

NEED/OPPORTUNITY STATEMENT (NOS)



HV Plant Limitations on TL 70 and 71

NOS- 000000001703 revision 1.0

Ellipse project no(s):

TRIM file: [TRIM No]

Project reason: Economic Efficiency - Network developments to achieve market benefits

Project category: Prescribed - NCIPAP

Approvals

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Approved	Andrew Kingsmill	Manager/Power System Analysis
Date submitted for approval		

Change history

Revision	Date	Amendment
0	October 2016	Initial issue

1. Background

This proposal forms part of the Network Capability Incentive Parameter Action Plan (NCIPAP), for the 2018/19 to 2023/24 regulatory control period. The NCIPAP portion of the STPIS described in section 5 of the STPIS guideline¹ is a plan consisting of a suite of small projects aimed at improving the capability of transmission assets through operational expenditure and minor capital expenditure on the transmission network which results in:

- > Improved capability of those elements of the transmission system most important to determining spot prices;
OR
- > Improved capability of the transmission system at times when Transmission Network Users place greatest value on the reliability of the transmission system.

2. Need/opportunity

According to recent historical performance of the National Electricity Market (NEM), the following constraint significantly affected the market outcomes at times of high load in NSW.

1. N>>N-NIL__S: Avoid overloading Mt Piper to Wallerawang line on trip of the other Mt Piper – Wallerawang line (70 and 71 transmission lines)

The above limit can be improved by addressing HV plant limitations on these lines (circuit breakers, disconnectors, wavetraps) and the secondary CT limitations. All HV plant and secondary ratings need to increase to 1700² MVA. The emergency rating of these transmission lines is currently 1428³ MVA. The worst limitation currently is 2400A/1371 MVA metering ratios. Increasing these ratios (and other limitations) to a minimum of 3000A/1700 MVA will increase the summer day 15 minute rating of the transmission line by about (1700 – 1428 =) 272 MVA.

3. Related needs/opportunities

None

4. Recommendation

It is recommended to investigate the options to address the limitations on 70 and 71 transmission lines. .

This project is to be included in TransGrid NCIPAP for the regulatory period 2019 – 2023.

¹ AER, Final Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme, Version 5 October 2015.

² The 15 minute rating summer day of the line conductor

³ See OM 304 – Ratings of Main Grid Circuits

Attachment 1 Market benefit calculation

The benefit of replacing HV equipment limiting the capacity of a transmission line can be calculated using the following:

- Extra capacity available = 272 MVA
- Duration NSW demand is greater than 12,000 MW and the constraint may bind⁴ = 1%
- Average generation cost of thermal generation compared to renewable generation⁵ = \$25/MWh

Extra renewable (wind/solar) generation capacity made available in NEM = $272 * 0.01 * 24 * 365$ MWh/year
 Market benefit = \$ $272 * 0.01 * 24 * 365 * 25$ /year

Accordingly, the benefit in replacing HV equipment limiting the rating of the transmission lines can be summarised as given in the table below.

Circuit	Current Capacity ⁶ (MVA)	Future Capacity (MVA)	Benefit due to project (\$/year)
70 Mt Piper – Wellington 330 kV	1428	1700	595,680
71 Mt Piper – Wellington 330 kV	1428	1700	

⁴ Based on Historical average number of times N>>N-NIL__S was binding for the period from 1 June 2012 to 31 May 2016 – Refer file “nsw-vic-ql-1703.xlsm” in N:\HV System Planning\PUBLIC\NCIPAP\Risk Costs

⁵ Based on the NSW Black Coal variable costs of \$25 – refer page 61 of Jacobs report “Retail electricity price history and projections.pdf” filed in PDGS supporting documents. Typical bid price for renewable (wind/solar) generation is either \$0 or negative. Accordingly, Market impact = \$25 - \$0 = \$25

⁶ This includes terminal equipment and protection limitations. As per Ratings Operating Manuals 304 to 307