

NEED/OPPORTUNITY STATEMENT (NOS)



Network Support and Control Ancillary Services
Southern NSW Absorbing Reactive Power Support

NOS- 00000001569 revision 1.0

Ellipse project description: P0009225 - Provision of NSCAS in Southern NSW
TRIM file: [TRIM No]

Project reason: The project improves network security.

Project category: Prescribed - Augmentation

Approvals

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Date submitted for approval	8 December 2016	

1. Background

In accordance with the National Electricity Rule (NER) clause 3.11.1(c)¹, TransGrid is to assume responsibility for procuring the Network Support and Control of Ancillary Services (NSCAS) to main system security and reliability in NSW. NSCAS are non-market ancillary services which are acquired in order to control the active power or reactive power flow into or out of a transmission network in order to:

- maintain power system security and reliability of supply in accordance with the power system security and reliability standards; and
- maintain or increase its power transfer capability to maximise the present value of net economic benefit to all those who produce, consume or transport electricity in the market.

These services are procured by Transmission Network Service Providers (TNSPs), or AEMO as a last resort, to maintain power system security and reliability where operational measures, such as switching lines out of service, are no longer feasible.

AEMO's 2012 National Transmission Network Development Plan (NTNDP) identified a gap for maintaining security in the southern NSW area requiring up to 800 MVAR of absorbing reactive power for the next five years.

The maximum voltages at all the high voltage busbars in the network are required to be managed below 1.1 pu of nominal volts. In addition, there are network-connected assets in southern NSW with technical limitations such that the maximum voltages are to be managed below following values:

- Upper Tumut 330 kV below 1.048 pu, or 345.84 kV
- Kangaroo Valley 330 kV below 1.048 pu, or 345.84 kV
- Lower Tumut 330 kV below 1.076 pu, or 335.08 kV

The NER clause 3.11.5 advises²:

"In the event the NSCAS gaps identified by AEMO in the NTNDP are not adequately met, AEMO is required to procure the required NSCAS by tender as per the published NSCAS tender guidelines."

AEMO, exercised its provider of last resort rights, and issued the 2012 NSCAS Tender for the provision of NSCAS as a non-regulated transmission service up to the period 30 June 2019. TransGrid successfully Tendered for the provision of reactive support of 800 MVAR at 1.048 pu as non-regulated transmission services to meet the NTNDP 2012 gap. A total of six (6) 180 MVAR 362 kV shunt reactors were installed; three (3) at Murray and three (3) at Yass substations.

2. Need/opportunity

AEMO has procured NSCAS under the two following agreements for the period from 30 June 2013 to 30 June 2019.

- > Agreement for generation support: AEMO has an NSCAS agreement via generation units running as synchronous condensers from 1 July 2013 to 30 June 2018.
- > Agreement with TransGrid: AEMO has procured 800 MVAR of absorbing reactive support from TransGrid, primarily using new network assets, including reactors at Murray Switching Station and Yass Substation. The service under this agreement commenced from 31 March 2014 and will end on 30 June 2019.

AEMO advised in their 2015 NTNDP that:

"AEMO has identified an NSCAS gap of about 150 MVAR absorbing reactive power capability to manage potential high voltage likely to occur in Kangaroo Valley after the expiry of one of the two existing NSCAS agreements in

¹ National Electricity Rule (NER) clause 3.11.1(c), <http://www.aemc.gov.au/Energy-Rules/National-electricity-rules/Current-Rules>

² NER clause 3.11.5, <http://www.aemc.gov.au/Energy-Rules/National-electricity-rules/Current-Rules>

June 2018. This NSCAS gap was identified on the assumption that the absorbing reactive power capability provided by TransGrid's existing NSCAS agreement, remains unchanged. “

In the early morning on 6/9/2015, there was low demand in both Victoria and NSW, and low interconnector flows from Victoria to NSW. After all operational options to suppress the voltage in Southern NSW were exhausted, including dispatching 5 TransGrid reactors at Yass and Murray, AEMO was required to dispatch two of Snowy Hydro's synchronous condensers (SCOs) units, Tumut 3 G2 and Murray2 G11, to avoid post contingency high voltage violations at Upper Tumut and Kangaroo Valley 330 kV.

TransGrid's assessment shows that the reactors (6 x 180 MVA 362 kV shunt reactors at Murray and Yass³) presently installed and available in the NSW transmission network will be sufficient to meet the identified NSCAS gap beyond 2018 (after the agreement for generation support expires).

There is an opportunity for TransGrid to provide the required absorbing reactive power services from 2019 onwards, as a prescribed service. That is, the 6x 180 MVA 362 kV shunt reactors at Murray and Yass NSCAS assets could be transitioned to the Regulated Asset Base (RAB).

Furthermore, if TransGrid cannot provide this service through network-connected reactors, AEMO could follow one of the following actions to ensure supply security can be maintained, however history suggests that this would cost the market at least \$50 million / year:

- a. AEMO could constrain generation in the area (e.g. Snowy) to generate and provide absorbing reactive support. (AEMO has not attempted to exercise this option in the past as the cost has been shown to be significantly higher than contracting for NSCAS services through the NSCAS tender process)
- b. AEMO could need to procure NSCAS services from other providers, mainly generators in the area. The procurement experience prior to 2013 suggests that the cost of NSCAS services provided by the generators could be significantly higher than providing NSCAS services by TransGrid through network installed reactors.

2.1 Date to Address the Need

The need date will be 30 June 2019.

2.2 Risks

The primary risk for TransGrid not addressing the identified need is voltage instability resulting in loss of load that is unserved energy (USE), in the southern NSW area. The load level under low demand is about 890 MW, and the load restoration time is estimated to be 8 hours. Furthermore, during works to restore the load, it is expected that the demand will increase over time; as such a factor of 0.5 is used to account for this.

VCR Risk Cost

$$VCR \text{ risk cost} = USE \text{ in } MWh * VCR^4$$

$$= (\text{load at risk during light load time} * \text{expected risk hours per year} * VCR) = \left(890MW * 4 \text{ hrs}^5 * \frac{\$38,350}{MWh} \right)$$

$$= \$136.53 \text{ million } \textit{per annum}$$

Refer Attachment 1 for the Risk cost summary.

3. Related needs/opportunities

Nil.

³ It is assumed that 6 x 180 MVA 362 kV shunt reactors at Murray and Yass instead of procured 800 MVA reactors to absorb VCAS after the "Agreement for Generation Support" expires in June 2018.

⁴ TransGrid's Investment Risk Tool bases the Value of Customer Reliability (VCR) on figures published by AEMO in its Value of Customer Reliability Review - Final Report, September 2014. In this case we use the mixed residential/industrial figure of \$38,350/MWh.

⁵ This is assumed that 8 hours restoration time and the work to restore the load will start immediately after the events. Therefore 8 * 0.5 = 4 hours restoration hour is used in the calculation.

4. Recommendation

It is recommended that TransGrid investigate its ability to provide, as a regulated service, the reactive power absorbing capability in the NSW southern network through the already installed network reactors.

Attachment 1 Risk costs summary

Current Option Assessment - Risk Summary



Project Name: Network Support and Control Ancillary Services

Option Name: 1569 - Base Case - 'Do Nothing'

Option Assessment Name: 1569 - Option 1 - Assessment 1

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF (\$M)	Failure Mechanism	NoxLoC xCoF (\$M)	PoF (Yr 1)	Total Risk (\$M)	Risk (\$M) (Rel)	Risk (\$M) (Op)	Risk (\$M) (Fin)	Risk (\$M) (Peo)	Risk (\$M) (Env)	Risk (\$M) (Rep)
NSCAS Reactors at Murray and Yass (Oil Filled)	1	Winding and Core	Unplanned Outage - HV (NSCAS Reactors at Murray and Yass (Oil Filled))	\$136.53	Failure	\$136.53	100.00%	\$136.53	\$136.53					
				\$136.53		\$136.53		\$136.53	\$136.53					

Total VCR Risk: \$136.53

Total ENS Risk: