

NEED/OPPORTUNITY STATEMENT (NOS)

Making the Grid More Resilience - Short-term Rating of Tie Transformers

NOS- 00000001392 revision 4.0



Ellipse project description:

TRIM file: [TRIM No]

Project reason: Capability - Improved Asset Management

Project category: Prescribed - NCIPAP

Approvals

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Approved	Andrew Kingsmill	Manager/Power System Analysis
Date submitted for approval	17 May 2016	

1. Background

This proposal forms part of the Network Capability Incentive Parameter Action Plan (NCIPAP), for the 2018/19 to 2022/23 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.

Transformer ratings are presently provided in rating advices in the form of step jump overload tables and excitation tables. The published rating guide is not continuous and will lead to approximations on the ability to overload the transformer.

With an on line model, more accurate projection of transformer loading limits could be provided with different operating scenarios and the loading capacity of the transformer could be better utilised. It may also assist in planning of outages for a specific day based on temperature and load projections. If on line temperature monitoring is added and included in the model, quite accurate information will be available.

This arrangement would be most likely to be of value on critical transformers where an outage will lead to potential overloading.

2. Need/opportunity

The rating is based on a thermal model of the transformer that relies on the inherent properties of the transformer (e.g.: thermal mass, heating from windings and no load losses, cooling capabilities, ratio of hot spot temperature etc.) and on ambient temperature, loading and voltage levels.

The regional interconnector flows can be impacted by the constraint on key tie transformer ratings or single element ratings. A recent example was the impact on the NEM pricing due to the binding constraint on the Kemps Creek Tie in May 2015² where the 5-minute price reached \$13,500/MWh in New South Wales. The implementation of the dynamic transformer ratings on key tie transformers may avoid these market pricing events by increasing the transfer capability of interconnector flows during periods of outage of one of the parallel transformer.

3. Related needs/opportunities

None.

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

² AEMO Electricity Pricing Event Report – Friday 01 May 2015

4. Recommendation

It is recommended to investigate the options to implement dynamic transformer ratings on key tie transformers to increase their ratings and thus increase the transfer capability of interconnector flows during periods of outage of one of the parallel transformer.

Attachment 1 Market benefit summary

The market benefit can be estimated based on the following:

- Extra capacity available on average = 100MVA³
- Expected use of extra capacity = 1%⁴
- Average the price difference NSW black coal and VIC brown coal = \$12/MWh⁵

Market benefit = extra capacity available * expected use of extra capacity * price difference
= \$ 100 * 0.01 * 24 * 365 * 12 /year
= \$0.105 million / year

³ Based on TransGrid Operating Manual OM 323, short time overload ratings of Darlington Point transformers.

⁴ Based on expected wind farm generation in the area

⁵ Constraints apply for NSW import from VIC , therefore the price difference between NSW black coal and VIC brown coal (\$8) is used to give \$12/MWh.