



Powerlink Queensland

Summary of Project Assessment Conclusions Report

19 September 2023

Managing voltages in South East Queensland

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Summary

Declining minimum flows and an increasing capacitive contribution from more energy efficient appliances and roof top solar systems in the South East Queensland (SEQ) area are increasing the likelihood of non-compliant over-voltage events. The current strategy of switching out selected feeders to ensure ongoing compliance with the National Electricity Rules (Rules) “voltage of supply at a connection point”¹ requirements is at the limit of its technical effectiveness. Continued reliance on increasingly onerous reconfigurations of the network will result in higher market costs.

Powerlink must therefore take action to avoid the increasing likelihood of unserved energy and the emerging risks arising from the projected shortfalls in reactive power absorption capability in the SEQ area. As the identified need of the proposed investment is to meet reliability and service standards specified within Powerlink’s Transmission Authority and guidelines and standards published by the Australian Energy Market Operator (AEMO), and to ensure Powerlink’s ongoing compliance with Schedule 5.1 of the Rules, it is classified as a ‘reliability corrective action’².

On 17 December 2021, AEMO declared an immediate Network Support and Control Ancillary Services (NSCAS) gap in southern Queensland. Powerlink issued an Expression of Interest (EOI) on 19 May 2022 requesting additional system security services to address this gap in the short-term prior to the implementation of any recommendations from the Regulatory Investment Test for Transmission (RIT-T) process.

The Managing voltages in South East Queensland RIT-T addresses the longer-term solutions that can be delivered to ensure compliance with voltage management obligations going forward, while minimising costs incurred from addressing the identified need. This RIT-T has taken into consideration the risks and uncertainties in the external environment in which Powerlink operates through the development of appropriate scenarios.

This Project Assessment Conclusions Report (PACR) represents the final step in the RIT-T process prescribed under the Rules undertaken by Powerlink to address the emerging risks arising from the projected shortfalls in reactive power absorption capability in the SEQ area. It contains the results of the planning investigation and the cost-benefit analysis of credible options compared to a non-credible Base Case where the emerging risks are left to increase over time. In accordance with the RIT-T, the credible option that maximises the present value of net economic benefits is recommended as the preferred option.

Developments since publication of the Project Assessment Draft Report (PADR)

Since publication of the PADR in October 2022, Powerlink completed its assessment in relation to the EOI to address the immediate NSCAS gap in southern Queensland. In December 2022, Powerlink published the findings and outcome of the EOI process in the ‘Request for power system security services in central, southern and broader Queensland regions – Final Report Part 1: NSCAS’. As a result, Powerlink entered into a Network Support Agreement with CleanCo Queensland (CleanCo) to provide the necessary NSCAS through utilising its assets in southern Queensland to operate during times of reactive power shortfall. These services became available from January 2023 to fulfil Powerlink’s regulatory obligations under the Rules³.

In December 2022, AEMO published the 2022 NSCAS Report, confirming the declared gap of 120MVA reactive power absorption, stating Powerlink was finalising the near-term solution and that newly committed and anticipated generation and storage projects, together with the outcome of this RIT-T, are expected to improve power system voltage control in southern Queensland. Given this, AEMO has not declared a gap at the end of the five-year NSCAS assessment period, noting the NSCAS gap may be re-assessed in 2023 as more information becomes available about uncertainties, such as the impact of synchronous generation dispatch and system strength services.

Credible options considered

Powerlink has developed three credible network options under three scenarios for future market-led Battery Energy Storage System (BESS) development, to maintain the existing electricity services, ensuring a reliable, safe and cost effective supply to customers in the area. The major difference between the credible options relates to whether to rely on network support services for reactive power absorption from either the NSCAS gap network support arrangements and/or BESS units, investment

¹ National Electricity Rules, Version 200, 30 May 2023, Schedule 5.1a.4 Power frequency voltage.

² The Rules clause 5.10.2, Definitions, reliability corrective action.

³ The Rules clauses 3.11.1(c)(2)(i) and (ii).

in additional 120MVA_r bus reactors in Powerlink's transmission network, or installing 30MVA_r bus reactors in Energex's distribution network.

By addressing the reactive power absorption capability in the SEQ area, all options allow Powerlink to meet the identified need and continue to meet the reliability and service standards specified within Powerlink's Transmission Authority, Schedule 5.1 of the Rules, AEMO guidelines and standards and applicable regulatory instruments.

Powerlink published a PADR in October 2022 to address the reactive power absorption capability in the SEQ area. In addition to CleanCo's submission to the Project Specification Consultation Report (PSCR), two submissions were received in response to the PADR that closed on 9 December 2022. The submissions proposed network support through BESS arrangements that have been captured in the envelope of BESS network support services identified in the PADR. As result, no additional credible options have been identified as a part of this RIT-T consultation.

Taking into consideration the outcome of the EOI process and submissions received, three credible network options, along with their net present values (NPVs) relative to the Base Case are summarised in Table 1. All options have been further refined from those proposed in the PADR, to reflect the network support services available from CleanCo and as a result of the NSCAS gap network support agreement. The absolute NPVs of the Base Case and the Options are shown graphically in Figure 1. Of the three credible network options, Option 1 has the highest NPV relative to the base case.

Table 1: Summary of credible network options (\$m, real 22/23)

Option	BESS Development Scenario	Description	NSP Cost (\$m)	NPV relative to Base Case (weighted \$m)	Rank
1	120MVA _r Belmont reactor, NSA with CleanCo and subsequent NSA				
	Low	120MVA _r Belmont reactor 2023/24 NSA 2023/24 to 2029/30	13.3*		
	Medium	120MVA _r Belmont reactor 2023/24 NSA 2023/24 Incremental BESS support 2028/29, then 2029/30	13.3*	-10.5	1
	High	120MVA _r Belmont reactor 2023/24 NSA 2023/24 Incremental BESS support 2029/30	13.3*		
2	120MVA _r Belmont reactor, NSA with CleanCo and additional TNSP 120MVA _r reactors				
	Low	120MVA _r Belmont reactor 2023/24 NSA 2023/24 120MVA _r TNSP reactors 2024/25 then 2028/29	39.8*		
	Medium	120MVA _r Belmont reactor 2023/24 NSA 2023/24 120MVA _r TNSP reactors 2027/28 then 2029/30	39.8*	-30.7	2
	High	120MVA _r Belmont reactor 2023/24 NSA 2023/24 120MVA _r TNSP reactor 2029/30	26.5*		

Option	BESS Development Scenario	Description	NSP Cost (\$m)	NPV relative to Base Case (weighted \$m)	Rank
3	120MVAr Belmont reactor, NSA with CleanCo and additional DNSP 30MVAr reactors				
	Low	120MVAr Belmont reactor 2023/24 NSA 2023/24 30MVAr DNSP reactors 2024/25, 2028/29, 2029/30	13.3* 80.0†		
	Medium	120MVAr Belmont reactor 2023/24 NSA 2023/24 30MVAr DNSP reactors 2027/28, 2028/29, 2029/30	13.3* 50.0†	-53.0	3
	High	120MVAr Belmont reactor 2023/24 NSA 2023/24 30MVAr DNSP reactor 2029/30	13.3* 10.0†		

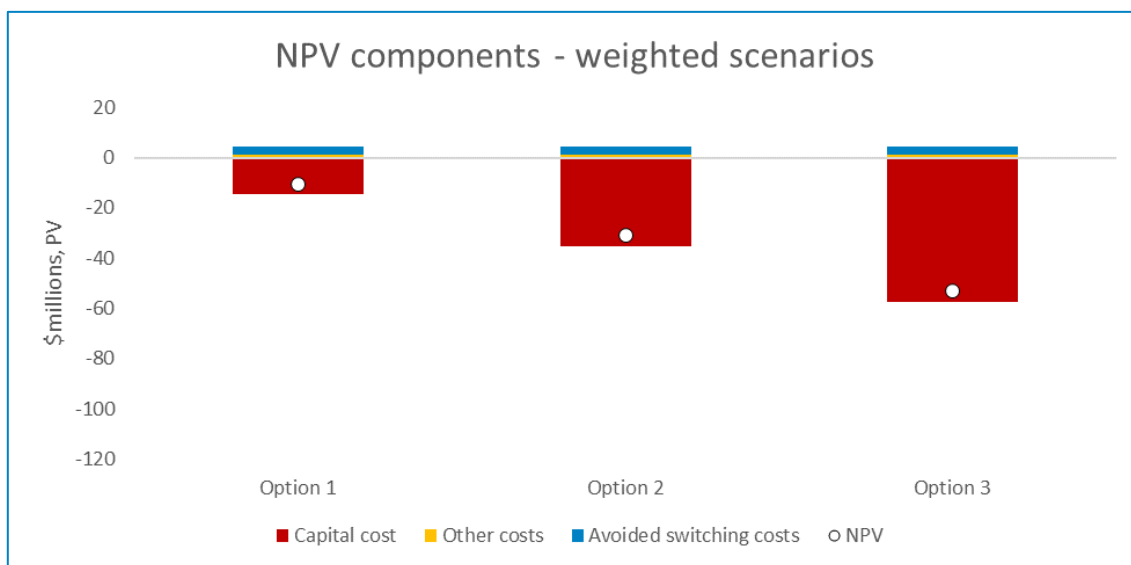
*TNSP project cost

†DNSP project cost

The absolute NPVs of the credible options are negative, shown graphically in Figure 1, with Option 1 being the least negative of the credible options. Given that the cost of network support services from CleanCo is common across all options, there is no change to the ranking of the refined options in this PACR compared to those in the PADR. CleanCo costs are commercial in confidence and therefore have not been published.

All options significantly reduce the total risks arising from the reactive power absorption capability in the SEQ area, enabling Powerlink to continue to meet reliability and service standards specified within its Transmission Authority. They also ensure Powerlink’s ongoing compliance with Schedule 5.1 of the Rules and guidelines and standards published by AEMO.

Figure 1: Weighted NPV components of credible network options (\$m, real 22/23)



Evaluation and Conclusion

The RIT-T requires that the preferred option maximises the present value of net economic benefit, or minimises the net cost, to all those who produce, consume and transport electricity. The cost-benefit analysis demonstrates that Option 1 provides the greatest net economic benefit in NPV terms and is therefore the preferred option.

This PACR makes a final recommendation to implement Option 1, which involves the installation of a 120MVAR reactor at Belmont Substation by 2024, and network support services from CleanCo to operate during times of reactive power shortfall, while further reactive support from BESS connections and other non-network developments emerge. The indicative capital cost of this option is \$13.3 million in 2022/23 prices. Under Option 1, site works would commence in 2023, with the reactor available for service by late 2024. Powerlink is the proponent of the proposed network project and CleanCo is the proponent of network support services.

Option 1 has been adopted as the final recommendation, and will now be implemented.

Dispute Resolution

In accordance with clause 5.16B(a) of the Rules, Registered Participants, the Australian Energy Market Commission, Connection Applicants, Intending Participants, AEMO and interested parties may, by notice to the Australian Energy Regulator, dispute conclusions in this report in relation to:

- the application of the RIT-T,
- the basis upon which the preferred option was classified as a reliability corrective action or
- the assessment of whether the preferred option has a material inter-regional impact or not

Notice of a dispute must be given to the AER within 30 days of the publication date of this report. Any parties raising a dispute are also required to simultaneously provide a copy of the dispute notice to Powerlink, as the RIT-T proponent.



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