Consultation paper

Pricing methodology guidelines: System strength pricing

22 March 2022

AUSTRALIAN
ENERGY
REGULATOR

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1.1 Our task

On 21 October 2021, the Australian Energy Market Commission (AEMC) made a final rule for the “Efficient management of system strength on the power system” rule change (system strength rule change).[1,2]

The AEMC’s final rule requires us, the Australian Energy Regulator (AER), to modify the pricing methodology guidelines by 31 August 2022[3] for two new requirements.[4] Specifically, the pricing methodology guidelines must specify or clarify:

- the permitted methodologies for determining the system strength unit price component of the system strength charge
- principles for determining forecast annual system strength revenue and estimated actual annual system strength revenue.

The pricing methodology guidelines set out the information a Transmission Network Service Provider (TNSP) must provide to demonstrate that its proposed pricing methodology complies with the National Electricity Rules (NER).[5]

The amendments to our guidelines will be most relevant to TNSPs who are System Strength Service Providers (SSSPs) under the new rule requirements – these are TransGrid, ElectraNet, Powerlink, TasNetworks and the Australian Energy Market Operator (AEMO).[6] However, the amendments will apply to all TNSPs and will have some consequential impacts on TNSPs who are not SSSPs, particularly TNSPs who may have system strength connection points on their networks.

1.2 Objective and scope of this consultation paper

This consultation paper commences our process to update the pricing methodology guidelines for the new system strength requirements.

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1 AEMC, *Rule determination: Efficient management of system strength*, 21 October 2021.

2 System strength is a quality of the power system reflecting a combination of fault current provision and the overall stability of the voltage waveform.

3 NER, clause 11.143.4.

4 NER, clause 6A.25.2(h). Note, clause 6A.25.2 sets out the required contents of the pricing methodology guidelines.

5 The current pricing methodology guidelines are available on our website: https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/pricing-methodology-guidelines-2014/final-decision

6 As part of its functions, AEMO is a Victorian electricity transmission network service provider.

This consultation is limited to adding the new system strength pricing requirements to the pricing methodology guidelines, and any consequential changes. We seek initial stakeholder feedback on:

- How we should approach this task.
- Issues and considerations for permitted system strength pricing methodologies.
- Issues and considerations for guidance on forecasting system strength revenues.

1.3 How can you get involved?

Stakeholder engagement is not only something we must have regard to when performing our regulatory obligations. It is a valuable input, which we encourage.

When we receive submissions that articulate stakeholder preferences, address relevant issues, and provide evidence and analysis, our decision-making process is strengthened. It also provides greater transparency, predictability and builds trust and confidence in the regulatory framework.

We invite stakeholder submissions on this consultation paper by **26 April 2022**. We will consider all submissions received by that date.

A summary list of consultation questions is set out in Appendix A, and a word version template of consultation questions can be found on our website.

Submissions should be in Microsoft Word or another machine-readable document format. Please address submissions to:

AERPricing@aer.gov.au

Warwick Anderson
General Manager – Network Pricing
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We prefer that all submissions are publicly available to facilitate an informed and transparent consultative process. Submissions will be treated as public documents unless otherwise requested. All non-confidential submissions will be placed on our website. Parties wishing to submit confidential information should:

- clearly identify the information that is the subject of the confidentiality claim
- provide a non-confidential version of the submission in a form suitable for publication.

1.4 Consultation process

To meet the 31 August 2022 due date[7] for amending the pricing methodology guidelines, we propose the following indicative milestones for this project.

Table 1.1 Indicative milestones

Date	Milestone
22 March 2022	AER publishes Consultation Paper
8 April 2022	AER stakeholder forum
26 April 2022	Submissions to Consultation Paper due
6 June 2022*	AER publishes proposed Pricing Methodology Guidelines
19 July 2022*	Submissions to proposed Pricing Methodology Guidelines due
By 31 August 2022	**AER publishes final Pricing Methodology Guidelines**
By 30 November 2022	*Applicable TNSPs and AEMO submit amended proposed pricing methodologies*[8]
By 31 January 2023	*AER publishes final decision on proposed pricing methodologies*

Note: *Dates are subject to change.

1.5 Structure of this consultation paper

The rest of this consultation paper is structured as follows:

- Section 2 explains the scope of the task we have been given by the AEMC and discusses important contextual considerations for system strength pricing.
- Section 3 introduces our proposed approach, including by describing the reform objectives, required rule considerations and materiality issues.
- Section 4 identifies key long-run pricing methodology issues, provides explanation of these economic cost concepts and poses questions for consultation.
- Section 5 identifies other possible pricing issues, provides explanation of their possible consequences, and poses questions for consultation.
- Section 6 identifies revenue forecasting considerations, explains the role of system strength revenues in pricing methodologies, and poses questions for consultation.

7 NER, cl. 11.143.4.

8 Note, NER cl. 11.143.5 requires each ‘applicable TNSP’ and AEMO to submit a proposed amended pricing methodology by this date. The applicable TNSPs are defined as Ausgrid, AusNet Services, ElectraNet, Powerlink, TasNetworks and TransGrid.

- Section 7 identifies possible issues affecting AEMO as SSSP for Victoria, whether these need special treatment in our guidelines, and poses questions for consultation.

1.6 Key terms used in this paper

Table 1.2 sets out the key terms we use in this issues paper.

Table 1.2 Key terms used in this paper

Term	Explanation
System strength	System strength is a quality of the power system that is related to the overall stability of the voltage waveform. There are three key concepts relevant to the overall stability of the voltage waveform: voltage waveform provision, inverter driven stability, and network stability management. In the context of this framework, system strength also includes fault level provision which is required for the operation of plant and network protection systems.
System strength service provider (SSSP)	SSSPs are now defined in NER clause 5.20C.3 as either the TNSP for the region, or where there is more than one TNSP for a region, they are the jurisdictional planning body for that region. In the instance that the jurisdictional planning body is not a TNSP, then the coordinating TNSP for that region will be the SSSP for the region. The TNSPs that are currently SSSPs are ElectraNet in South Australia, Powerlink in Queensland, TasNetworks in Tasmania, TransGrid in NSW and AEMO in Victoria.
System strength impact assessment guidelines (SSIAG)	AEMO will publish the SSIAG which will: - specify the number and location of system strength nodes - forecast the future inverter-based resource (IBR) connections for each system strength node - set the three-phase fault level required for a secure system at each node
Long-run average cost (LRAC)	See section 4.2.1
Long-run marginal cost (LRMC)	See section 4.2.1

2 Background: Implementing system strength pricing

This section:

- Outlines key elements of the AEMC's final rule, how it interacts with existing transmission pricing, and describes key terms used in this paper.
- Explains the scope of the task required by the system strength rule change.
- Identifies interdependencies with tasks being done by AEMO and tasks required of affected TNSPs.
- Introduces key contextual considerations for our inaugural system strength pricing guidance.

2.1 The system strength rule change

2.1.1 Background to the rule change

Historically, fault level (measured in MVA) in the electricity power system has been used as the proxy unit of measurement for system strength. However, this only captures one aspect of what system strength provides. AEMO currently defines system strength as:[9]

> *"the ability of the power system to maintain and control the voltage waveform at any given location in the power system, both during steady state operation and following a disturbance."*

These aspects of system strength are provided as a by-product of energy generation by synchronous generators.[10] Conversely, grid-following inverter-based generation provides limited contribution to fault levels and can tend to exacerbate any voltage waveform instabilities.[11] Additionally, the provision of system strength tends to decay over electrical distance, leading it to be a highly locational service as opposed to system-wide services such as frequency control.

A decline in system strength in the National Electricity Market (NEM) has been noticed over the last several years as inverter-based generation replaces synchronous generation output. As a result, the AEMC published the *Managing power system fault levels* final rule on 19 September 2017. This rule change introduced a minimum

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9 AEMO, *Renewable integration study — stage 1 report*, April 2020, p. 50.

10 Synchronous generators like coal, gas and hydroelectric generators are electro-mechanically coupled to the power system which provide system services like inertia, reactive power, system strength and voltage wave form as a by-product of their power production.

11 Inverter-based generators like many wind generators and solar PV are connected to the power system through power electronics. These non-synchronous generators can provide some system services like synchronous generators, however not automatically as a by-product of their energy generation.

system strength framework which required AEMO to declare system strength gaps when they occur, and TNSPs to procure services to meet the gap. This rule change also introduced the 'do no harm' rule, requiring connecting generators to mitigate any negative impact of their connection on the local system strength.

2.1.2 Rule change outcomes and requirements for the AER

On 27 April 2020, TransGrid submitted a rule change proposal aiming to abolish the 'do no harm' requirement and amend the minimum system strength requirement.[12] The proposal considered the existing framework was overly reactive in nature and was resulting in significant delays to connection of new generation, along with decreased efficiency in a reactive procurement approach.

On 21 October 2021, the AEMC made a more preferable final rule which replaced the minimum system strength framework and 'do no harm' obligation in order to facilitate the proactive provision of system strength where it is needed in the network.[13] A key finding of the rule making process was that TNSPs—designated as SSSPs—were best placed to identify options for system strength provision and to leverage economies of scale for efficient delivery of those options.

However, the process also identified the potential for inappropriate allocation of risk noting it is the connecting parties, not consumers, who are best placed to manage those risks.

As such, the final rule requires connecting plants to pay for the costs of 'consuming' the system strength service that SSSPs provide. Connecting plants would do this by paying a price based on the long-run costs of providing system strength services. This price is termed the system strength unit price (SSUP) and is intended to better coordinate the supply and demand of system strength by efficiently charging the parties for their use of centrally supplied system strength.

The final rule requires us to update our pricing methodology guidelines and set out the permitted methodologies for determining the SSUP. The appropriate TNSPs will then set the SSUP in accordance with their pricing methodology, which in turn must comply with our pricing methodology guidelines.

Sections 4 and 5 sets out our detailed consideration and consultation questions on the permitted methodologies for determining SSUP.

The final rule also requires us to include in our pricing methodology guidelines the principles for determining forecast annual system strength revenue and estimated actual annual system strength revenue. This revenue information are inputs to the

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12 TransGrid, *National Electricity Rules change proposal: Efficient management of system strength of the power system*, 27 April 2020.

13 AEMC, *Rule determination: Efficient management of system strength*, 21 October 2021.

true-up process to account for differences between forecast, estimated and actual annual system strength revenues.

Section 6 sets out our detailed consideration and consultation questions on the principles for forecasting annual system strength revenue.

2.1.3 Key elements of the AEMC's final rule

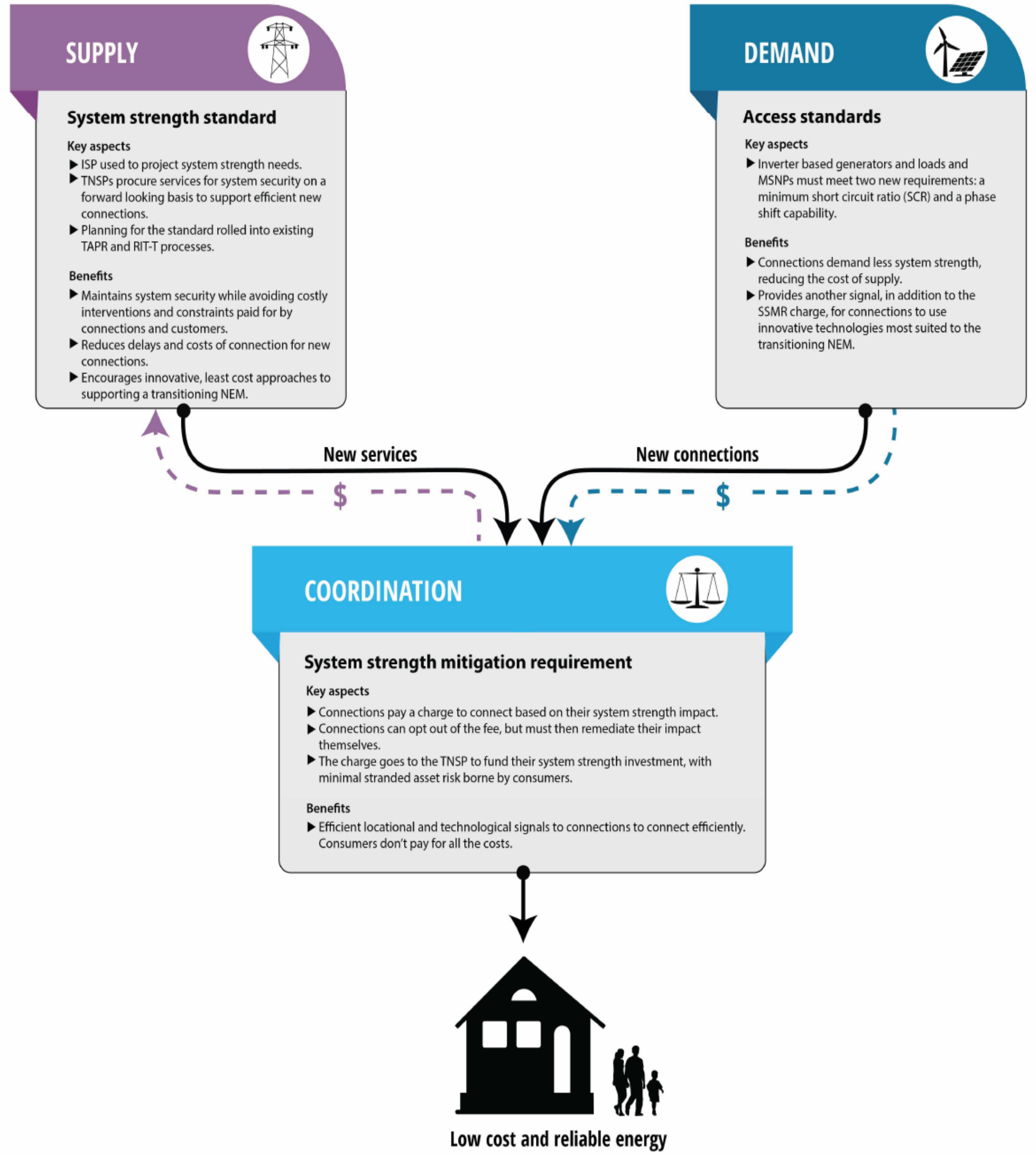
The final rule implemented a three-part approach to providing efficient levels of system strength. These included:

- **Supply side changes:** a new obligation on TNSPs to provide the right amount of system strength to support the connection of inverter-based resources (IBR) as forecast by AEMO. This new prescribed service standard evolves the existing system strength shortfall mechanism to enable greater coordination and forward-looking procurement of system strength.
- **Demand side changes:** new access standards for those parties that 'demand' system strength – these being IBR generators and certain types of load customers – to make sure they use system strength efficiently, minimising costs of supply.
- **Changes to facilitate the coordination of supply and demand:** a new way of charging for system strength that gives generators and certain large loads the choice to pay for system strength services offered by SSSPs or to provide system strength themselves. This evolves and expands the current 'do no harm' arrangements to better coordinate the supply and demand of system strength. The connecting party's choice of centrally procured or self-sourced system strength is exercised at the time of connection or where changes to the generating units or load trigger[14] the party to renegotiate their performance standards.

The AEMC summarised its reforms in the following illustration.

[14] In accordance with the processes for renegotiation of the standards in NER cll. 5.3.9, 5.3.12 and 5.3.13.

Figure 2.1 Overview of the system strength framework in the final rule



Source: AEMC, *Rule determination: Efficient management of system strength*, 21 October 2021, p.14.

Implementing the above reforms involves the following key actions by participants and market bodies, which we discuss further in section 2.2.2:

- **AER:** will update its transmission pricing methodology guidelines, and review and assess cost recovery applications via the existing processes (including revenue determinations, contingent projects and pass throughs).
- **AEMO:** will update its system strength impact assessment guidelines (SSIAG) and its system strength requirements methodology and publish an annual system strength report. In accordance with these documents, AEMO will:

- specify the number and location of system strength nodes
- forecast the future IBR connections for each system strength node
- set the three-phase fault level required for a secure system at each node.

- **SSSPs:** will need to update their transmission annual planning reports (TAPRs) for their plans to meet the system strength standard, seek AER cost recovery for their planned activities to meet the standard, and update their pricing methodologies to include system strength pricing.
- **TNSPs and DNSPs who are not SSSPs:** must implement the system strength charges from the SSSP for their region to connections on their networks who face the system strength charge, including:
  - Non-SSSP TNSPs who have system strength connection points on their network (i.e. Ausgrid and AusNet Services) will need to submit updated pricing methodologies to the AER by 30 November 2022.
  - DNSPs' pricing proposals from 2023 onwards must explain how those DNSPs will pass through system strength charges in a manner that replicates the amount, structure and timing of the relevant SSSP's system strength charge as far as is reasonably practicable.[15]

There are two timeframes relevant to the provision of system strength:

- a planning timeframe for which SSSPs are accountable, and
- an operational timeframe for which AEMO remains accountable for the real-time needs of the power system.

AEMO will project system strength requirements ten years into the future to allow each SSSP to undertake transmission planning for system strength as part of its usual planning process (which is also for ten years). AEMO will publish these projections as part of its annual system strength report, which will declare the system strength nodes and set out the minimum three-phase fault level for each system strength node and AEMO's forecasts of the level and type of IBR and market network service facilities connections at the node.

This information is then used by each SSSP to determine the level of system strength it must provide to meet the system strength standard.[16]

[15] NER, cl. 6.18.2(b)(6C).

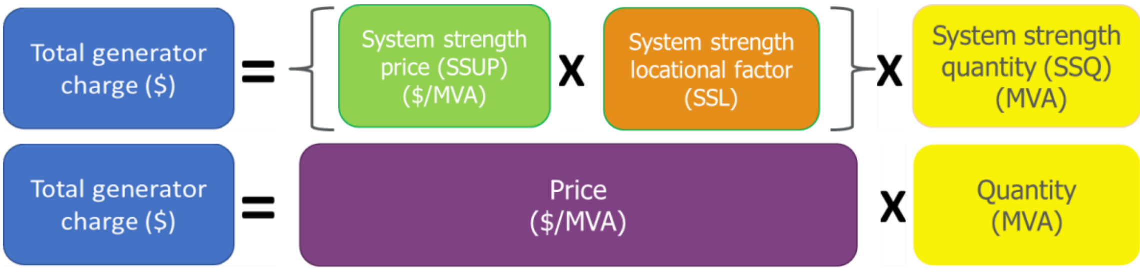
[16] The system strength standard is part of the network performance requirements for TNSPs and is set out in clause S5.1.14 of the NER. A new system standard for system strength is also set out in clause S5.1a.9.

2.1.4 Prescribed structure of the system strength charge

Relevant to this consultation paper, the final rule prescribed both the structure of the new system strength charge and who would be responsible for determining the guidance, calculations and key input forecasts required to administer it.

Figure 2.2 shows the system strength charge structure prescribed in the rules.

Figure 2.2 Prescribed components of the system strength charge



Source: AEMC, *Rule determination: Efficient management of system strength*, 21 October 2021, p.25.

The prescribed component parts of the system strength charge are:

System strength unit price (SSUP) in $/MVA for the relevant system strength node is the unit price for system strength procured from a given SSSP.

The AER's pricing methodology guidelines will specify permitted methodologies for determining the SSUP component of the charge following the principles set out in NER clause 6A.25.2(h).

The SSUP must be included in an SSSP's transmission pricing methodology and must be shown to comply with the permitted pricing methodologies and any information requirements set out in the AER's pricing methodology guidelines.

The SSUP is fixed for the duration of each system strength charging period, which is usually five years, subject to annual indexation (see section 5.2).[17] As set out in Figure 2.2, although the SSUP is fixed, the total generator charge is variable as it is impacted by the relative system strength quantities (MVA).

System strength locational factor (SSL) is the relative electrical distance from the closest system strength node for a newly connecting generator or load, calculated as the ratio of the:

[17] Each system strength charging period runs from the start of the second regulatory year in a regulatory control period of the SSSP to the end of the first regulatory year in its next regulatory control period – see clause 6A.23.5(b).

- additional fault level needed at the nearest system strength node to restore the available fault level at the connection point to the pre-connection level, and
- system strength quantity requirement of the connecting party plant.

The relevant NSP will calculate the SSL for each connection, drawing on AEMO guidance in the SSIAG. The relevant NSP will update the SSL at the start of each system strength charging period to account for any changes to the network.

System strength quantity (SSQ) is the expected consumption of the service (calculated as MVA/MW x MW) by the party connecting to the grid, which will be estimated from:

- the size of the connecting plant in MW, and
- its short circuit ratio (SCR) as determined by the relevant SCR access standard.

AEMO will provide guidance through the SSIAG, and the relevant NSP would use this guidance to calculate this component for each connection. The SSQ is fixed at the time of connection unless alterations to the connected plant require an update to the agreed performance standards.

2.1.5 Interaction with existing TNSP pricing methodologies

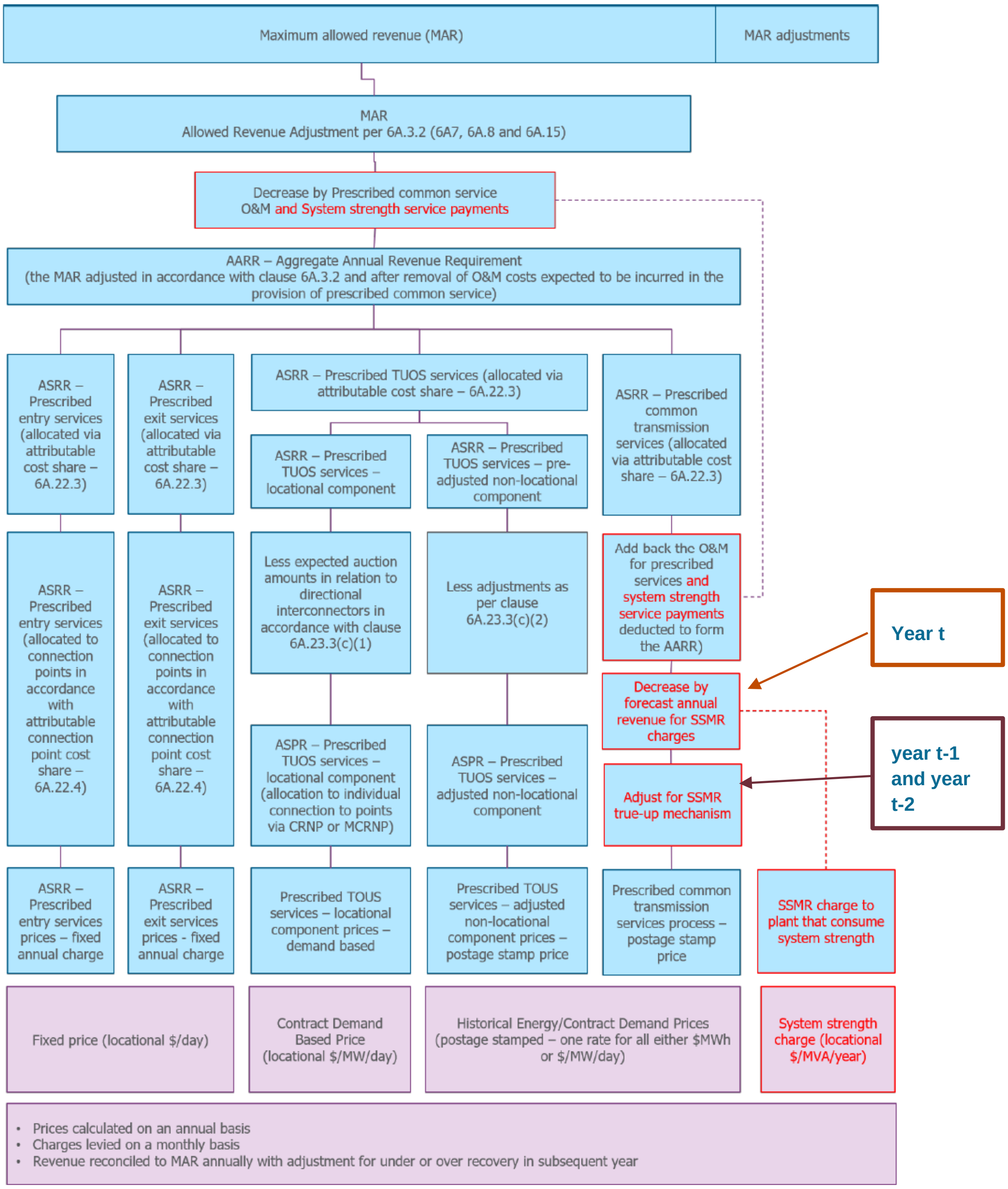
The AEMC's final rule also set out arrangements for how the costs of system strength service provision would be recovered from both system strength charges and existing prescribed transmission services.

At a high level, these arrangements specified that:

- system strength charges would reflect the SSSPs' estimated long run costs of service provision
- the costs of providing system strength, after deducting forecast revenues earned from system strength services and any true-up thereof, will be allocated to prescribed common transmission services and recovered from transmission customers on a postage stamp basis.

The AEMC illustrated this via the following figure.

Figure 2.3 How system strength pricing interacts with existing transmission pricing



Source: AEMC, *Rule determination: Efficient management of system strength*, 21 October 2021, p. 181.

Note: Figure 2.3 shows that SSSPs must forecast system strength revenues for year t, and true-up estimated and actual revenues from years t–1 and t–2, respectively. We discuss these in detail in section 6.

2.2 Scope of the AER's guidance task

The AEMC's final rule requires the AER to modify the transmission pricing methodology guidelines for two new requirements:[18]

> The *pricing methodology guidelines* must specify or clarify:
>
> (h) permitted methodologies for determining the *system strength unit price* component of the *system strength charge*, having regard to the following:
>
> (1) the *system strength charge* structure in clause 6A.23.5;
>
> (2) the desirability of providing efficient investment and *system strength transmission service* utilisation signals to actual and potential *System Strength Transmission Service Users* based on the long run cost of providing *system strength transmission services* at the relevant location;
>
> (3) the desirability of consistent pricing structures across the NEM; and
>
> (4) the costs and benefits associated with calculating, implementing and applying the methodology; and
>
> (i) principles for determining forecast *annual system strength revenue* and estimated actual *annual system strength revenue*.

2.2.1 What the pricing guidance must cover

2.2.1.1 Permitted pricing methodologies for system strength

The pricing methodology guidelines must specify or clarify the permitted methodologies for determining the SSUP component of the system strength charge.

These methodologies may differ from TNSPs' existing methodologies because those methodologies are required to allocate the maximum allowed revenue (MAR) based on full cost recovery to the various types of prescribed transmission services.

In contrast, the permitted pricing methodologies for system strength are required to be based on the long-run cost of providing system strength transmission services at the relevant location. They are not based on TNSPs' regulated MARs and, as such, will not be based on the same fully allocated cost approach currently used for other services.

We discuss this further in section 4.1.

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[18] NER, cll. 6A.25.2(h) and 6A.25.2(i). Note, cl. 6A.25.2 sets out the required contents of the pricing methodology guidelines.

2.2.1.2 Forecasting system strength revenue

The pricing methodology guidelines must specify or clarify principles for determining forecast annual system strength revenue for the relevant pricing year (year t) and estimated and actual annual system strength revenue for prior years for the purpose of administering the annual true-up mechanism.

These are forecasts of the revenues earned from the system strength charge. They are used to administer the SSSPs' annual tariff setting and MAR compliance demonstration. We discuss this further in section 6.1.

This is not the same as forecasting required revenues for the purpose of determining allowed cost recovery. The existing prescribed transmission services regulatory framework including the AER revenue determination, RIT-T and contingent project processes will be used to regulate SSSPs' maximum allowable revenue.[19]

Each SSSP will recover some of its costs of providing system strength services from system strength transmission service users (e.g. generators and large inverted based loads) through the system strength charge. It will recover the remainder of its system strength costs through charges to transmission customers for prescribed common transmission services. An annual true-up mechanism adjusts this allocation to account for any differences between actual and forecast/estimated system strength revenues and ensures that the total amount of revenue recovered by the SSSP does not exceed its maximum allowed revenue (MAR).

2.2.2 Interdependencies with other work

2.2.2.1 TNSPs' system strength service implementation

The existing planning, revenue setting and pricing processes of TNSPs who are SSSPs will be affected by the final rule in ways that can create interdependencies with our work.

SSSPs will need to update their transmission annual planning reports (TAPRs) for the new system strength planning standard. This will identify their planned solutions for meeting the standard over the next 10 years and therefore the nature of the costs relevant for use in potential permissible pricing methodologies. The first round of TAPRs to reflect the new requirement will be published by 31 October 2023.

SSSPs will need to make proposals to the AER to approve MAR inclusive of their new system strength obligations. These revenue proposals, contingent project applications and pass-through applications will identify forecast costs and demand for the 5-year

[19] As discussed in section 7 below, AEMO does not have an AER revenue determination. AEMO instead has a revenue methodology, which will be used for determining its maximum allowed revenue for system strength services as SSSP for Victoria.

pricing period. These forecasts may provide relevant short-term data into the forecasting periods required for potential permissible pricing methodologies.

As noted earlier, affected TNSPs will need to submit updated proposed pricing methodologies to the AER by 30 November 2022. These must include their proposed methodologies for the SSUP and comply with our updated pricing methodology guidelines. This includes SSSPs and the two TNSPs who may have system strength connection points on their network (i.e. Ausgrid and AusNet Services).

2.2.2.2 AEMO's system strength requirement implementation

The rules deem all existing fault level nodes to be system strength nodes. AEMO may declare additional system strength nodes from time-to-time. AEMO must set out the process to declare nodes in its system strength requirements methodology. AEMO's annual system strength report must publish its declaration of new nodes and give an indication of any possible future nodes. AEMO's system strength report will also set out the system strength requirements for each node, including 10-year forecasts of the minimum three phase fault level and the level and type of IBR and market network service facilities connections.[20]

AEMO is required to publish its system strength impact assessment guidelines by 30 November 2022 and its first system strength report and revised system strength methodology by 1 December 2022.

As set out in section 2.1.3, this AEMO work will provide key inputs to how SSSPs calculate and charge for system strength, as well as key forecasts relevant to cost and revenue forecasting by the SSSPs.

This timing means the AER will not know how many nodes there will be when it finalises its guidelines beyond the existing fault level nodes deemed as system strength nodes in the transitional provisions. When submitting their updated proposed pricing methodologies on 31 November 2022, SSSPs will also not know the final nodes or the final content of AEMO's SSIAG or requirements methodology.

Question 1: Are there any implications of the TNSP and AEMO interdependencies that could affect the form of our system strength pricing methodology guidance?

2.3 Context for this system strength pricing guidance

In addition to the interdependencies and timing issues discussed above, other complicating factors may affect the system strength pricing methodology guidance.

It is important to acknowledge the context within which the system strength rule is being implemented and consequences this may have for both:

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20 NER cll. 5.20C.1 and 11.143.3.

- efficient provision and utilisation of system strength services in the future, and
- the AER's pricing methodology guidance.

Contextual factors include:

- System strength is a new transmission service that is being fitted into an existing cost recovery and pricing regime for prescribed (regulated) transmission services.
- The existing NER transmission pricing rules and pricing methodologies are quite prescriptive and require TNSPs to adopt a fully allocated cost approach to pricing prescribed transmission services.
- The NER cost concepts for system strength pricing are long-run. Unlike existing prescribed transmission services, they are not based on TNSPs' regulated MARs. This means the permitted pricing methodologies for system strength services cannot be based on the same annual fully allocated cost approaches currently used for other services.
- SSSPs' long-run system strength costs could be capital or operating in nature. SSSPs can either build infrastructure like synchronous condensers to meet their system strength requirements or procure system strength supply from synchronous generators or grid-forming inverter technologies.
- TNSPs were not previously required to proactively provide system strength, only doing so in response to AEMO-declared fault level shortfalls. They may need time to develop maturity in:
    - how they forecast the costs of system strength provision
    - how they forecast long-term and short-term demand for centrally-procured system strength
    - understanding and predicting the impact of system strength pricing on decision making by generators and large inverter-based loads.
- The technology for, cost of, and minimum efficient scale of system strength provision may change in future:
    - Synchronous condensers are the established technology. They are characterised by economies of scale[21] with long asset lives of around 40 years, but with diminishing effectiveness with distance.
    - Technology is evolving that could see grid-forming inverters in future become a cost-effective solution for either generator self-provision of system strength or SSSP procurement.[22] Such inverters may have a shorter

21 GHD, in its report for ARENA on 'Managing system strength during the transition to renewables' observes that for a typical synchronous condenser project, two thirds of the capital costs are fixed irrespective of the capacity of the condenser (see GHD, *Managing system strength during the transition to renewables*, pp.37–40 and section 4.2).

22 See AEMO's August 2021 White Paper on 'Application of Advanced Grid-scale Inverters in the NEM' for a discussion of this potential and the engineering design capabilities needed for future scale use in the NEM.

economic life than synchronous condensers and may be scalable in smaller capacity increments than is economic for synchronous condensers.

- There may be mismatches through time between the supply of, and demand for, system strength services. For example:
    - There will likely be a lag between SSSPs providing a particular amount of system strength services and connecting parties nominating to buy this amount of service due to the commissioning process for new connections. Hence, transmission consumers may bear more of the required revenues for system strength costs initially; and
    - Connecting generators and large inverter-based loads may not take up the centrally-procured system strength service at the rates anticipated by AEMO and the SSSPs.
- The charge paid by connecting parties covers the incremental cost of future system strength procurement, with transmission consumers bearing the residual costs. Given the aforementioned lag between service procurement and purchase by connecting parties, along with the aforementioned potential evolution in technologies, this could lead to transmission consumers facing large residual charges. This would be more pronounced in the scenario where a technology evolution was sudden and rapid. As such, the pricing guidance and methodology may need flexibility to accommodate such an evolution in costs.
- The existing 'do no harm' connection standard[23] places all system strength cost and risk on the connecting party. The new SSSP model and any pricing methodology for SSSP system strength services will mean connecting parties could be better off than they are today. This is because:
    - they can access the benefits of economies and scale and scope through centralised procurement
    - they can pay an ongoing system strength charge, rather than the upfront capital costs of building their plant for self-provision, and
    - residual SSSP system strength costs will be shared with load customers.
- The number and location of system strength nodes, and the system strength locational factors may change over time. The pricing guidance and methodologies may therefore need flexibility to implement these changes.
- Generators who retune their plant in future, or replace their inverter, may seek to revisit their SSQ by triggering a review of the performance standards. This process could provide a mechanism for the connecting party to reduce its future system strength charges. Hence, there may be merit in the SSUP providing both an initial incentive signal at the time of connection as well as an ongoing incentive.

[23] Meaning that the proposed generator will do no harm to the stable operation of existing generators, loads or network equipment.

However, any such ongoing incentive may be limited in practice if generators perceive risk in the process for reopening performance standards.

These complex and temporal contextual factors suggest that it may be desirable to:

- preserve some flexibility in the pricing methodologies for system strength services
- favour simplicity in initial permitted methodologies, and revisit the potential benefits and costs of more complex methodologies as the market for these services matures
- favour pricing methods that can support relative stability in the SSUP over time
- seek to place SSSPs' system strength investment and utilisation risk with the parties best placed to manage it.

Question 2: Do you have any feedback on these or other relevant contextual factors and their consequences for the AER's guidance development?

3 Our approach

Our approach to this guideline amendment task must advance the National Electricity Objective, deliver on the new guidance requirements in NER clauses 6A.25.2(h) and 6A.25.2(i), and meet the requirements of the transmission consultation procedures.

To achieve this, this section introduces our proposed approach, including by:

- describing the reform objectives and implications for our task
- discussing required considerations from the rules
- outlining the AER's intended approach to developing the new guidance.

3.1 Reform objectives

The AEMC's final rule determination stated:

> the final rule helps to minimise system strength costs overall through building in incentives that limit demand for system strength services to be procured by the SSS Providers. The charge is designed to reflect the system strength costs that a connecting party would impose on the system. Through the charge the connecting party is incentivised to reduce its impact. It can do that by full or partial remediation or by choosing to locate in a part of the grid where it would face a lower charge due to that location having higher levels of system strength.[24]

SSUP pricing design should seek to provide connecting parties with incentives to:

- locate in areas with a lower cost of providing system strength
- develop and utilise technologies that can reduce their demand for system strength services where this is efficient
- procure centrally-sourced system strength where this is more efficient than self-sourced system strength
- manage system strength risks that they are best placed to manage.

These incentives should primarily be provided upfront at the time of connection when the generator or load are making the location and investment decisions.

3.2 Rule considerations

The new clause 6A.25.2(h) requires us to have regard to the system strength charge structure in clause 6A.23.5 (see section 2.1.4) and the considerations set out in Table 3.1 when developing our pricing methodology guidance.

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[24] AEMC, *Rule determination Efficient management of system strength*, 21 October 2021, p. 23.

We have had regard to these considerations in identifying the potential issues for pricing guidance. Table 3.1 sets out these issues and references where they are discussed in this consultation paper.

Table 3.1 Matters arising from rule considerations

Rule requirement	Possible matters to examine
Clause 6A.25.2(h)(2) requires that we have regard to: the desirability of providing efficient investment and system strength transmission service utilisation signals to actual and potential System Strength Transmission Service Users based on the long-run cost of providing system strength transmission services at the relevant location	• What time horizon is 'long-run'? (section 4.1) • What form(s) of long-run costs could be permissible (e.g. marginal, average or both)? (section 4.2) • What are the benefits of different long-run cost methodologies in terms of investment and utilisation incentives, and are there any preconditions for these benefits to be realised? (section 4.2.3) • Should the system strength unit price be indexed annually to reflect changes in costs? If so, what indexation method should be used? (section 5.2)
Clause 6A.25.2(h)(3) requires that we have regard to: the desirability of consistent pricing structures across the NEM	• Could differing system strength pricing methodologies affect competition in the wholesale market? (section 4.2.3) • What long-run cost methodologies would support consistent price structures over time? (section 4.2.3.2) • Is consistency with the pricing of other transmission services desirable? (section 5.1) • Is consistency over time desirable? (section 5.1)
Clause 6A.25.2(h)(4) requires that we have regard to: the costs and benefits associated with calculating, implementing and applying the methodology	• How different do we expect the outcome of the long-run pricing methodologies to be: 1) from each other, and 2) from connecting parties' costs of self-provision? (section 4.2.3.1) • What are the costs of administering different methodologies, and any variants of these, e.g. ○ What costs and demand data are needed to apply different long-run cost methodologies? ○ What of this data is already available to TNSPs for other purposes (supporting data synergies and ease of verification) and what would need to be obtained and verified specifically for that pricing methodology? (section 4.3)

Rule requirement	Possible matters to examine
	• How would different methodologies affect the allocation of system strength cost recovery between connecting parties and energy consumers? (section 4.2.3.3) • Are the costs and benefits of the different methodologies expected to change in future? (section 4.3) • Do the costs of administering the different pricing methodologies vary with the number of system strength nodes? (section 4.3)

The rules place no specific requirements on our approach to establishing principles for determining forecast annual system strength revenue and estimated actual annual system strength revenue.

3.3 Materiality considerations

When applying the rule requirements for both costs and benefits assessment and efficient investment and utilisation signals, it is useful to consider the materiality of system strength service costs, prices and related incentives. This is important for proportionality in the regulatory requirements, so that administrative and regulatory costs remain proportionate with the realised benefits.

The intended benefits will be derived from enhanced efficiency in connecting parties' system strength investment and utilisation decisions. To ensure proportionality, the guidance should be informed by an understanding of likely thresholds at which different potential pricing methodologies will materially affect the decision making of connecting generators and inverter-based loads. This will involve having regard to the likely materiality of the system strength charges relative to:

- the generators' and inverter-based loads' own project costs
- their expected competitors' costs
- their discount rate (which will affect preferences for upfront project capital versus an ongoing SSSP payment), and
- their costs of any delays to the connection process that arise from electing to self-provide system strength instead of paying the system strength charge.[25]

If economies of scale and scope from centrally-procured system strength mean system strength charges are immaterial compared to the above connecting party costs, the incremental benefits from different long-run pricing methodologies may be negligible. In

[25] Connecting parties who opt to pay the system strength charge are not subject to the full impact assessment process and remediation requirements.

such cases the administrative cost of requiring and implementing more onerous pricing methodologies will not be warranted. We discuss this further in section 4.2.3.

Question 3: What materiality considerations should inform our assessment of potential pricing methodologies?

Please provide any relevant evidence that you think should inform our materiality assessment.

3.4 Implications for our approach

We have set out below some key implications of the above objectives, rule, and materiality considerations for SSUP pricing design.

- **Timing for relevant incentives** – Pricing incentives should primarily be provided upfront at the time of connection when the associated location and investment decisions are being made by the generator or load. This means:
  - Pricing signals will target allocative efficiency. The economic impact of ongoing pricing signals may be low as it will only be relevant where changes to the generating units or load trigger the party to renegotiate their performance standards.
  - Stability in system strength pricing over time will be important. After connection, generators and inverter-based loads will have limited ability to respond to ongoing pricing signals, whereas expectation of future volatility could distort their upfront connection location and investment decisions.
- **Materiality** – Guidance on permitted pricing methodologies should be informed by the materiality of:
  - The expected difference in centrally-procured system strength prices under available long-run cost methodologies
  - The materiality of centrally-procured system strength charges compared to connecting parties' other relevant costs (listed in section 3.3)
  - The relative costs and benefits of available long-run cost methodologies.

As we discussed above, the circumstances in which we and SSSPs will be implementing system strength pricing is complex and dynamic. We are therefore pursuing a consultative approach that will be informed by:

- Questions raised in this consultation paper.
- Any other matters that stakeholder choose to raise in their submissions.
- Stakeholder workshops on key issues following the consultation paper submissions.
- Consultation on our draft guidance.

4 Issues to consider: Pricing based on long-run cost

This section:

- Explains the implications of long-run costs methodologies compared to existing transmission pricing methodologies.
- Describes the economic cost concepts of long-run marginal cost (LRMC) and long-run average cost (LRAC).
- Outlines potential issues associated with the use of LRMC and LRAC in system strength pricing and associated consultation questions.

This section 4 focusses on SSSPs other than AEMO, although most of the issues in this section are also applicable to AEMO as SSSP for Victoria. There are some differences in the rules regarding the regulation of AEMO in its role as SSSP for Victoria and other SSSPs. For example, that the AER does not approve AEMO's revenues. Section 7 discusses these differences, and their implications for system strength pricing methodologies.

4.1 Long-run cost pricing is different to existing transmission pricing

As noted earlier, the NER require system strength pricing to be based on long-run costs. This means the permitted pricing methodologies will be unlike the existing pricing methodologies for existing prescribed transmission services.

Existing methodologies allocate TNSPs' AER-approved revenue requirements within a given 5-year regulatory period (i.e. allocate the annual MARs). Revenues are generally allocated to different services based on the assets that are attributable to the provision of that service or other appropriate cost allocators.

In contrast, the new rule 6A.25.2(h) require SSSPs to estimate the long-run costs of providing system strength. The system strength price is based on that estimate of long-run costs, rather than the AER-approved revenue requirement that relates to the provision of system strength services.[26]

In practice, this likely means that the permitted pricing methodologies for system strength services:

- Will need to reflect long-run forecasts of costs and demand that extend beyond the SSSPs' current regulatory control period and approved MARs

[26] Any residual amount of approved revenue related to the provision of system strength services is recovered through prescribed common transmission services.

- May need to adopt either or both long-run economic cost concepts commonly used in regulated infrastructure pricing, i.e. LRMC and LRAC.

4.1.1 Issues in using forecasts beyond the 5-year regulatory determination

The costs and forecasts used in existing pricing methodologies have the potential to be corroborated with those approved by the AER during the 5-year revenue determination process.[27] Having long-run forecasts means that we need to consider:

- How long is long-run, and should there be guidance on this?
- How can the AER and affected stakeholders assess the reasonableness of SSSPs' long-run forecasts?

One pragmatic way to address both these questions may be to consider what relevant forecasts are currently produced that go beyond the 5-year regulatory control period.

For example, there are a range of forecasts and forecasting inputs produced by TNSPs and AEMO that may warrant consideration (summarised in Table 4.1). These suggest a minimum term of 10 years for long-term may align to these data sources.

Table 4.1 Candidate input data sources for long-run cost and demand estimation

Source	Nature of data available	Forecast period
AEMO system strength report[28]	• current number and location of system strength nodes and an indication of possible future nodes and when they may be declared • the forecast minimum three-phase fault level required for each node for each year for the next 10 years • the level and type of IBR connections for each system strength node (i.e. system strength demand) for each year for the next 10 years	10 years
AEMO ISP	• forecasts of power system needs, including in relation to system strength, and the costs of options to meet those needs	30 years[29]

27 Noting that some pricing methodology inputs are updated annually, and some allocators rely on optimised replacement cost, which is not used in the determination processes.

28 NER, cll. 5.20.7 and 5.20C.1.

29 Forecasts of power system needs, potential options to meet those needs and the costs of those options will necessarily be relatively high-level for the later parts of the ISP's modelling period. More detailed information and

Source	Nature of data available	Forecast period
	• connection forecasts	
TNSP TAPR	• activities undertaken or planned by the SSSP to meet its obligations at each system strength node, modelling methodologies used in planning those activities, forecasts of available fault level at each node • information on proposed network investment related to system strength, including the relevant dates, purpose, total costs and the indicative costs of any non-network options considered[30]	10 years
TNSP revenue recovery processes	• AER revenue determination processes, contingent project applications and cost pass through applications all provide relevant forecast cost and demand information for the pricing periods to which they apply in additional to historical cost information reflected in the TNSPs regulated asset bases	Up to 5 years

In economic theory, “long-run” involves looking at the time horizon in which all costs are variable.

We consider a 5-year forecasting period does not meet the requirement for “long-run”. If the AEMC had intended system strength pricing to reflect the five-year regulatory control period costs, we would expect the rule to have adopted that time horizon. That is not what the new rule 6A.25.2(h) does.

In distribution network pricing, DNSPs are required to propose prices based on LRMC. The AER has been administering compliance with this long-run pricing requirement for over a decade. Our most recent guidance to DNSPs on the minimum timeframe for long-run cost forecasting is in our 2021 Victorian distribution determinations:

> 'we consider a forecast horizon should be at least 10 years to be considered "long run".'[31]

cost estimates are developed for potential ‘actionable ISP projects’, which are those projects where AEMO considers a RIT-T should be completed within the next two years.

30 NER, cl. 5.20C.3(f)-(g)

31 AER, *Draft decision - Jemena distribution determination 2021-26 - Attachment 19 - Tariff structure statement*, September 2020, pp. 19-44.

Several DNSPs' approved tariff structure statements include LRMC modelling that adopts longer periods than this.[32]

Depending on the long-run cost concept adopted, there may be potential for longer forecasting periods to support less volatility in the SSUP over time. We discuss this in section 5.1.

Technology solutions to providing system strength will likely evolve in the future. In turn, there will likely be tranches of different forms of system strength services (e.g. synchronous condensers, contracted non-network services, etc) with different temporal durations. We would therefore expect an efficient portfolio of action to meet the system strength standard. The horizon over which this portfolio is expected to vary may also be relevant in choosing a time horizon for "long-run".

Question 4: Should our guidance specify a minimum period for "long-run", and if so, is 10 years reasonable?

4.2 Long-run economic cost concepts

4.2.1 What are these long-run cost concepts?

Marginal cost pricing of system strength looks at the cost of the next unit of system strength. By contrast, average cost pricing simply takes the total cost of providing system strength and divides it by the units of system strength. In choosing between these concepts, we are comparing the cost of the next unit to the cost of all units.

4.2.2 How are they estimated?

Estimating average cost involves dividing the total forecast cost of the relevant system strength services by the units of system strength provided over that forecast period. In a simplified example, if a synchronous condenser costs $30m for a 300MVA unit, then the average cost would be $30m/300MVA = $100k/MVA.

Estimating marginal cost is more complex because it involves estimating the forward-looking costs that are responsive to changes in demand for system strength. There are a range of established methodologies for this purpose, including average incremental cost (AIC), perturbation approach and the marginal incremental cost (MIC) method. We discuss these further in section 4.3.

In distribution, we observe[33] that:

- most DNSPs calculate LRMC using the AIC method

[32] For example, Essential Energy used a 15 year forecast horizon to estimate LRMC for its 2019–24 regulatory control period, while SA Power Networks used a 20 year forecast horizon to estimate LRMC for its 2020–25 regulatory control period.

[33] AER, *Network tariffs and long run marginal cost | explanatory note*, September 2021, pp. 2-3.

- there is a general perception that the AIC method is less costly to implement than some other methods, but produces less accurate estimates of LRMC.

The perturbation method involves a greater level of estimation. This involves estimating forward-looking total operating and capital costs for each year over the forecasting period as a first step. The method then re-estimates the optimised forward-looking operating and capital costs for each year of that period due to a permanent increment in demand. The present value of the difference between these two forward-looking costs is then divided by the demand increment applied.

The AIC approach involves estimating future operating and capital costs to satisfy expected increases in demand. The present value of these future costs is then divided by the present value of the demand over the forecast horizon. The AIC can generally be estimated using pre-existing expenditure and demand forecasts that a network has available from its business-as-usual activities.

The costs involved in conducting a detailed assessment via the perturbation method are generally higher compared to the costs of estimating LRMC using the AIC approach. There is also a question about the reliability of the future demand forecasts required to apply perturbation methods. If there is considerable uncertainty about future demand and costs, then the method may provide an unwarranted impression of its accuracy.

4.2.3 In what circumstances may LRMC and LRAC have different incentive effects?

In this section we explore the following questions:

- How different do we expect the outcome of the long-run pricing methodologies to be: 1) from each other, and 2) from connecting parties' costs?
- What are the benefits of different long-run cost methodologies in terms of investment and utilisation incentives, and are there any preconditions for these benefits to be realised?
- Which long-run cost methodology would support consistent price structures over time?

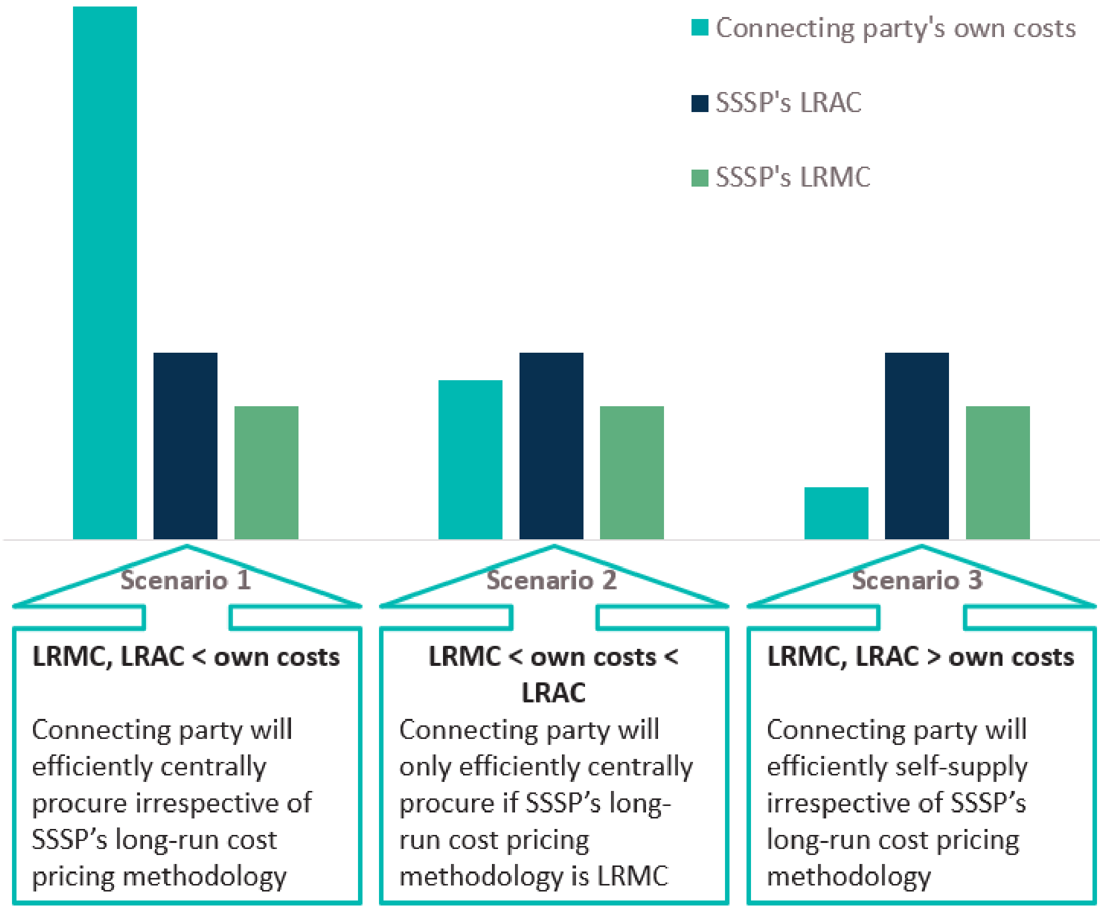
4.2.3.1 Incentive implications of relative costs

Incentive effects of pricing system strength on either LRAC or LRMC will depend upon:

- How material the difference between an SSSP's LRMC and LRAC is, and
- How material is the difference between connecting parties' costs of self-providing system strength and those of their SSSP's LRMC and LRAC.

We illustrate how the relative level of costs will impact the efficient system strength investment and utilisation decisions of connecting parties under 3 illustrative scenarios in Figure 4.1.

Figure 4.1 Illustrative unit cost scenarios and impact on decision making



The expected economies of scale and scope available from centrally-procured system strength were a motivating factor in the AEMC adopting these reforms. Such economies would mean LRMC will likely be less than LRAC once SSSPs have adapted their network investments and operations to meet the system strength standards. This is because system strength capacity will have been built or procured to meet the standard for AEMO's forecast level of required system strength. Therefore, the above illustrative scenarios all assume that LRAC is above LRMC, even though it is theoretically possible to be the other way around.

In these illustrative scenarios, it is only scenario 2 where the efficient investment and utilisation decisions of connecting parties could be distorted by whether the permissible pricing methodology is LRAC rather than LRMC.

When looking at the likelihood of scenario 2 and the materiality of this impact on investment decisions, we expect relevant costs to consider will include generators' and inverter-based loads':

- own project costs, in aggregate and relative to system strength costs (e.g. there may be a convenience factor or risk preference for outsourcing these if they are immaterial)

- their discount rate (which will affect preferences for upfront project capital versus an ongoing SSSP payment)
- their expected competitors' costs of system strength
- their costs of connection delay.

If scenario 1 is likely, or system strength costs are immaterial compared with total project costs, there is no efficiency or incentive benefits in moving from LRAC to LRMC. The additional costs of estimating LRMC may not be warranted.

Question 5: What scenario(s) (either illustrated in Figure 4.1 or others), do you think should inform our guidance development? Do you have a view on or evidence of the likelihood of these scenarios?

4.2.3.2 Incentive implications of pricing stability

As noted earlier, the SSUP pricing incentives for efficient system strength investment and utilisation should primarily be provided upfront in the investment decision-making process. That is, when the generator or load are making the associated location and system strength provision decisions, well before connection.

Stability in the SSUP over time will likely be beneficial because:

- after connection, generators and inverter-based loads will likely have limited ability to respond to any ongoing pricing signals
- expectation of future volatility could distort their upfront connection location and investment decisions if ongoing volatility is seen as a material risk
- managing volatile SSUP costs may increase the cost of capital

So how can long-run cost pricing methodologies affect stability?

If there are large economies of scale in the SSSPs' provision of system strength, this would involve SSSPs making investments in large lumps relative to the expected increase in system strength demand. In this case the LRMC of system strength provision would tend to vary significantly relative to the LRAC.

An additional consideration is that the system strength framework has been designed in such a way that regular review periods also create an incentive for connections to reduce their system strength 'consumption' in an ongoing manner in order to reduce their exposure to the SSUP at each review.

Question 6: To what extent is volatility in the SSUP between 5-year periods likely to have an adverse impact on efficient generator and IBR load investment decisions?

Question 7: Is pricing stability desirable over successive SSUP pricing periods?

Question 8: Do you consider the permitted pricing methodologies will affect SSUP pricing stability?

4.2.3.3 Incentive implications of residual cost recovery

The AEMC in its rule change process adopted an assessment criteria of placing system strength investment and utilisation risks on the parties best placed to manage them.[34] Principles of efficient risk allocation include that where a risk cannot be managed by any party (residual risk), it should be allocated to the party best able to absorb the risk.

We consider this principle is consistent with our rule requirement for:

> 'providing efficient investment and system strength transmission service utilisation signals to actual and potential system strength transmission service users based on the long run cost of providing system strength transmission services at the relevant location.'[35]

The costs of system strength provision will be partly recovered from connecting generators or large inverter-based loads, and partly from all transmission load customers. SSSPs do not need to recover their total allowed revenues for system strength through the system strength charge. SSSPs can recover any difference between allowed and actual system strength revenues from customers through prescribed common transmission services with an annual true-up process.

The choice of SSUP pricing methodology can affect the proportion of costs recovered from connecting parties and the proportion recovered from load customers, and therefore how risk is allocated between those two groups.

Load customers paying prescribed common transmission services have no means to manage the risk of how much system strength costs SSSPs incur. However, SSSP costs allocated to load customers (and the potential variability in this cost) is likely to be small relative to the total delivered cost of electricity. This is consistent with the principle that an unmanageable risk should be allocated to the party best able to absorb the risk.

We expect LRAC to place more of the risk of system strength costs on generators who use system strength and whose decisions affect how much system strength costs SSSPs incur. This is because (as the AEMC identified) using LRAC for system strength will likely be higher and less volatile and therefore have less residual costs to recover from other transmission customers.

If the guidelines were to require or allow LRMC pricing of the SSUP, more residual costs would fall to common transmission services and ultimately load customers. Those other customers do not have the ability to manage the drivers of the bulk power system's system strength costs, but as noted above, are best able to absorb the risk.

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34 AEMC, *Rule determination: Efficient management of system strength*, 21 October 2021, p.34.

35 NER, cl. 6A.25.2(h)(2).

Question 9: Should the permitted pricing method(s) place risk with the party best placed to manage it, and should any residual unmanageable risk be allocated to the party best able to absorb the risk?

Question 10: Do you consider that a LRAC permitted pricing methodology would support this?

4.3 Costs of administering long-run pricing methodologies

The costs to administer the long-run methodologies will be affected by:

- the level of estimation required for a given methodology as discussed in section 4.2.2
- costs and demand data needed for different long-run cost methodologies, and importantly, what data is already available to TNSPs for other purposes.

The LRAC methodology and the average incremental cost form of the LRMC methodology can both draw on data that is likely already available to TNSPs. This would support:

- data synergies for SSSPs in applying these methodologies
- ease of verification for the AER and system strength customers.

Using resource-intensive perturbation methods may only be warranted if we expect scenario 2 from Figure 4.1 is likely and the difference in system strength costs is material enough to influence connecting parties' investment decisions.

The costs of administering the different pricing methodologies may also:

- vary with the number of system strength nodes
- vary in the future, e.g. if over time the long-run cost estimation becomes software-based in the way existing TNSP pricing methodologies have done.

Question 11: What issues should the pricing methodology guidelines consider in relation to minimising administrative complexity and implementation costs? What data or evidence would be useful to inform the response to this question?

5 Issues to consider: Other pricing issues

This section outlines other potential issues associated with the developing the pricing methodology guidance and associated consultation questions.

5.1 Is pricing consistency desirable?

Section 4.2.3.2 explored whether consistency of SSUP pricing levels over time is desirable. This section considers other elements of consistency that may also be desirable.

5.1.1 Is consistency with other transmission service pricing desirable?

All other prescribed transmission services are priced based on fully allocated cost whereby the revenues reflected in the MAR (inclusive of sunk and forecast capex, as well as opex) are recovered. This approach to all other services is more reflective of LRAC.

Question 12: Is consistency with the pricing of other transmission services desirable?

5.1.2 Can consistency impact innovation?

Arguably, more flexibility in the permitted methodologies could support greater innovation in system strength investment and utilisation.

On the other hand, the following factors may be greater drivers of innovation in system strength investment and utilisation (rather than the permitted methodology for determining SSUP):

- external factors such as changes in grid forming inverter technology.
- cost recovery and efficiency incentives in the regulatory framework for determining SSSP's regulated revenues.

Question 13: Could allowing different system strength pricing methodologies support innovation? Do you expect this to be material and over what timeframe might it be material?

5.1.3 Should there be consistency in the permitted long-run pricing methodology?

One option available to the AER in amending the pricing methodology guidelines is to permit SSSPs to choose either long-run methodology (LRMC or LRAC). However, this raises a potential scenario in which some NEM regions could face a higher LRAC-based SSUP while others face a lower LRMC-based SSUP.[36]

Question 14: Should the AER permit SSSPs to choose between different long-run pricing methodologies?

Question 15: Could differing system strength pricing methodologies between SSSPs affect competition in the wholesale market?

5.2 Annual indexation

The SSUP is fixed for the system strength charging period (usually five years) unless the pricing methodology guidelines allow annual indexation.

There may be merit in adopting the same inflation series used by the AER to index the MAR under the revenue determination from one year to the next. This would and could maintain the SSUP in real terms. Further, it would prevent the relative real share of SSSP's revenues coming from system strength charges declining compared to other prescribed transmission services for reasons that are not related to system strength demand.

Question 16: Should the system strength unit price be indexed? If so, what method should be used for indexation?

36 This assumes economies of scale and scope in centralised system strength procurement.

6 Issues to consider: Revenue forecasting

This section identifies possible revenue forecasting requirements and considerations, provides explanation of the issues, and poses questions for consultation.

6.1 What revenue inputs are required?

Each year the SSSPs' pricing methodologies will rely upon system strength revenue inputs to apply a true-up process to account for differences between forecast, estimated and actual annual system strength under rule 6A.23.3A. This involves revenues inputs for three years:

- Forecast system strength revenues for the relevant transmission pricing year (**year t**)
- Estimated system strength revenues for the year before the relevant transmission pricing year (**year t–1**)
- Actual system strength revenues for the year 2 years prior to the relevant transmission pricing year (**year t–2**).

The role of these revenue inputs is to determine how much system strength revenue adjustments must occur to the allocated revenues SSSPs will recover from prescribed common transmission services in a given pricing year.

Figure 2.3 illustrates these revenue inputs in the context of prices for prescribed transmission services.

Operation of the transmission revenue cap means that inaccuracy in the forecasts in year t and estimates in year t–1 cannot lead to SSSPs receiving more revenue than their AER-approved MAR. However, inaccuracy in these inputs could drive annual volatility in prescribed common transmission service prices if:

- system strength revenues are expected to be material relative to the total cost pool that SSSPs recover from prescribed common transmission services, and
- system strength revenues are difficult to forecast accurately, resulting in material annual differences between actual vs forecast/estimated revenues.

Actual year t–2 revenues will be verifiable against the SSSP's financial systems and reporting, and so would not be expected to be affected by inaccuracies.

6.2 What forecasting guidance may be desirable?

6.2.1 The basis of revenue inputs

We consider that a principled approach to this guidance would be consistent with the role of these revenue inputs in the pricing methodologies. On this basis, our guidance on forecasting these revenue inputs could seek to:

- Ensure the revenue inputs that SSSPs use in their pricing methodologies are reasonable estimates for that purpose
- Impose a compliance burden that is commensurate with:
    - How TNSPs currently administer transmission pricing methodologies
    - Any customer risk arising from forecasting inaccuracy
- Minimise the costs of administration by relying on data that is already reported by TNSPs for other purposes as much as possible (e.g. in responding to annual regulatory information notices that we have issued).

We would expect that SSSP's forecast system strength revenues would be based on the SSUP by node and a forecast of location-adjusted demand for each node having regard to:

- The system strength quantity (SSQ) and system strength locational factor (SSL) in existing connection agreements for each node
- The SSQ and SSL for expected connections in each node during the pricing year, and reflecting the estimated timing of commissioning of that generator or load.

We expect the estimated system strength revenues would be informed by actual data for the part of the year it is available, and updated forecasts for the balance of that year having regard to the factors used in forecasting revenues listed above.

We expect actual revenues will be verifiable against the SSSP's financial systems and reporting.

Question 17: What level of detail should be contained in the forecasting principles for system strength revenue inputs?

Question 18: What revenue forecasting principles should be included in the pricing methodology guidelines?

6.2.2 Treatment of confidential information

As system strength pricing is implemented progressively for new connections, there may be instances where only one or two generators are buying system strength from a particular node. Hence, the system strength prices in an SSSP's pricing methodology could disclose commercially sensitive information to those generators' competitors.

Section 2.5 of our existing pricing methodology guidelines sets out guidance on information disclosure, including the treatment of confidential or commercially sensitive information. This includes treatment of information that may be commercially sensitive to a transmission customer.

Question 19: Are the arrangements for treatment of confidential and commercially sensitive information in the existing pricing methodology guidelines sufficient for system strength services?

7 Issues to consider: AEMO as Victoria's SSSP

This section explains who is responsible for system strength in Victoria, identifies key differences between Victoria and other regions that may be relevant to the pricing methodology guidelines and poses questions for consultation based on those differences.

7.1 Responsibility for system strength provision and pricing in Victoria

In Victoria, responsibility for the provision of prescribed transmission services is split between AEMO and declared transmission system operators (DTSOs) such as AusNet Services.

The rules provide that AEMO is the SSSP for Victoria. AEMO is therefore responsible for meeting the new system strength standard and planning for and providing system strength services in Victoria.

AEMO is expected to provide system strength services by contracting with DTSOs or providers of non-network solutions, including undertaking contestable tenders where applicable. AEMO's costs of providing system strength services are expected to be largely based on the payments under those agreements, plus its internal costs including planning and procurement costs.

AEMO is also responsible for pricing prescribed transmission services in Victoria except for prescribed connection services. AEMO is therefore responsible for calculating system strength charges and prescribed common transmission service charges. This includes setting the SSUP and performing the annual true-up calculation.

We are currently in the process of making a determination on AEMO's transmission pricing methodology for the period from 1 July 2022 to 30 June 2027.[37]

AusNet Services also has a transmission pricing methodology, which we recently approved for its 1 April 2022 to 31 March 2027 regulatory control period.[38] AusNet Services' pricing methodology only covers connection services, i.e. prescribed entry services and prescribed exit services.

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37 See https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/aemo-determination-2022%E2%80%9327

38 AER, *Final decision: AusNet Services transmission 2022–27 – Pricing methodology*, 28 January 2022. https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/ausnet-services-determination-2022%E2%80%9327/final-decision

7.2 Relevant differences between AEMO and other SSSPs

In its role as a TNSP in Victoria, AEMO is subject to the transmission revenue and pricing regulatory requirements in chapter 6A of the rules. However, Schedule 6A.4 modifies the application of those rules to AEMO.

The AEMC's system strength final rule included some minor amendments to Schedule 6A.4, including providing that the system strength charging period for AEMO means:

> 'the period from the commencement of this definition until 30 June 2027 and each subsequent period of 5 years except that if a pricing methodology of the System Strength Service Provider commences at the start of any such period and is in effect for longer than 5 years, the subsequent period ends when that pricing methodology ends.'[39]

Our current pricing methodology guideline applies to AEMO and does not contain any provisions that modify how it applies to AEMO compared with other TNSPs.

The key difference between AEMO and the other SSSPs that may be relevant to system strength pricing is that AEMO does not have an AER revenue determination. Instead, AEMO's MAR is determined in accordance with Schedule 6A.4 of the NER and the revenue methodology developed by AEMO under clause S6A.4.2.

AEMO's revenue methodology must include a description of:

- the categories of costs to be recovered; and
- the method (which must be consistent with the Cost Allocation Principles) for allocating costs to prescribed transmission services and negotiated transmission services; and
- how under and over recovery of revenue in a particular regulatory year is to be treated.

The absence of an AER revenue determination may have implications for the availability of cost information for AEMO when calculating its system strength costs and prices in accordance with the economic cost concepts and other issues discussed in sections 4 and 5. The AER revenue determination process, contingent project applications and cost pass through applications may provide relevant cost information for other SSSPs that will not be available for AEMO.

As an alternative, AEMO may have access to cost information from tenders and contracts for the provision of system strength services by DTSOs and non-network providers. The availability of this information is likely to increase over time as AEMO procures more of these services.

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39 NER, cl. S6A.4.2(k).

AEMO is subject to the same annual planning reports as other TNSPs, so may be able to utilise information prepared for its TAPR when calculating system strength costs and prices, as discussed in section 4.1.1. AEMO is also subject to the RIT-T process, which may also include relevant information on system strength costs.

Question 20: What are the differences between AEMO as SSSP for Victoria and other SSSPs that may be relevant to our pricing methodology guideline?

Question 21: Are the issues discussed in sections 4 to 6 above equally applicable to AEMO as SSSP for Victoria?

Question 22: Are there any areas where our guideline should treat AEMO differently to other SSSPs because of any of differences between how AEMO is regulated and how other SSSPs are regulated?

A List of consultation questions

For convenience, this appendix lists the questions we raise for stakeholders throughout this consultation paper, and provides a link to the associated section of the paper.

Table A.1 List of questions

#	Question	Section of this paper
1	Are there any implications of the TNSP and AEMO interdependencies that could affect the form of our system strength pricing methodology guidance?	Section 2.2.2.2
2	Do you have any feedback on these or other relevant contextual factors and their consequences for the AER's guidance development?	Section 2.3
3	What materiality considerations should inform our assessment of potential pricing methodologies? Please provide any relevant evidence that you think should inform our materiality assessment.	Section 3.3
4	Should our guidance specify a minimum period for "long-run", and if so, is 10 years reasonable?	Section 4.1.1
5	What scenario(s) (either illustrated in Figure 4.1 or others), do you think should inform our guidance development? Do you have a view on or evidence of the likelihood of these scenarios?	Section 4.2.3.1
6	To what extent is volatility in the SSUP between 5-year periods likely to have an adverse impact on efficient generator and IBR load investment decisions?	Section 4.2.3.2
7	Is pricing stability desirable over successive SSUP pricing periods?	Section 4.2.3.2
8	Do you consider the permitted pricing methodologies will affect SSUP pricing stability?	Section 4.2.3.2
9	Should the permitted pricing method(s) place risk with the party best placed to manage it, and should any residual unmanageable risk be allocated to the party best able to absorb the risk?	Section 4.2.3.3
10	Do you consider that a LRAC permitted pricing methodology would support this?	Section 4.2.3.3
11	What issues should the pricing methodology guidelines consider in relation to minimising administrative complexity and implementation costs? What data or evidence would be useful to inform the response to this question?	Section 4.3

#	Question	Section of this paper
12	Is consistency with the pricing of other transmission services desirable?	Section 5.1.1
13	Could allowing different system strength pricing methodologies support innovation? Do you expect this to be material and over what timeframe might it be material?	Section 5.1.2
14	Should the AER permit SSSPs to choose between different long-run pricing methodologies?	Section 5.1.3
15	Could differing system strength pricing methodologies between SSSPs affect competition in the wholesale market?	Section 5.1.3
16	Should the system strength unit price be indexed? If so, what method should be used for indexation?	Section 5.2
17	What level of detail should be contained in the forecasting principles for system strength revenue inputs?	Section 6.2.1
18	What revenue forecasting principles should be included in the pricing methodology guidelines?	Section 6.2.1
19	Are the arrangements for treatment of confidential and commercially sensitive information in the existing pricing methodology guidelines sufficient for system strength services?	Section 6.2.2
20	What are the differences between AEMO as SSSP for Victoria and other SSSPs that may be relevant to our pricing methodology guideline?	Section 7.2
21	Are the issues discussed in sections 4 to 6 above equally applicable to AEMO as SSSP for Victoria?	Section 7.2
22	Are there any areas where our guideline should treat AEMO differently to other SSSPs because of any of differences between how AEMO is regulated and how other SSSPs are regulated?	Section 7.2

B Shortened forms

Shortened form	Extended form
ABS	Australian Bureau of Statistics
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AIC	Average incremental cost
DNSP	Distribution network service provider
DUOS	Distribution use of system
DTSO	Declared transmission system operator
IBR	Inverter based resources
LRAC	Long-run average cost
LRMC	Long-run marginal cost
MAR	Maximum allowed revenue
MIC	Marginal incremental cost
MNSP	Market network service providers
MVA	Megavolt amperes
MW	Megawatt
NEM	National electricity market
NER	National electricity rules
NSP	Network service provider
TAPR	Transmission annual planning report
TNSP	Transmission network service provider
TUOS	Transmission use of system
SSIAG	System strength impact assessment guidelines
SSL	System strength locational factor
SSSP	System strength service provider
SSQ	System strength quantity
SSUP	System strength unit price