

Introduction

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Key modelling assumptions

Financial year runs from 1 July to 30 June.

2018 dollars are used for all monetary values unless otherwise stated.

Project description

The existing single circuit 132 kV line from Cultana to Port Lincoln was built in 1967 and some components are reaching end of life . It requires significant ongoing expenditure to refurbish the line and restore it to the necessary performance standard. The refurbishment works are required in the following areas:

- Conductor replacement
- Insulator replacement
- Detailed inspection and sample testing

Costs of maintaining the existing line are significant and are of sufficient size to warrant consideration of other possible options to reinforce the transmission line going forward. This project assessment looks to inform the economic case for different reinforcement options.

Project options

Base case	The base case involves maintaining the current arrangements to the extent possible, and would involve maintaining the existing line and continued purchases of generation support. The two major costs would be 1) higher repairs and maintenance costs and 2) generation support. The base case also involves increased risk of faults as the line approaches the end of its useful life.
Option 1	Live line reconductoring of the existing single circuit 132kV line. This option would involve higher line reconductoring costs but removes the need for generation support during line works.
Option 2	Option 2 is the deferred version of Option 1, where capital works on the lines are deferred for 5 years.
Option 3	Build a double circuit 132 kV transmission line for the entire length of the Eyre Peninsula transmission line on the new easement. In addition, there will be substation works for Cultana, Port Lincoln, and Yadhaira.
Option 4	Option 4 is the deferred version of Option 3, where capital works on the lines are deferred for 5 years

Inputs to the model

Parameter/Input	Description	Source
Discount rate	Rate used to discount future costs and benefits to account for the time value of money	ElectraNet Estimate
Base financial year for analysis	The base year which cost and benefit inputs are denominated	ElectraNet Estimate
Time horizon	Number of years the analysis	ElectraNet Estimate
Capex: transmission line	Costs for build of transmission line and cost for reconductoring transmission ..	ElectraNet Estimate
Capex: transmission line capex timing	Timing of transmission line capex expenditure	ElectraNet Estimate
Caepx: ElectraNet project delivery costs	Capitalised cost for ElectraNet to manage and deliver the project	ElectraNet Estimate
Capex: generation support costs during construction (capitalised generation costs)	Cost of generation support required during construction or reconductoring of lines	ElectraNet Estimate
Capex: substation capital expenditure	Cost of substation works related to options involving double circuit lines	ElectraNet Estimate

Capex: Substation capital expenditure timing	Timing of substation capex expenditure	ElectraNet Estimate
Capex: islanding project capital expenditure	Cost of islanding project for options involving single circuit lines	ElectraNet Estimate
Opex: generation support	Cost of maintaining generation support availability at Port Lincoln	ElectraNet estimates
Opex: routine maintenance costs	Annual routine maintenance costs	ElectraNet Estimate
Opex: corrective maintenance backlog	Cost of corrective maintenance backlog	ElectraNet Estimate
Opex: Generation support costs required during faults repair and restoration	Cost of generation support during faults and fault restoration	ElectraNet Estimate
Unserved energy	Annual value of unserved energy per year if load is met	AEMO for VCR assumption ElectraNet estimate on Eyre Peninsula upgrade for load, number of events, and event duration assumption
Reduced constraints on windfarms	Annual value of extra dispatch available by reducing constraints on windfarms	ElectraNet estimate Average pool price and renewable energy certificate price
Reduced transmission losses	Annual value of a reduction in transmission losses	Average pool price
Value of generation lost avoided	Annual value of avoided generation lost	ElectraNet estimate on Eyre Peninsula upgrade for loads and number of faults Average pool price and renewable energy certificate price
Number of faults	Number of faults assumed for a single circuit transmission line per year	AEMO
Risk cost reduction	Annual value of avoided risk	Risk cost

R0 Results

Sensitivities, results and rankings

Input Summary

Parameter/input selection for sensitivity analysis Discount rate

Scenario parameters and inputs	Units	Discount rate scenario		
		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%
Routine maintenance	% of estimate	100%	100%	100%
Corrective maintenance	% of estimate	100%	100%	100%
Security and compliance	% of estimate	100%	100%	100%
VCR	% of estimate	100%	100%	100%

Cost Benefit Analysis Results (Quantitative)

0.02330184 Net present value of benefits

NPV results for Discount rate scenarios					
Option	Units	Low	Medium	High	Weighted NPV
Option 1	2018 \$	120,144,084	88,118,441	50,823,177	86,361,900
Option 2	2018 \$	111,427,103	83,277,536	51,240,739	81,981,793
Option 3	2018 \$	177,758,776	123,418,689	60,843,549	120,673,671
Option 4	2018 \$	146,242,041	103,580,041	56,475,766	102,099,283

Output summary Ranking of options

Ranking of options under Discount rate scenarios					
Option	Low	Medium	High	Weighted NPV	
Option 1	3	3	4	3	
Option 2	4	4	3	4	
Option 3	1	1	1	1	
Option 4	2	2	2	2	

		Base input	Base value	Active	Estimate
132kV DC line costs	\$/km	600,000	1.00	1.00	600,000
Generator support contract	\$ per year	9,000,000	1.00	1.00	9,000,000
Risk cost percentage	%	80.00%	1.00	1.00	80.00%
Discount rate	%	6.00%	1.00	1.00	6.00%