes may be applied.

4.5.2 Type 1: Providing flexibility to applicants with non-material differences from negotiated access to register

This Type of process is applied where the R1 modelling has identified minor deviations in plant capability between the original performance standards determined at finalisation of connection agreement, and the more detailed model developed as the plant moves toward registration.

Under these conditions, we consider that the new modelled capability should ‘replace’ the originally determined performance standards, where it can be shown that the deviation is non-material – ie, that would not result in any meaningful system operability or security issues.

We understand that under current arrangements, NSPs and AEMO are precluded from allowing this to occur. Both parties are obligated to request plant redesign and / or remodelling for relatively minor deviations identified in the R1 process. We understand that this is often necessary simply to demonstrate strict compliance with the agreed negotiated performance standards, even where a minor deviation is unlikely to have any impact on power system security or quality of supply. This creates unnecessary delays for projects getting to commissioning, for no real security or operability benefit.

We propose that where applicants’ R1 models demonstrate minor “non-material” deviations from the negotiated access standard, these applications should be approved and allowed to proceed to registration, through adapting their performance standards to meet the new level of performance demonstrated through the R1 modelling.

This will allow for a simpler and quicker determination at the R1 stage, lowering costs of connection for new entrants without any detriment in terms of power system security or operability.

Governance of setting the materiality threshold

We recognise that determining what is a ‘non-material’ deviation in plant capability between original performance standard modelling and the R1 package, is not a simple process.

To support these Type 1 projects, we therefore propose the development of clear **materiality thresholds**. These thresholds would be determined on a connection by connection basis, reflecting the different physical characteristics of each connection, and the specific impacts and risks associated with that connection.

These materiality thresholds would be determined in accordance with a **materiality guideline**, to be developed in cooperation between industry (i.e. connection applicants and NSPs) and AEMO, who would be the primary author. This will provide guidance on how to determine whether a material difference exists between the negotiated performance standards documented in the connection agreement and the R1 package.

These guidelines could include:

- the elements of the performance standards that should have a materiality threshold attached, and how this could be determined;
- the appropriate negotiation processes for developing materiality thresholds;
- what thresholds are likely to be acceptable across different situations; and
- how to consider specific risks and costs, such as the development of a risk assessment and management framework.
-

Box 8: A risk-based approach to evaluating materiality

Part of the policy goal of the rule change request is encouraging the R1 model assessment to be considered not as a compliance exercise, but rather as a process where all parties develop sensible engineering approaches to assess and manage risks.

A risk management approach to dealing with the materiality of impacts on the power system will help with assessment of new connections. Assessments in setting the materiality threshold and reviewing the R1 would consider both

- the ***potential impact*** of an identified issue leading to security impacts on the system, and
- the ***probability of such an issue occurring***

in deciding how best to assess the issues raised through R1 model assessment.

This is not a simple exercise, however there is precedent across other industries, such as in construction. A risk management approach would be developed and applied on a project by project basis and would be enabled through the good working relationships between AEMO, NSPs and connection applicants.

For the avoidance of doubt, we consider that connecting applicants would bear just as much responsibility for assessing and proposing solutions to identified risks. Resolution of these risks will only be possible where all parties collaborate, with a focus on finding workable engineering based solutions

The new guideline should outline specific areas of compliance within the access standards and guidance on the approach. This would inform conditions of the negotiated access standard that could have materiality thresholds applied. The guideline should draw on learnings from past connection processes.

All relevant parties should be involved in the development of the materiality guideline. While the AEMC will consider the appropriate process for the guideline and the balance of prescription between the rules and the guideline, our initial view is that the guideline should be prepared by AEMO in conjunction with the NSPs and all other stakeholders (particularly generation and storage developers).

It is appropriate that AEMO and NSPs should have lead responsibility, as they are the parties whose NER compliance obligations are impacted by the introduction of the new materiality threshold framework.

Given the successful collaboration of the CRI processes, we would expect that there would be on-going engagement, ideas sharing and discussion with the industry during the development of the guideline. To ensure this occurs most effectively, we consider the guidelines should be developed in accordance with a NER defined consultative framework.

We also note that as AEMO is responsible for the guideline, there could be merit in extending the guideline to provide broader R1 issues management guidance e.g., issues encountered, criteria underpinning decision-making, potential pathways to resolution, how issues can be best managed to limit delays.

Importantly, the rule change should be able to be applied in the interim before the finalisation of any guidelines. The preparation of the guideline should not be a reason to delay the introduction of the requested changes.

We consider that the application of these materiality thresholds and assessments will be a learning experience across the industry. Therefore, at least initially, AEMO could consider how to report on the application of materiality decisions in new connection agreements and how these have been evaluated as part of the R1 modelling through the Connections Scorecard.

Option of including materiality thresholds in the Negotiated Connection Agreement or at the R1 stage

When applying for connection, applicants use the process laid out in clause 5.3.4A to agree a negotiated access standard with the NSP. This negotiated access standard includes specification of how the plant meets elements of the access standards.

To allow for the assessment of materiality at the R1 stage, we propose adding into this negotiation process (defined in clause 5.3.4A), an option to also negotiate materiality thresholds.

Alternatively, the NSPs, AEMO and generators may undertake work to identify and agree the materiality thresholds for their performance at the commencement of the R1 assessment. As part of its self-assessment applicants can also define the range of non-material issues in its R1 application. An applicant will be able to identify deviations in its ability to comply with its performance standards, which it considers to be non-material. The NSP in consultation with AEMO can then decide to agree or disagree with the applicant's request.

In all likelihood, we suspect that applicants will rely more on the R1 process to consider and propose the definition of materiality as informed by their own modelling. However, it will be their choice and there may be certain parameters in the performance standards which are more suited to setting a materiality threshold in advance during the 5.3.4 process.

This negotiation will consider the specific needs of the network at the location of the connection, as well as the technical specifications of the proposed plant. Assessment of the impact of the materiality thresholds will form part of the provision of S and D data.

We consider that delaying as long into the process as possible – ie, defining the materiality thresholds at commencement of R1 - could result in more informed decisions from all parties and potentially a wider permitted range, than if the thresholds are set at the 5.3.4A stage. However, whether to request these thresholds be developed earlier or later in the process would be at the discretion of the connecting applicant.

These materiality thresholds should provide a reasonable element of leeway in terms of assessment of whether a new plant can progress through to registration. However, the role of the materiality thresholds is also to set reasonable boundaries for the finalisation of the performance standards at the conclusion of the R1 stage, taking into account the need to maintain system security and operability.

Error! Reference source not found. The NSP (and AEMO) would be required to use reasonable endeavours to meet a request for inclusion of materiality thresholds, if the proponent requests them.

Materiality can be used to define response to minor deviations

Under the current rules, an applicant not being able to meet its agreed negotiated access standard compliance by a negligible value can lead to a need for remodelling of performance and potentially undertaking expensive design changes under the clause 5.3.9 process. These costs may be incurred for no ultimate security benefit to end consumers.

We propose that where the R1 assessment report, alongside the R1 model (or actual performance), demonstrates that the generating system is *outside* of the expectations laid out by the negotiated access standard but *within* the materiality threshold as set out above, the applicant should be able to receive R1 approval and proceed to registration.

This new level of plant performance demonstrated in the R1 model would be taken to be the negotiated access standard going forward. For the remainder of the asset life, the plant will be expected to comply strictly with the revised performance standard as per its R1 model.

Under this approach, an applicant that has performance within the window of the materiality threshold, is considered to be meeting its performance standard and be allowed to register.

Given the scope of this rule change, it is proposed that the use of materiality to permit minor deviations is only incorporated into the rules for the purposes of the R1 assessment. In other words, the materiality definition does not apply at any stage after the R1 model assessment. However, the AEMC may wish to consider whether it might be appropriate to use the materiality concept to allow for the pragmatic resolution of minor performance issues that arise later, for instance at the R2 stage or, indeed, over the remainder of the asset's service life.

Adjustments to performance standards require changes to the 5.3.4A framework to allow minor adjustments

Enabling this kind of adjustment to the plant's performance standards in the R1 process will require amendments to elements of the 5.3.4A process, which currently prevent such minor adjustments from taking place.

The rule change seeks to address the risks borne by the market through providing more flexibility to consider and identify the optimal arrangement during the R1 assessment and registration process. One potential limitation within the current Rules is the requirement under NER sub clause 5.3.4A(b)(1A) which requires that any amended access standard must be no less onerous than the performance standard previously agreed in the connection agreement.

This includes any changes in the performance standards between the time of connection agreement execution and project FID – that is, the stage immediately preceding R1.

This clause prevents any minor downwards adjustment of the performance standard during the R1 process, even though there could be circumstances where a minor lowering of the standards represents the fastest way to progress a project through R1 approval (and, subsequently, registration) and would have no impact on system security or operability.

Allowing this downward adjustment would avoid any costs associated with additional remodelling exercises and potentially investment, to demonstrate compliance with the originally agreed performance standards. We consider that removing this requirement will allow all parties to be able to consider more appropriate actions in response to non-material issues identified at this stage.

In addition, removing this clause may improve the process followed by all generation when following the clause 5.3.9 process to change their access standard. We understand that there have been

occurrences where both generators and NSPs have been frustrated by the requirement to continue to meet specific technical obligations after a clause 5.3.9 process, even where a less strict response may be in the best interest of system security (e.g., overly sensitive voltage response) and consumers generally.

4.5.3 Type 2: NSPs identify and procure the lowest cost solution where external power system issues are identified as causing issues in the R1 stage

Under a Type 2 process, where an issue has been identified in the R1 stage and this is due to a change in the external power system (as opposed to a change made by the connecting applicant), the relevant TNSP would identify the lowest cost solution to resolve the issue.

Currently, connection applicants bear all risks when the R1 modelling process identifies these kinds of issues, which are due to changes in external network conditions. If this occurs, the applicant must determine and implement a solution before it can be registered.

Examples of such changes in external network conditions could include unexpected retirement of a large synchronous unit in the electrical vicinity, energisation of major transmission augmentations, or the successful energisation of a local generator. We understand that these changes can result in interactions with a newly connecting generator, which may result in system security or power quality issues.

As discussed above, requiring connection applicants to manage these issues through the registration process represents an inefficient allocation of cost and risk. These costs and risks would be far more efficiently managed by a party with access to the appropriate information and tools – such as the relevant TNSP.

TNSPs are best placed to identify the most efficient solutions to security issues

TNSPs are best positioned to resolve these kinds of issues, at the lowest cost to consumers.

We consider this approach would be consistent with the general framework laid out by the AEMC in the *system strength* frameworks.²⁴ Under that framework, measures to manage converter driven instability has become part of the primary TNSPs key functions, through a standardised requirement to deliver ‘efficient levels’ of system strength. The logic behind this allocation of responsibility is that the TNSP is best placed to leverage economies of scale and scope to manage these issues, at the lowest possible cost to consumers.

Our proposed rule change request is consistent with this approach in that TNSPs can again leverage their access to information, as well as scale and scope efficiencies, to manage the impacts of changes in external power system conditions. Rather than having multiple generators trying to independently resolve these issues, the TNSP can coordinate and identify the single lowest cost solution.

As such, these measures taken by the TNSP would be a regulated activity, that is they would be provided as a prescribed service. Costs incurred in meeting this new obligation would therefore become recoverable either as capital or operating expenditure, through the regulatory determination process.

²⁴ AEMC, *Efficient management of system strength on the power system*, Rule determination, 21 October 2021, p. iii.

For many connections, the most likely way that a TNSP can manage the effects of these external network changes is to ‘retune’ the asset of the connecting applicant

The rule change request places the obligation on the TNSP to resolve system security, power quality or operability issues, caused by changes in the wider system and as identified through the R1 model. Actions that the TNSP could undertake to meet this requirement include:

- Procure services from the applicant by requesting changes in generator settings, sometimes referred to as ‘retuning’;
- Undertake capital works; and/or
- Procure services from other market participants through a non-network solution.

The second and third options are described in the next section.

It is our observation that alongside system strength issues, many of the externally triggered issues identified through the R1 modelling - such as power quality issues like harmonic interactions - can be resolved through retuning of the *connecting applicant’s generator plant responses*.

We therefore consider the most likely solution for a Type 2 process will be TNSPs requesting the connecting applicant to make minor system, setting or firmware changes to its plant – known as ‘retuning’.

However, as these retuning exercises can require some remodelling for the connecting applicant, they can impose material delays for progressing the plant to registration. This can in turn impose significant costs on connecting applicants.

We propose that where this occurs, there should be a mechanism to determine a fair payment to be made to the connecting applicant to recover costs incurred. These costs would likely include those associated with undertaking any necessary modelling to adjust the generating system responses, as well as payments to reflect the time value of delays to finalising registration and energisation.

The form of such payments to generators obviously requires further consideration. However, we consider that the existing NER provide precedent that could be used to develop an effective process.

For example, this could resemble a network support agreement arrangement, although it is noted that the connecting generator may not be required to undertake further actions post registration so there may be no basis for an ongoing contract.

A more appropriate arrangement may be for the payment to be a ‘one off’ process, determined on the basis of the complexity of modelling work and length of time taken to undertake the process. This payment could be on the basis of *reasonable costs*, as described under existing arrangements like the clause S5.2.2 provisions.

TNSP capital works or non-network solution

Where a TNSP utilises either the second or third option above, we propose the existing NER mechanisms for the undertaking of capital and operating expenditure should apply. This would include conducting a Regulatory Investment Test for Transmission (RIT-T) if the estimated capital cost of the most expensive option considered is greater than \$7m.²⁵ An amendment to Schedule 5.1 is required to specify that the resolution of external system changes in the R1 process would

²⁵ See NER 5.16.3.

represent a ‘reliability corrective action’. While, in general, a RIT-T must demonstrate positive net economic benefits, for reliability corrective action the TNSP is permitted to procure a solution that has negative net economic benefits – provided that they are the *least* negative of all the options considered.

A guideline would be developed providing details on the nature of external network changes and subsequent issues identified in the R1 stage

To support NSP decisions on assessments of R1 models, in response to changes in external power systems conditions, we propose that the rule change includes arrangements to develop a new guideline that can be used for assessing this Type of R1 model assessment.

The guideline would include:

- A methodology for making the assessment of whether the R1 model has identified an external power system issue, compared to an internal issue of the generator
- A process for TNSPs to determine the optimal solution including requesting design changes from the applicant
- How to calculate a fair payment of the procurement of services from applicants. This payment amount should cover costs including impact of delays.

Either AEMO or AER could be best placed to be assigned with this responsibility to prepare the guideline. Given the successful collaboration of the CRI processes, we would expect that there would be on-going engagement, ideas sharing and discussion with both networks and generators during the development of the guideline.

In some cases, it may be difficult to determine where changes are because of external situations, or through changes in generator conditions. The intent of the rule change is not to require parties to undertake detailed or time-consuming analysis to ensure this is determined all the time. Such a course of action is unlikely to be in any parties’ interest, as the applicant is likely to face lengthy delays. Rather, the purpose of this is to develop a course of action for circumstances where identification is relatively simple. We reiterate that the purpose of this framework is to encourage cooperative actions in response to issues with the R1, to facilitate more efficient risk allocation.

More importantly, this process is intended to quickly identify and implement the lowest cost solution to address the identified issue. This is the main focus of the process, rather than trying to apportion responsibility between parties. In any case, we expect that both parties in such an arrangement would face strong incentives to quickly identify the most efficient, lowest cost and fastest pathway to resolution – the connecting applicant will want to be registered as quickly as possible, while the TNSP will want to minimise the cost of exercises to retune and address the identified issue.

In addition, we also acknowledge that reasonable costs may be difficult to determine. The administratively simplest solution may be to determine a standardised schedule of payments for certain actions in a Type 2 process. This could be developed by each TNSP, or the AER could potentially play a role.

Cost recovery

Securing the network is an extension of TNSP’s regulated activities. To deliver on their core reliability of supply obligations, TNSPs are required to maintain system security and power quality in the most efficient manner.

We consider that expenditure on maintaining system security and power quality in response to issues identified in the R1 assessment report, including covering the reasonable costs of new entrant generators responding to issues, can be viewed as an extension of this existing role of TNSPs.

We consider that the preferable option for cost recovery is for this obligation to be rolled into the regulated revenue of the TNSPs, which is recovered through consumer TUOS.

This represents a reasonable and simple approach, which is likely to be free of the kinds of complexities associated with implementation of the System Strength charging frameworks.

More to the point, it is consistent with the NEO, as the reliability and price benefits to consumers from reducing delays in connecting new generation will far outweigh any minor increases in TUOS associated with TNSPs meeting this new obligation. We consider that consumers would be better off under this approach. Currently, the risks of material delays during R1 to manage external network conditions are borne by new entrants. These risks in turn result in increased premiums levied by financiers, to address the risks of material project delays. These increased finance costs are then recovered from consumers by generators.

Equally, the significant delays associated with meeting additional modelling requirements in R1 can significantly delay the entry of much needed new generation capacity, at exactly the time when it is most desperately needed, creating reliability and price risks for consumers.

We therefore consider that there is ample justification for a simple TUOS recovery process for these costs.

However, we also acknowledge that market bodies are frequently required to address concerns from consumer groups around any perceived increase in TUOS, even if that increase in TUOS is more than offset against broader cost savings. We acknowledge that some kind of cost sharing may be considered necessary by rule makers. For the avoidance of doubt, however, it is important to make clear that such an approach would represent a far less efficient solution than simple TUOS recovery.

If rule makers do decide to adopt this approach, then the system strength charging mechanisms in the *Efficient provision of system strength* rule change, may offer a precedent.²⁶

In a general sense, the new system strength charging framework could be used as template for a cost sharing mechanism. Under the system strength framework, the costs of system strength solutions are recovered as a common prescribed service, through system strength charges levied on generators who elect to utilise the network provided system strength and consumers through the 'postage stamp' component of TUOS.

A similar mechanism could be applied to 'sharing' the costs of TNSP measures to manage the effects of external network changes in R1. However, we recognise that the potential costs associated with this reform would be very difficult, if not impossible, for the TNSP to credibly forecast as part of its normal five yearly operating expenditure submission.

In a specific sense, the kinds of retuning solutions considered in the system strength rule – i.e., as one of the ways that TNSPs can meet their obligations under the new system strength planning

²⁶ See: AEMC, *Efficient provision of system strength final determination*, p.45

standards – may very closely resemble the kinds of TNSP led solutions to manage external network issues in the R1 process.²⁷

We consider that if the external system security issues identified in the R2 stage are related to system strength - which would be entirely consistent with the definitions of ‘voltage waveform stability’, or inverter driven instability, as considered in the final system strength rule – then it would be entirely appropriate for these issues to be addressed (and charged for) through the new system strength frameworks.²⁸

We recognise that AEMO and the AEMC have identified some issues with the implementation of the new system strength framework, particularly around the design of the system strength charging mechanism and the determination of how much each individual generator would pay.

Other issues at risk of affecting projects at the R1 stage, such as harmonic interactions, may not be readily addressed through the system strength frameworks, if they cannot be captured under the definitions of maintenance of voltage waveform stability.

However, we understand that the general concept of engagement with individual generators to retune responses likely represents a sensible approach to managing these types of issue.

Cost pass through for recovery of TNSP costs

The framework for the economic regulation of TNSPs set out in Chapter 6A of the NER requires the AER to set a maximum allowed revenue that applies to the provision of prescribed transmission services by TNSPs during a regulatory control period. Each TNSP must submit to the AER a revenue proposal, which is then assessed and approved (or amended) by the AER.²⁹ TNSPs may also submit cost pass through applications or contingent project applications to the AER seeking to recover additional revenue in certain circumstances.

Consequently, by default (and consistent with the system strength framework), primary TNSPs would need to forecast capital and operating expenditure needed as part of their revenue proposals or as part of a contingent project application.

However, we note that expenditure on resolving issues identified through assessment of applicants’ R1 models will likely be difficult to forecast.³⁰ This is because this cost could be variable depending on the complexity of the issues identified. As such, we propose this be a cost pass through event for TNSPs if their forecast capital and operating expenditure is insufficient over the regulatory control period to pay the efficient costs.

²⁷ The AEMC explicitly considered this as a possibility in its final determination of the Efficient provision of system strength rule change. We note that the process of determining and implementing these charges has been difficult. However, we also consider that once the current issues are resolved, the additional changes considered in this rule change request would require only incremental adaptations

²⁸ Note these kinds of solutions have already been implemented to resolve system strength issues. As detailed in AEMO’s *Notice of change to system strength requirement and shortfall at Ross*. Available at: https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/operability/2021/notice-of-change-to-system-strength-requirement-and-shortfall-at-ross.pdf?la=en.

²⁹ In Victoria, the role of primary TNSP is discharged by AEMO. There is no AER oversight of AEMO’s revenue requirements, as AEMO does not have an AER revenue determination. Instead, AEMO must consult on and publish a revenue methodology setting out the method of calculating its maximum allowed revenue for prescribed transmission services for each regulatory year.

³⁰ Changes through the R1 process will, by definition, be difficult to forecast because they will be changes not anticipated when the relevant connection agreement was executed.

We note that, under the NER, positive pass through amounts are subject to the relevant positive change event entailing the TNSP incurring materially higher costs, where the materiality threshold is 1% of the maximum allowed revenue for the TNSP in the relevant regulatory year.³¹ We suggest that the AEMC considers whether Network Support pass throughs,³² which are not subject to a materiality test, would represent a more appropriate precedent for the treatment of pass throughs in relation to the resolution of external system changes in the R1 process.

Similarly, the AER should consider, if the rule change is made, whether this pass through should be considered an uncontrollable cost and therefore exempt from the efficiency saving benefit scheme.

Consideration will also need to be given as to how primary TNSPs can recover their efficient costs of resolving wider system issues identified under the R1 process in their current regulatory control period and the next regulatory control period. We note that, under the system strength framework, this was dealt with through a combination of pass throughs and contingent projects.³³

The CEC is committed to working with both AEMO and the AEMC in order to addressing the issues that have emerged through the implementation of the system strength framework expeditiously, however we do not consider this should create a meaningful impediment to the approach described above.

Box 9: Overall consumer costs likely to be reduced by rule change

Regardless of the detailed policy design to recover network costs, the total impact on consumers is likely to be minimal with consumers may be better off. Currently, costs (and risks) of security are borne by new entrants. These parties in turn pass through any costs to consumers through higher wholesale bids or choose not to enter the market leading to lower competition and reliability.

Concerns regarding impacts on power system operability and security

We are conscious that some stakeholders may raise concern that this arrangement could provide a perverse incentive where the applicant seeks connection of poorly tuned or low-quality assets, in order to transfer costs onto other parties.

While we acknowledge this concern, we also consider there are several safeguards in the rules to prevent this situation from occurring in practice:

- The process for the initial negotiation of performance standards under 5.3.4A is unchanged and therefore the applicant needs to demonstrate their ability in their plant design to comply with those standards, including the existing requirement to justify any reduction in capability below the level of the automatic access standard (even if this is not appropriate in all conditions).
- Post 5.3.4A, any internal plant change that leads to lower level of performance is only permitted where the impact is agreed to be immaterial by the NSP and AEMO.
- The applicant is exposed to the risk that the timeframes for the NSP resolution of the external issue is longer than their commissioning timeframes resulting in the risk that they are subject to

³¹ See NER 6A.7.3(c).

³² See NER 6A.7.2.

³³ AEMC, *Efficient management of system strength on the power system*, Rule determination, 21 October 2021, p. 29.

constraints. The applicant has an incentive to ensure that the plant design is sufficiently robust to minimise the risk of delays, and to move through any retuning exercise as expeditiously as possible.

- This mechanism is only triggered when there is an external change in the power system post the connection agreement.

TNSP and DNSP obligations under the new arrangements

We note that Chapter 5 of the NER applies to both TNSP and DNSP connections (although distribution-connected loads and embedded generation where the responsible party is the retailer would generally be expected to use Chapter 5A). Consequently, the rule change has the potential to apply to projects connecting to DNSP networks.

Although DNSPs do have responsibilities associated with the management of system security, they do not have roles in resolving system strength and inertia issues in the same way as primary TNSPs, and this rule change should not lead to DNSPs having to address these types of issues. Therefore, we propose that, in the case of external event changes (i.e. Type 2 process), it would be the primary TNSP that would be responsible for resolving the issues (but would need to consult with the relevant NSP on how the issue is resolved, where the connection was to another NSP's network).

4.5.4 Type 3: Applicants can resolve minor issues post R1

Under a Type 3 process, connection applicants can propose that minor deviations can be resolved later in the connection process, or potentially even beyond commissioning. This is intended to ensure that minor deviations between the original performance standards and the R1 model, which have proven difficult to resolve, do not result in an overall stable generating system from progressing to registration.

However, this Type process would require the connecting applicant to demonstrate that all efforts had been made to resolve these issues. Furthermore, the connecting applicant would also commit to resolving the issue within the defined timeframe.

Under the current NER arrangements, if NSPs or AEMO identify an issue at the R1 stage, there is no allowed flexibility in the NER for them to accept an action plan from the applicant, which would commit to resolving the issue in a defined timeframe, once the rest of the R1 package is approved.

Connection applicants must instead resolve all these issues before they can proceed to registration. This can lead to an approach where applicants face significant delays in reaching registration, incurring material costs, until relatively minor issues are resolved.

We consider that an effective and preferable mechanism would be to allow AEMO and NSPs to place conditional obligations on the applicant which are approved, alongside the R1 model package. This Type process represents a plant being unable to meet certain specifications of the negotiated access standards as agreed in the connection agreement, but where only minor changes (e.g., to firmware) are needed to bring it into line with the negotiated access standard. Another circumstance where this may be useful is where a work-around by the market operator is available, which could allow energy export under certain conditions but a long-term solution from the generator is needed.

Essentially, the approval of the R1 by the NSP would be conditional on the identified actions by the applicant being resolved at a future point of time.

We consider that the connection applicant would provide evidence for AEMO and NSP as to all works undertaken to resolve the issue in the R1 period.

Applicants would also work with NSPs and AEMO to define a plan whereby these issues would be resolved. This could occur during the R2 stage, where actual plant performance is assessed. We understand it may even be possible to allow for resolution at even later stages, such as when the plant has completed R2 and is in full operation.

We consider the connection applicant would need to make binding commitments to resolve the identified issues within the agreed timeframe.

One issue will be how these binding commitments can be enforced. A possible method for this is to rely on the commissioning program, where the connecting plant is taken through a series of hold points, which are used to confirm the technical performance of the plant against actual conditions.

Where the applicant is a generator, this could include rectification of any identified issues from the R1, before the generator is allowed to move beyond identified hold-points. As a last resort, AEMO can use constraint equations to limit export of generation if they become a threat to system security, for example by not meeting their commitments. However, we consider this is an unlikely occurrence, with connecting parties having a strong incentive to resolve any identified issues within the agreed timeframe, in order to ensure their ability to export energy.

It may also be appropriate that identified issues can be rectified beyond commissioning, once the generating system is fully energised and exporting energy at full capacity. Although any timeframes proposed to be beyond commissioning would need to be accompanied by detailed evidence of why resolution cannot practically be achieved during commissioning, and a detailed plan for resolution.

We understand concerns raised from NSPs and AEMO regarding their ability to ensure connecting applicants meet their commitments to rectify any issues through the conditional approval process. It follows that the NER should include appropriate arrangements for practical enforcement of conditional approvals.

We understand that this feeds into a wider question of actions available in response to generator's non-compliance. The NER may place powers on AEMO to raise concerns with the AER but there may be practical impediments to timely resolution of these concerns. As such the AEMC could consider whether conditional approvals could come with explicit mechanisms for AEMO or NSPs to take action in response to concerns.

In addition to these techniques, the AEMC may need to consider whether to recommend that applicants not meeting commitments made at the R1 stage should be recommended to become a civil penalty provision. This may be required to ensure that applicants continue to meet commitments made at the R1 stage. Further, the AEMC may need to also consider whether there is a need to include in the NER, additional mechanisms to enable AEMO the ability to recover additional AEMO compliance management costs associated with monitoring and ensuring compliance post the R1 process.

4.5.5 Type 4: Applicant rectifies issues subject to NSP evidence

Under this Type process, where material issues have been identified that are due to changes made to the connecting plant, the connecting applicant would be responsible for remediating these issues.

We understand there may be circumstances where the R1 model presents clear issues for performance against the negotiated access standards due to changes in the internal design of the plant.

Under these circumstances, proceeding to registration may not be appropriate. The revised framework therefore includes this Type 4 process, which occurs when the NSP identifies that the applicant's R1 model demonstrated plant performance is outside the materiality threshold, due to changes in the applicant's plant - that is, changes made behind the point of connection by the connecting applicant - and that this is likely to lead to material system security, power quality or operational issues.

We consider that under such conditions, it would be reasonable for the connecting applicant to go through a process to rectify the identified issues, before moving to registration.

However, under the current NER, there are no requirements for NSPs or AEMO to provide any guidance or evidence as to the nature of the issues identified. This can delay the process of rectification, if insufficient information is provided to the connecting applicant.

We therefore propose that if the NSP, on AEMO's advice, refuses the R1 application within the defined time period on the basis of these kinds of issues, it must transparently demonstrate how connection of the plant would lead to a substantial negative impact on system security, power quality or operability.

This would require the NSP to prepare a report that demonstrates all the below points:

- How the applicant's R1 model indicates performance outside of the materiality definition;
- How the changes in the modelled outcome are associated with internal plant design issues and not caused by changes in the wider power system;
- That connection of the plant would lead to an impact on the power system such that it would lead to a reduction in system security, quality or operability that would materially affect consumers or other market participants; and
- The issue cannot be resolved during the R2 stage through the applicant undertaking works on a conditional basis as part of the commissioning program
- An outline of the required course of action to rectify the identified issue.

If the NSP can meet the above onus of proof, then the R1 model be rejected and the applicant would undertake the necessary work to bring the plant performance back to within any agreed materiality thresholds.

Design changes at this stage will likely need to be assessed under the process laid out in clause 5.3.9 of the NER. While we acknowledge the broader problems with the 5.3.9 framework, we consider this is the only regulatory process in the current NER that can be used to enable these changes.

Under this scenario, the applicant would change its plant design to meet the required performance standard. The R1 model would not be accepted until the plant's performance is at least within the materiality threshold.

4.6 Facilitated review for R1 process steps

All parties have the same overall goal of facilitating new connections in a timely, low cost and secure manner. However, we accept there is the potential for disagreement between applicants, AEMO and the NSP on technical issues and approach. Currently, as the R1 process is not clear in the NER, the process for resolving related issues is not specified.

When considering this issue, we note that connection decisions require engineering judgement from all parties. However, formal dispute resolution is not easily accessible when there is difference of opinions, nor is it able to provide a timely solution.

We propose that the first step of any dispute resolution for the R1 mechanism should be a facilitated review. The purpose of this is to allow an informed fresh set of eyes to kick start constructive conversation focussed on developing positive solutions that work for all parties.

This will not guarantee an effective outcome but will allow for more facilitated discussions that encourage compromise and sensible solutions prior to any formal triggering of dispute resolution.

We believe the parties can agree whether to involve a third-party to help facilitate the discussions to help reach a timely and workable solution. The purpose of these facilitated discussions will be to informally bring the parties together to focus on the shared goals of a secure power system and the connection of the required generation to maintain a low-cost and reliable supply of energy. It will also provide a mechanism to escalate internally within the applicant, NSP and AEMO to find a workable solution for all parties. This new party will not have any authority to make binding resolutions on the generator NSP or AEMO.

Under our request, the proponent will still retain the existing options to trigger a formal dispute if the new facilitated review stage doesn't result in a resolution. As such the mostly likely formal action would be the request for an independent engineer under rule 5.4 to determine an assessment on commercial matters, which may be escalated to commercial arbitration. (It may be necessary to clarify the scope of the matters that can be considered by the independent engineer, as specified in clause 5.4.1.)

The rule change would obligate AEMO and NSP to engage in this facilitated review process within 10 business days of the request. If there is a dispute that cannot be resolved, this should be taken through arbitration as laid out in rule 5.5, or through the dispute resolution process in rule 8.2, as appropriate.

The rule change should include appropriate controls to ensure the approach to the discussion is exercised on a case-by-case basis, and applicants with deficient or rejected applications that would not benefit from discussions for example, do not disproportionately or inappropriately utilise AEMO's and other parties' limited resources.

5 How the proposed rule change contributes to the achievement of the National Electricity Objective

The AEMC is required to assess all rule change requests with reference to how they contribute to meeting the NEO. 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:

- *price, quality, safety and reliability and security of supply of electricity*
- *the reliability, safety and security of the national electricity system.*

The rule change proposed by the CEC will provide for meeting the NEO in the following ways:

- Reduced long terms costs for consumers because of lower risks and costs by investors and developers of new renewable generation and storage

- Improved reliability due to faster connection of new entrants, increasing supply of energy in advance of retirement of thermal coal assets
- Supports the ongoing transition to a decarbonised NEM by encouraging needed investment in renewables and storage, helping to reduce the emissions intensity of the energy sector
- Reducing uncertainty for investors, which will reduce risk premiums and investment costs generally. This will help to reduce costs for consumers as participants will have lower investment costs to recover through the wholesale market, increasing market competition and leading to more efficient wholesale prices.
- Better allocation and sharing of risk across participants, NSPs and AEMO, resulting in lower overall costs for consumers.
- Better management of system security and provision of power system quality, by identifying the optimal solutions to deliver on these power system requirements at lowest overall cost.

5.1 Long term cost reduction for consumers

This rule change request will reduce risk for investors and developers of new renewable generation and storage. This will lead to a reduction in costs, primarily through lower development costs, administrative overheads and financing costs.

We therefore consider the making of the rule would lower the costs these generators would consider necessary in determining their bids for both wholesale energy and ancillary services.

In addition, supporting new entrants will lead to more competition in the market and help maintain downward pressure on wholesale prices, to counter the potential impacts of retirement of existing thermal plant.

We consider that the making of the rule would help deliver efficient outcomes in both energy and ancillary service markets. This will drive long term efficient prices for consumers of these services.

5.2 Supporting the energy market transition to decarbonisation

The energy market is in a state of transition due to the closure of existing thermal generation and the need for extensive new entry of renewable generation and storage, within a relatively short period of time.

All market bodies and regulatory agencies are facilitating these changes as a high priority, to minimise the potential for negative consumer impacts. The regulatory environment must be flexible in allowing for the implementation of high volumes of new entrant renewable plant, some of whom may be utilising new technologies that can provide significant benefit to consumers, such as grid forming inverter technology.

The rule change request will support flexibility to quickly integrate these technologies, allowing a clear process for generators to follow from connection agreement to registration. For all parties, this improved setting out of the process will provide more certainty, lowering costs and minimising confusion over roles and responsibilities. For consumers, this would result in lower risks and costs being borne due to the changing nature of the power system.

Finally, the rule change is also consistent with the emissions reduction requirement that will shortly be integrated into the NEO. While this element of the NEO is not yet formally legislated, we urge the AEMC to begin consideration of the likely requirements it will place on regulators. We consider this rule change is entirely consistent with this emissions reduction objective, in that it will accelerate the

rollout of renewable generation. By doing so, it supports and enables the various state and federal emissions reduction policies that have been legislated, or shortly will be.

As identified throughout this rule change request, we acknowledge there is a balance to be struck between the rapid integration of renewable generation and storage, against the requirement to manage system security, power quality and the ability of NSPs and AEMO to manage the power system. We consider that the various provision included in this request are sufficient to strike that balance.

5.3 Removing uncertainty and reducing investor risk

The current lack of certainty in the R1 process acts as a barrier to entry for new generation and storage investment, or at least materially increases the cost of new entry which may make it non-viable for some investors to enter the market.

By reforming the R1 process and making it clearer, this should remove uncertainty for investors and therefore reduce the risk premiums attached to the cost of new generation, including dispatchable generation and batteries needed to maintain overall system security.

Applicants must have their R1 approved before they are able to submit their request for Registration under the process laid out in Chapter 2 of the NER. However, the current system is unclear in describing the process. Subsequently, there are multiple examples of connecting parties experiencing delays due to being from applicants unable to resolve their issues in their plant so they can complete the pre-registration step.

This lack of clarity regarding process in turn leads investors in subsequent assets, who have learned from the experiences of previous connections, to increase risk premiums and require higher rates of return for their investments.

This rule change request clarifies the process that applicants follow from completing the connection application to registration. The introduction of timeframes, clear allocation of responsibilities and introduction of clear pathways to registration, all act to remove this uncertainty. We consider this will help to reduce the perception of risk for investors, associated with the current R1 process.

Reducing risk premiums from investors therefore reduces the costs borne by market participants, in turn reducing the extent of investment costs that need to be recovered through the wholesale market. This helps to deliver more efficient wholesale prices for consumers.

In addition, the streamlined process would lower the costs for AEMO and NSPs, as the process would be clarified for these participants as well.

5.4 Better allocation of risk

Under the current process, generators face a risk of large delays or even being asked to change technical specifications between the connection application and registration. At this late stage of the connection process, generators have often reached financial close and sometimes are well advanced in the physical construction of assets.

A generator that faces a delay or added cost will not be able to progress to commissioning and exporting energy, until its R1 model and associated documentation are approved. This places a large risk on incoming generators that they may have to bear additional or costs or delays during this stage for reasons that are not clear and are not able to be mitigated before construction commences.

The proposed rule change will place a clear onus of proof on AEMO and NSPs to provide clarity on issues that the generators need to resolve, as well as providing the framework for this to happen in a timely manner. In addition, the rule change implements a mechanism for compensation of generators incurring costs due to changes in external conditions. This reduces the risk that potential new entrants face due to the uncertain demands of the process and unspecified timeframes.

More generally, this rule allocates costs and risks to those parties who are best able to manage them. In particular, the new Type 2 process enables NSPs to utilise their unique access to and ability to leverage scale and scope economies, to source the lowest cost solution to any power system quality and security issues identified in an R1 assessment. This will help reduce the costs of risk management, which is ultimately passed on to consumers through lower electricity costs.

5.5 Improved reliability for consumers

The transition of the power system will require a substantial number of new entrants of varied location and technology type to enter the market in response to the closure of existing thermal generation. The timely entry of large volumes of new entrant generation and storage will improve the reliability of the overall power system considerably.

The rule change request will simplify and quicken the process of these new connections entering the market. This in turn will lead to an increased supply of generation, helping to contribute to a higher level of system reliability.

5.6 Improved management of system security issues

Currently, any security issues that are identified using an applicant's R1 model are resolved by the connecting applicant before it can register. The applicant does not have access to the full context of any issues and is only capable of responding through changes to its design. Such design changes may come with substantial cost and project delays.

In addition, the applicant has no incentive to find the best overall solution for the power system, but instead aims for the cheapest and quickest method of satisfying the NSP and AEMO.

Finally, primary TNSPs have a better understanding of the needs, and clearer information on the overall status, of the power system. They can also exercise economies of scale and scope to identify the lowest overall cost solution.

Under the rule change proposal, external issues identified by an applicant's R1 model will be managed by the primary TNSP, with reference to its overall capabilities and needs. The TNSP can plan and construct a wide variety of assets, considering the future needs of the power system and expected changes due to new entrants and market exit. Equally, the TNSP can also utilise its access to information to engage with multiple participants to identify low cost non-network solutions to address the identified issue.

Separating network security provision from the process for R1 approval will lead to more efficient spending on security services. This would mean that overall security spending will be more coordinated, and thus potentially lower across all connections. In addition, this improved coordination is likely to lead to improved security outcomes.

Further to this, the potential use of a revised charging mechanism for issues raised by the network, will allow for the costs of these security solutions to be equitably and efficiently shared across parties.

5.7 Proportionate administrative costs for the sector

While the proposal will result in new and different functions for market bodies, NSPs and participants, we consider that on balance there will be a net saving through the rule change achieving administrative clarity and ease of process for market participants and bodies. With the roles and responsibilities clearly specified plus timeframes more explicit, this will result in lower costs compare to the current arrangements.

6 Rule change request consistent with ongoing policy work

Substantial reforms to the R1 process are a key requirement to enable the transition to lower carbon emission generation. The ability to connect new generators is on the critical path for this process, and the registration component of the connection process has been identified as one of the most opaque and problematic elements of getting generators connected.

We recognise that the AEMC and AEMO are actively considering processes to improve the connection process to support the energy transition. This rule change is consistent with and supports this ongoing package of works.

This rule change proposal has been drafted to complement these reforms and will work in parallel to achieve a fit for purpose and robust connection process. Collectively these reforms will be a key enabler for the energy transition.

We also note that under the NEL, the AEMC needs to consider whether it has made a rule change on a related topic within the last twelve months. As there hasn't be any rule determinations relating to the interaction of the commissioning and registration process for new entrant generators over the last year, we don't see any limitations on the AEMC ability to evaluate this proposal.

6.1 AEMC Rule Changes

The AEMC has recently made a number of rule change determinations relating to the connection process which are consistent with this rule change proposal from the CEC.

System Strength: In October 2021, the AEMC completed a final rule relating to the provision of system strength, requiring networks to proactively provide efficient levels of system strength. Much of the rule has not yet come into force, though we note that it will directly impact on the technical obligations that newly connecting generators will be required to meet. Specifically, the rule amends

- Clause 5.3.4B – Generators can pay a *system strength charge* to allow NSPs to meet system strength requirements on the generator's behalf, rather than relying on connecting generators managing this through the connection process.
- Schedule 5.2 - Introduction of two new technical requirements on Generators to meet before registration relating to system strength. (Schedule 5.2.15 Short circuit ratio and Schedule 5.2.16 Voltage phase angle shift).

Generator performance standards rule change: On 27 September 2018, the AEMC made a rule amending the requirements around the connection process, to increase the flexibility for generators while also improving certainty for NSPs and AEMO. This rule change introduced the capability to have a negotiated connection agreement through the clause 2.3.4A process. This reform provided more flexibility for generators and NSPs to work together to provide for a connection process that met both their outcomes. However, the rule also introduced limitations on reduction of the

performance standards below levels set as the original negotiated access standards, which we have identified as an impediment to effective R1 processes.

Generator Registration and Connections: On 21 October 2021, the AEMC made a rule relating to the process for smaller generators receiving exemptions to registration and increasing transparency of AEMO's processes and decision-making. As a requirement of this rule change there is a requirement for AEMO to create a guideline on the processes for registration, classification and exemption under Chapter 2 of the Rules, and the matters AEMO may or will take into account when assessing such applications. AEMO published the guideline in August 2022, which helps clarify which generators need to meet the requirements to be registered.

6.2 Ongoing AEMO work

AEMO Review of access standard obligations for connection

AEMO is currently consulting on a review of the technical obligations of connections in the NER access standards, including for generators. The review is following industry consultation including with the Reliability Panel. The review is examining the appropriateness of the technical requirements that generators are required to meet as part of the connection process.

At the end of this review, the AEMO final report may recommend NER amendments by way of a rule change request to the Australian Energy Market Commission.

6.3 Other Connection Reform Initiative workstreams

In addition to this rule change request, the CRI is examining a number of potential changes to the regulatory framework to improve the connection of new generation.

Review of 5.3.9 Rule

New applicants are required to use the process set out in clause 5.3.9 to revise the negotiated access standard to respond to any issues identified during R1. There is a separate workstream examining the 5.3.9 frameworks in general and improvements that could be made to allow for improved negotiations.

This rule change relates to methods to ensure that NER clause 5.3.9 process is only utilised in the appropriate circumstances.

Recommendation 6.5

The CRI report recommended that a rule change be prepared to allow for collective retuning “post-revenue” in response to changes in network conditions once the connection process is completed. This rule change relates to the process followed when there are external changes after the commissioning plan is completed, and the generator is required to undertake changes to its plant to maintain secure operation of the power system.

Similarly, we recognise that while the general concept of ‘collective retuning’ has been achieved in practice in both Ross in Queensland and West Murray in Victoria, it is not explicitly accounted for in the existing NER frameworks. The CEC has committed to detailed consideration of this concept, including how it might be enabled through better regulations.

This recommendation relates to similar issues to these raised by the rule change request. Specifically, who bears the risks when situations change, and are existing generators best placed to respond to challenges impacting on consumers and new entrants. However, we consider that this

recommendation does not directly relate to the connection process but instead to changes of a finalised generator and should be considered separately.

7 Costs, benefits and expected impacts of the proposed rule change

7.1 More clarity of connection and registration process

The main benefit of the rule change request is the provision of more clarity of process and timelines for all parties involved in the registration and connection process.

With a clearer process investors and developers will face lower risk and quicker pathway for connection. This will lead to lower cost for new entrants, which in turn provide for lower costs for consumers.

Providing increased clarity provides benefits to NSPs and AEMO through creation of clear guidance on what is technically required for connection and registration, thus allowing for reduction in the effort involved by these parties.

7.2 Reduced risk for generation applicants increases level of investment

The revisions to the R1 will reduce the risks borne by generators during the latter stages of the connection process. Notably, generators will be far less likely to experience delays where they are uncertain of how to respond, and how to make changes. This reduced risk borne by generators is likely to result in lower costs being passed on to consumers.

Attachment 2 illustrates some of the potential impacts of the revised R1 process set out in the rule change on a number of recent generator connections where issues have been experienced.³⁴

7.3 Improved management of system security

Connecting generators currently are responsible for resolving all broader system issues identified during the R1 stage of their connection. We have observed that this is a service that generators are providing to the wider network through connections, with each individual generator bearing these costs to manage wider security issues on behalf of all participants.

The rule change does not only remove the risk from the generator, but also allows for greater choice of technical solutions. A generator only has its own assets to respond to a security issue, while the TNSP can undertake developments on its own assets, as well as procure services from market participants. This improved choice allows for more cost-effective system security actions.

7.4 Administration costs of implementation

One cost related to the rule change request will be the administration costs of developing the new processes. The rule change request calls on AEMO to draft and consult on a new guideline. In addition, new process will need to be developed by AEMO and NSPs to account for changes to materiality and developing out how to prove the revised onus of proof.

However, these administrative costs will be offset by reduced complexity experienced by all parties due to improved process. The benefits of the rule will increase over time to account for learnings as the new process is better understood by all parties.

³⁴ Note that the case studies in Attachment 2 have been anonymised to preserve confidentiality.

7.5 Ongoing administrative costs for participants

Once the rule change comes into force, there may be additional administrative steps on participants compared to the status quo. Currently, much of the work during the final stages of the process is through informal discussion between the parties. The rule change request will create a more structured framework on the steps required and the evidence that needs to be provided.

Due to these obligations, the applicant will likely need to provide detailed information to AEMO and to relevant NSPs. In addition, NSPs and AEMO will then need to make formal timebound decisions and provide the applicant with details of security issues or materiality assessments.³⁵

If the relevant NSP decides to respond to identified security issues, this may assessment of options, along with determining the extent of efficient costs that can be recovered.

While this will increase the administrative burden on these parties, we consider that this is balanced by the improved information flow and reduced risk that the new process will bring.

8 Guidelines will need to be developed as part of the transition of the rule change request

The implementation of the rule change process will require the preparation of two guidelines³⁶ on the operation of elements of the revised R1 framework:

1. Operation of the materiality definition, and the process for setting this during the negotiation of the connection agreement.
2. Defining of external changes in the power system identifying during R1 and providing a methodology for determining fair value for applicants that revise their plant design or settings, in response to TNSP requests for system security services.

In addition, AEMO and NSPs will require time to make the necessary changes to their processes, to account for the framework changes in the rule change request. NSPs will be required to be able to prepare documentation that meet the “onus of proof” for applicants that may not be able to receive R1 approval within the required period.

We suggest that the rule change includes a 6-month period for implementation from the making of the final rule, including a rule consultation process for the new guidelines, before coming into force. If the guidelines are delayed, then the rule changes should still take effect. In making the rule change request, the AEMC will need to account for all the ongoing processes of the CRI in deciding how best to integrate this rule change request alongside other reforms of the connection process.

In addition, the transitional arrangements will need to account for connection applications that are in process on the commencement date of the new rule. We propose that the new framework apply for all connection agreements that are negotiated under clause 5.3.4A after the implementation date. Any R1 model assessments for applicants that have already signed their connection agreements at the time the new rule commences should continue under the existing process.

³⁵ The AEMC may need to consider whether a time limit should include a reasonable endeavours qualification, similar to other timebound obligations on AEMO and NSPs under NER Chapter 5, to reflect that there can be scenarios in which AEMO is unable to meet its obligations through factors outside of its control.

³⁶ We recognise that for ease the AEMC could merge these two into a single guideline requirement. However, this may not be possible if the materiality guideline is developed by an industry committee.

Attachment 1: Proposed changes to relevant NER clauses

This attachment presents the detail of our proposed changes to the existing rules necessary to achieve the changes proposed in this request

Rule Clause	Proposed changes drafting
Chapter 2	
2.2.1(e)(3)	<ul style="list-style-type: none"> — Specify that demonstration of technical performance of a generator seeking to be registered is in reference to an applicant receiving an R1 model approval from the NSP. This should link to a new requirement on the NSP in clause 5.8.4 for the NSP to inform AEMO and the connection applicant of the approval of the R1. — Provide that registration can occur conditional in the event of a type 3 connection. — If AEMO does not proceed with registration following NSP approval of R1 model, then provide reasons to the applicant and required actions to achieve registration
Chapter 4	
4.3.4	Add a section to clarify that primary TNSPs can act to provide security services where the R1 models and assessment from a generation applicant has identified security, power quality or operational concerns on the wider network. Link this obligation to process as outlined in new clause 5.8.4A.
Chapter 5	
5.3.4	Allow a connecting applicant to include considerations of materiality threshold with the connection application.
5.3.4A	<ul style="list-style-type: none"> — Remove the provision in 5.3.4A(b)(1A) which provides that a negotiated access standard varied under 5.3.9 must be no less onerous than the existing performance standard. — Allow applicants to specify elements of the connection agreement which could fall within the materiality threshold as an element of discussion with the NSP. — Outline that setting of the materiality threshold in the negotiated connection agreement would be an AEMO advisory matter allowing AEMO to provide feedback into the process, but noting it is specifically an element of negotiation between the applicant/NSP. — Set out that if the NSP considers that the R1 model of an applicant identifies performance within the materiality threshold, then this is taken as the negotiated access standard for the plant going forward.
New section likely near 5.3.4A	<ul style="list-style-type: none"> — Establish requirement for AEMO to publish and maintain a materiality application guideline. Will be required to consult with industry using the rules consultation procedure. The guideline would include: <ul style="list-style-type: none"> — Outline elements of the performance standards that may form part of the materiality threshold

Rule Clause	Proposed changes drafting
	<ul style="list-style-type: none"> — Set out process for negotiation between applicants, AEMO and NSPs — If possible, provide some “automatic” materiality thresholds that can be applied. — Case studies of historical connections, and how these would be considered in the framework. — AEMO should provide annual update on recent examples of materiality decisions within connection requirements <p><i>Note – materiality can still be applied during the R1 process</i></p>
5.3.9	The operation of cl5.3.9 process is subject to work of another CRI workstream. We consider that there are no direct changes needed, but this needs to be considered in preparing the rule change
5.8.4	<ul style="list-style-type: none"> — Revise cl5.8.4(a) to clarify that the applicant is required to provide the R1 model and studies, and optionally a report identifying proposed type of assessment, plus any proposed changes to its performance standards. — Allow applicants, AEMO, and NSP to set out appropriate materiality thresholds at the time of commencing R1 assessment — In making its assessment, the applicant can specify whether its connection includes any of the following issue types: <ul style="list-style-type: none"> — Type 0: Modelled performance is consistent with negotiated access standard — Type 1: The performance of the plant is within the materiality threshold — Type 2: The R1 model identifies issues with the external system that can be resolved by actions from the relevant primary TNSP. — Type 3: The R1 model has identified that the applicant should receive conditional approval for registration as it acts towards meeting the negotiated access agreement. — Provide for different issues to be managed as different types, with the timing of the overall assessment being determined by the slowest pathway that was triggered. — Specify that it is the responsibility of the NSP to provide formal acceptance of the R1 model. — Place an obligation on NSP to provide the approval of the R1 following the process in revised clause 5.8.4. — Provide that approval from the R1 model can be conditional in the event of a type 3 connection. — Where R1 approval (which would prevent a generator connection from proceeding to registration) is not provided, it is the responsibility of the NSP to provide documentation — An NSP’s decision of type of R1 modelling type is to be made in reference to advice prepared by AEMO on the submitted model along with the applicant’s self-assessment. In making its decision, the NSP should use engineering best judgement and also have regard to: a) previous discussions with the applicant during the connection process and b) the importance of timely resolution of issues to enable connection and financing of the project. The NSP and AEMO consideration of the applicant’s R1 model and assessment should be proportionate to the risk to the system. — Revise cl5.8.4(c) that AEMO is to provide its advice to the NSP on the combined package within 20 business days. The NSP then has a further 10 business days to decide on the approval of the R1 model.

Rule Clause	Proposed changes drafting
	<ul style="list-style-type: none"> — Require that if the R1 model is not approved at the end of the timeframe of the new 5.8.4(c), there is a requirement for the NSP to provide documentation to the applicant outlining the reasons for non-acceptance of the R1 model (ie that this is a type 4 connection). — The NSP must identify why the modelled performance is not within the materiality threshold — The NSP must identify why any issues identified in the applicant’s model are not external — The NSP must identify potential security issue so that the applicant cannot receive conditional approval for registration before relevant changers are made. — If additional information is requested from the applicant, the NSP should outline in its report the expected cost and time delay, justified against potential security risk identified by the applicant remodelling performance. — Identify that if agreement is not reached the applicant can request all parties must enter into a facilitated discussion in good faith to identify R1 modelling issues. This must be commenced within 10 working days of being requested by any party. Facilitated discussion requires sharing of information and concerns in a collaborative and reasonable manner.
5.8.4A (proposed new clause)	<ul style="list-style-type: none"> — New section on the process of NSPs to respond to external security issues identified from the R1 model (i.e., type 3) — Link to cl4.3.4 provision that external changes identified through the R1 model is the relevant primary TNSP’s responsibility to resolve. Identify that the TNSP can procure changes to applicant design, or undertake other network actions to resolve — Outline requirement on AEMO to prepare a guideline relating to external changes in network conditions identified during the R1. Place obligation on AEMO to prepare and maintain a cost calculation guideline including fair return of direct costs and compensation for connection delay. — An obligation on TNSP to resolve issue in a timely and reasonable manner being aware of the applicant timeframes for commissioning — Identify applicant, or other registered generators, can receive payment for efficient costs from a TNSP request to changes to plant design to address external events. — Identify that TNSP must use all reasonable endeavours to identify solution as quickly as possible, and applicant must use all reasonable endeavours to implement identified solution as quickly as possible. — R1 registration approval under clause 5.8.4 should be issued when applicant agrees to undertake procured work or the TNSP identifies another solution. — Clarify that the R1 acceptance from the NSP means that the applicant meets the requirement for registration under clause 2.2.1(e)(3) (if relevant). R1 approval does not necessarily mean a Generator is registered nor that the plant is allowed to be energised until separately approved.

Rule Clause	Proposed changes drafting
5.8.5	Add a section that it is a compliance obligation for applicants to meet their agreed terms of the R1 modelling assessment, including design changes identified during the clause 5.8.4/5.8.4A process. <i>The AEMC to consider whether this could be recommended to be a civil penalty provision.</i>
Schedule 5.1.15 (proposed new clause)	Add a clause to give effect to the resolution by TNSPs of external system changes by in the R1 process being classified as <i>reliability corrective action</i> .
Schedule 5.2.1 (g) 5.2.2	Revise to specify that the movements within materiality threshold identified through the R1 model are taken to represent the negotiated access standard going forward. (i.e., allow for Type 1 R1 assessment)
5.4 5.5 8.2	We consider these are not likely to be altered significantly, but the rule change could provide guidance on the application of dispute resolution after the new facilitated discussions arrangements outlined in clause 5.8.4. It may be necessary to clarify the scope of the matters that can be considered by the independent engineer, as specified in clause 5.4.1.
Chapter 6A	
6A.6.6 (e)	In the TNSP's forecast operating expenditure, include a requirement to include estimate for procurement of security revisions associated with new connections, as identified through R1 model (i.e., new clause 5.8.4A).
6A.7.3	Add forecast costs to rectify security issues identified by R1 models a cost pass through for TNSPs.
Chapter 10	
Definitions	Need to review current definitions and insert new definitions consistent with the proposed rule. Following terms will likely need to be defined <ul style="list-style-type: none"> — <i>R1 approval</i> – An approval issued by the relevant NSP that a connection applicant R1 data is consistent with the achievement of the agreed performance standards. For generators, this meets the requirement under clause 2.2.1(e)(3) for a generator to be technically capable before it can be registered. — <i>Materiality Threshold</i> – A change in technical specification identified in R1 modelling from negotiated access standard that a risk-based analysis has demonstrated will have minimal impact or low probability of occurrence to impact system security. — <i>External change in network condition</i> – An instance where power system conditions outside the control of the applicant have changed between negotiated access agreement and the provision of the applicant's R1 model. — <i>Conditional R1 Approval</i> – An agreement between a connection applicant and NSP where the NSP provides R1 approval with the connection application committing to undertake specified actions within a set timeframe of energisation.

Rule Clause	Proposed changes drafting
Chapter 11	
11.X	<ul style="list-style-type: none"> — Requirement on AEMO to draft initial materiality assessment guideline before the substantive changes in the rules come into force. — Requirement on AEMO to draft the external security cost compensation guideline using the rules consultation procedure before the substantive changes in the rules come into force.

Attachment 2: Likely impacts of the proposed rule on recent connection case studies

Project summary	Connection delay	How rule change may have impacted
<p>Wind Farm in Victoria where approximately 200MW of >500MW was not able to be registered.</p>	<ul style="list-style-type: none"> Registration was delayed due to 'oscillation issues.' Ongoing issues with GPS for remaining capacity. 	<p>NSP would be required to assess the oscillation issue.</p> <p>Depending on severity or impact, this could be deemed an area the applicant can address at the time of commissioning (Type 3). Alternatively, the NSP could have identified that the issue was caused due to effects on the wider network, in which case the Type 2 processes would apply.</p>
<p>Multiple connections in West Murray Region between 2018 and 2020.</p>	<ul style="list-style-type: none"> West Murray region 'grid weakness' - connection delays following system strength issues and voltage oscillation problem. 	<p>West Murray region issues were largely resolved through NSP investment at the direction of AEMO.</p> <p>Under our rule change request, this would be a Type 2 process where primary TNSP procures response.</p>
<p>Small Energy Park in North Queensland delayed during construction.</p>	<ul style="list-style-type: none"> Delay likely caused due to system strength issues. 	<p>System strength issues can be resolved efficiently by networks, as a Type 2 response. The AEMC has recently made a rule to improve system strength procurement.</p>

Attachment 3: Application of the rule in Victoria

Under the National Electricity Law (NEL), a rule change request relating to transmission must consider its application on AEMO's declared network functions.

A request for a rule regulating AEMO's declared network functions may only be made by

- (a) AEMO;
- (b) a declared transmission system operator that is a party to a network agreement with AEMO;
- (c) a Minister of an adoptive jurisdiction.

The AEMC cannot make a rule "regulating AEMO's declared network functions" unless it proposed by one of the parties specified.³⁷

AEMO's declared network functions are set out in 50C(1) of the NEL. These are:

- a) to plan, authorise, contract for, and direct, augmentation of the declared shared network;
- b) to provide information about the planning processes for augmentation of the declared shared network;
- c) to provide information and other services to facilitate decisions for investment and the use of resources in the adoptive jurisdiction's electricity industry;
- d) to provide shared transmission services by means of, or in connection with, the declared shared network;
- e) any other functions, related to the declared transmission system or electricity network services provided by means of or in connection with the declared transmission system, conferred on it under this Law or the Rules;
- f) any other functions, related to the declared transmission system or electricity network services provided by means of or in connection with the declared transmission system, conferred on it under a law of the adoptive jurisdiction

We consider that this rule change request does not relate to any of the declared network functions specified in the NEL. The rule change is narrowly focussed on the process followed by the NSP in assessing a connecting applicant's performance against the negotiated access standard before registration, where the applicant is a generator. This task does not seem to fit into any of the categories outlined as a declared network function.

Therefore, any rule made by the AEMC in response to this rule change request would apply equally in Victoria as all other NEM regions.

³⁷ NEL s91(7)(9)

Attachment 4: Tables on current R1 process

The below table outlines the requirements for generators during the R1 stage of the completion step in generation.

Document	Purpose	Most Recent Publication	Cross reference to NER obligations
Generation connection R1 Submission Checklist	Checklist of information expects before submission of R1 data and commissioning plan	3 May 2021	Checklist to assist in R1 process. AEMO Not required to publish under the NER
Generator Performance Standard Template	Technical specification of connection requirements	31 March 2021	Cross linked to multiple technical standards largely located in NER Schedule 5.2 Template for proving compliance with NER requirements
Assess Standard Assessment Guide	Provides detail on information required by AEMO from applicants and NSPs	January 2019	Outline of rule requirement under NER 5.3.4A This document from AEMO is not required under the NER
Interim Primary Frequency Response Requirements	At pre-R1 stage AEMO wants evidence that generator can comply with PFR obligations.	4 June 2020	Guideline specifically required and given power under 4.4.2A(a) of the NER.
Power System Model Guidelines	Information that needs to be supplied for the mathematical models	1 July 2018	Guideline specifically required and given power under S5.5.7(a)(3) of the NER.

	of plant, and power system security		
Guideline for preparation of a releasable User Guide	Requirements for generators to supply a user guide to help interpret their models	1 July 2018	AEMO documentation to help interpretation of generator obligation under NER S5.2.4(b)(8)
Application for registration as a generator in the NEM / Application guide	Provides details and template for information to be supplied under registration as a Generator	2021	AEMO in charge of registration under NEL, Part 2 Div, 1 Section 11. Approval from AEMO to register as a generator required under NER 2.2.1(e)

The below table outlines the requirements for generators during the R2 stage of the completion step in generation.

Document	Purpose	Most Recent Publication	Cross reference to NER obligations
Power System Model Guidelines	Information that needs to be supplied for the mathematical models of plant, and power system security	1 July 2018	Guideline specifically required and given power under S5.5.7(a)(3) of the NER.
GPS Compliance Assessment and R2 Model Validation Test Plan Template: for inverter-based technologies	Outlines standard tests and expectations for inverter-based technologies	February 2020	This document is not explicitly required under the NER. Outlines AEMO's expectations for commissioning program (NER 5.8.4), and testing against connection agreement (clause 5.7.3),
Commissioning requirements for generating Systems	Provide guidance in the in preparing testing for the R2 tests.	3 August 2012	Not clear, notes that post- connection testing is required
R2 testing guideline	Provide guidance in the in preparing testing for the R2 tests.	28 June 2013	Not clear, notes that post- connection testing is required