Expanding NSW-QLD transmission transfer capacity

Project Specification Consultation Report

Summary

November 2018

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This RIT-T progresses the Integrated System Plan to expand NSW-QLD transfer capacity

The inaugural Integrated System Plan (ISP), released by the Australian Energy Market Operator (AEMO) in July 2018, recommended two key transmission investments in relation to expanding transfer capacity between New South Wales and Queensland necessary to support the long-term interests of consumers for safe, secure, reliable electricity, at the least cost, across a range of plausible futures.

AEMO differentiated these two investments as being needed over the immediate-term (by around 2020) and over the medium-term (by the mid-2020s), respectively.

Figure E.1 The AEMO ISP recommended two expansions to NSW-QLD transfer capacity

The ISP concluded that by 2020, or as soon as they can be built, market benefits associated with the Group 1 upgrade can be realised due to a reduced need for new gas fired generation in New South Wales to meet demand once Liddell retires in 2022, as well as benefits from allowing more efficient generation sharing between New South Wales and Queensland.

The ISP forecasts the Group 2 upgrade will provide market benefits from fuel cost savings and capital deferral over the longer-term by allowing greater utilisation of renewable energy and coal-fired generation in Queensland, as further generation is developed to achieve the Queensland Renewable Energy Target (QRET). However, the ISP notes the preferred option for this Group 2 upgrade is sensitive to a range of inputs, including New South Wales demand forecasts.

TransGrid and Powerlink have initiated this Regulatory Investment Test for Transmission (RIT-T) to progress the ISP's recommendations to increase the transfer capacity between New South Wales and Queensland. That is, to progress and consult on both the Group 1 and Group 2 upgrades identified by AEMO.

On 12 November 2018, the New South Wales government released the NSW Transmission Infrastructure Strategy that will support early development of the ISP Group 1 project by TransGrid by bringing forward early planning and feasibility work.

In response to a request from the COAG Energy Council, the Energy Security Board (ESB) is currently considering a work program to convert the ISP to an actionable strategic plan. The COAG Energy Council has requested the ESB to report to the December 2018 meeting on how the Group 1 ISP projects can be implemented and delivered as soon as practicable and with efficient outcomes for consumers.

The ‘identified need’ is to provide net market benefits from expanded transfer capacity

The identified need for this RIT-T is to increase overall net market benefits in the NEM through relieving existing and forecast congestion on the transmission network between New South Wales and Queensland.

The key sources of market benefit are expected to be:

- a reduced need for new gas fired generation in New South Wales once the Liddell Power Station retires;
- allowing more efficient generation sharing between New South Wales and Queensland, including greater use of existing, relatively modern, coal-fired generation in Queensland and renewable energy development to meet the QRET; and
- assisting the nation to meet carbon emission and renewable energy targets at lowest long-run cost.

A full RIT-T quantitative analysis will be reported in the Project Assessment Draft Report (PADR). This will involve separate quantification of each key source of expected market benefit across a range of scenarios and sensitivities.

Five types of options are proposed to be assessed, which build on those in the ISP

TransGrid and Powerlink have identified five types of credible options to increase transfer capacity between NSW and Queensland at this stage of the RIT-T, building on the options identified in the ISP. In addition, combinations of these options will be considered.

These options differ principally in scale and technology and include:

- incremental investments to the existing network to modestly increase transfer capacity (Options 1A, 1B, 1C and 1D);
- a new single-circuit 330 kV line from NSW to Queensland (Option 2);
- three variants of a new double-circuit line from NSW to Queensland, including an option that involves 500 kV (Options 3A, 3B and 3C);
- three HVDC options (Options 4A, 4B and 4C); and
- a grid-connected battery system (Option 5).

Options 1A, 1B, 1C and 1D focus on delivering incremental increases in transfer capacity (i.e., consistent with the ISP’s Group 1 upgrade), while options 2-5 focus on delivering additional increases in transfer capacity (i.e., consistent with the ISP’s Group 2 upgrade).

While the ISP found that a new 330 kV double circuit interconnector provided net market benefits over the longer-term, it notes that this finding is sensitive to a range of inputs and suggested that larger capacity options be investigated. Options 2-5 have therefore been developed to further investigate and consult on options for delivering this longer-term increase in transfer capacity.

Box E.1 – The proposed options build on the assessment undertaken in the ISP

The credible options considered in this RIT-T build on the ISP assessment undertaken over 2017 and 2018. In particular, while the ISP Group 1 and Group 2 recommended investments have been included (e.g., Option 1A and Option 3A, respectively), we are now also:

- considering additional low cost incremental options for increasing transfer capacity in the short-term (i.e., options 1B, 1C and 1D);
- considering the use of alternate technologies whose attributes are expected to provide additional benefits (e.g., the synchronous condensers in options 1A and 1C);
- including options with a larger HVAC capacity upgrade as recommended in the ISP (i.e., options 2, 3B and 3C);
- including additional options investigating the use of HVDC technology (i.e., options 4A, 4B and 4C); and
- investigating the use of a grid-integrated battery system (i.e., Option 5).

We have also undertaken significant work to assess each of the potential credible options since the ISP was released. This has included:

- redefining capacity improvements based on power system modelling to develop an updated assessment of the indicative impact on transfer capacity; and
- refining the cost estimates for each of the options.

This RIT-T therefore seeks to progress and consult on the various options and combinations of options for expanding transfer capacity between New South Wales and Queensland, over both the short-term and the longer-term.

A 'first-pass' screening process will be applied to all options, combinations of options, and any others identified during the PSCR consultation process, in preparation of development of the PADR. In particular, while each credible option will be modelled and reported in the PADR, it is expected that the initial list will be refined based on this modelling and that only a subset of these options may be further analysed.

A summary of the potential credible options is provided in Table E.1.

Table E.1 Summary of potential credible options

Option description	Indicative total transfer capacity (MW)[1]		Estimated capex ($m)[2]	Expected delivery time
	Northward	Southward		
Incremental upgrades to the existing network to increase transfer capacity				
Option 1A – Uprate Liddell to Tamworth Lines and install new dynamic reactive support at Tamworth and Dumaresq and shunt capacitor banks*	770	1,215	142	2-3 years
Option 1B – Uprate Liddell to Tamworth Lines only	535	1,030	28	2-3 years
Option 1C - Install new dynamic reactive support at Tamworth and Dumaresq and shunt capacitor banks	595	1,180	114	2-3 years
Option 1D – Sapphire substation cut into line 8C and a mid-point switching station between Dumaresq and Bulli Creek	535	1,165	45	1-2 years
A new single-circuit line from NSW to Queensland				
Option 2 – 330 kV single circuit between Braemar and Liddell	980	1,865	855	3-4 years
A new double-circuit line from NSW to Queensland				
Option 3A – 330 kV double circuit between Bulli Creek and Armidale*	770	1,593	560	3-4 years
Option 3B – 330 kV double circuit line between Braemar and Liddell via Uralla (and establishment of a Uralla 330 kV substation)	1,530	2,160	1,505	4-5 years
Option 3C – 330 kV double circuit line between Braemar and Uralla, 500 kV single circuits between Uralla and Wollar and between Uralla and Bayswater (and establishment of Uralla 500/330 kV substation)	1,695	2,540	2,039	5-6 years
High Voltage Direct Current options				
Option 4A – HVDC back-to-back	1,195	1,780	825	2-3 years
Option 4B – HVDC between Mudgeeraba and Lismore**	765	1,190	600	3-4 years
Option 4C – HVDC between Western Downs and Bayswater**	2,590	2,990	2,100	4-5 years
A grid-connected battery system				
Option 5 - Battery energy storage system	1,135	1,635	1,000	1-3 years

** Option 1A is the ISP recommended Group 1 investment and Option 3A is the ISP recommended Group 2 investment. These are based on the ISP modelling assumptions. The capacity improvements and cost estimates for these options is continuing to be reviewed and will be revised in the PADR.*

*** Power transfer capacities are defined for both the existing HVAC interconnector and for the new HVDC option.*

[1] The transfer capacities shown in this table are indicative for one operating state only (daytime, medium demand) and serve to summarise the notional differences between options.

[2] All cost estimates are to be treated as indicative at this stage and TransGrid and Powerlink will further refine these estimates as part of the PADR.

Non-network options can assist in expanding transfer capacity

TransGrid and Powerlink are interested to hear from potential proponents of non-network options.

Section 4 of this report outlines how non-network technologies can contribute to meeting the identified need of relieving existing and forecast congestion on the transmission network between New South Wales and Queensland over the short and medium term. We also present a number of potential technologies that could assist.

In particular, we set out both:

- general information on how non-network options can assist with increasing transfer capacity; and
- specific information on the use of a potential Wide Area System Integrity Protection Scheme.

Proponents of non-network options are encouraged to make submissions on any non-network option they believe can address, or contribute to, the identified need.

We encourage proponents to reach out and contact us as soon as practicable about potential solutions, ahead of preparing a formal submission.

The information provided in submissions will be used to further develop non-network options for inclusion in the next stage of the RIT-T assessment process.

Next steps

TransGrid and Powerlink welcome written submissions on this PSCR. Submissions are due on or before 22 February 2019. Submissions are particularly sought on the credible options presented and from potential proponents of non-network options that could meet the technical requirements set out in this PSCR.

TransGrid and Powerlink will also publish an accompanying input and methodology consultation paper. This document will provide greater detail in relation to the modelling approach and parameters we intend to adopt in the quantitative RIT-T analysis. This separate report will be published in addition to the NER requirements for a RIT-T and will provide greater transparency and opportunity to obtain earlier stakeholder feedback on the quantitative modelling, ahead of the Project Assessment Draft Report (PADR).

Submissions should be emailed to regulatory.consultation@transgrid.com.au

Submissions will be published on the TransGrid and Powerlink websites. If you do not wish for your submission to be made publicly available, please clearly specify this at the time of lodgement.

The next formal stage of this RIT-T is the PADR. The PADR will include the full quantitative analysis of both network and non-network options, and is expected to be published during 2019.