

OPTIONS EVALUATION REPORT (OER)

Substations-Use of NonConventional ITs

OER- 000000001578 revision 1.0



Ellipse project no.: P0009365

TRIM file: [TRIM No]

Project reason: Capability - Improved Asset Management

Project category: Prescribed - Network-Other

Approvals

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Approved	Lance Wee	M/Asset Strategy
Date submitted for approval	25 November 2016	

Change history

Revision	Date	Amendment
0	23 November 2016	Initial issue
1	25 November 2016	Update to format

1. Need/opportunity

The introduction of Non-Conventional Instrument Transformers (NCITs) onto the High Voltage (HV) network is a key enabler within TransGrid's long term vision of a Smart Network¹. NCIT technology will allow TransGrid to move toward the concept of a fully digital substation and provides an ability to seamlessly integrate with IEC-61850 solutions.

In addition to the above, the rollout of NCITs has several other advantages including:

- > Reduced Voltage Transformer (VT) and Current Transformer (CT) replacement costs;
- > Reduced secondary cabling costs; and
- > Reduced on-going routine maintenance costs.

Based on these potential benefits TransGrid proposes to investigate the testing and pilot deployment of NCITs onto the HV network.

2. Related Needs/opportunities

Nil.

3. Options

All dollar values in this document are expressed in un-escalated 2016/17 dollars.

Base Case

The Base Case for this Need is to do nothing and continue with TransGrid's operation and maintenance (O&M) for high voltage CT and VT assets. Although maintaining the existing status-quo for these assets, this approach does not align with the Smart Network vision moving into the future.

Option A — Non-Conventional Instrument Transformers [[OFR 1578A](#), [OFS 1578A](#)]

This option covers the proof of concept, pilot deployment and in-service testing of a set of non-conventional CTs and VTs. The purpose of this option is to demonstrate that NCITs can deliver comparable performance and reliability for a minimum target capital saving of 15% over current practices. A 15% saving has been estimated based on cost reductions associated with reduced footing size requirements, smaller steel structures, less copper cabling and reduced on-going maintenance. This savings target will be confirmed during the proof of concept and pilot deployment phases of this project.

The expected total capital cost to implement this option is \$896k. This costing is estimated using TransGrid's "Success" estimating system.

Based on the minimum capital saving target of 15% and the current replacement levels for instrument transformers, this option should deliver a benefit of \$1.2m per annum.

All options have been assessed as technically feasible.

¹ Smart Network Vision, 2016.

4. Evaluation

Evaluation of the proposed options has been completed using both commercial considerations and the ALARP (as low as reasonably practical) regulatory requirements. The results of these evaluations are outlined below.

4.1 Commercial evaluation

The result of commercial evaluation for each of the options is summarised in Table 1.

Table 1 – Commercial evaluation (\$ million)

Option	Description	Total capex	Annual opex	Annual post project risk cost	Economic NPV @10%	Financial NPV @10%	Rank
Base Case	Do Nothing	N/A	-	NA	N/A	N/A	2
A	Non-Conventional Instrument Transformers	0.896	-	NA	10.96	10.96	1

The commercial evaluation is based on:

- > a 10% discount rate
- > a life of the investment of 40 years and a corresponding residual/terminal value

Sensitivities on economic Net Present Value (NPV) for the option with changing discount rates are shown in Table 2.

Table 2 – Discount rate sensitivities (\$ million)

Option	Description	Economic NPV @13%	Economic NPV @6.75%
A	Non-Conventional Instrument Transformers	7.29	17.97

4.2 SFAIRP/ALARP evaluation

As this Need is not addressing risk there is no requirement for an SFAIRP/ALARP analysis.

4.3 Preferred option

The preferred option to address the need is Option A - Non-Conventional Instrument Transformers based on the commercial evaluation.

This option has been selected due to its technical viability, significant technical benefits and provides a positive NPV.

Capital and operating expenditure

No analysis completed for operating expenditure for either option however it is expected that Option A will have significantly less expenditure than the base.

Regulatory Investment Test

A Regulatory Investment Test for Transmission (RIT-T) is not required as this is an asset replacement project with no augmentation component.

5. Recommendation

It is the recommendation that Option A - Non-Conventional Instrument Transformers be scoped in detail.

Attachment 1 – Commercial evaluation report

Option A NPV calculation

Project_Option Name			Option A - Non-Conventional Instrument Trasformers		
1. Financial Evaluation (excludes VCR benefits)					
NPV @ standard discount rate	10.00%	\$10.96m	NPV / Capital (Ratio)	12.24	
NPV @ upper bound rate	13.00%	\$7.29m	Pay Back Period (Yrs)	Not measurable	
NPV @ lower bound rate (WACC)	6.75%	\$17.97m	IRR%	68.00%	
2. Economic Evaluation (includes VCR benefits but excludes tax benefits from non-cash transactions, ENS penalty and overall tax cost)					
NPV @ standard discount rate	10.00%	\$10.96m	NPV / Capital (Ratio)	12.24	
NPV @ upper bound rate	13.00%	\$7.29m	Pay Back Period (Yrs)	Not measurable	
NPV @ lower bound rate (WACC)	6.75%	\$17.97m	IRR%	68.00%	
Benefits					
Risk cost	As Is	To Be	Benefit	VCR Benefit	\$0.00m
Systems (reliability)	\$0.00m	\$0.00m	\$0.00m	ENS Penalty	\$0.00m
Financial	\$0.00m	\$0.00m	\$0.00m	All other risk benefits	\$0.00m
Operational/compliance	\$0.00m	\$0.00m	\$0.00m	Total Risk benefits	\$0.00m
People (safety)	\$0.00m	\$0.00m	\$0.00m		
Environment	\$0.00m	\$0.00m	\$0.00m		
Reputation	\$0.00m	\$0.00m	\$0.00m		
Total Risk benefits	\$0.00m	\$0.00m	\$0.00m	Benefits in the financial NPV* *excludes VCR benefits	\$1.22m
Cost savings and other benefits			\$1.22m		
Total Benefits			\$1.22m	Benefits in the economic NPV** **excludes ENS penalty	\$1.22m
Other Financial Drivers					
Incremental opex cost pa (no depreciation)			#REF!	Write-off cost	\$0.00m
Capital - initial \$m			-\$0.90m	Major Asset Life (Yrs)	40.00 Yrs
Residual Value - initial investment			\$0.31m	Re-investment capital	\$0.00m
Capitalisation period			4.00 Yrs	Start of the re-investment period	0.00 Yrs