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Project description

The project will replace individual Transformer Bushings that have reached end of technical and/or economic lives, at locations where the asset won't be replaced as part of an augmentation or substation rebuild during the 2018-23 regulatory control period.

Project options

Base case	Bushings are not replaced and are tested every four years. It is estimated that of the total population of 32 sets, 10% will be identified for change-out annually as corrective maintenance. Changeout and testing costs are shown in Estimates - Maintenance tab.
Option 1	Bushings are changed out by a replacement project in 2019-2023 before their end of technical life is reached. Testing of new bushings is not required. Refer to Estimates - Maintenance tab.
Option 2	Delay of replacement project until the next regulatory period in 2024-2028.

Key modelling assumptions

Financial year runs from 1 July to 30 June.

Real 2018 \$ are used for all monetary values unless otherwise stated.

Inputs to the model

Parameter/Input	Description	Source
Discount rate	Real pre-tax discount rate	ElectraNet estimate
Current financial year	Year to start analysis	When the capital investment is due to occur for the project
Time horizon	Length of time under consideration	Total project life including useful life and if the project occurred in the next regulatory period
Capital costs	Amount of capital investment in real terms for each project option	Estimated capital costs in the estimate from project center
Useful life	Length of time capital investments are expected to provide service	Useful life estimated from orginal economic justification on project center
Routine bushing test	Annual routine cost of testing bushings	Estimates maintenance
Corrective work	Annual amount of corrective work	Estimates maintenance
Risk Assessment	Value of risk associated with each of the different options	See detailed risk models

10 Inputs

User provided parameters and inputs to the model

Inputs

General parameter inputs

Parameter	Unit	Value	Source
Inflation rate	Percentage	2.00%	RBA
Discount rate (real, pre-tax): estimate	Percentage	6.00%	ElectraNet estimate
Discount rate (real, pre-tax): lower bound	Percentage	4.50%	ElectraNet estimate
First year of analysis	Year	2019	Current financial year
Base financial year for analysis	Year	2018	Base year
Time horizon	Years	20	ElectraNet

Sensitivities		
Low	Medium	High
1.50%	2.00%	3.00%
4.50%	6.00%	8.50%

Capital cost

Sensitivities			Comment
Low	Medium	High	
70%	100%	130%	Standard sensitivities used

Capital cost inputs						
Option	Asset	Amount	Start year	End year	Commision Year	Asset life
Option 1	Transformer Bush	1,716,240	2019	2019	2020	20
Option 1	Transformer Bush	1,716,240	2020	2020	2021	20
Option 1	Transformer Bush	1,716,240	2021	2021	2022	20
Option 1	Transformer Bush	1,716,240	2022	2022	2023	20
Option 2	Transformer Bush	1,716,240	2024	2024	2025	20
Option 2	Transformer Bush	1,716,240	2025	2025	2026	20
Option 2	Transformer Bush	1,716,240	2026	2026	2027	20
Option 2	Transformer Bush	1,716,240	2027	2027	2028	20

Costs inputs

Cost type	Cash/Non-cash	Low	Percentage Medium	High	Comment
Routine bushing test	Cash	70%	100%	130%	Standard sensitivities used
Corrective work	Cash	70%	100%	130%	

Financial year		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	Comment
Routine bushing test	Units	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
Base case	2018 \$	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	95,040	Reduced testing as replacement program is
Option 1	2018 \$	95,040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 undertaken
Option 2	2018 \$	95,040	95,040	95,040	95,040	95,040	95,040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Financial year		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	Comment
Corrective work	Units	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
Base case	2018 \$	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	444,000	Reduced testing as replacement program is
Option 1	2018 \$	444,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 undertaken
Option 2	2018 \$	444,000	444,000	444,000	444,000	444,000	444,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Benefit inputs

Benefit type	Cash/Non-cash	Low	Percentage Medium	High	Comment
Risk cost reductions	Cash	50%	80%	100%	

Financial year		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	Comment
Risk cost reductions	Units	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
Base case	2018 \$	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 A conservative approach to risk has been undertaken
Option 1	2018 \$	0	0	0	5,937,853	5,978,512	6,019,179	6,059,854	6,100,534	6,141,219	6,181,909	6,222,603	6,263,300	6,304,001	6,344,705	6,385,412	6,426,122	6,466,834	6,507,548	6,548,265	6,588,984	as benefits from reducing the risk will not start until
Option 2	2018 \$	0	0	0	0	0	0	0	0	6,141,219	6,181,909	6,222,603	6,263,300	6,304,001	6,344,705	6,385,412	6,426,122	6,466,834	6,507,548	6,548,265	6,588,984	over half of the project has been undertaken.

R0 CBA Results

14047 Transformer Bushing Replacement

Sensitivities, results and rankings

Input Summary

Parameter selection for sensitivity analysis

Discount rate

Scenario parameters		Discount rate scenario		
	Units	Low	Medium	High
Assumed scenario weighting	% weighting	33%	33%	33%
Discount rate	% real, pre-tax	4.50%	6.00%	8.50%
Capital cost	% of estimate	100%	100%	100%

Cost selection for sensitivity analysis

Routine bushing test

Scenario cost inputs		Routine bushing test scenario		
	Units	Low	Medium	High
Routine bushing test	% of estimate	70.0%	100.0%	130.0%
Corrective work	% of estimate	100.0%	100.0%	100.0%

Benefit selection for sensitivity analysis

Risk cost reductions

Scenario benefit inputs		Risk cost reductions scenario		
	Units	Low	Medium	High
Risk cost reductions	% of estimate	50.0%	80.0%	100.0%

Cost Benefit Analysis Results (Quantitative)

Output summary

Net present value of benefits

NPV results		Scenario			Weighted NPV
Option	Units	Low	Medium	High	
Option 1	2018 \$	32,260,374	43,679,186	42,135,814	39,358,458
Option 2	2018 \$	20,472,837	26,557,807	23,743,506	23,591,383

Output summary

Ranking of options

Ranking of options		Scenario			Weighted ranking
Option	Units	Low	Medium	High	
Option 1	2018 \$	1	1	1	1
Option 2	2018 \$	2	2	2	2

Other Considerations (Qualitative)

These assets are at the end of their technical life, there is increased risk of failure which may result in increased safety and reliability issues, or in the worst case, catastrophic failure of the transformer and the resultant loss and damage associated with this.

It is likely that if these assets are not replaced that a number will fail during the regulatory period or the next period resulting in corrective operational expenditure cost and the unplanned unavailability of parts of the network. Therefore option 1 is the best option.