NEED/OPPORTUNITY STATEMENT (NOS)

Making the Grid More Flexible – to Improve Reverse Power Flow Regulation

NOS- 000000001421 revision 1.0

Ellipse project no.: P0008195
TRIM file: [TRIM No]

Project reason: Capability - Improved Asset Management
Project category: Prescribed – Augmentation

Approvals

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Approved	Andrew Kingsmill	Manager/Network Planning
Date submitted for approval	13 December 2016	

1. Background

Where TransGrid enters into a connection agreement with a Generator or large industrial load, TransGrid has the obligation to ensure that the voltage levels at the connection points are controlled to the agreed supply point voltage. Generally this will be achieved through automatic control by transformer Automatic Voltage Regulation (AVR) to a level determined by local area constraints in conjunction with the customer.

2. Need/opportunity

At present the standard transformer AVRs Local Control Routines/Function blocks are built to prevent AVR under reverse power flow, which requires manual tap changing by the System Operator to adjust bus voltages. This results in very poor voltage regulation when embedded generation is generating. This situation is currently being experienced at the following TransGrid's substations: Dapto, Munyang, Marulan, Wagga, Williamsdale and Yass.

There exists an opportunity to improve the voltage at these locations to allow reverse power flow.

The primary risk of TransGrid not addressing this need is a cost for the time spent by System Operators manually adjusting transformer tap positions at the supply point when embedded generation is generating. The risk cost is estimated below:

Cost to the Market =Time spent by System Operators in manually adjusting AVRs
= 20%[1] of Time transformer[2] flows are in the reverse direction
= 20% x (2074+1219+129+2579+11+3264)[3] hrs/yr
= 20% 9276 hrs/year
= 1855 hrs/year

Using a System Operator time value of $100/hr[4],

The estimated cost per year of the Base case = 1,855hrs/yr * $100 = $0.19 million

3. Related needs/opportunities

Nil.

4. Recommendation

It is recommended that options be considered to address the identified need/opportunity.

[1] Typical factor of time System Operators spend on monitoring and adjusting AVRs manually during reverse power flows – Based on information from TransGrid Control Room

[2] Dapto, Marulan, Munyang, Wagga, Williamsdale and Yass transformer flows from 1/6/2015 to 1/6/2016 were considered in the annual estimate (data downloaded from AEMO OPDMS)

[3] These are the number of hours respectively for Dapto, Munyang, Marulan, Wagga, Williamsdale, and Yass.

[4] Based on Average System Operator value

Attachment 1 Risk costs summary

Current Option Assessment - Risk Summary

Project Name: Making the Grid More Flexible - to Improve Reverse Power Flow Regulation

Option Name: 1421 - Base Case

Option Assessment Name: 1421 - Base Case - 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)
Controls	1	Bay Controller	Unplanned Outage - HV (Transformer AVR Reverse Power Flow)	$0.93	Failure	$0.93	20.00%	$0.19			$0.19			
				$0.93		$0.93		$0.19			$0.19			

Total VCR Risk: Total ENS Risk:

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