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6 December 2021

Mr Kevin Hinkley
Customer Planning Manager
Transgrid
180 Thomas Street
Sydney, NSW 2000
Via email: kevin.hinkley@transgrid.com.au

Dear Kevin,

AEMO review of Transgrid Network Capability Incentive Parameter Action Plan (NCIPAP) for 1 July 2023 to 30 June 2028

I am writing to provide AEMO's review of your proposed projects in the Transgrid NCIPAP for the regulatory period from 1 July 2023 to 30 June 2028. This review is provided in compliance with clause 5.2 of the Service Target Performance Incentive Scheme (STPIS)[1].

Transgrid proposed six NCIPAP projects as summarised in Attachment 1. AEMO agrees with Transgrid's assessment of the project need, improvement targets and likely material benefits. Priority projects were ranked on the lowest to highest payback period . AEMO's assessment is provided in the same attachment.

If you have any questions or would like to seek any clarification, please contact Nadesan Pushparaj at [redacted].

Yours sincerely

[redacted]
Samantha Christie
Manager Network Planning

cc: Mr Warwick Anderson, General Manager, AER

[1] AER. Service target performance incentive scheme. https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/service-target-performance-incentive-scheme-version-5-september-2015-amendment.

Transgrid: NCIPAP proposals for the regulatory period 1 July 2023 - 30 June 2028
AEMO Review - November 2021

Sourced from Transgrid									AEMO Review			
Project name	**Transmission circuit/Injection point**	**Scope of works**	**Current limit and reason for the limit**	**Target limit**	**Completion date**	**Capital cost estimate ($m)**	**Operating cost estimate per annum ($M)**	**Market benefit per annum**	**Pay back period**	**Ranking**	**Review of material benefit**	**Benefit category**
Increase thermal capacity of Yass Transformers (ID N2471)	Yass No.1 and No.2 330/132 kV transformers	Install monitoring equipment, communication and other secondary system equipment to implement online monitoring and dynamic rating system for the Yass 330/132 kV No.1 and No.2 transformers.	Currently, the maximum thermal capacity of each of the transformers is 200 MVA continuous and 300 MVA short-term rating. These are based on static rating. Increased renewable generation in the Wagga Wagga area and from the Wagga Wagga-Yass and Yass-Parkes 132 kV network resulting in increased power flow through the Yass 330/132 kV transformers from the 132 kV to 330 kV network.	After application of dynamic rating, the expected increase for each of the transformer capacity is 50 MW continuous and short-term rating.	No later than year 2024/25	1.60	0.032	2.05	9.5 months	1	Increased generation from the Wagga Wagga area and from the Wagga Wagga-Yass and Yass-Parkes 132 kV network would increase the loading on the Yass 330/132 kV transformers above the existing thermal rating. AEMO agrees with Transgrid that the proposed works for application of dynamic ratings for the Yass 330/132 kV transformers would allow for increase in generation output from the generators connected in the Wagga Wagga and Yass 132 kV networks.	Market benefits due to improved access to low-cost generation
Increase capacity for Generation between Darlington Point and Wagga Wagga (ID N2176)	Darlington Point 330/132 kV transformers	Upgrade cooling equipment of the two Darlington Point 330/132kV transformers, and additional works to connections and secondary systems equipment to increase thermal rating of these transformers from 280 MVA to 375 MVA.	Thermal capacity of the existing two 330/132 kV transformers at Darlington Point is limited to 280 MVA. A number of solar farms have recently been developed in the Darlington Point area, which have an impact on the increased loading of the Darlington Point 330/132 kV transformers. Generators which feed into the 132 kV network in the area supplied from the Darlington Point transformers are: 1) Darlington Point Solar Farm (275MW) 2) Coleambally Solar Farm (150MW), and 3) Griffith Solar Farm (30MW). Generators under development in the same 132 kV network in Darlington Point area are: 1) Hillston Solar Farms (85MW) 2) Riverina Solar Farm (30MW), and 3) Avonlie Solar Farm (190MW).	Increase thermal capacity of each of the Darlington Point 330/132 kV transformers from 280 MVA to 375 MVA.	No later than year 2024/25	4.13	0.08	4.70	10.7 months	2	Additional generation connections to the Darlington Point 132 kV network would increase the loading on the Darlington Point 330/132 kV transformers above the existing thermal rating. AEMO agrees with Transgrid that the proposed works to increase thermal rating of Darlington Point 330/132 kV transformers would allow for increase in generation in the Darlington Point 132 kV network.	Market benefits due to improved access to low-cost generation
Increase thermal capacity of Molong to Orange North 132 kV line (94T) (ID N2470)	Molong to Orange North 132 kV line (Line 94T)	(1) Install weather stations to measure weather along Line 94T. (2) Install communications links between weather station and dynamic line rating (DLR) interface. (3) Modify DLR interface server software to calculate dynamic ratings. (4) Integrate DLT in TransGrid's SCADA system and transfer to AEMO. (5) Remove terminal equipment limitation at Molong and Orange North.	Static summer daytime rating of the Molong-Orange North 132 kV line (94T) is 112 MVA. Line 94T becomes a network constraint with increased renewable generation at or west of Molong and high demand in Orange North. Generation in this area needs to be constrained off to prevent overloading of Line 94T.	After application of dynamic ratings, the expected increase of thermal capacity of Line 94T is approximately 4% to 20%.	No later than year 2023/24	0.50	0.01	0.18 - 0.92	11.1 months	3	Increased generation from Molong and Parkes area would increase the loading on the Molong-Orange 132 kV line above the existing static thermal rating. AEMO agrees with Transgrid that the proposed works for application of dynamic ratings for the Molong-Orange 132 kV line would allow for increased generation output from existing and committed generators in the Molong and Parkes area.	Market benefits due to improved access to low-cost generation

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Maintain capacity during Climate Change (ID N2655)	132kV Armidale - Inverell 132kV Deniliquin - Finley 132kV Coleambally - Deniliquin 132kV Bango Wind - Cowra 132kV Port Macquarie - Taree 132kV Burrinjuck - Tumut 132 132kV Gadara - Wagga 330 132kV Finley - Uranquinty 330kV Armidale - Dumaresq 330kV Armidale - Sapphire 330kV Dumaresq - Sapphire	Installation of weather station elements connected back to a central processing unit (HMI) via a suitable mobile network to enable TransGrid to apply dynamic line rating (DLR) for the transmission lines referred in the Transmission circuit/injection point.	Static thermal ratings based on fixed ambient variables applied.	After application of DLR, optimise line ratings based on the prevailing weather conditions. Rating of each of the lines is expected to increase by 5-20 MW.	Jun-28	5.89	0.00	1.4 - 5.6	1.7 years	4	Proposed dynamic line rating monitoring scheme will improve thermal rating of transmission circuits referred to in the column 'Transmission circuit/Injection point'. AEMO agrees with Transgrid that the proposed rating increase would allow for increased output of generation which is being impacted by the existing static rating of transmission lines which are referred to in this project.	Market benefits based on improved access to low cost generation.
Darlington Point 330/220 kV Transformer Tripping Scheme (ID N2631)	330/220/33 kV transformers at Darlington Point Substation	(1) Install a tripping scheme to trip the 220 kV circuit breaker of the remaining in-service transformer upon loss of one of the 330/220/33 kV transformers. (2) Increase the limit on the 330/220/33 kV transformers at Darlington Point Substation from the current limit of 125 MVA to 200 MVA per transformer.	Rating of each of the 330/220/33 kV transformers at Darlington Point is 200 MVA. However, to manage the loading on a transformer following an outage of a parallel transformer, system normal loading is limited to 125 MVA on each transformer. Far South-West NSW renewable generation is currently constrained under system normal conditions by current application of the rating at Darlington Point 300/220/33 kV transformers.	Increase limit on the each of the 330/220/33kV transformers at Darlington Point from 125 MVA to 200 MVA.	FY2024/25	0.367	0.0073	0.07	5.9 years	5	Current application of thermal rating of Darlington Point 330/220/33 kV transformers would constrain generation at 220 kV in Far South-West NSW. Following completion of Project EnergyConnect (SA-NSW interconnector), increased rating of Darlington Point 330/220 kV transformers would allow for accommodation of additional new generation in Far South-West NSW. AEMO agrees with Transgrid that the proposed works to implement a tripping scheme would allow for use of higher ratings of these transformers and allow for increased generation from Far South-West NSW.	Market benefits due to improved access to low-cost generation
Relieve Balranald-Darlington Point 220 kV line (X5) voltage stability constraints (ID N2575)	220kV side of Balranald Substation	(1) Install a 220kV 20 MVAr capacitor bank (2) Install a 220kV switch bay including a Point on Wave (POW) circuit breaker (3) Install all secondary systems associated with the control and protection of the capacitor bank	In order to maintain voltage levels at Balranald while considering poss ble cred ble contingency events, power flow on the Balranald-Darlington Point 220 kV line (X5) needs to be limited to about 150 to 200 MW depending on system conditions. NEMDE has a voltage stability constraint equation to limit power flow on line X5 from Balranald to Darlington Point to avoid voltage collapse at Balranald for contingency trip of any 220 kV line in North-West Victoria. This voltage stability equation limits renewable generation at Balranald, Broken Hill and North-West Victoria.	Increase power flow on line X5 from Balranald to Darlington Point between 5 to 10 MW depending on generation dispatch at Balranald, Broken Hill and import from Victoria.	FY2024/25	5.44	0.108	0.721	8.9 years	6	Recent historical data shows NEMDE constraint equation N^^N_NIL_3 (Out= Nil, limit power flow on line X5 from Balranald to Darlington Point (X5) to avoid voltage collapse at Balranald for contingency trip of any major 220kV line in NW Victoria) frequently binds. Following completion of Project EnergyConnect (SA-NSW interconnector), the existing voltage collapse limit at Balranald would be increased and binding hours would be likely to be reduced. AEMO agrees with Transgrid that the proposed capacitor bank at Balranald would increase voltage stability limit at Balranald. However, expected market benefit is l kely to be reduced with the introduction of Project EnergyConnect.	Market benefits due to improved access to low-cost generation