

OPTIONS EVALUATION REPORT (OER)



Sydney West SVC Replacement

OER 000000001286 revision 2.0

Ellipse project no.: P0005909

TRIM file: [TRIM No]

Project reason: Capability - Asset Replacement for end of life condition

Project category: Prescribed - Replacement

Approvals

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Date submitted for approval	15 November 2016	

Change history

Revision	Date	Amendment
0	24 June 2016	Initial issue
1	27 October 2016	Update to 2016/17 dollars and SFAIRP/ALARP data
2	15 November 2016	Update to format

1. Need/opportunity

The Static Var Compensator (SVC) at Sydney West has been in service since 2004 and is required to balance the overall reactive power requirement of the NSW system. The SVC control system installed at Sydney West operates on an obsolete operating system which is no longer supported by the manufacturer. This system has ongoing issues with low disk space and problems where a hard reboot is the only course of action. As such, the system is a vulnerability in the continued service of the SVC.

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 keep the SVC in service with no change to its control system. This approach does not address the ongoing issues with the control system or of the aging system as the SVC nears its nominal lifetime of 20 years. The risk cost of \$1.84m per annum will increase as the components age and their probability of failure increases.

The key drivers for this risk cost are market impacts and energy not served due to the failure of the SVC control system, as well as the increased replacement costs required to accelerate the recovery.

Increasing maintenance on the equipment cannot reduce the probability of failure in order to reduce the risk cost.

Option A – SVC Control and Protection Replacement [[OFR 1286A](#), [OFS 1286A](#)]

This Option is to address the ongoing issues with the obsolete SVC control system and limited ongoing support. The scope of works includes the replacement of the control and protection systems and interfaces to TransGrid systems with modern equivalents.

The expected capital costs for the option total \$5.9m. This costing is estimated using TransGrid's "Success" estimating system.

The residual risk associated with this option upon completion of the project amounts to \$0.089m per annum (base case risk cost = \$1.84m). The risk reduction is realised through the reduction in the probability of failure for all assets.

4. Evaluation

Evaluation of the proposed options has been completed using the ALARP (As Low As Reasonably Practicable) regulatory requirements and economic considerations. The results of this evaluation 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 ¹ @10%	Financial NPV @10%	Rank
Base Case	Run-to-fail	N/A	-	1.84	N/A	N/A	2
A	SVC Control and Protection Replacement	5.90	-	0.089	6.57	4.27	1

The commercial evaluation is based on:

- > Economic life of the assets is assumed 20 years, hence this assessment period has been applied.
- > Capital cost is not escalated and it does not include capitalised interest.

The sensitivity of the option with changing discount rate is shown in Table 2.

Table 2 – Discount rate sensitivities (\$ million)

Option	Description	Economic NPV @13%	Economic NPV @6.75%
A	SVC Control and Protection Replacement	4.26	10.47

4.2 SFAIRP/ALARP evaluation

Options to reduce the network safety risk as per the risk treatment hierarchy have been considered in other lifecycle stages of the asset, and it has been determined that no reasonably practicable options exist to reduce the risk further than those capital investment options listed in Table 1.

Evaluation of the proposed options has been completed against the SFAIRP (So Far As Is Reasonably Practicable)/ALARP (As Low As Reasonably Practical) obligation, as required by the Electricity Supply (Safety and Network Management) Regulation 2014 and the Work Health and Safety Act 2011. The Key Hazardous Events and the disproportionality multipliers considered in the evaluation are as follows:

- > Catastrophic failure of asset/uncontrolled discharge or contact with electricity/ unauthorised access to site - 3 times the safety risk and 10% of the reliability risk (applicable to safety)

The results of this evaluation are summarised in the tables below.

¹ Net Present Value (NPV)

Table 3 – Feasible options (\$ thousand)

Option	Description	CAPEX	Expected Life	Annualised CAPEX
Base	Run-to-fail	N/A	N/A	N/A
A	SVC Control and Protection Replacement	5,900	20 years	300

Table 4 – Annual risk calculations (\$ thousand)

Option	Annual Residual Risk			Annual Risk Savings		
	Safety Risk	Reliability Risk	Bushfire Risk	Safety Risk	Reliability Risk	Bushfire Risk
Base	0	419	0	N/A	N/A	N/A
A	0	20	0	0	399	0

Table 5 - Reasonably practicable test (\$ thousand)

Option	Network Safety Risk Reduction ²	Annualised CAPEX	Reasonably practicable ³ ?
A	40	300	No

The outcome of the SFAIRP/ALARP evaluation is that none of the options presented in Table 5 **Error! Reference source not found.** are reasonably practicable, and are therefore not required to satisfy the organisation’s SFAIRP/ALARP obligations.

4.3 Preferred option

The option to address the condition of the identified assets, Option A – SVC Control and Protection Replacement, is the preferred option for all assets identified.

This option has been selected due to its technical viability and reduction in reliability risk. This option provides significant technical benefits and provides the greatest positive.

Capital and operating expenditure

There is negligible difference in predicted ongoing operational expenditure between the option and the Base Case.

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 recommended that SVC Control and Protection Replacement be scoped in detail.

² The Network Safety Risk Reduction is calculated as 6 x Bushfire Risk Reduction + 3 x Safety Risk Reduction + 0.1 x Reliability Risk Reduction

³ Reasonably practicable is defined as whether the annualised CAPEX is less than the Network Safety Risk Reduction

Attachment 1 – Commercial evaluation report

Option A NPV calculation

Project_Option Name		Sydney West SVC Replacement - Option A			
1. Financial Evaluation (excludes VCR benefits)					
NPV @ standard discount rate	10.00%	\$4.27m	NPV / Capital (Ratio)	0.72	
NPV @ upper bound rate	13.00%	\$2.51m	Pay Back Period (Yrs)	0.22 Yrs	
NPV @ lower bound rate (WACC)	6.75%	\$7.27m	IRR%	22.08%	
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%	\$6.57m	NPV / Capital (Ratio)	1.11	
NPV @ upper bound rate	13.00%	\$4.26m	Pay Back Period (Yrs)	3.41 Yrs	
NPV @ lower bound rate (WACC)	6.75%	\$10.47m	IRR%	27.95%	
Benefits					
Risk cost	As Is	To Be	Benefit	VCR Benefit	\$0.38m
Systems (reliability)	\$0.42m	\$0.02m	\$0.40m	ENS Penalty	\$0.02m
Financial	\$1.42m	\$0.07m	\$1.35m	All other risk benefits	\$1.35m
Operational/compliance	\$0.00m	\$0.00m	\$0.00m	Total Risk benefits	\$1.75m
People (safety)	\$0.00m	\$0.00m	\$0.00m	Benefits in the financial NPV*	\$1.37m
Environment	\$0.00m	\$0.00m	\$0.00m	*excludes VCR benefits	
Reputation	\$0.00m	\$0.00m	\$0.00m	Benefits in the economic NPV**	\$1.73m
Total Risk benefits	\$1.84m	\$0.09m	\$1.75m	**excludes ENS penalty	
Cost savings and other benefits			\$0.00m		
Total Benefits			\$1.75m		
Other Financial Drivers					
Incremental opex cost pa (no depreciation)			\$0.00m	Write-off cost	\$0.00m
Capital - initial \$m			-\$5.90m	Major Asset Life (Yrs)	20.00 Yrs
Residual Value - initial investment			\$0.00m	Re-investment capital	\$0.00m
Capitalisation period			3.00 Yrs	Start of the re-investment period	0.00 Yrs