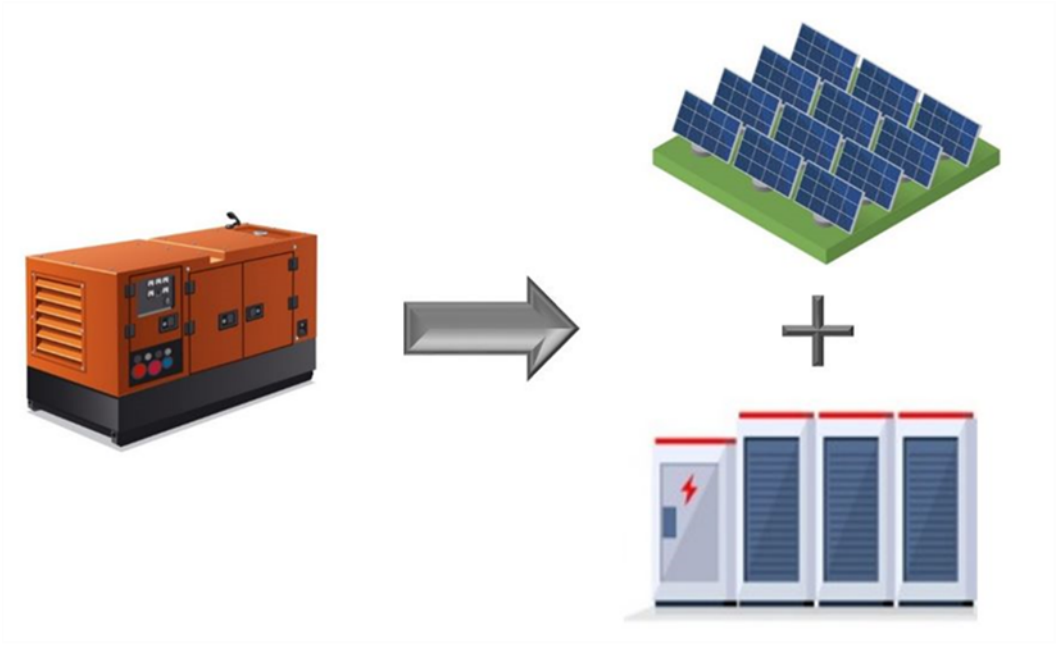
Archetype

24 kWh/day - Genset → PV+Battery



Power | Storage | Off-grid - Photovoltaic

Executive summary

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

System summary

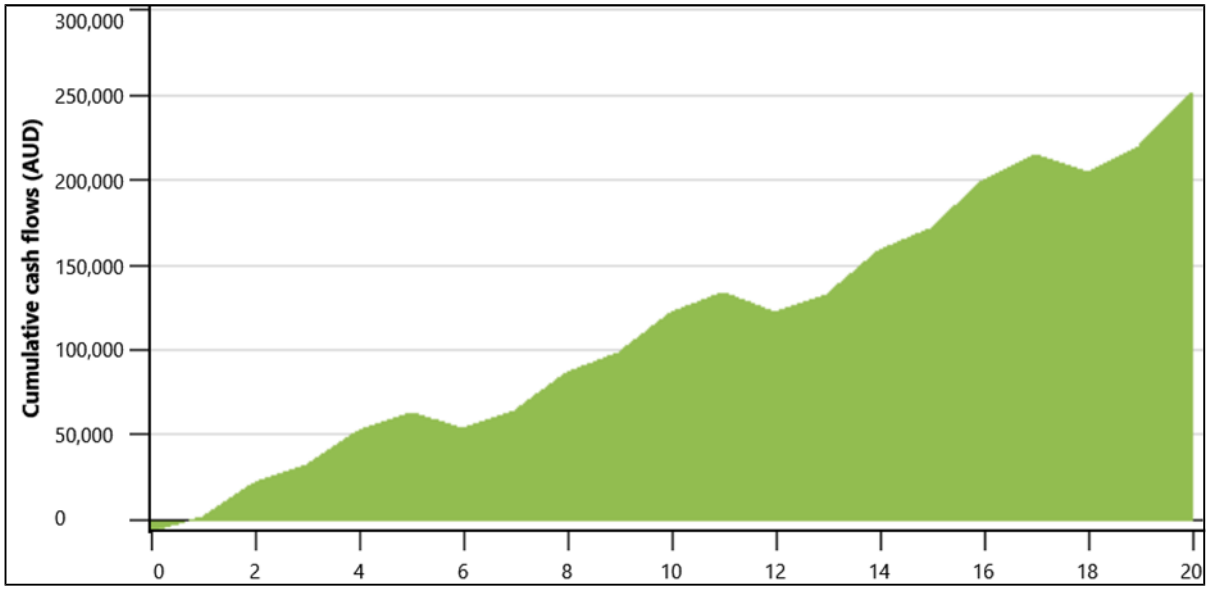
	Technology		Capacity	Energy delivered	Fraction of load delivered
			kW	kWh	%
Power					
Base load	Photovoltaic		7.6	8,414	92.2%
		Total	7.6	8,414	92.2%

Equipment	Unit	Capacity
Inverter	kW	5
Battery	kWh	23.04

Fuels	Unit	Consumption
Base case		
Diesel (#2 oil)	L	6,778

The main results are as follows:

Cash flow - Cumulative



Location | Climate data

Location

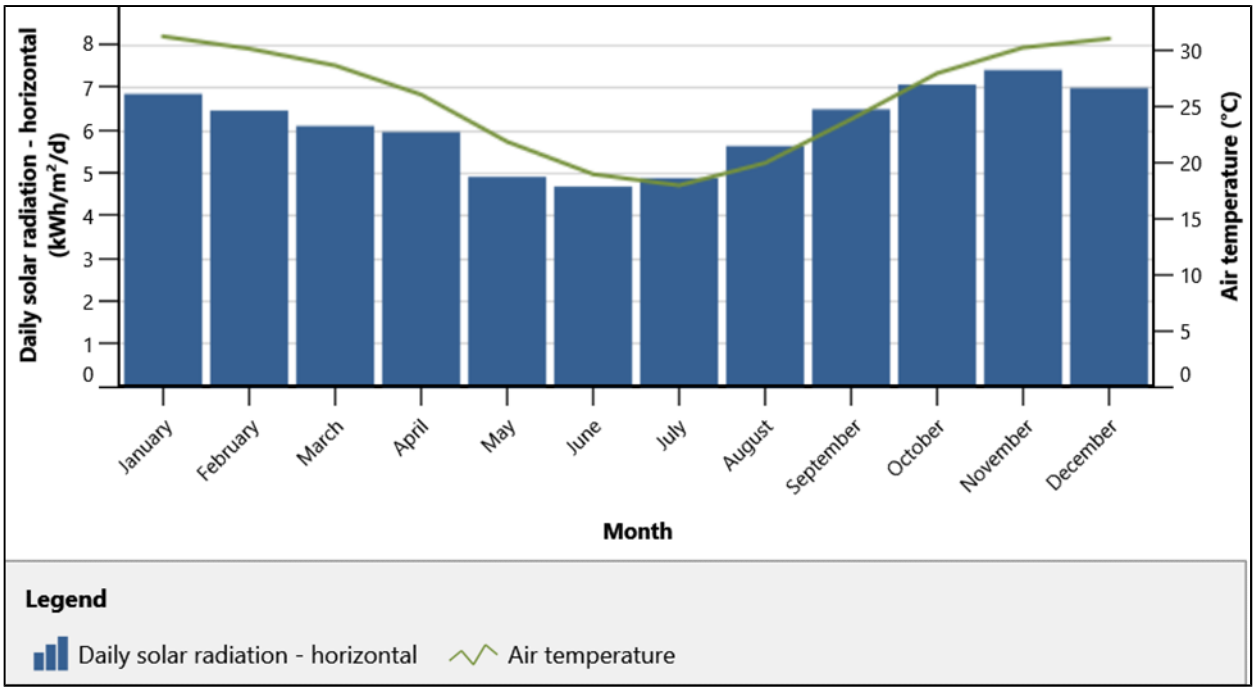
Legend

Facility location

Climate data location

	Unit	Climate data location	Facility location
Name		Australia - Queensland - Cloncurry A	Australia
Latitude	˚N	-20.7	-20.7
Longitude	˚E	140.5	140.5
Climate zone		1B - Very hot - Dry	1B - Very hot - Dry
Elevation	m	190	188

Climate data

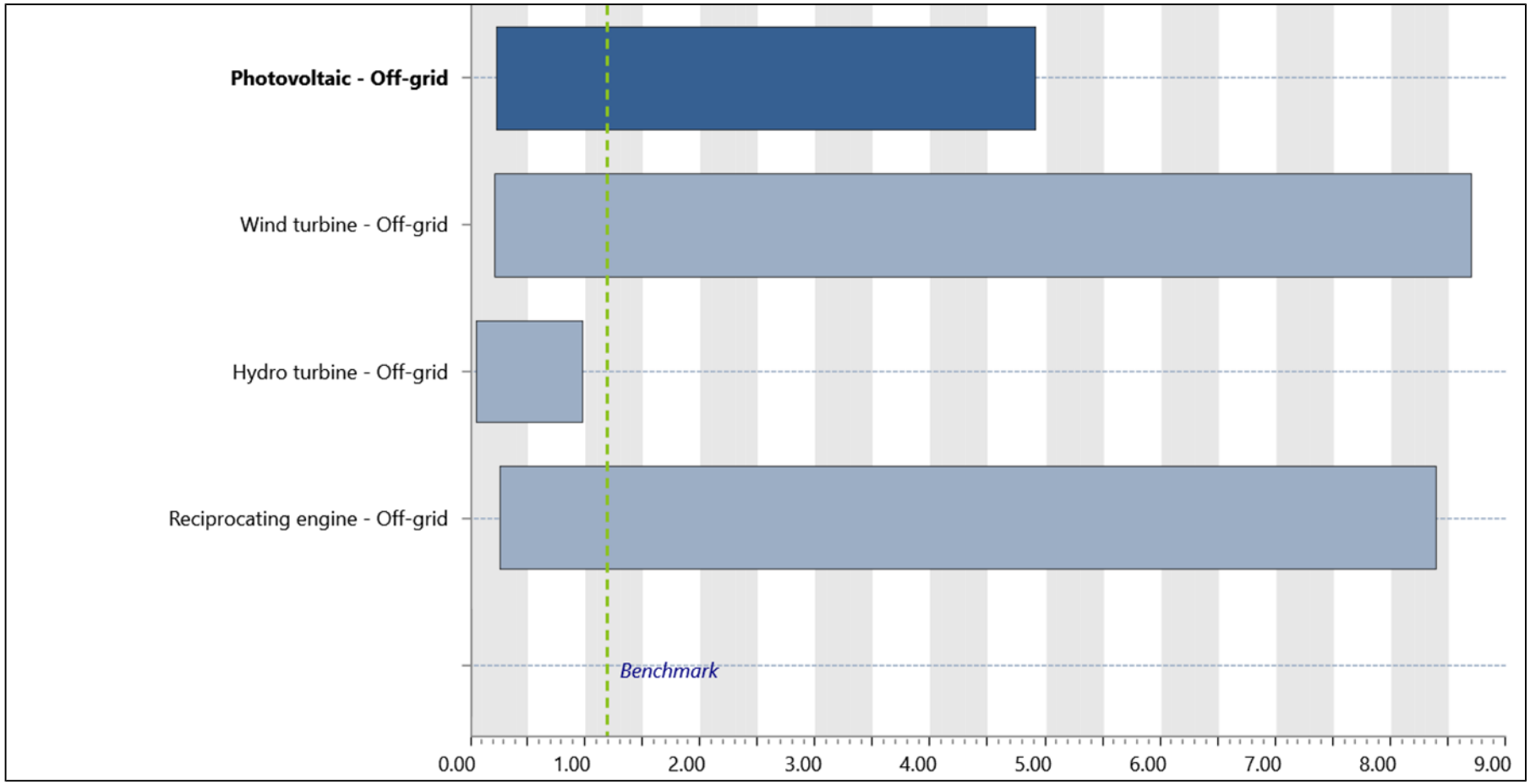


Heating design temperature	9.2
Cooling design temperature	39.7
Earth temperature amplitude	19.6

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/m²/d	kPa	m/s	°C	°C-d	°C-d
January	31.3	48.5%	128.65	6.86	98.4	4.1	32.3	0	660
February	30.2	54.0%	106.96	6.47	98.5	4.1	31.0	0	566
March	28.7	47.5%	63.55	6.11	98.7	4.6	29.1	0	580
April	26.1	41.5%	16.50	5.97	99.1	4.1	26.9	0	483
May	21.9	42.0%	12.71	4.92	99.3	4.6	22.6	0	369
June	19.0	43.5%	10.50	4.69	99.5	3.6	18.9	0	270
July	18.0	39.5%	6.51	4.89	99.5	3.6	18.3	0	248
August	20.0	33.0%	2.79	5.64	99.5	3.6	21.1	0	310
September	23.9	28.0%	4.50	6.50	99.3	4.1	26.3	0	417
October	28.0	28.5%	20.46	7.08	99.0	4.1	30.7	0	558
November	30.3	29.5%	43.50	7.42	98.8	4.1	32.9	0	609
December	31.1	37.0%	82.77	7.00	98.5	4.1	33.6	0	654
Annual	25.7	39.3%	499.40	6.13	99.0	4.1	26.9	0	5,724

Benchmark

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



Benchmark: 1.19 AUD/kWh

System summary

	Technology	Capacity kW	Energy delivered kWh	Fraction of load delivered %
Power				
Base load	Photovoltaic	7.6	8,414	92.2%
	Total	7.6	8,414	92.2%

Equipment	Unit	Capacity
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Base case		
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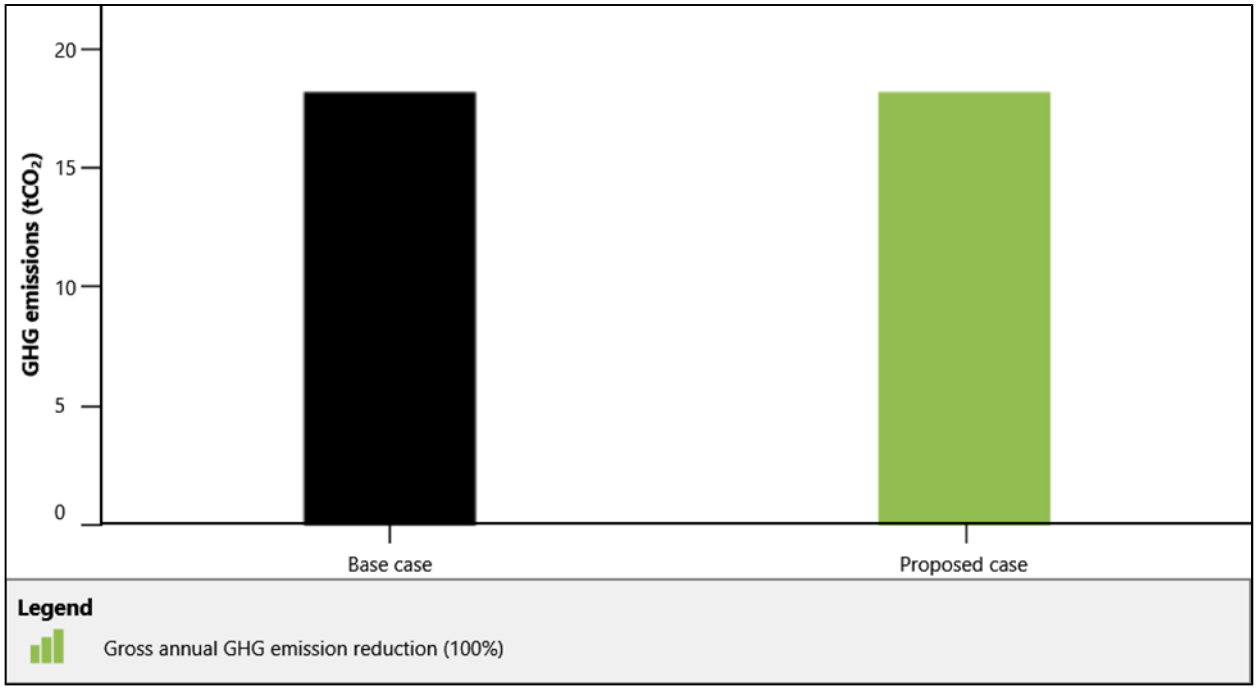
GHG emissions

GHG emissions



GHG equivalence

18.2 tCO_2 is equivalent to 3.3

Cars & light trucks not used

GHG emissions		
Base case	18.2	tCO_2
Proposed case	0	tCO_2
Gross annual GHG emission reduction	18.2	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	15,689
Equity	AUD	6,724
Debt interest rate	%	7%
Debt term	yr	15
Debt payments	AUD/yr	1,723

Costs | Savings | Revenue

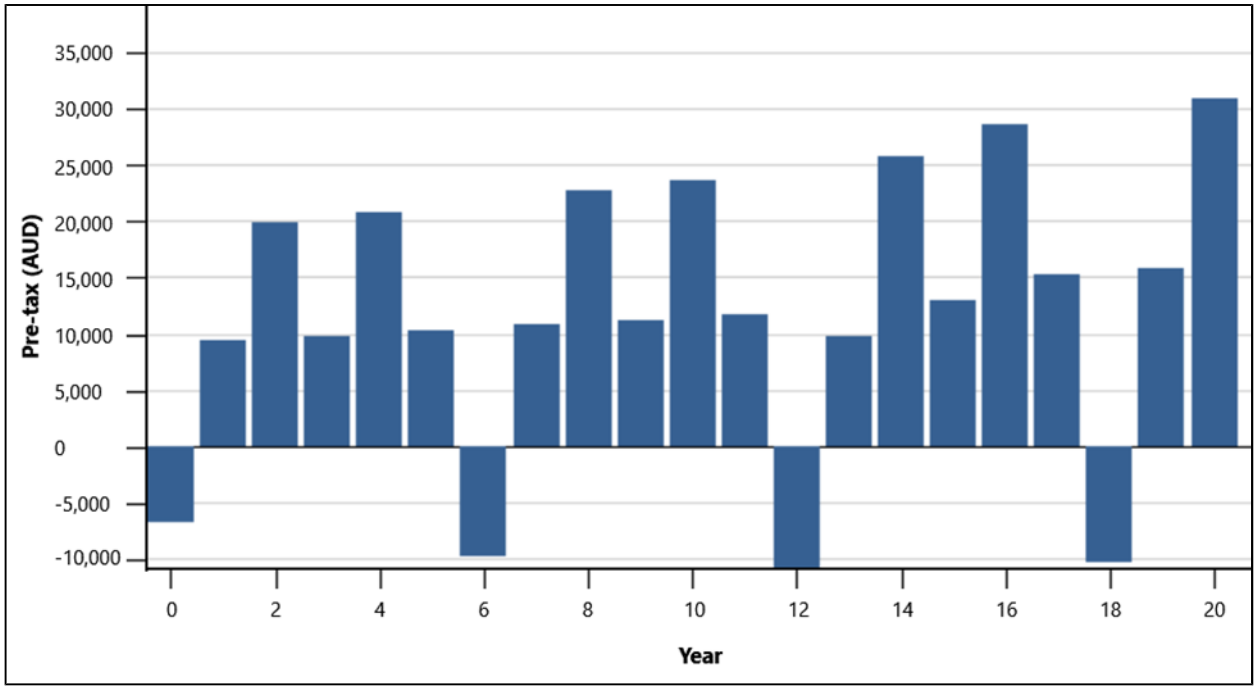
Initial costs			
Power system	100%	AUD	22,413
Total initial costs	100%	AUD	22,413
Yearly cash flows - Year 1			
Annual costs and debt payments			
O&M		AUD	287
Debt payments - 15 yrs		AUD	1,723
Total annual costs		AUD	2,010
Annual savings and revenue			
Fuel cost - base case		AUD	11,134
GHG reduction savings		AUD	0
Total annual savings and revenue		AUD	11,134
Net yearly cash flow - Year 1		AUD	9,124
Periodic costs (credits)			
Generator replacement - 2 yrs		AUD	-10,000
Proposed case battery replacement - 6 yrs		AUD	28,020
Proposed case inverter replacement - 13 yrs		AUD	2,000

Financial viability

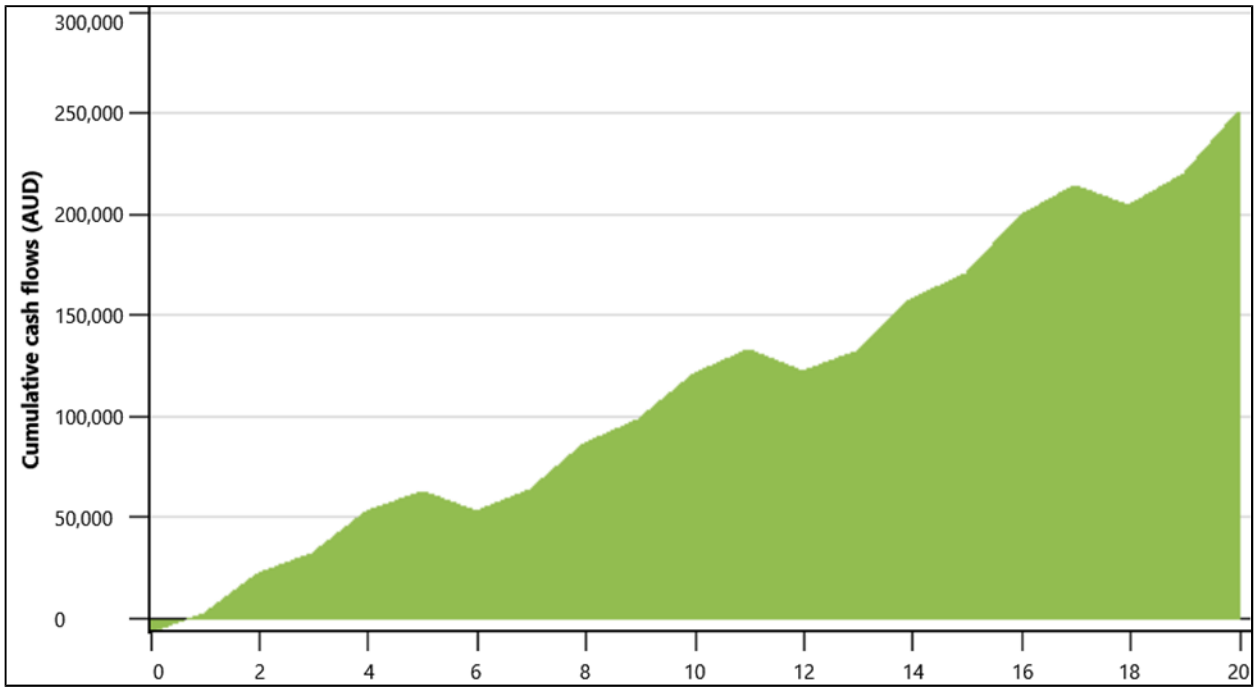
Pre-tax IRR - equity	%	180%
Pre-tax MIRR - equity	%	19.9%
Pre-tax IRR - assets	%	56.2%
Pre-tax MIRR - assets	%	16.3%
Simple payback	yr	2.1
Equity payback	yr	0.72
Net Present Value (NPV)	AUD	106,522
Annual life cycle savings	AUD/yr	11,669
Benefit-Cost (B-C) ratio		16.8
Debt service coverage		6.4
GHG reduction cost	AUD/tCO_2	-629
Energy production cost	AUD/kWh	0.959

Cash flow

Annual



Cumulative

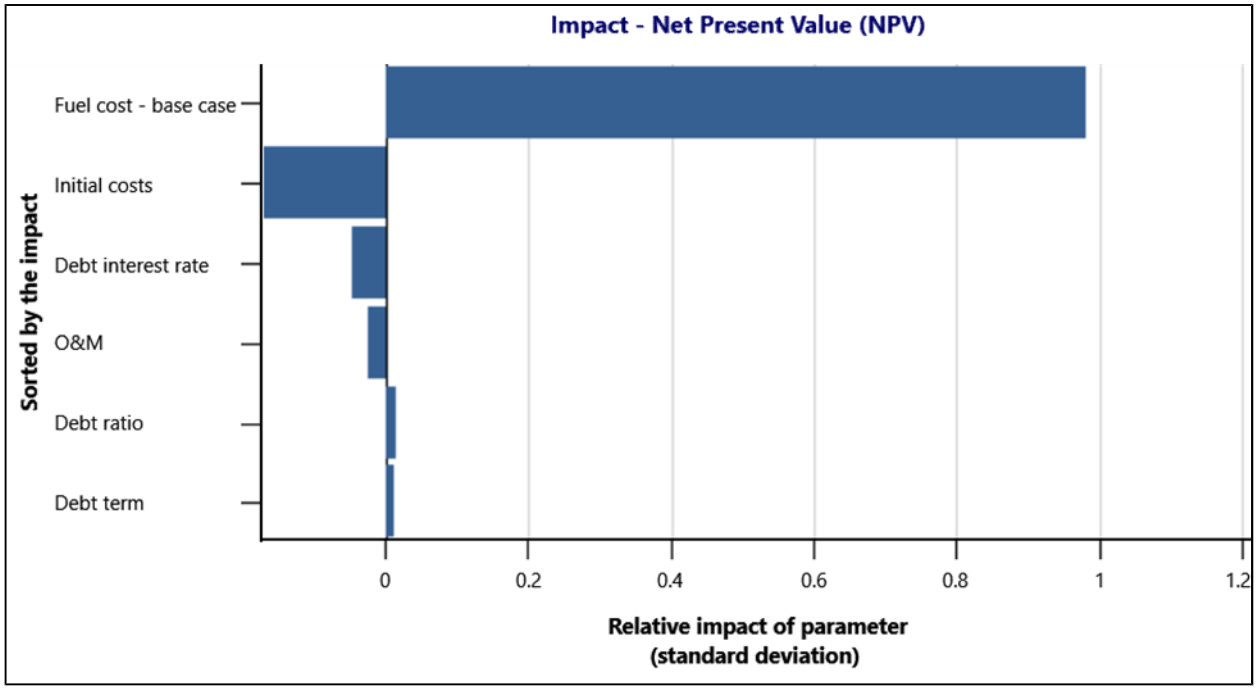


Yearly cash flows

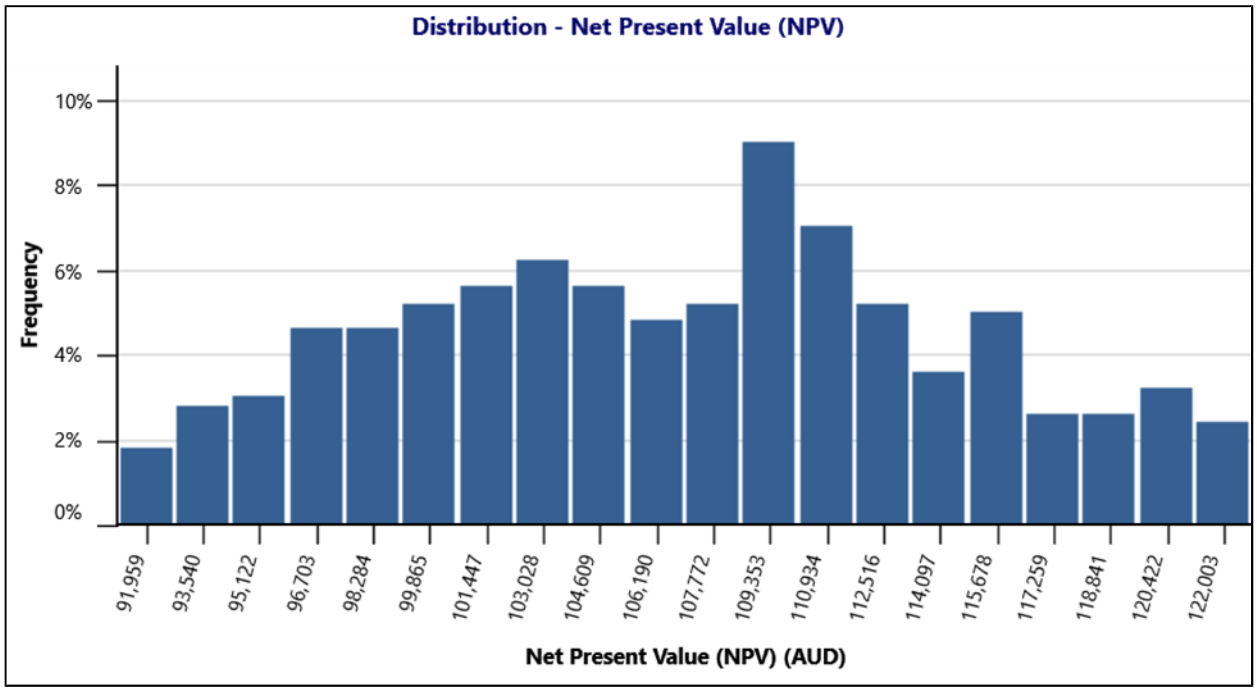
Year #	Pre-tax AUD	Cumulative AUD
0	-6,724	-6,724
1	9,341	2,617
2	19,966	22,583
3	9,788	32,371
4	20,842	53,213
5	10,253	63,466
6	-9,801	53,665
7	10,737	64,402
8	22,702	87,104
9	11,240	98,344
10	23,689	122,033
11	11,764	133,797
12	-10,820	122,977
13	9,721	132,699
14	25,784	158,483
15	12,875	171,358
16	28,618	199,976
17	15,188	215,163
18	-10,245	204,919
19	15,801	220,720
20	30,977	251,697

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	22,413	25%	16,810	28,017
O&M	AUD	287	25%	216	359
Fuel cost - base case	AUD	11,134	25%	8,350	13,917
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	107,156
Level of risk				%	10%
Minimum within level of confidence				AUD	91,163
Maximum within level of confidence				AUD	122,795

Analysis type

Feasibility