Webinar for industry stakeholders and proponents of non-network solutions

System Strength RIT-T

28 NOVEMBER 2024

Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular the lands on which we operate.

We pay our respect to their Ancestors, Elders and knowledge holders and recognise their deep history and ongoing connection to Country.

Disclaimer

Dear reader

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Thank you

Moderated Q&A is open. Please submit your questions at any time.

1.	Welcome	Gerard Reilly
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4.	Technical considerations	Cheryl Noronha
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8.	Questions	Gerard Reilly

Overview of System Strength

Carl Davis

Manager Portfolio Planning and Optimisation

What is System Strength?

- Transitioning to intermittent renewables creates power network challenges.
- System strength describes how well the power system can recover from disturbances or faults.
- Adequate system strength is required for power quality and stable renewable integration.

Minimum

Enables the network to maintain voltages during network disturbances and faults

Efficient

Enables generation to stay connected during system disturbances

Only acts locally, and contribution reduces with distance

Key dates

2024 2025

Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

4 Nov 2024
Project Assessment Draft Report (PADR) Published

20 Dec 2024
PADR Submissions Close

30 Jun 2025 (Target)
Project Assessment Conclusions Report (PACR) Published

31 Aug 2025
AEMO Full Enablement Protocol Published

2 Dec 2025
Commencement

Overview of the PADR

Carl Davis

Manager Portfolio Planning and Optimisation

Portfolio Approach

Technology Options

PHES

BESS

Syncon

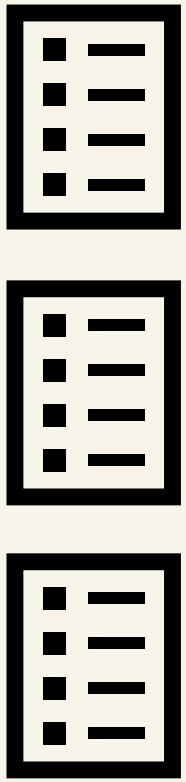
GT with Clutch

Sync Gen

~80 Unique solutions

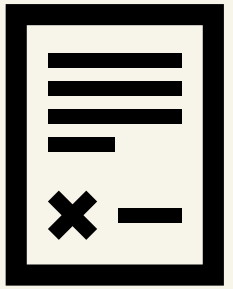
Market Modelling

RIT-T Draft Preferred Regional Portfolios for SQ, CQ & NQ



Negotiation with Individual Service Providers

First tranche contracts in place by 31 August 2025



Start Date = 2 December 2025

Later tranches depend on solution lead time and requirement timing

Technical Considerations

Cheryl Noronha
Principal Engineer Power System Performance & Connections

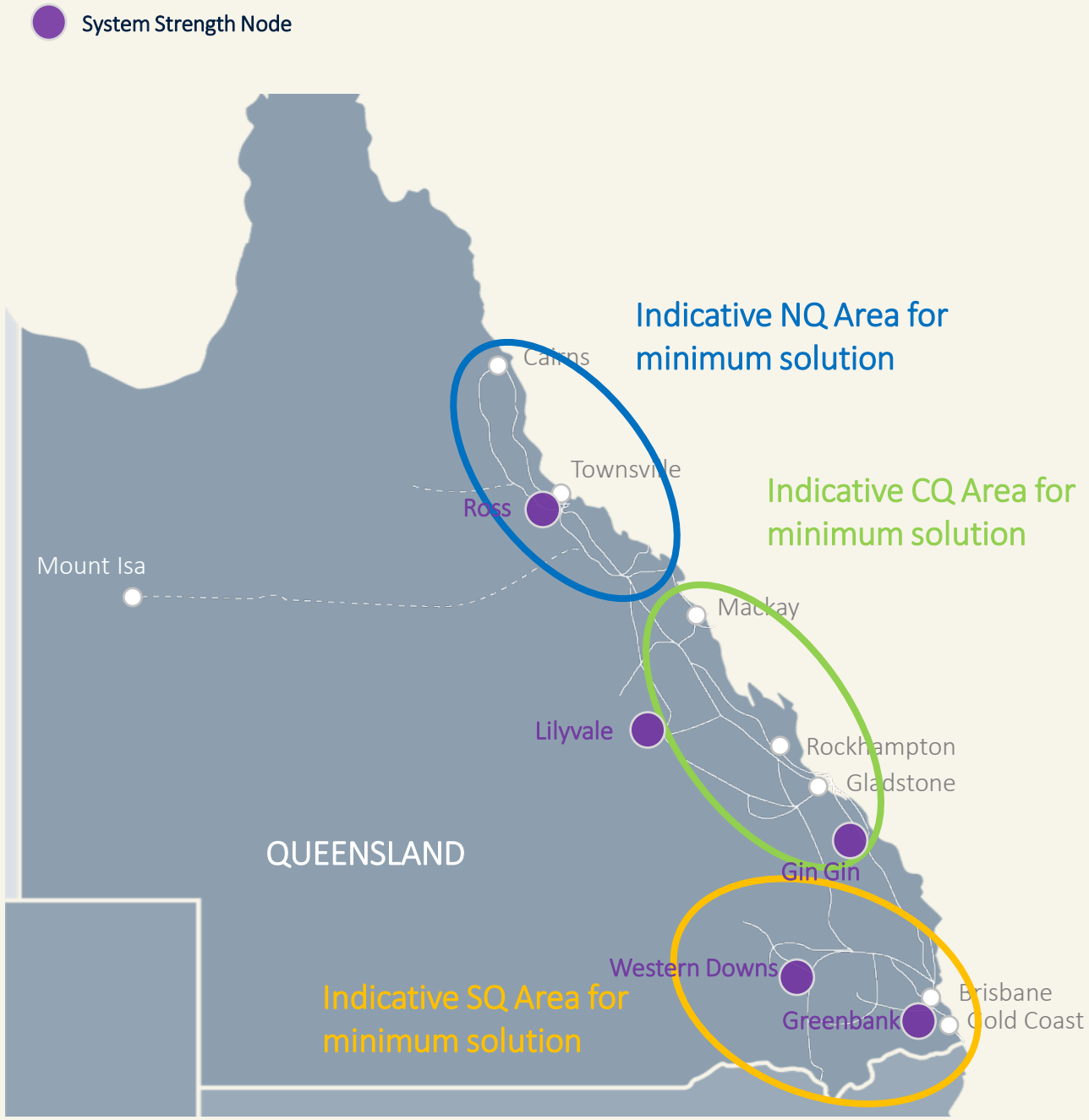
Technical Considerations – Background

Detailed EMT simulation studies

- Check technical feasibility of solutions
- Where & how many system strength services to support future IBR
- 5-year outlook, considering both day and night conditions

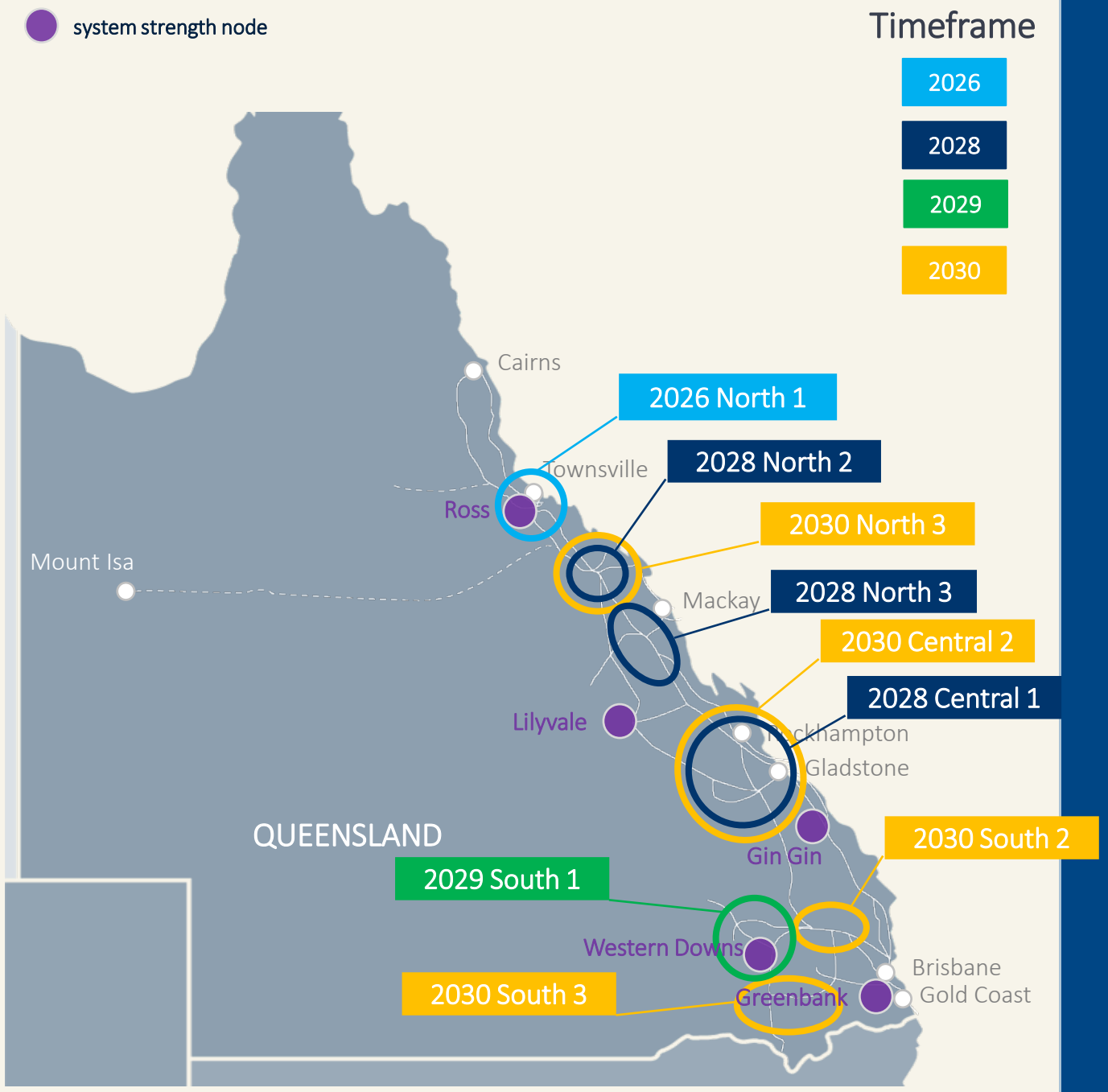
Study data and assumptions

- AEMO's 2023 system strength report used for renewable forecasts
- Site-specific models used, if available, or generic models used



Results – Minimum System Strength

- In early years (to 2026) requirements can be met by existing synchronous generators (coal, gas, hydro)
- Later years alternative synchronous machines could replace a number of existing generators
- Alternative synchronous machines could be synchronous condensers
- Location considerations – minimum requirements for Northern, Central and Southern Queensland
- Solutions in one location also influence adjacent areas



Results – Efficient System Strength

- Near term efficient need in Far North Queensland (end of 2026)
- Number of efficient services needed across Queensland as renewable/battery installations grow over 5 years.
- Grid forming battery size in range from 200MW - 300MW would be suitable.
- Efficient services could be met by other technologies (synchronous, emerging technologies – grid forming STATCOM).

Grid Forming (GFM) BESS expectations

Additional technical assessment of GFM performance

- Generator performance standard (GPS) process still applies
- Additional assessment above GPS process needed to check stable voltage waveform performance
- Required only for shortlisted GFM BESS solutions
- Refer to Appendix I of PADR

Technical expectations

- Detailed (EMT) BESS models required
- BESS project to provide results of specific simplified studies
- Oscillation damping performance to be assessed
- Some level of short-term overloading capability to be assessed
- BESS must remain in grid forming mode when providing the service (e.g. not changing between grid-forming and grid-following).
- More information to support submission is preferred (e.g. BESS manufacturer GFM test results)

Formation and assessment of portfolios

Carl Davis

Manager Portfolio Planning and Optimisation

Common solutions in each portfolio

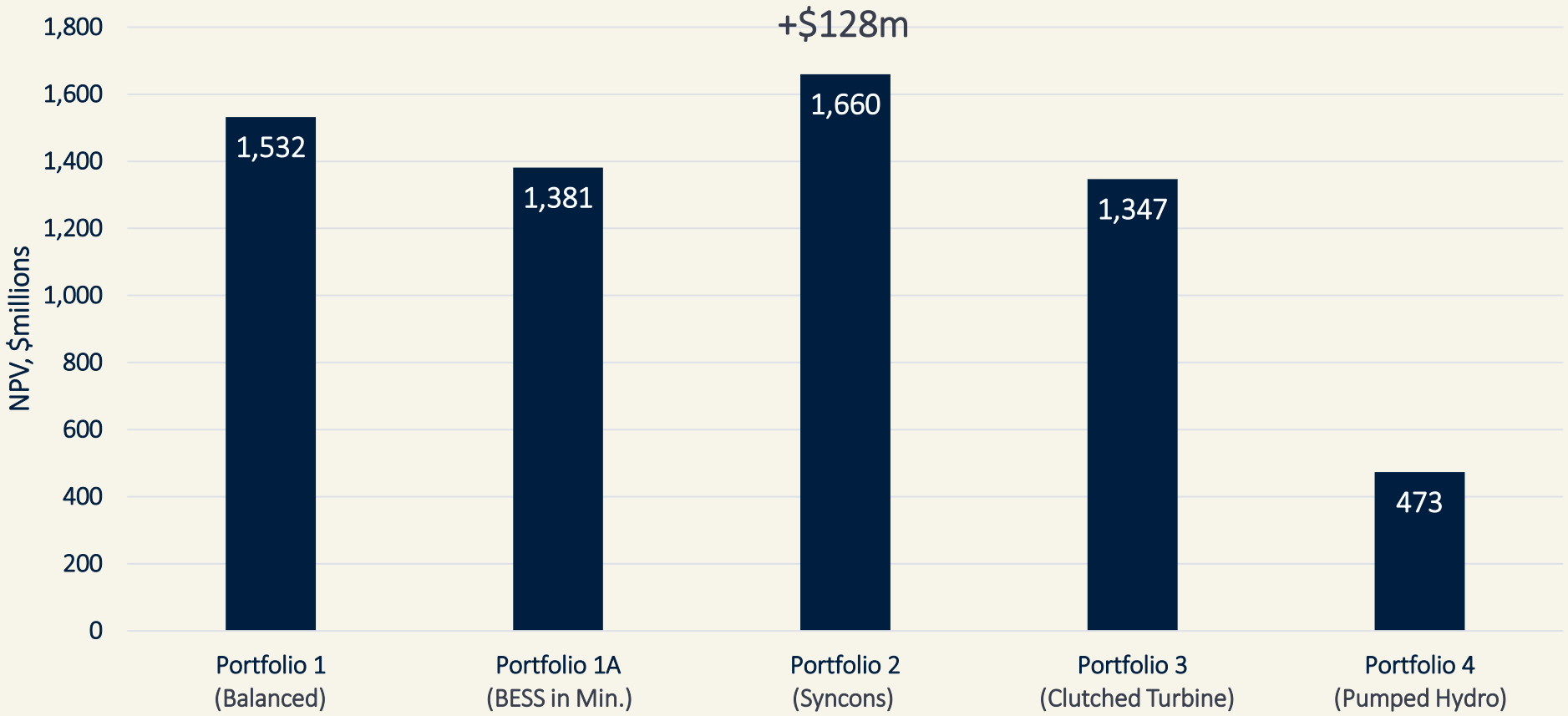
Requirements	Solutions
Minimum fault level	• One new syncon in Southern Queensland • Non-network contracts with existing, expected and potential future gas and hydro projects in Southern and Northern Queensland • Clutch at Townsville Power Station • Non-network contract with existing (small) syncon
Efficient Stable Voltage Waveform	• Each portfolio includes 2.15 gigawatts of grid-forming BESS

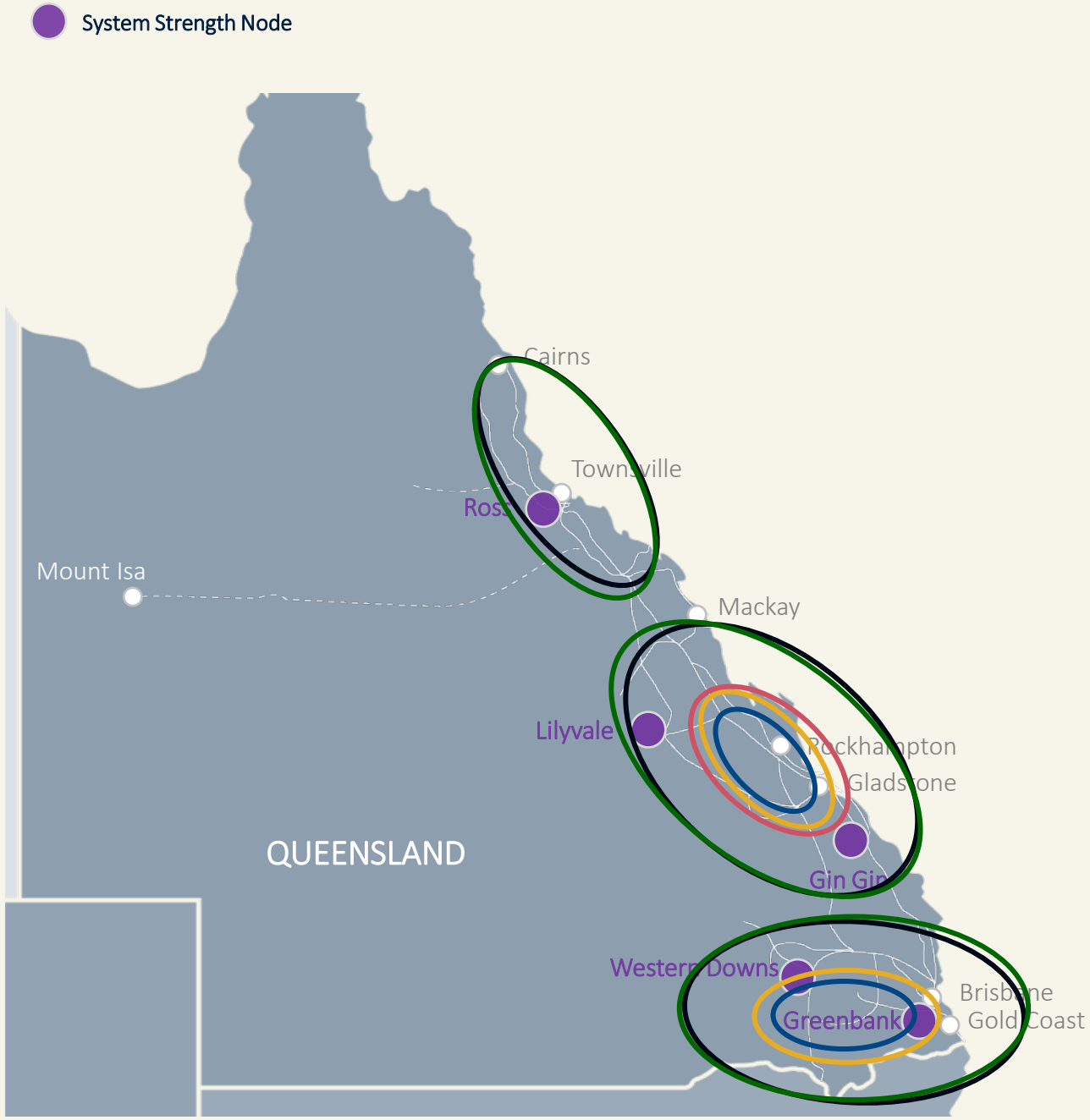
Portfolios of credible options

Portfolio	Solutions for minimum requirements
1 – Balanced Technology	• Six new syncons in Central Queensland • Two future clutched gas turbines in Central Queensland
1A – Balanced Technology (BESS in Minimum)	• Five new syncons + one large grid-forming BESS in Central Queensland • Two future clutched gas turbines in Central Queensland
2 – Synchronous Condensers	• Eight new syncons in Central Queensland
3 – Clutched Gas Turbines	• Four new syncons in Central Queensland • Four future clutched gas turbines in Central Queensland
4 – Pumped Hydro Energy Storage	• Three new syncons in Central Queensland • Two future clutched gas turbines in Central Queensland • Three planned pumped hydro energy storage units in Central Queensland

Estimated net benefits - ISP Step Change

Portfolio 2 ranks first in the NPV with $128 million greater benefits than Portfolio 1.

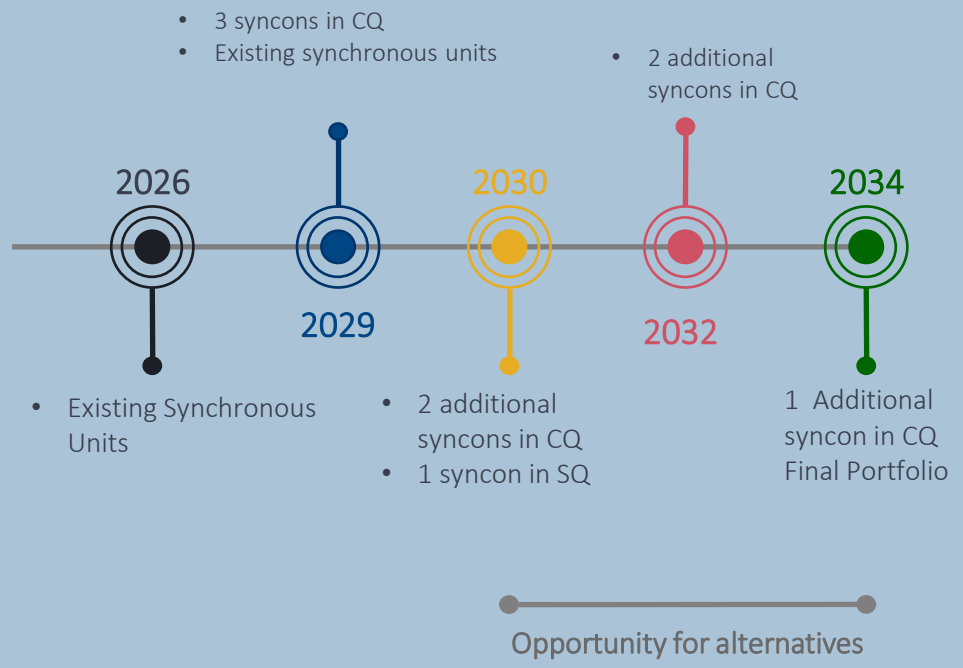




Portfolio 2

- 9 Synchronous Condensers by 2034
- Contracting with a range of other synchronous units in Southern and Northern Queensland

Timeline for minimum level



Commercial Considerations

Carl Davis

Manager Portfolio Planning and Optimisation

Commercial Parameters: See Appendix G of PADR.

Timing: Contracts staged to align with lead times.

Submissions: Best info / pricing required in competitive PADR process.

Pricing Structure

Payment Type	Unit	Description
Availability payment	$/month	Compensate the service provider's fixed costs for maintaining the availability of the system security service. AEMO will not take these payments into account in its daily scheduling and enabling activities.
Activation payment	$/activation per unit	Compensate the service provider for the cost of commencing operation from a previously inactive state.
Usage payment	$/hr per unit	Compensate the service provider for the variable costs (if applicable) of operating in the manner required to provide the system security service.
Energy Revenue	$	The transfer to the TNSP of revenue from the sale of electricity on the spot market (positive or negative) resulting from the service being enabled at Minimum Dispatch or Auxiliary Load (if applicable).

Reference: *AEMO Provisional Security Enablement Procedures*, 30 June 2024

Next steps

Carl Davis

Manager Portfolio Planning and Optimisation

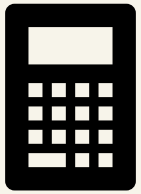
Existing proposals: information needed from proponents

What	When	Why
Confirm the proposal is still available to Powerlink	ASAP	To identify solutions suitable for further investigation.
Provide updated technical information	20 Dec 2024	To ensure models have the latest information.
Provide updated pricing & commercial information	20 Dec 2024	Pricing and terms must align with AEMO's requirements published 30 June 2024.
Provide updated status of projects	20 Dec 2024	Materially impacts solution costs and portfolio NPVs under the RIT-T, with project status information quality also influencing solution selection.

Information requests to: networkassessments@powerlink.com.au

Key topics we are seeking your feedback on

Proposed reopening triggers and responses to material changes



Updated commercial parameters

Options to manage energy revenue exposure

Key dates


2024
2025
Oct
Nov
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4 Nov 2024
Project Assessment
Draft Report (PADR)
Published
20 Dec 2024
PADR Submissions
Close
30 Jun 2025 (Target)
Project Assessment
Conclusions Report
(PACR) Published
31 Aug 2025
AEMO Full
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Questions

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