05

Non-network solutions

The use of cost effective non-network solutions is essential to provide reliable and cost effective transmission services for customers. This chapter discusses Powerlink's approach and process for engaging with non-network solution providers and provides a summary of potential non-network solution opportunities anticipated to become available over the next five years.

Key highlights

- As the power system transforms, non-network solutions will be essential to address network needs such as inertia, system strength, network support and control ancillary services (NSCAS) and voltage control.
- Opportunities may become available in the future to assist in managing daily peaks and troughs where economic, delivering positive outcomes for customers.
- Non-network solutions, in part or full, may also contribute to a network strategy by maintaining a balance between reliability and the cost of transmission services for customers.

5.1 Introduction

Powerlink has established processes for engaging with stakeholders for the provision of non-network services in accordance with the requirements of the National Electricity Rules (NER). For a given network limitation or potential asset replacement, the viability and an indicative specification of non-network solutions are first introduced in the Transmission Annual Planning Report (TAPR) and TAPR templates. As the identified need date approaches and detailed planning analysis is undertaken, further opportunities are explored in the consultation and stakeholder engagement processes undertaken as part of the Regulatory Investment Test for Transmission (RIT-T).

In the past, Powerlink has implemented a range of non-network solutions in various areas in Queensland to assist, support or augment the power transfer capability of the high voltage transmission network.

Most recently, in early 2023, Powerlink entered into a Network Support Agreement with CleanCo Queensland (CleanCo) to assist in a short-term solution to address an NSCAS gap in Southern Queensland until such time as the longer term solution could be assessed and implemented under the Managing voltages in South East Queensland RIT-T. In September 2023 Powerlink published a Project Assessment Conclusions Report which identified the preferred option to address the identified need for reactive power absorption capability in the SEQ. This option involves the installation of a 120MVAr reactor at Belmont Substation by December 2024, and network support services from CleanCo to operate during times of reactive power absorption shortfall, while further reactive support from BESS connections and other non-network developments emerge (refer to Table 6.2 and Section 6.8.1).

Powerlink also anticipates that non-network solutions will materially contribute to meet both the forecast minimum and efficient system strength requirements in Queensland from December 2025 (refer to Section 6.8.2).

5.2 Increasing opportunities for non-network solutions

Given the scale of the energy transformation, rapid uptake of variable renewable energy (VRE) resources and signalled retirement of synchronous generators, it is critical to find alternate solutions and to procure services to address future power system security requirements such as inertia, system strength and NSCAS. Powerlink expects that non-network solutions will materially contribute to the provision of these services through a suite of solutions with, but not limited to, existing synchronous generation plant, dedicated synchronous condensers, pumped hydro energy storage and grid-forming asynchronous plant.

The uptake of rooftop photovoltaic (PV) systems is expected to continue within residential and commercial premises. Should this trend progress in the absence of energy storage devices (such as household battery systems) or significant levels of demand time of day shifting, minimum demand will further decrease and there will be a continued widening between maximum and minimum demand (refer to Section 3.2). The installation of additional reactive devices and/or non-network solutions are likely to be required to manage high voltages during minimum demand conditions.

Continuation of this trend is likely to present further challenges to the power system. Generating stations will be required to ramp up and down in response to daily demand variations more frequently. Decreasing minimum demand may also lower the amount of synchronous generation that is on-line and this could further impact on voltage control, system strength, inertia and the ability for available generators to meet evening peak demand.

There may also be future opportunities for new technologies, including flexible loads, offering non-network solutions to assist with managing daily peaks and troughs. Demand shifting and storage solutions have the potential to smooth the daily load profile and could offer a number of benefits to the power system including reducing the need for additional transmission network investments. More information on these emerging issues is available in Chapter 3 and sections 6.9.1 to 6.9.11.

Powerlink is committed to genuine engagement with providers of non-network solutions and the implementation of these solutions where technically feasible and economic to:

- address inertia, system strength and NSCAS requirements, ensuring the secure operation of the transmission network
- address future network limitations or address the risks arising from ageing assets remaining in-service within the transmission network
- more broadly, in combination with network developments as part of an integrated solution to complement an overall network reconfiguration strategy
- provide demand management and load balancing.

Potential non-network solution opportunities within the next five years are described in Table 5.1.

5.3 Non-network solution providers are encouraged to register with Powerlink

Powerlink has established a Non-network Engagement Stakeholder Register (NNESR) to convey non-network solution providers the details of potential non-network solution opportunities. The NNESR is comprised of a variety of interested stakeholders who have the potential to offer network support and/or system security services through alternate technologies, existing and/or new generation or Demand Side Management (DSM) initiatives (either as individual providers or aggregators).

More information on potential non-network solutions is available on Powerlink's website, including details regarding current RIT-T consultations and Powerlink's Network Support Contracting Framework.

Interested parties are encouraged to contact NetworkAssessments@powerlink.com.au to become a member of Powerlink's NNESR.

Table 5.1 Potential non-network solution opportunities within the next five years

Potential project	Indicative cost (most likely network option)	Zone	Indicative non-network requirement	Possible commissioning date	TAPR Reference
Transmission lines					
Woree to Kamerunga 132kV transmission line replacement	$70m	Far North	Up to 70MW at peak and up to 1,200MWh per day on a continuous basis to provide supply to the 22kV network	December 2028	Section 6.9.1
Line refit works on the 275kV transmission lines between Ross and Chalumbin	$37m	Far North	The Ross to Chalumbin transmission lines provide injection to the north area of close to 400MW at peak and up to 3,000MWh per day. The network configuration also facilitates generator connections in the area and provides system strength and voltage support for the region.	June 2029	Section 6.9.1
Rebuild the 275kV transmission line between Calliope River and Larcom Creek Substation	$107m	Gladstone	Up to 160MW at peak and up to 3,200MWh per day on a continuous basis to provide supply to the 66kV and 132kV loads at Yarwun and Raglan	June 2029	Section 6.10.2
Rebuild the 132kV transmission line between Calliope River and Gladstone South substations	$53m	Gladstone	Up to 160MW and up to 1,820MWh per day	June 2026	Section 6.10.2
Rebuild of two of the three transmission lines between Calliope River and Wurdong tee as a double circuit by December 2028 Line refit works on the remaining single circuit 275kV transmission line between Calliope River Substation and Wurdong Substation by June 2029 Targeted refit of the three single circuit transmission lines between Calliope River (Wurdong Tee) and Gin Gin substations by June 2029 Line refit works on the 275kV transmission line between Woolooga and South Pine substations by June 2029	$40m $14m $75m $16m	Wide Bay	Powerlink would consider proposals from non-network providers that can significantly contribute to reducing the load requirement in this region.	December 2028 to June 2029	Section 6.11.1

Table 5.1 Potential non-network solution opportunities within the next five year (*continued*)

Potential project	Indicative cost (most likely network option)	Zone	Indicative non-network requirement	Possible commissioning date	TAPR Reference
Replacement of the 110kV underground cable between Upper Kedron and Ashgrove West substations	$18m	Moreton	Up to 220MW at peak to Brisbane's inner north-west suburb (potentially coupled with network reconfiguration)	June 2028	Section 6.11.4 Anticipated RIT-T
Line refit works on sections of the 275kV transmission line between Greenbank and Mudgeeraba substations	$30-53m	Gold Coast	Proposals which may significantly contribute to reducing the requirements in the southern Gold Coast and northern NSW area	December 2028	Section 6.11.5
Substations - primary plant and secondary systems					
Kamerunga 132kV Substation replacement	$75m	Far North	Provide supply to the 22kV network of up to a peak 60MW, and up to a peak 900MWh per day on a continuous basis would allow for the decommissioning of the Kamerunga Substation and bridging of the Woree to Kamerunga Feeders to the Kamerunga to Barron Gorge Feeders.	December 2028	Section 6.9.1
Ingham South 132kV primary plant and secondary systems replacement	$10m	Ross	Up to 20MW at peak and up to 280MWh per day on a continuous basis to provide supply to the 66kV network at Ingham South	December 2027	Section 6.9.2 Anticipated RIT-T
Strathmore SVC secondary systems replacement	$8m	North	Up to 260MVArs capacitive and 80MVArs inductive support at Strathmore	June 2026	Section 6.9.3 Anticipated RIT-T
Alligator Creek 132kV primary plant replacement	$7m	North	Up to a peak of 80MW and 1,400MWh per day on a continuous basis	June 2025	Section 6.9.3
Alligator Creek SVC secondary systems replacement	$7m	North	Potential non-network solutions would need to provide voltage imbalance support for the 132kV network	June 2028	Section 6.9.3
Calvale 275kV primary plant replacement	$18m	Central West	More than 100MW and up to 2,000MWh per day on a continuous basis to provide supply to the 132kV network at Moura and Biloela	December 2028	Section 6.10.1
Broadsound 275kV primary plant replacement	$19m	Central West	Up to 250MW and up to 6,000MWh per day on a continuous basis to provide supply to the 275kV network at Broadsound	December 2027	Section 6.10.1

Table 5.1 Potential non-network solution opportunities within the next five year (*continued*)

Potential project	Indicative cost (most likely network option)	Zone	Indicative non-network requirement	Possible commissioning date	TAPR Reference
Callemondah Substation primary plant and secondary systems replacement	$10m	Gladstone	Up to 180MW at peak and up to 2,500MWh per day on a continuous basis to provide supply to the 132kV network at Gladstone South and/or Aurizon load at Callemondah	June 2025	Section 6.10.2 Anticipated RIT-T
Mudgeeraba 110kV primary plant and secondary systems replacement	$33m	Gold Coast	Proposals which may significantly contribute to reducing the requirements in the transmission into the southern Gold Coast and northern NSW area	June 2029	Section 6.11.5
Substations - transformers					
Nebo 132/11kV transformers replacement	$11.5m	North	Proposals would need to provide injection or demand response at Nebo Substation of up to 3MW during peak demand and up to 50MWh per day	December 2025	Section 6.9.3 Current RIT-T
Kemmis 132/66kV transformer replacement	$7m	North	Provide injection or demand response at Kemmis of up to 60MW during peak demand and up to 650MWh per day	December 2026	Section 6.9.3 Current RIT-T
System services					
To be identified through the RIT-T process		State-wide	To address the minimum and efficient levels of system strength in Queensland	From December 2025	Section 6.8.2 Current RIT-T

Note:

(1) TAPR template data associated with emerging constraints which may require future capital expenditure, including potential projects which fall below the RIT-T cost threshold of $7m, is available on Powerlink's TAPR portal (refer to Appendix E, in particular transmission connection points and transmission line segments, regarding Powerlink's methodology for template data development).