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Summary: Complying with reactive margin requirements at Beryl

RIT-T Project Specification Consultation Report

Region: Central West NSW

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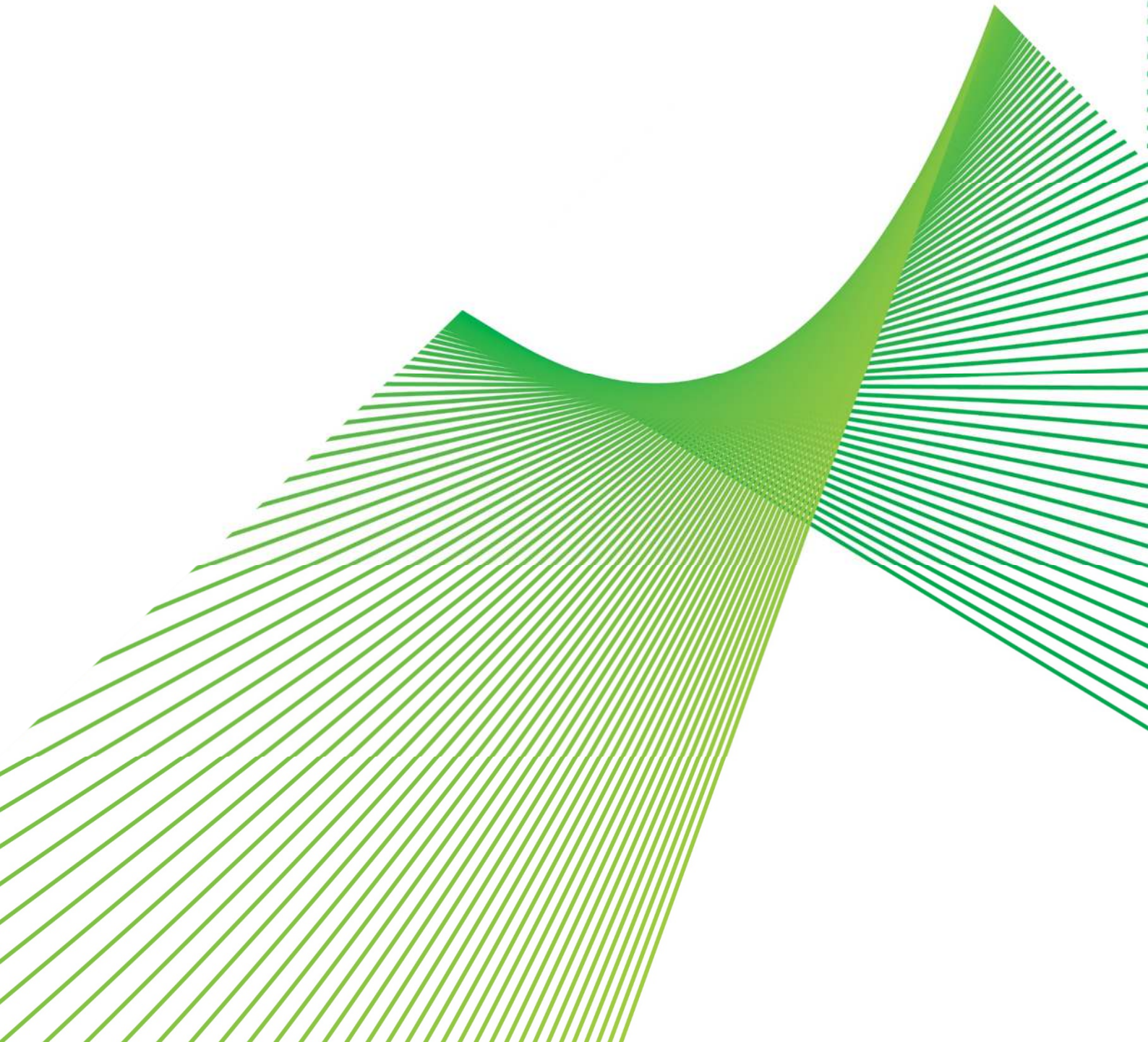

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Executive summary

We are applying the Regulatory Investment Test for Transmission (RIT-T) to options for maintaining reliable supply to the Beryl area of Central West New South Wales (NSW) in light of current and projected demand in the Essential Energy distribution network. This Project Specification Consultation Report (PSCR) represents the first step in the RIT-T process.

As set out in our revenue proposal for the current (2023-28) regulatory control period, and most recent (2024) Transmission Annual Planning Report (TAPR),[1] we have identified reactive margin shortfall (and voltage) issues in the Beryl area, arising from current and projected demand in the downstream Essential Energy distribution network.[2]

While load at the Beryl BSP has grown in recent years, to a current winter peak of 82 MW and a summer peak of 77 MW, it is now forecast to remain relatively flat going forward. However, we estimate that based on these demand levels, during a contingent outage of Line 94B (between Beryl and Wellington), the current network capacity would likely need to be limited to 68 MW in order to alleviate reactive margin issues and avoid complete voltage collapse in the Essential Energy network.[3]

While no significant unserved energy has occurred to-date, due to contingent outages not having occurred during these peak periods, our power system studies have identified continuing reactive margin shortfall issues in the Beryl area going forward, if action is not taken, particularly during times where the renewable generation in the area is not being dispatched.

Identified need: compliance with the NER requirements regarding reactive margins

The National Electricity Rules (NER) require Transgrid to operate its network to satisfy reactive margin requirements (i.e., the maximum size of loading on a particular bus before its loading limit is expired and voltage collapse takes place). Specifically, Transgrid is required to ensure that the reactive power margin at any connection point is not less than 1% of the maximum fault level (in MVA) at the connection point (NER, Schedule 5.1.8).

Our planning studies show that there is currently a risk of breaching the NER obligations regarding reactive margin requirements in our network if an outage of Line 94B occurs during peak winter demand, particularly at times of low or no local renewable generation. Without action, this would breach the defined reactive margin requirements in the NER, as well as result in substantial expected unserved energy to end consumers due to potential voltage collapse in the distribution network.

We have therefore commenced this RIT-T to assess the options available for meeting our reactive margin requirements to avoid these consequences and continue to maintain compliance with the relevant NER standards.

We consider this a 'reliability corrective action' under the RIT-T as the proposed investment is for the purpose of meeting externally-imposed regulatory obligations and service standards, i.e., Schedule 5.1.8 of the NER.

1 Transgrid, *Transmission Annual Planning Report 2024*, p. 52.
2 Transgrid, *Augex Overview Paper*, 2023-28 Revenue Proposal, 31 January 2022, p. 32.
3 This has been calculated based on the amount of pre-contingent load shedding required under normal system conditions to alleviate reactive margin issues following a contingent outage of Line 94B

While we forecast that there will also be voltage control issues if nothing is done (i.e., breaches of the requirements of Schedule 5.1.4 of the NER), these are considered a secondary concern to the forecast reactive margin constraints. Specifically, the reactive margin constraints are expected to be the first and most material constraint to be reached and, once resolved, will fully resolve the projected voltage control issues as well.

Four credible options have been identified at this stage of the RIT-T

We have identified four potential credible network options to address the identified need from a technical, commercial, and project delivery perspective.

Table E-1 Summary of the credible network options considered at this stage, $2024/25

Option	Description	Capital cost ($m)	Commissioning
1	Install a 30 MVA synchronous condenser at Beryl	24.1	2027/28
2	Construct and operate a network BESS at Beryl	58.1	2027/28
3	Construct a new line adjacent to existing Line 94B	85.6	2028/29
4	Install a 30 MVA STATCOM at Beryl	23.4	2027/28

All works would be completed in accordance with the relevant standards with minimal modification to the wider transmission assets. Necessary outages of affected line(s) in service would be planned appropriately in order to complete the works with minimal impact on the network.

Non-network solutions may be able to assist with meeting the identified need

We consider that non-network options able to provide dynamic reactive support may be able to assist with meeting the identified need.

At this stage, we consider that possible options could include but are not limited to:

- battery energy storage systems (BESS); and
- generators in the region who are able to provide reactive power support.

Non-network solutions offering a reduction in load (e.g., through demand management or embedded generation), are not considered commercially or technically feasible due to the nature of the identified need and the complexity[4] associated with forecasting trigger conditions in advance of required service activations (which would likely result in material over or under-procurement of services from such providers). As such, the specification for non-network solution providers focuses on the requirements for dynamic reactive support.

The following table summarises the location, size and timing requirements for non-network solutions.

[4] For example, in the case of reactive margin constraints, the required technical characteristics of non-network options depend on: (1) general system demand; and (1) renewable generation and storage in the region.

Table E-2 Summary of the location, size and timing requirements for non-network solutions

From	Size - MVAr (supplying)	Location	Time of day
2025/26	30 MVAr	Beryl 132 kV	Overnight only (Summer & Spring: 6 pm – 6 am) (Winter & Autumn: 5 pm – 7:30 am)

The accompanying Expression of Interest (EOI) specifies the type and form of information we are seeking from proponents in order to have their solutions assessed in the Project Assessment Draft Report (PADR).

We encourage interested parties to contact us (via written submissions or otherwise) regarding the potential for their non-network solution to satisfy, or contribute to satisfying, the identified need outlined above.

The credible options will be assessed against three reasonable scenarios

The credible options will be assessed against three different scenarios as part of the PADR analysis to identify the top ranked credible option in terms of expected net benefits.

Table E-3 Summary of proposed scenarios for the PADR assessment

Variable / Scenario	Central demand scenario	Low demand scenario	High demand scenario
Scenario weighting	1/3	1/3	1/3
Demand scenario	Central demand forecast (POE50)	Low demand forecast (POE90)	High demand forecast (POE10)
Discount rate	7%		
VCR	$39.2/MWh		
Network capital costs	Base estimate		
Operating costs	Base estimate		

We propose to weight the three scenarios equally given there is nothing to suggest an alternate weighting would be more appropriate.

In addition, at this stage, we consider that all categories of market benefit derived from an option affecting the wholesale market may be material for this RIT-T, particularly where a non-network component may form part of the credible options. However, we will reassess this in preparing the PADR and, importantly, in light of submissions received to the EOI (and this PSCR).

If any expected wholesale electricity market benefits are expected to be materially different between options, we expect to undertake wholesale electricity market modelling to estimate them. However, if this is not the case, then we will likely apply a proportionate approach to estimating these benefits (which may include not estimating them at all where there is a strong case for them not affecting the ranking of the options).

Should any wholesale market modelling be undertaken for the PADR analysis (i.e., full wholesale market modelling, or a proportionate approach), this would also be reflected in the scenario analysis (in a manner such that the scenarios are 'internally consistent' consistent with the AER's RIT-T Guidelines[5]).

Submissions and next steps

We welcome written submissions on materials contained in this PSCR. Submissions are due on 20 February 2025.[6]

Submissions to this PSCR should be emailed to our Regulation team via regulatory.consultation@transgrid.com.au, while responses to the separate EOI regarding non-network solutions should be emailed to our Innovation team via innovation@transgrid.com.au.[7] In the subject field of any PSCR submission or EOI response, please reference 'Complying with reactive margin requirements at Beryl PSCR'.

At the conclusion of the consultation process, all submissions received will be published on our website. If you do not wish for your submission to be made public, please clearly specify this at the time of lodgement.

We intend to produce a PADR that addresses all submissions received as well as responses to the EOI and presents our draft conclusion on the preferred option for this RIT-T. Subject to what is proposed in submissions to this PSCR, we anticipate publication of a PADR by mid-2025.

[5] AER, *Regulatory investment test for transmission Application guidelines,* October 2023, p 44.
[6] Consultation period is for 12 weeks.
[7] We are bound by the *Privacy Act 1988 (Cth)*. In making submissions in response to this consultation process, we will collect and hold your personal information such as your name, email address, employer and phone number for the purpose of receiving and following up on your submissions. If you do not wish for your submission to be made public, please clearly specify this at the time of lodgement. See Privacy Notice within the Disclaimer for more details.