

Feasibility report

Archetype

12 kW



Power plant - Wind turbine

Executive summary

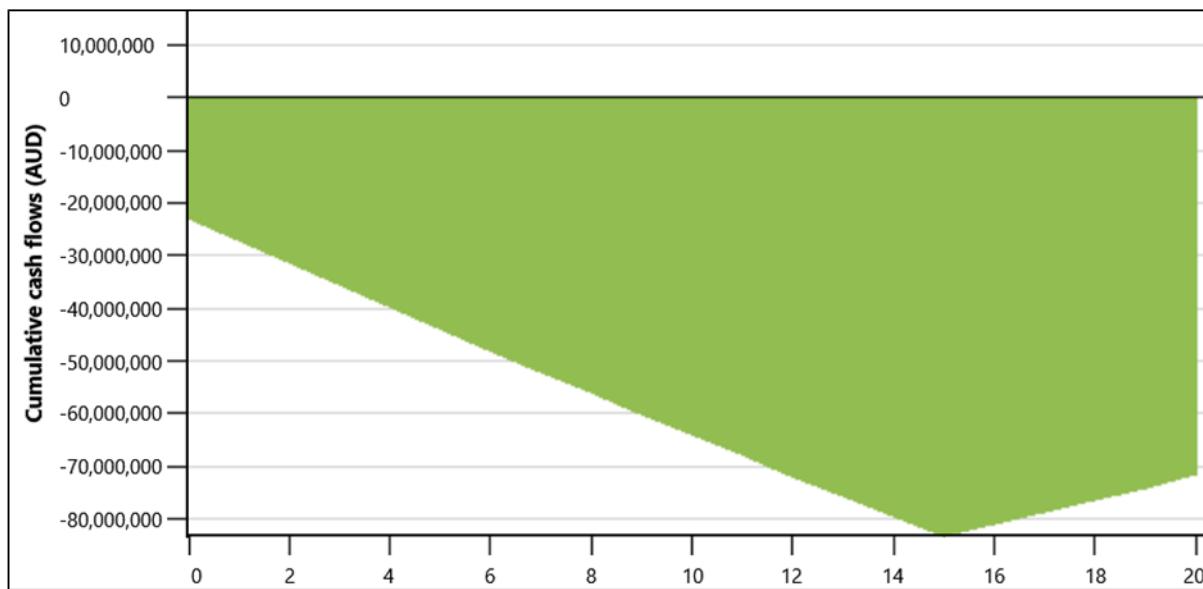
This report was prepared using the RETScreen Clean Energy Management Software. The key findings and recommendations of this analysis are presented below:

Target

	Electricity exported to grid MWh	Electricity export revenue AUD	GHG emission reduction tCO ₂
Proposed case	21,801	2,180,099	15,457

The main results are as follows:

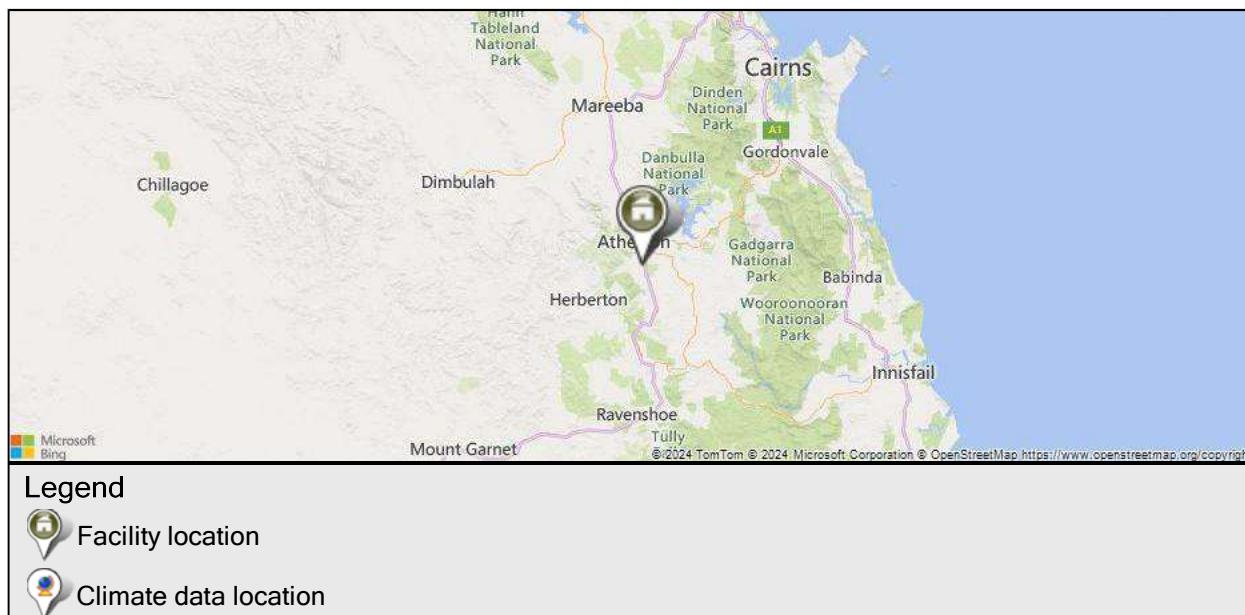
Cash flow - Cumulative



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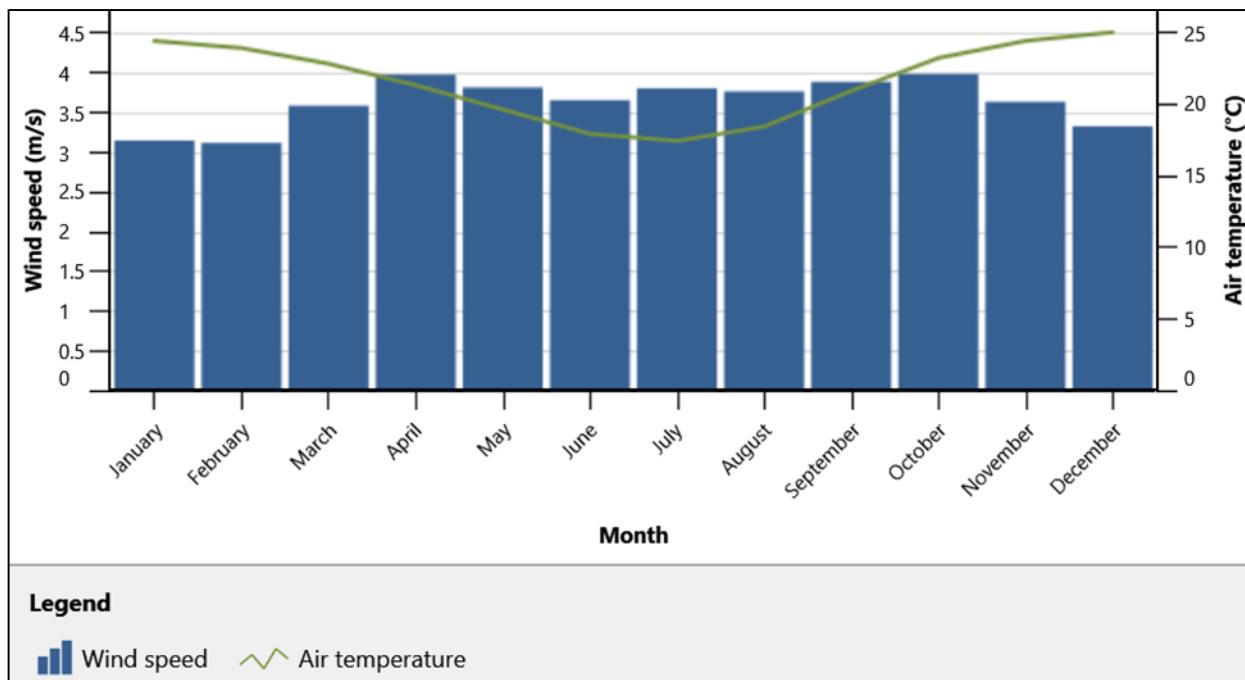
Location | Climate data

Location



	Unit	Climate data location	Facility location
Name		Australia - Queensland - Atherton	Australia - QLD - Atherton
Latitude	°N	-17.3	-17.3
Longitude	°E	145.5	145.5
Climate zone		2A - Hot - Humid	2A - Hot - Humid
Elevation	m	556	767

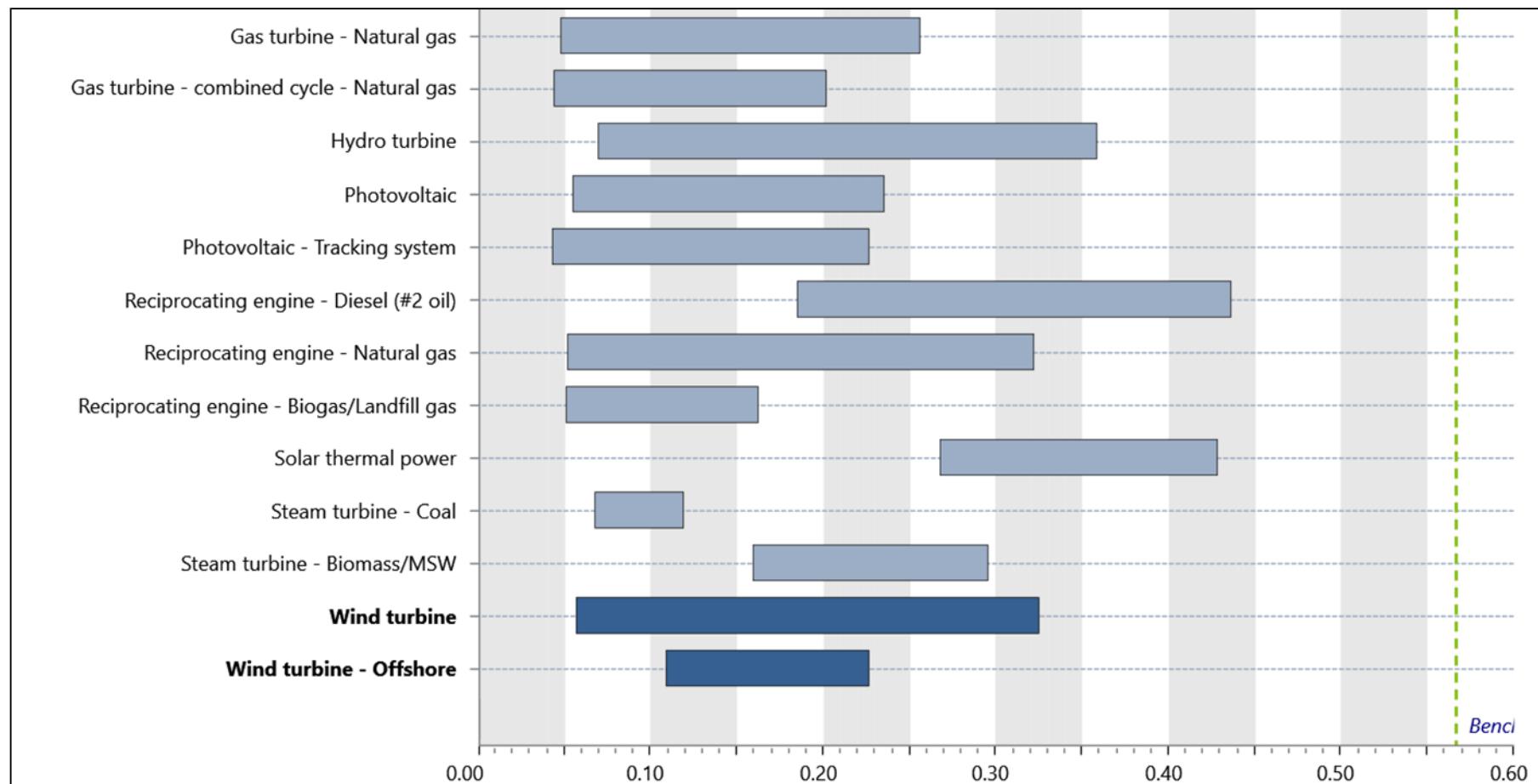
Climate data



Month	Heating design temperature		15.7		Atmospheric pressure	Wind speed	Earth temperature	Heating degree-days	Cooling degree-days
	Air temperature	Relative humidity	Precipitation	Daily solar radiation - horizontal					
	°C	%	mm	kWh/m²/d	kPa	m/s	°C	°C-d	°C-d
January	24.5	79.5%	292.33	6.12	94.6	3.2	25.3	0	450
February	24.0	85.3%	342.16	5.48	94.6	3.1	24.5	0	392
March	22.9	85.6%	262.88	5.38	94.8	3.6	23.3	0	400
April	21.4	84.7%	145.20	4.85	95.0	4.0	21.8	0	342
May	19.7	82.9%	82.46	4.41	95.1	3.8	20.1	0	301
June	18.0	79.4%	48.00	4.30	95.2	3.7	18.5	0	240
July	17.5	76.1%	40.92	4.59	95.3	3.8	18.0	16	233
August	18.5	70.7%	30.38	5.27	95.3	3.8	19.4	0	264
September	21.0	63.9%	25.20	6.31	95.2	3.9	22.2	0	330
October	23.3	62.0%	47.74	6.88	95.1	4.0	24.8	0	412
November	24.5	65.4%	104.40	6.84	94.8	3.7	26.0	0	435
December	25.1	70.8%	175.15	6.52	94.7	3.3	26.2	0	468
Annual	21.7	75.5%	1,596.82	5.58	95.0	3.7	22.5	16	4,266

Benchmark

Energy production cost - Central-grid - Range (AUD/kWh)



Benchmark: 0.57 AUD/kWh

Power plant

Wind turbine 12 kW



12MW wind Farm

Capacity	12,000	kW
Electricity	21,801	MWh

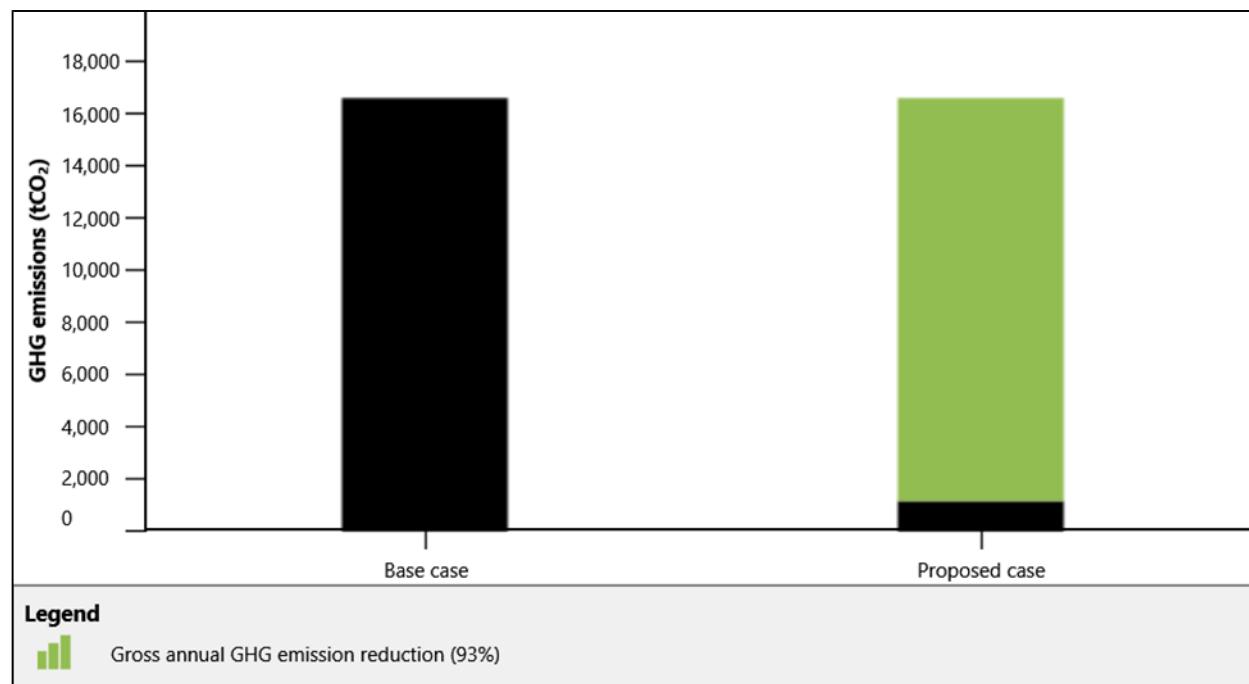
Target

Summary

	Electricity exported to grid MWh	Electricity export revenue AUD	GHG emission reduction tCO ₂
Proposed case	21,801	2,180,099	15,457

GHG emissions

GHG emissions



GHG equivalence



15,456.9 tCO₂ is equivalent to 2,830.9

Cars & light trucks not used

GHG emissions

Base case	16,620.3	tCO ₂
Proposed case	1,163.4	tCO ₂
Gross annual GHG emission reduction	15,456.9	tCO ₂

Financial viability

Financial parameters

General		
Inflation rate	%	2%
Discount rate	%	9%
Reinvestment rate	%	9%
Project life	yr	20
Finance		
Debt ratio	%	70%
Debt	AUD	53,760,000
Equity	AUD	23,040,000
Debt interest rate	%	7%
Debt term	yr	15
Debt payments	AUD/yr	5,902,559

Annual savings and revenue

Electricity export revenue		
Electricity exported to grid	MWh	21,801
Electricity export rate	AUD/kWh	0.10
Electricity export revenue	AUD	2,180,099
Electricity export escalation rate	%	2%

Costs | Savings | Revenue

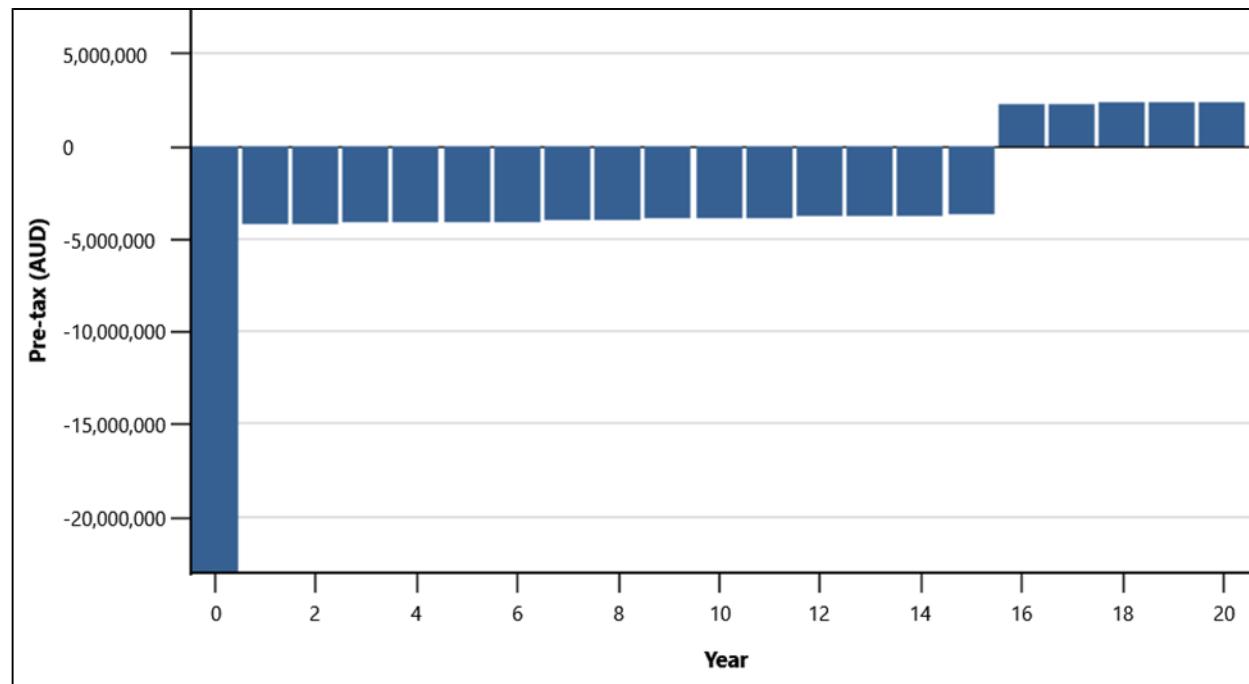
Initial costs			
Initial cost	100%	AUD	76,800,000
Total initial costs	100%	AUD	76,800,000
Yearly cash flows - Year 1			
Annual costs and debt payments			
O&M costs (savings)		AUD	576,000
Debt payments - 15 yrs		AUD	5,902,559
Total annual costs		AUD	6,478,559
Annual savings and revenue			
Electricity export revenue		AUD	2,180,099
GHG reduction savings		AUD	0
CE production revenue		AUD	0
Total annual savings and revenue		AUD	2,180,099
Net yearly cash flow - Year 1		AUD	-4,298,461

Financial viability

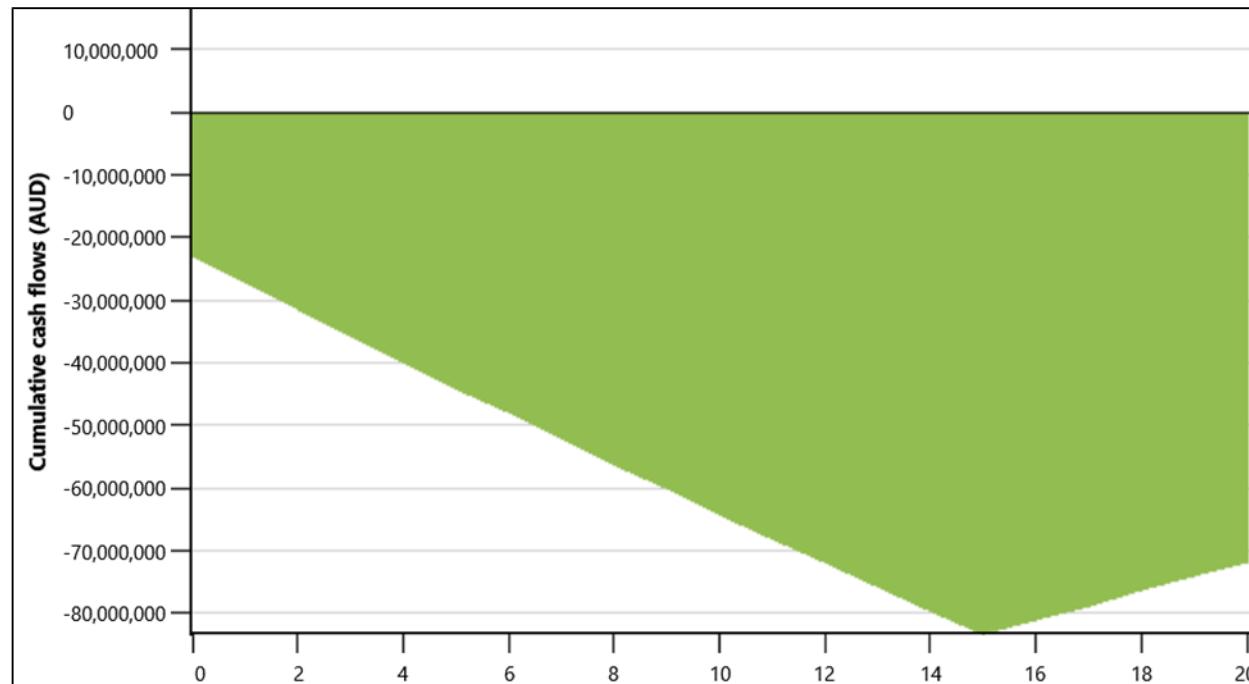
Pre-tax IRR - equity	%	Negative
Pre-tax MIRR - equity	%	-6.8%
Pre-tax IRR - assets	%	Negative
Pre-tax MIRR - assets	%	-9.9%
Simple payback	yr	47.9
Equity payback	yr	> project
Net Present Value (NPV)	AUD	-53,442,041
Annual life cycle savings	AUD/yr	-5,854,387
Benefit-Cost (B-C) ratio		-1.3
Debt service coverage		0.28
GHG reduction cost	AUD/tCO ₂	423
Energy production cost	AUD/kWh	0.386

Cash flow

Annual



Cumulative

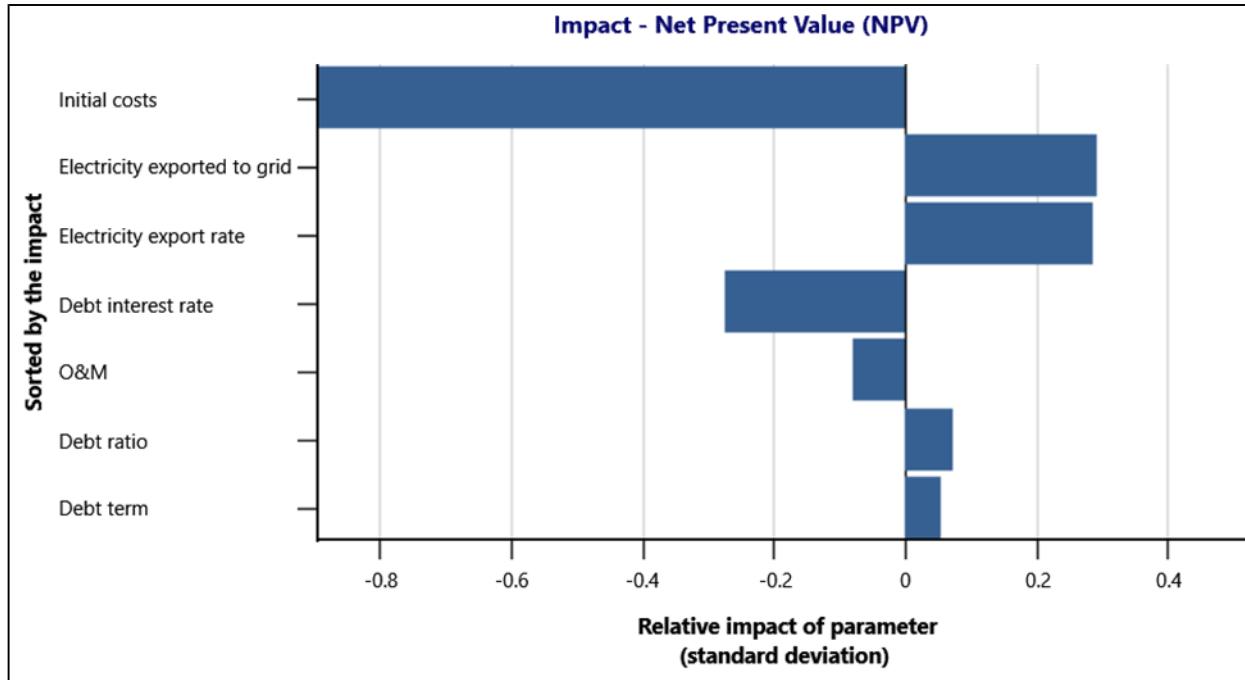


Yearly cash flows

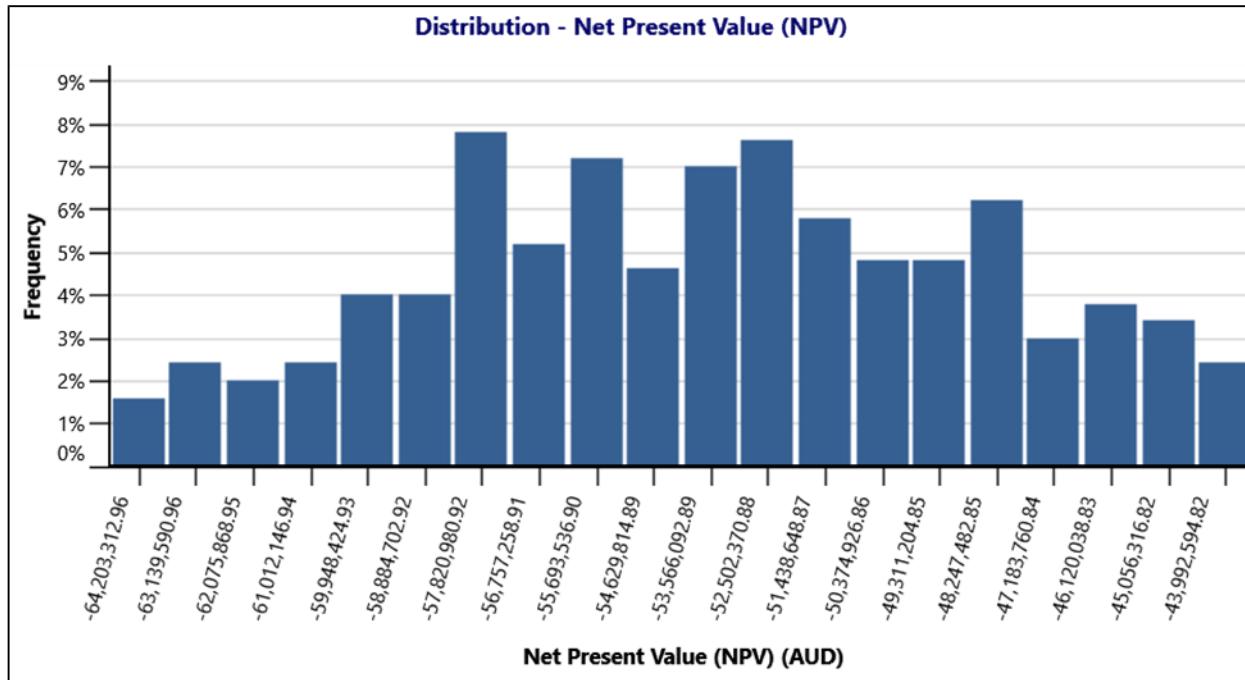
Year #	Pre-tax AUD	Cumulative AUD
0	-23,040,000	-23,040,000
1	-4,266,379	-27,306,379
2	-4,233,655	-31,540,033
3	-4,200,277	-35,740,310
4	-4,166,231	-39,906,542
5	-4,131,505	-44,038,046
6	-4,096,084	-48,134,130
7	-4,059,954	-52,194,084
8	-4,023,102	-56,217,186
9	-3,985,513	-60,202,699
10	-3,947,172	-64,149,871
11	-3,908,064	-68,057,935
12	-3,868,174	-71,926,109
13	-3,827,487	-75,753,596
14	-3,785,985	-79,539,581
15	-3,743,654	-83,283,234
16	2,202,083	-81,081,151
17	2,246,125	-78,835,026
18	2,291,048	-76,543,978
19	2,336,869	-74,207,109
20	2,383,606	-71,823,503

Risk

Impact



Distribution



Perform analysis on	Net Present Value (NPV)				
Number of combinations	500				
Random seed	No				
Parameter	Unit	Value	Range (+/-)	Minimum	Maximum
Initial costs	AUD	76,800,000	25%	57,600,000	96,000,000
O&M	AUD	576,000	25%	432,000	720,000
Electricity exported to grid	MWh	21,800.99	25%	16,350.74	27,251.23
Electricity export rate	AUD/MWh	100.00	25%	75.00	125.00
Debt ratio	%	70.0%	25%	52.5%	87.5%
Debt interest rate	%	7.00%	25%	5.25%	8.75%
Debt term	yr	15	25%	11	19
Median				AUD	-53,546,510
Level of risk				%	10%
Minimum within level of confidence				AUD	-64,741,076
Maximum within level of confidence				AUD	-43,458,594

Analysis type

Feasibility

