

# Feasibility report

## Archetype

12 kW



Power plant - Wind turbine

# Executive summary

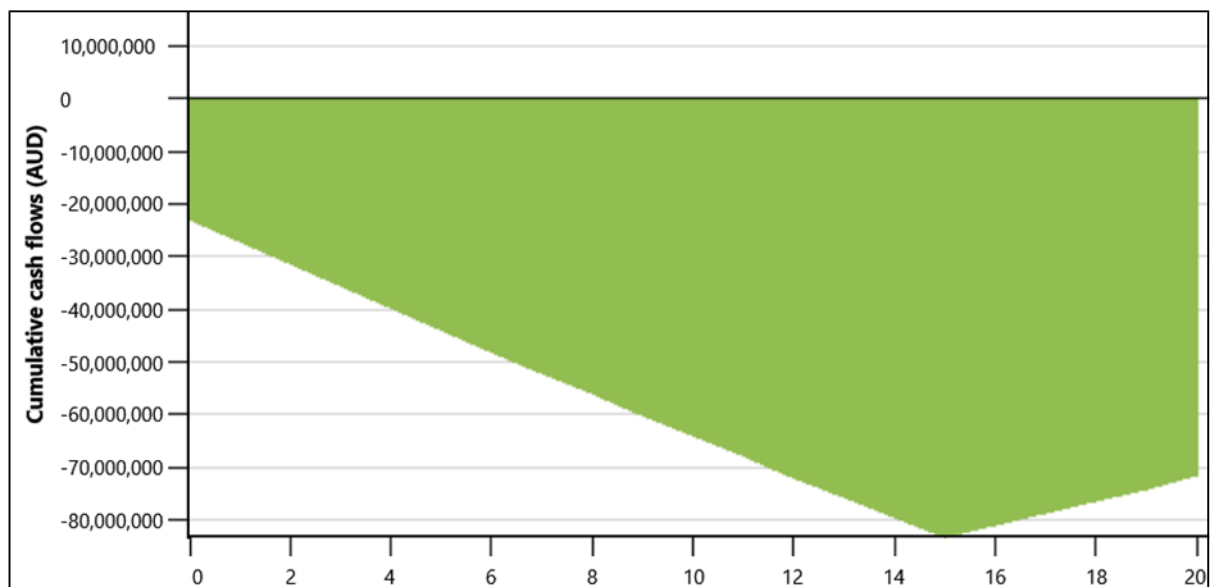
This report was prepared using the RETScreen Clean Energy Management Software. The key findings and recommendations of this analysis are presented below:

## Target

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

The main results are as follows:

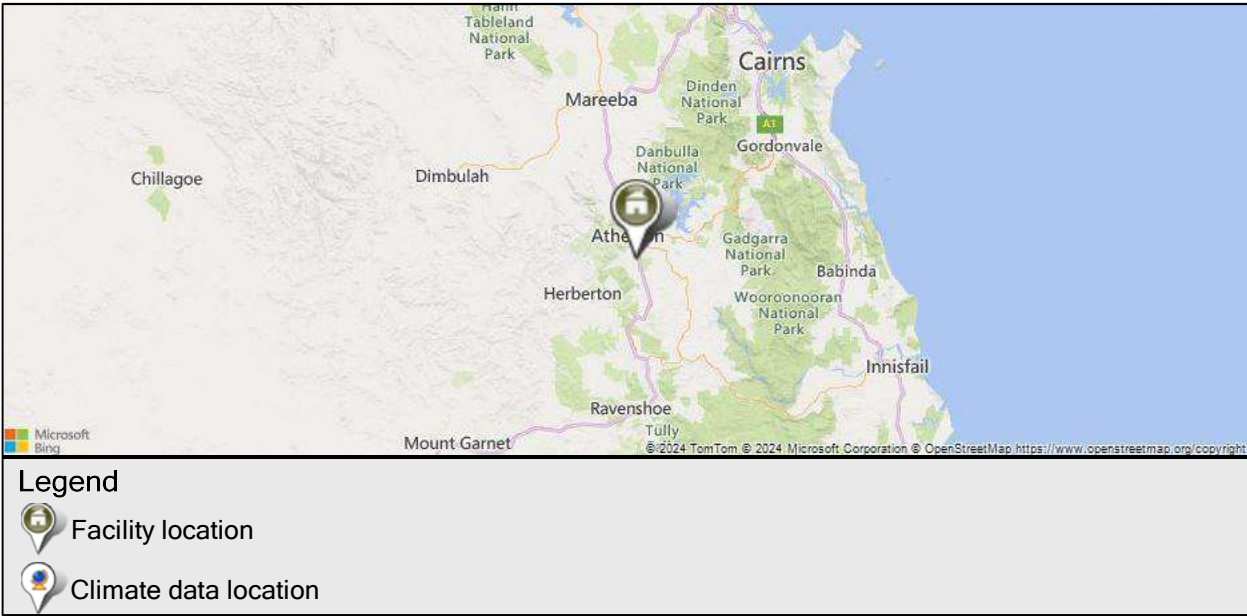
## Cash flow - Cumulative



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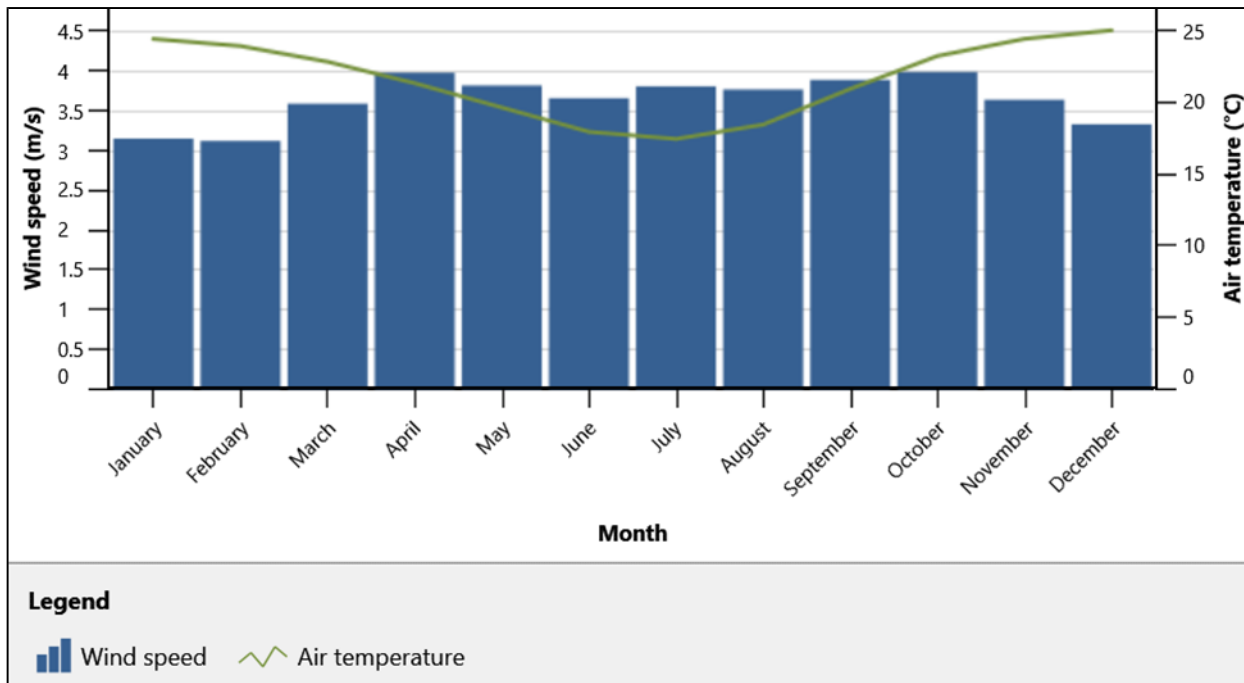
Location | Climate data

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

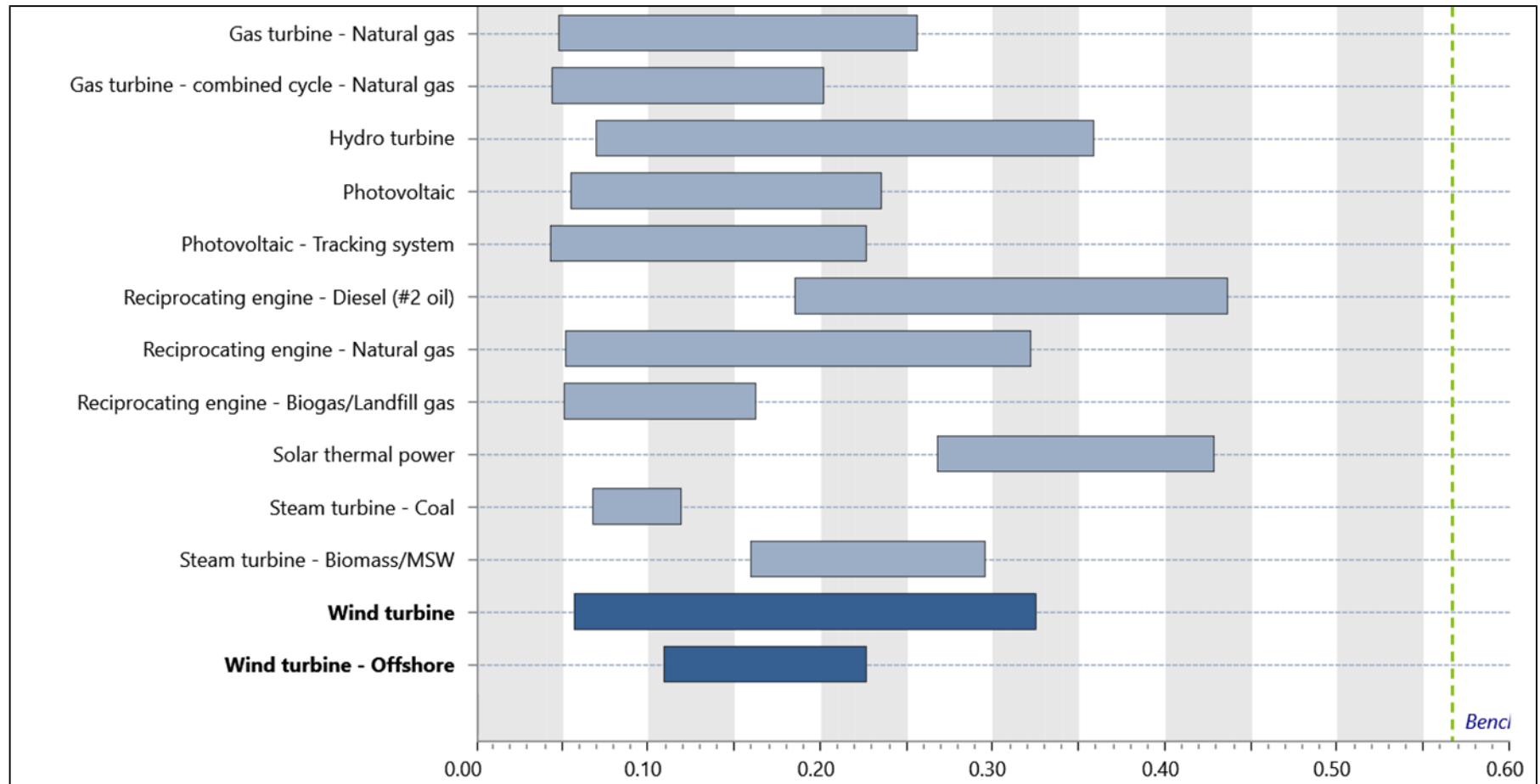
## Climate data



Heating design temperature		15.7							
Cooling design temperature		28.6							
Earth temperature amplitude		9.1							
Month	Air temperature	Relative humidity	Precipitation	Daily solar radiation - horizontal	Atmospheric pressure	Wind speed	Earth temperature	Heating degree-days	Cooling degree-days
	°C	%	mm	kWh/m <sup>2</sup> /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)



Power plant

Wind turbine  
12 kW



12MW wind Farm

Capacity	12,000	kW
Electricity	21,801	MWh

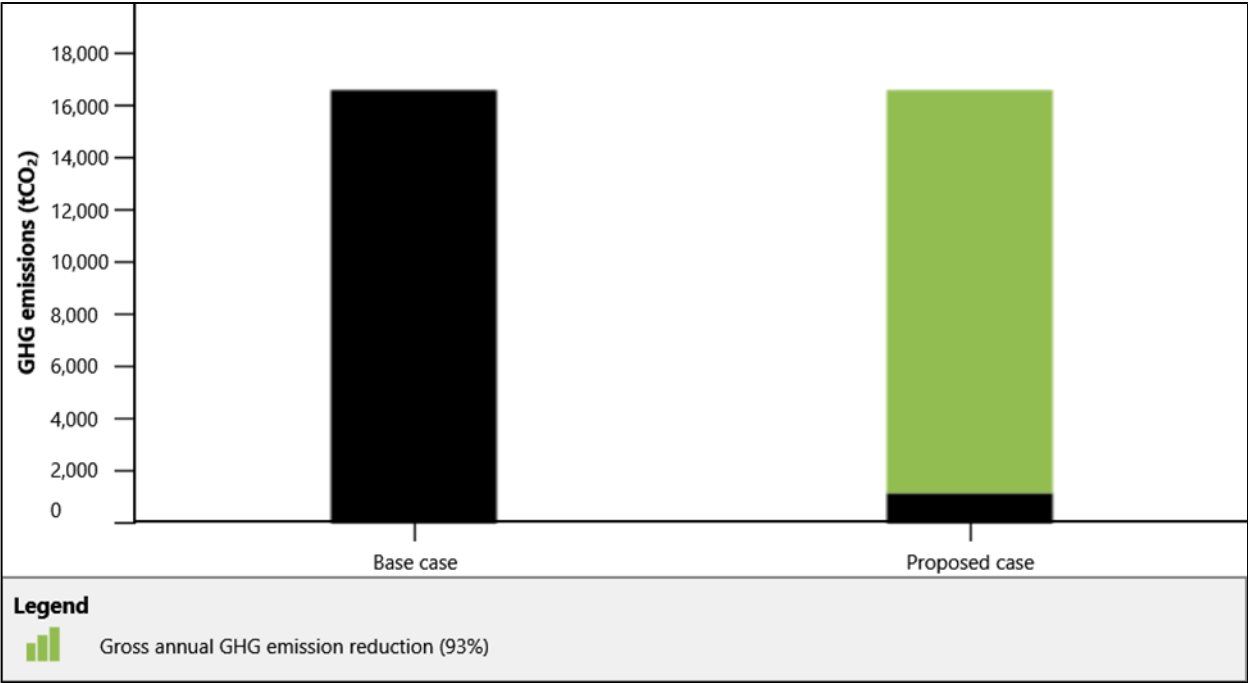
# Target

## Summary

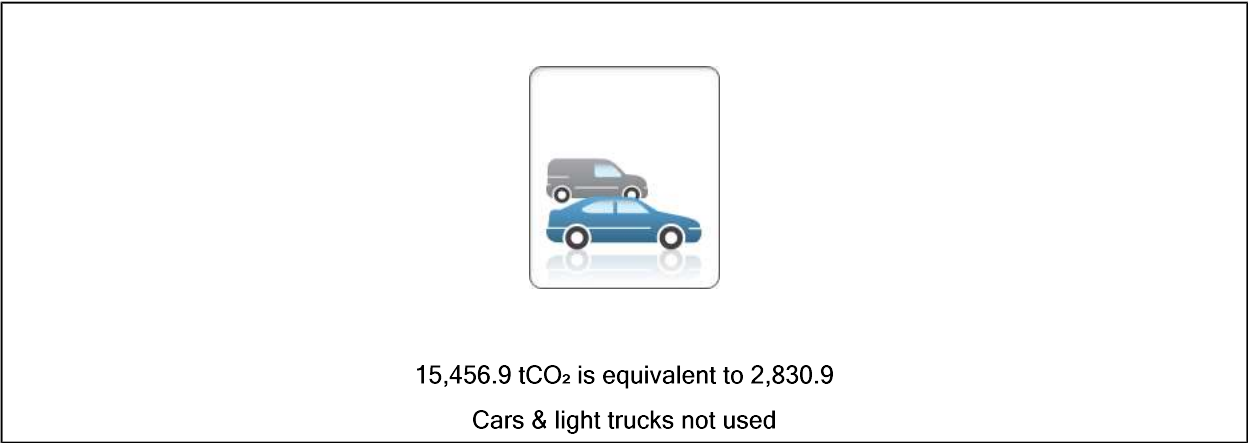
	Electricity exported to grid MWh	Electricity export revenue AUD	GHG emission reduction tCO <sub>2</sub>
Proposed case	21,801	2,180,099	15,457

# GHG emissions

GHG emissions



GHG equivalence



GHG emissions		
Base case	16,620.3	tCO <sub>2</sub>
Proposed case	1,163.4	tCO <sub>2</sub>
Gross annual GHG emission reduction	15,456.9	tCO <sub>2</sub>



## 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

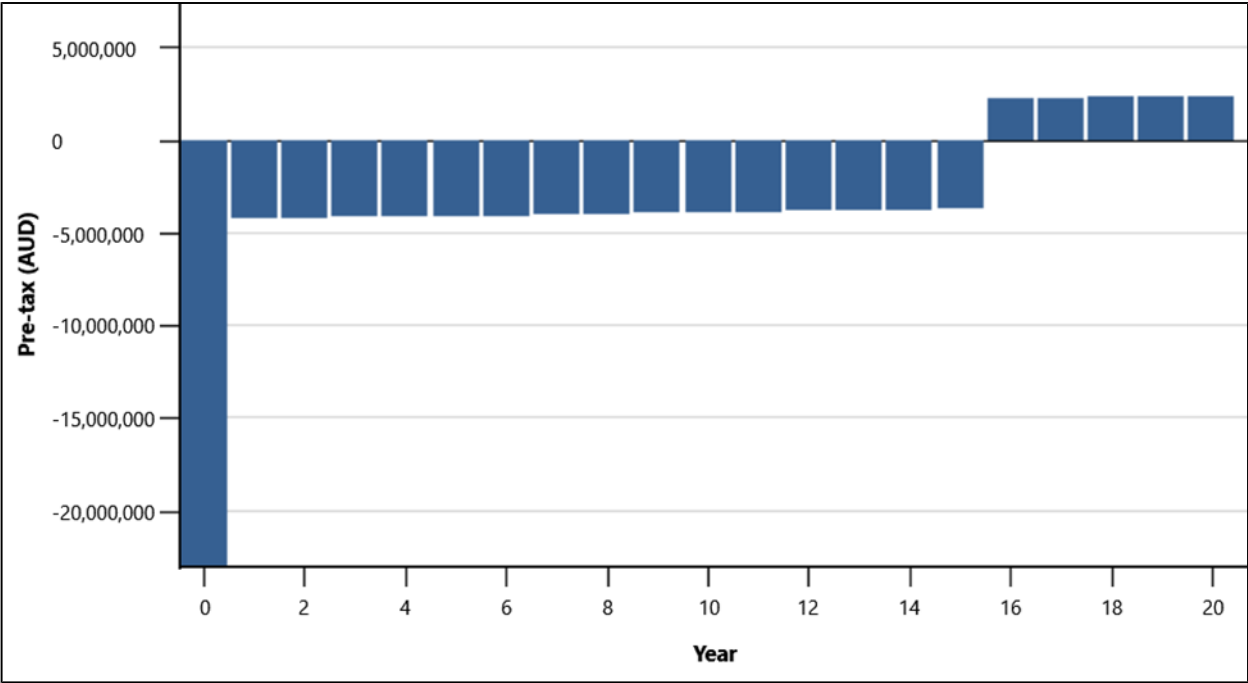
Initial costs			
Initial cost	100%	AUD	76,800,000
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Total initial costs	100%	AUD	76,800,000
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Yearly cash flows - Year 1			
Annual costs and debt payments			
O&M costs (savings)		AUD	576,000
Debt payments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

## Financial viability

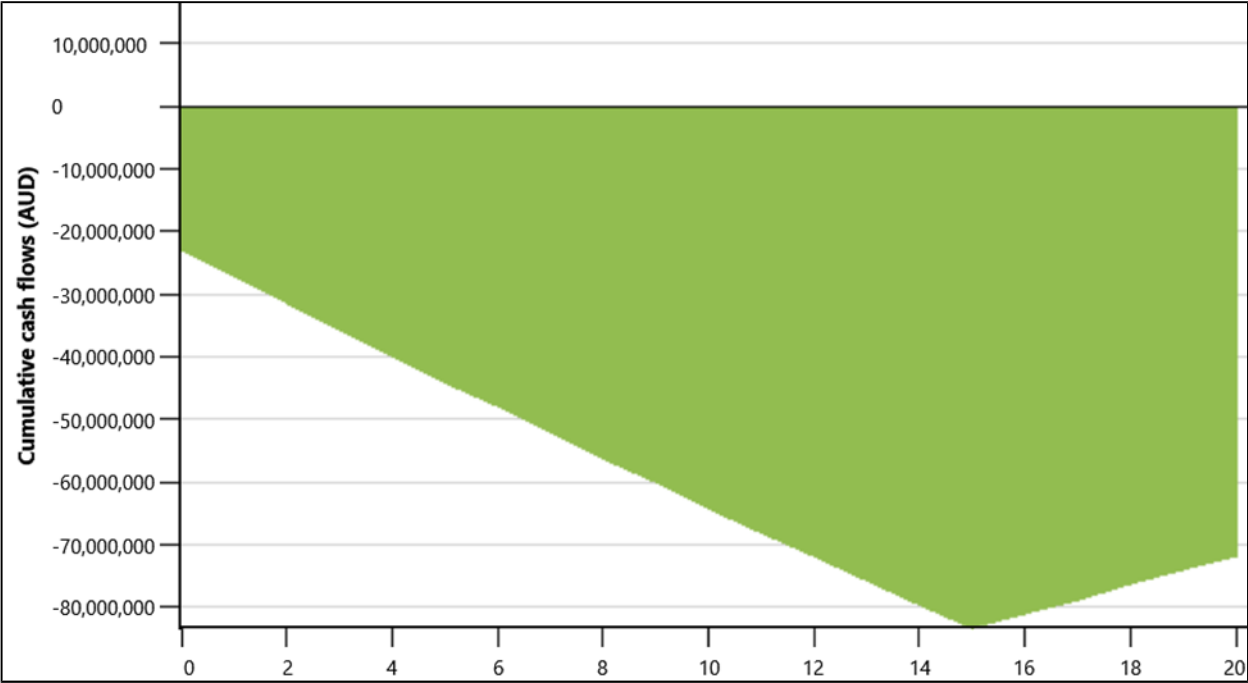
Pre-tax IRR - equity	%	Negative
Pre-tax MIRR - equity	%	-6.8%
Pre-tax IRR - assets	%	Negative
Pre-tax MIRR - assets	%	-9.9%
Simple payback	yr	47.9
Equity payback	yr	> project
Net Present Value (NPV)	AUD	-53,442,041
Annual life cycle savings	AUD/yr	-5,854,387
Benefit-Cost (B-C) ratio		-1.3
Debt service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

# Cash flow

Annual



Cumulative

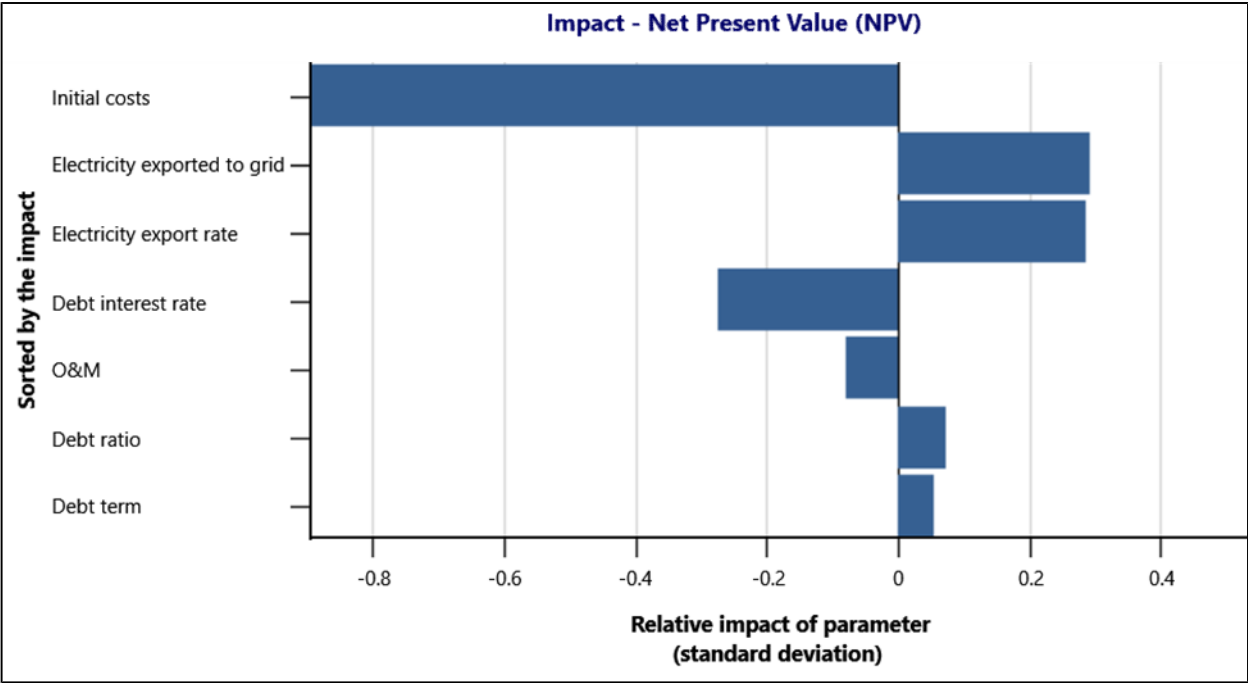


## Yearly cash flows

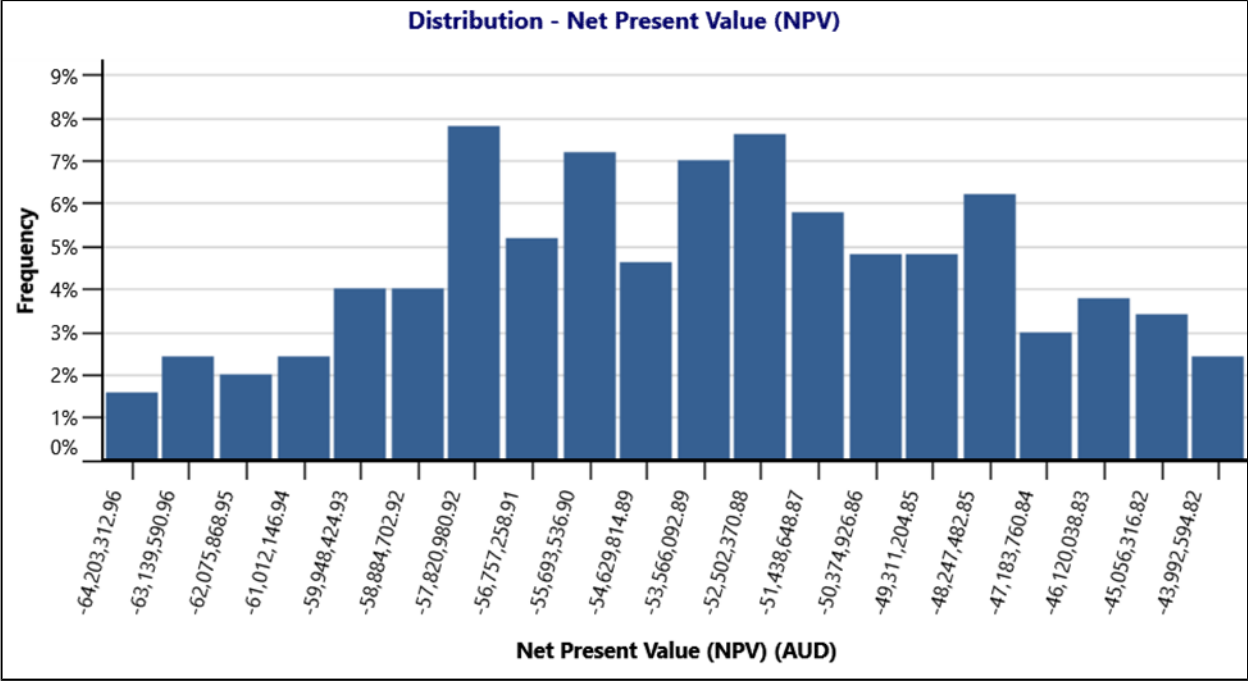
Year #	Pre-tax AUD	Cumulative AUD
0	-23,040,000	-23,040,000
1	-4,266,379	-27,306,379
2	-4,233,655	-31,540,033
3	-4,200,277	-35,740,310
4	-4,166,231	-39,906,542
5	-4,131,505	-44,038,046
6	-4,096,084	-48,134,130
7	-4,059,954	-52,194,084
8	-4,023,102	-56,217,186
9	-3,985,513	-60,202,699
10	-3,947,172	-64,149,871
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

