



**TransGrid**

# **Summary: Improving stability in south-western NSW**

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**RIT-T – Project Assessment Draft Report**

Region: South Western New South Wales

Date of issue: 23 September 2021

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# Summary

TransGrid is applying the Regulatory Investment Test for Transmission (RIT-T) to options for improving stability in the south-western New South Wales (NSW) power system. Publication of this Project Assessment Draft Report (PADR) represents the second step in the RIT-T process and follows the Project Specification Consultation Report (PSCR) released in July 2020.

## Benefits from the options considered in this PADR

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The main power system in south-western NSW consists primarily of one 330 kV transmission line from Darlington Point to Wagga Wagga (Line 63) and 220 kV transmission lines west of Darlington Point (including Line X5). Smaller underlying 132 kV transmission lines supply regional towns.

This area has seen significant growth in renewable generation connections to the transmission network as part of the wider energy market transition. Approximately 594 MW of renewable generation has connected in the area since December 2015 and approximately 695 MW of renewable generation is currently being commissioned. This is having an impact on how this part of the power system operates. In particular, while power has historically primarily flowed west from Darlington Point to supply rural and mine loads, this is expected to reverse with the increase in renewable generation in the area, particularly during daytime when there is an abundance of solar generation.

These changes in power flows are expected to lead to an increasing risk of power system instability going forward. Currently the only way of managing this risk is to constrain generation in south-western NSW. In recognition of the risks to future power system stability, in May 2020 the Australian Energy Market Operator (AEMO) implemented an operational constraint in the NEM Dispatch Engine to limit power flows and prevent this occurring.

TransGrid has identified the opportunity to strengthen the transmission network to relieve this constraint and provide wider market benefits to the National Electricity Market (NEM). Specifically, the market modelling undertaken as part of this PADR finds that there are significant benefits expected from options that relieve the constraint in terms of avoided generator dispatch cost, avoided and deferred capital costs associated with new generation and storage capacity and lower transmission costs associated with connecting Renewable Energy Zones (REZ). This PADR compares these benefits to the costs of the various investment options.

TransGrid recognises that the need to introduce constraints in the transmission system in south-western NSW has had a material impact on the operation of renewable generation that has recently connected in that area. TransGrid is committed to completing this RIT-T process in a timely fashion, to enable investment to relieve this constraint, where that is found to be net beneficial to the market.

## The PADR analysis has benefited from stakeholder consultation

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The PSCR was released in July 2020 and TransGrid subsequently received submissions from seven parties, which can be grouped into the following two broad categories:

- > existing or new renewable generators in south-western NSW – Sunraysia, Neoen, RWE, Reach Solar Energy;
- > one solar generator– whom requested that their submission be kept confidential; and
- > two providers of battery systems – both of whom have requested that their submissions be kept confidential.

While submissions covered a range of topics, there were five broad topics that were most commented on, namely:

- > support for the identified need;

- > whether the construction timetable of the new/rebuild line options is realistic;
- > the ability of interim solutions to assist in the near term;
- > a potential grid-connected battery option; and
- > whether a stand-alone STATCOM is a technically feasible solution.

Each of the points raised in submissions have been summarised and responded to in this PADR.

In addition, prior to, as well as after, receiving submissions, TransGrid held a number of bilateral meetings with submitters in order for them to further understand the RIT-T assessment and the option requirements in south-western NSW, as well as how proposed solutions are expected to be able to assist with meeting the identified need. These discussions have played a pivotal role in being able to define and include the credible options assessed in this PADR and TransGrid thanks all parties for their time and effort to-date.

For more information on the RIT-T process including various opportunities for stakeholders to provide submissions and feedback please see Appendix E 'The RIT-T Process explained'.

## Five types of credible options have been developed and assessed in this PADR

Stakeholder consultation on the PSCR has assisted with developing and refining the credible options put forward in the PSCR. Specifically, consultation with third parties since the PSCR has enabled this PADR to assess the following five types of credible options:

- > Option 1 – a new or rebuilt 330 kV transmission line between Darlington Point and the new Dinawan substation being constructed for EnergyConnect:
  - Option 1A (new line);
  - Option 1B (rebuilt line);
- > Option 2 – a new 330 kV transmission line between Darlington Point and the Wagga Wagga substation;
- > Option 3 – a static synchronous compensator (STATCOM) solution at the Darlington Point substation;
- > Option 4 – Option 1A plus an interim 3-year battery solution; and
- > Option 5 – a standalone long-term battery solution.

Table 1 below summarises each of the credible options.

**Table 1: Summary of the credible options**

Option	Description	Estimated capital cost	Expected delivery time
1A	Establish a new Darlington Point to Dinawan 330 kV transmission line	\$211 million	4-5 years
1B	Rebuild the existing 99T Darlington Point to Coleambally and 99L Coleambally to Deniliquin as 330 kV to Dinawan	\$303 million	4-5 years
2	Establish a new Wagga Wagga to Darlington Point 330 kV transmission line	\$393 million	4-5 years
3	STATCOM	\$50 million for a 100 MVar STATCOM	3-4 years
4	Option 1A + 3-year interim network support solution utilising a battery (proposed by a confidential submitter)	\$211 million (for the network component)	4-5 years for the network component



Option	Description	Estimated capital cost	Expected delivery time
		Confidential for network support	Network support from battery available from Q1 2022
5	A standalone long-term battery solution (proposed by a confidential submitter)	Confidential	2022/23 commissioning

## **Establishing a new Darlington Point to Dinawan 330 kV transmission line provides the greatest net benefits of all options considered**

Uncertainty is captured under the RIT-T framework through the use of scenarios, which reflect different assumptions that are expected to affect the key drivers of the estimated net market benefits.

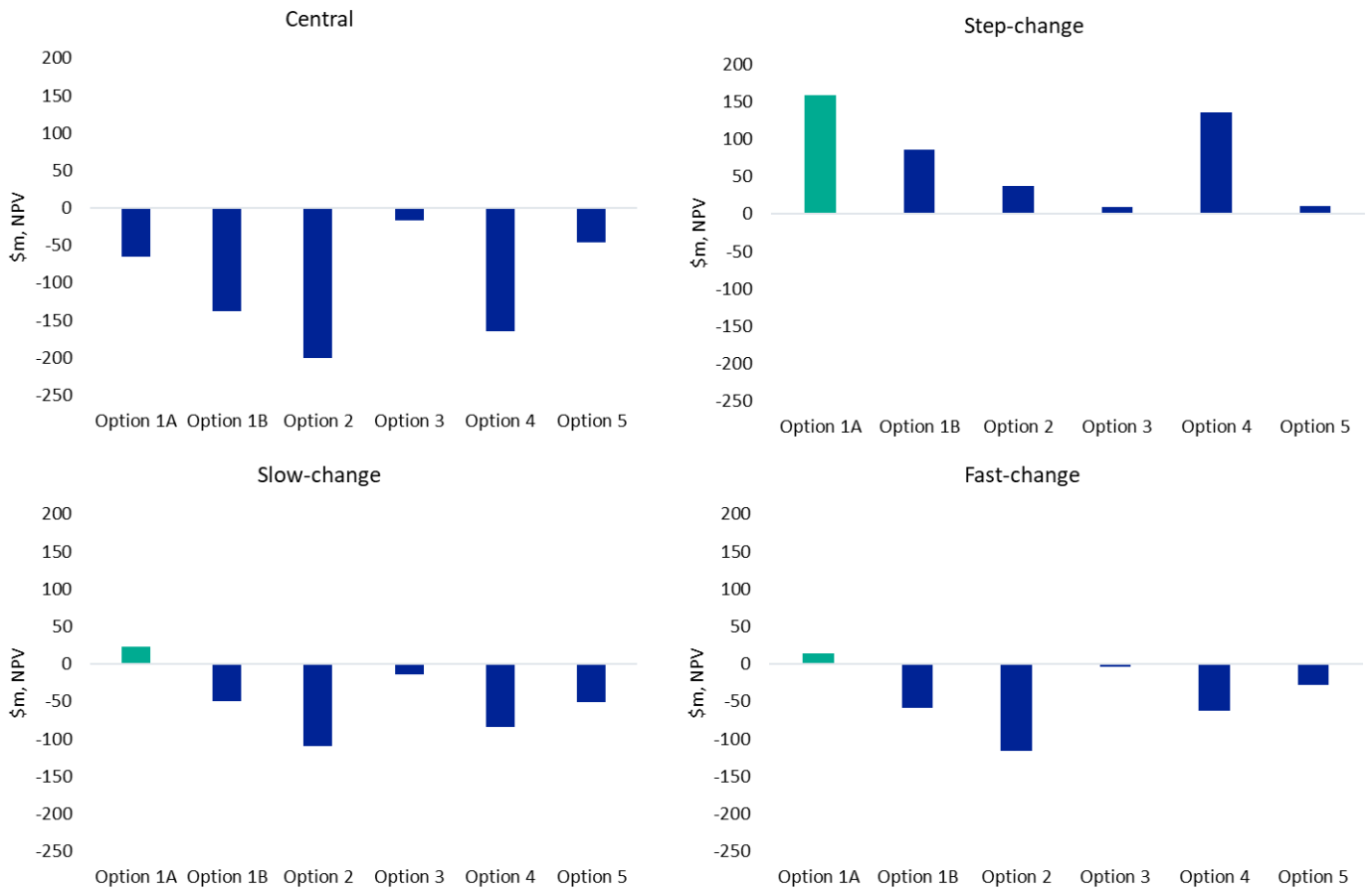
Four core scenarios have been considered as part of this PADR, which are intended to cover a wide range of possible futures and are generally aligned with the AEMO 2020 ISP 'central', 'slow-change', 'step-change' and 'fast-change' scenarios. The four scenarios differ in relation to key variables expected to affect the market benefits of the options considered, including demand outlook, the uptake of Distributed Energy Resources (DER), assumed generator fuel prices, assumed emissions targets, retirement profiles for coal-fired power stations, and generator and storage capital costs.

The results of the PADR assessment find that Option 1A (a new Darlington Point to Dinawan 330 kV transmission line) is the only option with positive expected net benefits on a weighted basis across all scenarios. Option 1A is expected to deliver net benefits of \$33 million on a weighted basis, with the second ranked option, Option 3 (STATCOM), having an estimated net cost of approximately \$7 million. Overall, the PADR analysis finds that Option 1A is the preferred option for this RIT-T.

Option 1A is found to deliver positive net benefits in three of the four scenarios, with the step-change scenario expected to provide significant net benefits (in the order of \$160 million). TransGrid notes that recent commentary from the Energy Security Board (ESB) suggests that the NEM is in fact tracking closest to the step-change currently<sup>1</sup> and that the net benefits of Option 1A increase to nearly \$60 million if the step-change scenario is given a weighting of 40 per cent (with the other three scenarios weighted equally) in the analysis.

<sup>1</sup> See Argus Media, Australia tops step-change energy transition scenario, Morrison, K., 7 May 2021 (accessed via <https://www.argusmedia.com/en/news/2212777-australia-tops-stepchange-energy-transition-scenario> on 7 July 2021), Renew Economy, "We are headed for step change:" ESB's Kerry Schott on new market design, Parkinson, G., 30 September 2020 (accessed via <https://reneweconomy.com.au/we-are-headed-for-step-change-esbs-kerry-schott-on-new-market-design-89487/> on 7 July 2021) & ESB, *The Health of the National Electricity Market 2020*, Volume 1: The ESB Health of the NEM Report, 5 January 2020, p. 8.

**Figure 1: Summary of the estimated net benefits**



The market benefits of all options are primarily derived from avoided generator dispatch cost, avoided and deferred capital costs associated with new generation and storage capacity and lower transmission costs associated with connecting REZ (under the step-change scenario). On a weighted basis, these three categories of market benefit make up nearly all of the total market benefits estimated for Option 1A.

The market modelling undertaken finds that the assumed timing of VNI West and the assumptions regarding the carbon budget have the strongest impact on the estimated benefits for the options. Specifically:

- > with VNI West in-place, the transfer limit between south-western NSW and Wagga Wagga (Canberra zone) is 3,000 MW under both the base case and option cases (meaning that benefits are limited to the years prior to VNI West being commissioned); and
- > with the carbon budget, there is a requirement for lower coal generation and higher renewable build, which results in a greater estimated benefits for any options that unlock cheaper renewable resources.

The modelling therefore finds that the step-change scenario has significantly greater market benefits than the other scenarios since VNI West is assumed to be commissioned in 2035 under this scenario, along with a very restrictive carbon budget. Moreover:

- > the central scenario is found to have the lowest net benefits of all scenarios since there are only a few years that the options provide benefits before VNI West is commissioned (in 2028/29 for this scenario);<sup>2</sup>

<sup>2</sup> We have assumed an earlier commissioning date for VNI West under the central scenario than in the core 2020 ISP assumptions, consistent with AEMO's accelerated delivery date in the 2020 ISP (and the draft 2021 IASR timing). Specifically, we have assumed a timing of 2028/29 for VNI West under the central scenario. While AEMO has an accelerated delivery date of 2027/28 for VNI West in the 2020 ISP (and draft 2021 IASR), we have assumed a commissioning of 1 July 2028 as this is our current view of the earliest practical delivery date.

- > the fast-change scenario has a VNI West timing of 2035/36 and a restricted carbon budget that results in higher benefits for this scenario compared to the central scenario; and
- > while VNI West is excluded in the slow change scenario, the other key assumptions in this scenario (such as a significantly lower demand forecasts and coal life extension) are expected to result in lower new capacity requirements that, on balance, lead to similar net benefits for the options compared to the fast-change scenario.

TransGrid notes that it is intended that the analysis in the PACR will be updated to reflect the final 2021 Inputs, Assumptions and Scenarios Report (IASR) that was recently published by AEMO, as well as any other recent relevant market developments not captured in these assumptions.

## Next steps

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TransGrid welcomes written submissions on this PADR. Submissions are due on 5 November 2021<sup>3</sup>.

Submissions should be emailed to TransGrid's Regulation team via [regulatory.consultation@transgrid.com.au](mailto:regulatory.consultation@transgrid.com.au).<sup>4</sup> In the subject field, please reference 'PADR Summary: Improving stability in south-western NSW project.'

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

The next formal stage of this RIT-T is the publication of a PACR. The PACR is expected to be published by early 2022.

To read the full Project Assessment Draft Report visit [TransGrid's website](#).

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<sup>3</sup> Additional days have been added to cover public holidays.

<sup>4</sup> TransGrid is bound by the Privacy Act 1988 (Cth). In making submissions in response to this consultation process, TransGrid 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.