



Powerlink Queensland

# Summary Project Specification Consultation Report

## Addressing system strength requirements in Queensland from December 2025

March 2023

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## Summary

### The power system is transforming to support decarbonisation

The pace and scale of change in the decarbonisation of Australia's energy system (made up of both generation and power systems), is one of the fastest in the world. Moving the energy system to much greater levels of Variable Renewable Energy (VRE) generation brings technical challenges to the transmission network, such as the need to ensure system strength is maintained,

Powerlink, as the Transmission Network Service Provider (TNSP) and System Strength Service Provider (SSSP) in Queensland, has obligations to ensure customers continue to receive a safe, reliable and secure supply of electricity.

Powerlink is committed to providing transmission network services that are valued by customers.

### System strength is a critical component of the power system

System strength is a measure of the ability of the power system to remain stable by maintaining the voltage waveform, at any given location, both with and without the occurrence of an event or disturbance or fluctuations in supply or demand.

System strength has traditionally been provided by the electrical characteristics of coal, gas-fired and hydro-electric power generation (synchronous generation) which are electrically coupled to the power system. However, many non-synchronous generation technologies, such as large scale solar and wind, do not inherently provide system strength because the majority currently use grid-following inverter technology and power electronics to generate electricity. These are known as grid-following Inverter-Based Resources (IBR).

Given the scale of the energy transformation, rapid uptake of VRE resources and signalled retirement of much of the existing fleet of synchronous generators, it is critical to find alternate solutions to address system strength needs.

### Powerlink is required to apply the RIT-T to procure system strength services

In October 2021, the Australian Energy Market Commission (AEMC) introduced the *Efficient management of system strength on the power system* Rule with a number of sequenced obligations as part of an evolved framework for the supply, coordination and demand sides of the power system. As a result and from 2 December 2022, Powerlink, as the SSSP in Queensland, is required to take action to plan, procure and make available system strength services as set out in the 10-year forecast provided in the Australian Energy Market Operator's (AEMO's) most recent System Strength Report.

In December 2022, AEMO published the first System Strength Report under the evolved framework that defines the system strength requirements for Queensland over a 10-year outlook period.

Given the estimated capital cost of the most expensive credible option to address the identified need for system strength services meets the minimum cost threshold to apply the Regulatory Investment Test for Transmission (RIT-T), Powerlink must take action to ensure ongoing compliance with the National Electricity Rules (NER).

As the identified need for the proposed investment is to meet reliability and service standards specified within Powerlink's Transmission Authority, guidelines and standards published by AEMO, and Powerlink's ongoing compliance with Schedule 5.1.14 of the NER, it is classified as a 'reliability corrective action'.<sup>1</sup>

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<sup>1</sup> Refer to NER Clause 5.10.2, Definitions, reliability corrective action.

While system strength is an important component in the development of the AEMO's Integrated System Plan (ISP), the identified need to provide system strength services is subject to the application and consultation process for RIT-T projects that are not *actionable ISP projects*<sup>2</sup>.

Consistent with the Australian Energy Regulator's (AER's) RIT-T Application Guidelines for non-ISP projects, the assessment undertaken in subsequent reports under this RIT-T will compare and rank the net present value (NPV) of credible options designed to address the emerging risks, relative to a non-credible base case<sup>3</sup>.

### Powerlink is seeking a portfolio of system strength services to meet both the forecast minimum and efficient requirements

It is expected that non-network solutions will materially contribute to the provision of the minimum and efficient system strength services required through a portfolio of solutions such as, but not limited to existing or anticipated:

- synchronous generation plants operating as generator and/or with the potential for full or hybrid conversion to allow operation as synchronous condensers
- dedicated synchronous condensers
- various grid-forming plant, and/or
- any other technology that can support stable voltage waveform.

In addition, given the

- potential suite of non-network alternatives available
- varying contributions to system strength offered by different technologies and
- locational and availability factors to be considered on a case-by-case basis

Powerlink expects that there will not be a direct one-to-one relationship between the number of alternatives required and the number of synchronous plant identified in this PSCR. Rather, it is anticipated that a portfolio of system strength services will be required.

### The minimum system strength requirement to be procured

To deliver the **minimum** system strength requirements identified by AEMO, Powerlink is seeking:

- Seven synchronous machines or equivalent plant online in Central Queensland in the order of 350MVA each,
- Two hydro-electric machines or equivalent plant in North Queensland in the order of 20MVA each, and
- Four synchronous machines or equivalent plant online in Southern Queensland in the order of 400MVA each.

AEMO's 2022 System Strength Report forecasts normal dispatch of existing units will reduce dramatically in the 10-year outlook period, with system strength shortfalls at the Gin Gin node forecast to occur almost 30% of the time in 2027/28.

In the interests of transparency, and a realistic assessment of the pace of change that can be achieved while maintaining the reliability and security of the power system, Powerlink expects that the initial suite of services is likely to include existing synchronous plant and/or modifications thereof, subject to the submissions received and cost-benefit analysis undertaken as part of this RIT-T.

### The efficient system strength requirement to be procured

To deliver the **efficient** system strength requirements, further to the minimum requirements above, Powerlink has estimated that eight synchronous machines or equivalent plant are

<sup>2</sup> Refer to NER Clause 5.16.2.

<sup>3</sup> AER, *Application guidelines, Regulatory Investment Test for Transmission*, August 2020, page 21.

required within the 10-year outlook period of AEMO's 2022 System Strength Report (refer to Table 1) to support the forecast levels of IBR (known as efficient level of system strength).

Table 1: Description of the requirement for efficient system strength services

Year/s	Number of additional Units	Cumulative number of additional Units	Required Efficient System Strength
2025	1	1	One additional approximately 200MVA synchronous machine <b>or equivalent plant</b> online in North Queensland
2025 - 2030	3	4	Three additional approximately 200MVA each synchronous machines <b>or equivalent plant</b> online in Central and North Queensland are required to support additional IBR connections between 2025 and 2030. The required timing for the additional units is likely closer to 2025 than 2030.
2030 - 2033	4	8	Four additional approximately 200MVA each synchronous machines <b>or equivalent plant</b> online, possibly in Central and Southern Queensland. The required timing for the additional units is likely closer to 2030 than 2033.

System strength services required to be made available beyond 2030 will be guided by AEMO's annual System Strength Report forecasts as the energy transformation continues to gain momentum.

Powerlink is seeking to procure system strength services that will be available from 2025. Consistent with the National Electricity Objective<sup>4</sup>, Powerlink also recognises the desirability of longer term contracts to promote efficient investment in electricity services, protecting the long-term interests of consumers.

## Two credible options are proposed to address the identified need

A credible option is defined in the Rules as an option, or group of options, that addresses the identified need, is commercially and technically feasible, and can be implemented in sufficient time to meet the identified need.

Considering the timing of the identified need from December 2025, the current challenging external environment, including supply chain disruptions, and acknowledging the risk of network project delivery delays in the immediate term, Powerlink does not consider there is a credible network option to meet the identified efficient need in its entirety as described in Table 1.

Powerlink is proposing two credible options that address both the minimum and efficient levels of system strength required. Given the scale and pace of the energy transformation, Powerlink considers this a prudent, least-regret approach to ensure the power system remains safe, reliable and secure.

- Option 1 seeks to procure system strength services to meet the identified need in its entirety for both the minimum and efficient levels of system strength. System strength services offered must be able to commence availability in the period between December 2025 and December 2030.
- Option 2 is a hybrid solution which seeks to procure system strength services together with the installation and commissioning of up to eight new 200MVA synchronous condensers (network component) for both the minimum and efficient levels of system strength required by December 2030. System strength services offered must be able to commence availability in the period between December 2025 and December 2030.

The indicative capital cost of the network component of Option 2 is up to \$752 million in 2023/24 prices. Annual operating and maintenance costs are anticipated to be up to approximately \$15 million (2023/24 prices).

<sup>4</sup>Refer to the [AEMC](#) website.

The economic analysis in the Project Assessment Draft Report (PADR) will identify the optimal timing and combination of option/s (i.e. total non-network or varying contributions of non-network and network) which delivers the lowest overall cost to customers.

### **The requirement for system strength services will continue to grow**

This RIT-T is the first consultation to address the need for system strength services under the evolved regulatory framework.

Procuring system strength services is expected to be an iterative process moving forward, requiring future RIT-Ts as more information becomes available and there is greater certainty in the size, location and timing of new generation and retirement of existing synchronous generation.

Powerlink will likely require a comprehensive and expanding portfolio of non-network solutions on an ongoing-basis, particularly as more IBR connects to the transmission network and the requirement for system strength services continues to grow.

### **Powerlink welcomes non-network options to form all or part of the solution**

Powerlink welcomes submissions from proponents who consider they could offer a potential non-network option that is both economically and technically feasible by 2030. If parties prefer, they may request to meet with Powerlink ahead of providing a written response.

Powerlink is seeking written submissions on this Project Specification Consultation Report, on or before Friday, 21 July 2023.

Please address submissions to:

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