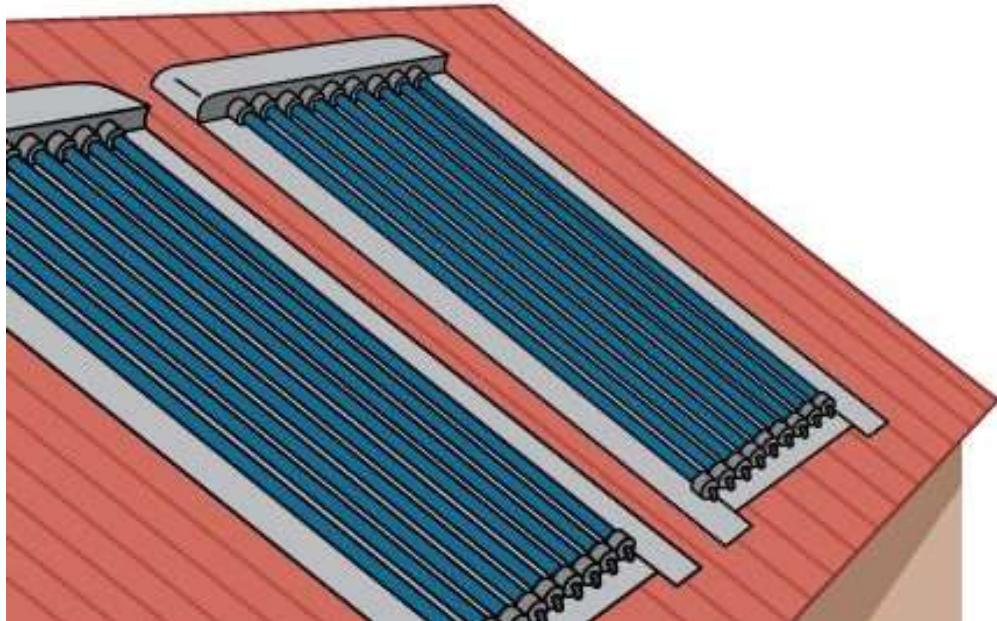


Feasibility report

Archetype

Industrial - Hot water



Individual measure - Solar water heater

Prepared for:

Waleed

Prepared by:

Mr.Umer

Executive summary

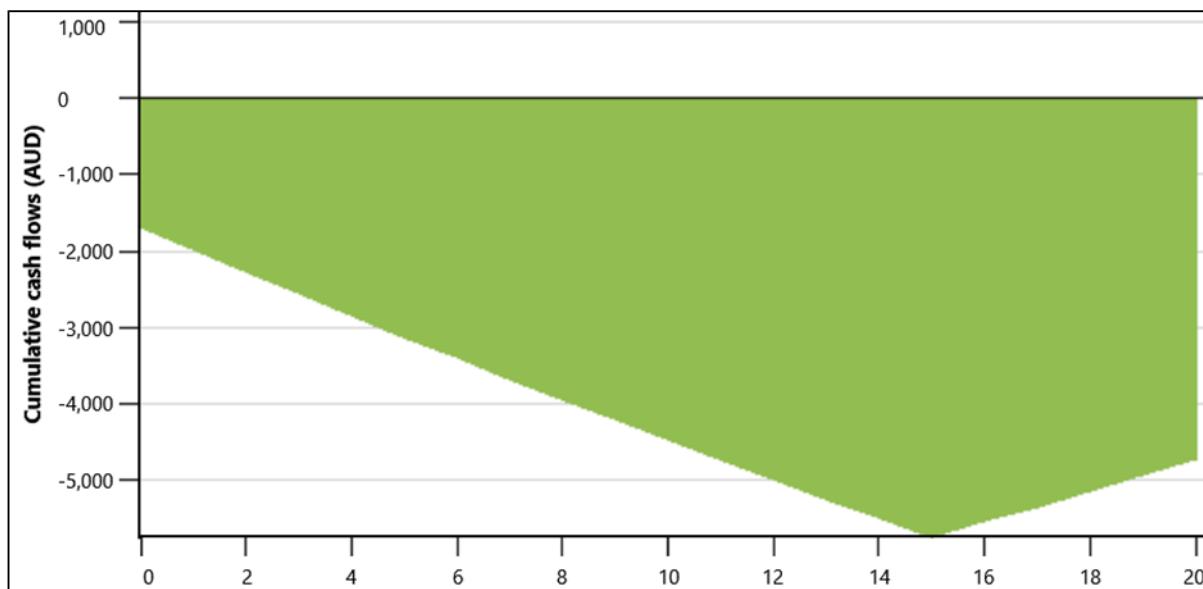
This report was prepared using the RETScreen Clean Energy Management Software. The key findings and recommendations of this analysis are presented below:

Target

	Fuel consumption kWh	Fuel cost AUD	GHG emissions tCO ₂
Base case	5,324	150	0.96
Proposed case	326	9.21	0.06
Savings %	4,998 93.9%	141 93.9%	0.9 93.9%

The main results are as follows:

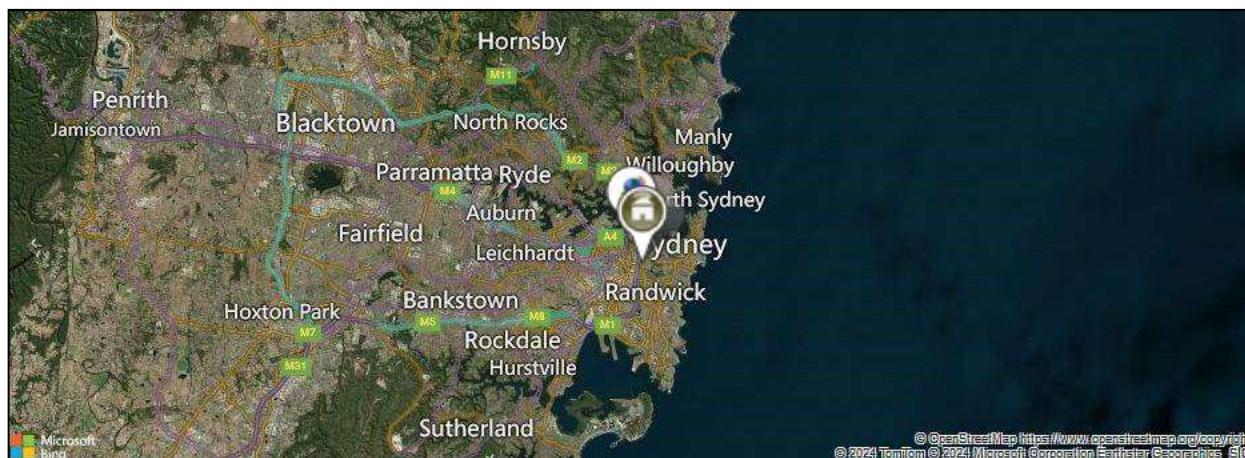
Cash flow - Cumulative



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Location | Climate data

Location

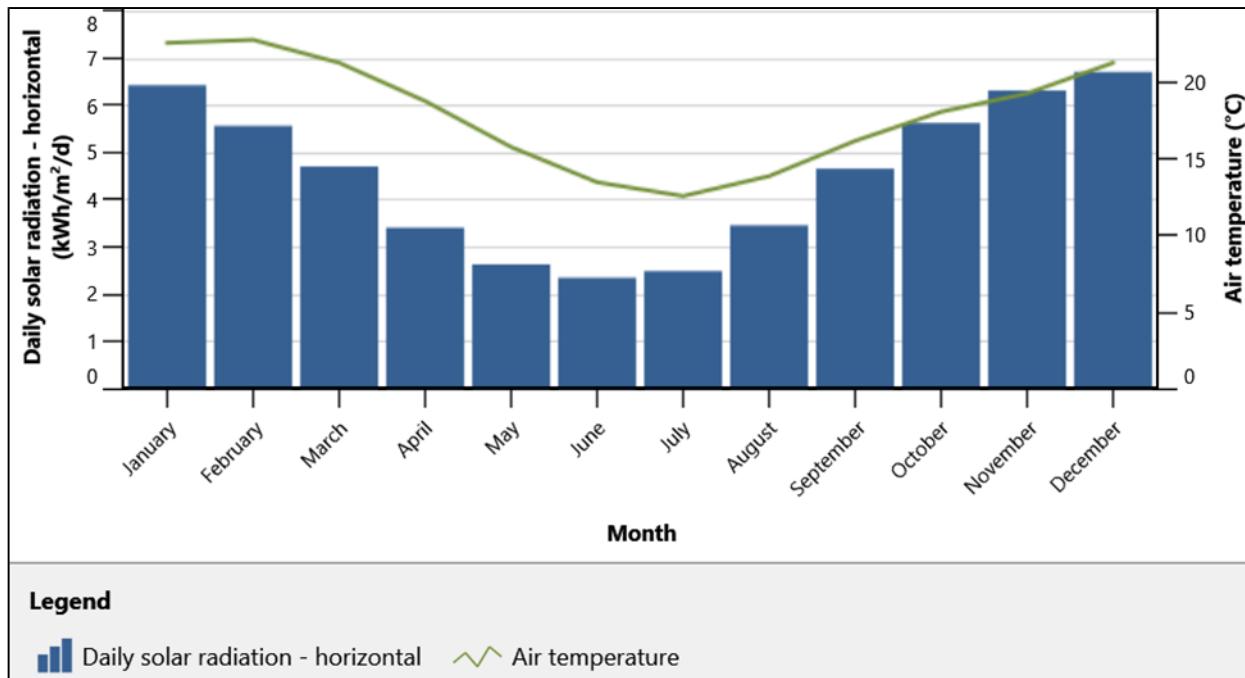


Legend

- Facility location
- Climate data location

	Unit	Climate data location	Facility location
Name		Australia - New South Wales - Sydney	Australia - NSW - Sydney
Latitude	°N	-33.8	-33.9
Longitude	°E	151.2	151.2
Climate zone		3A - Warm - Humid	3A - Warm - Humid
Elevation	m	40	64

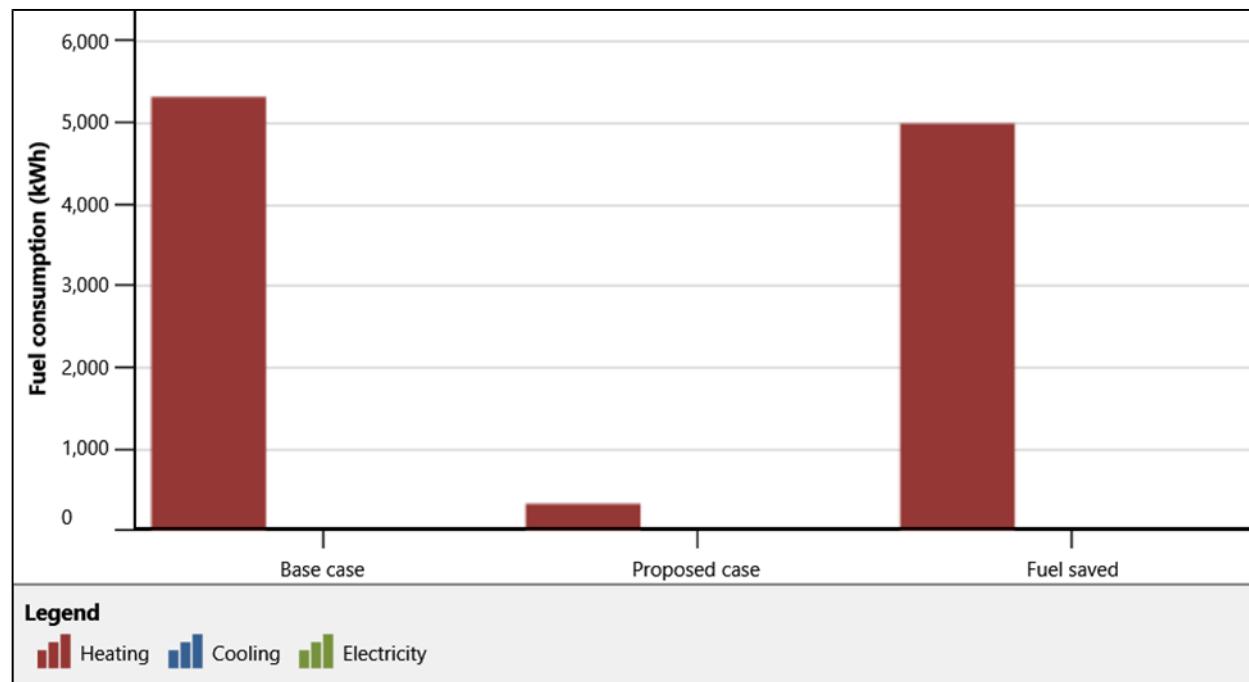
Climate data



	Heating design temperature		8.0							
	Cooling design temperature		28.8							
	Earth temperature amplitude		7.4							
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 ² /d	kPa	m/s	°C	°C-d	°C-d	
January	22.6	71.3%	94.86	6.44	101.3	6.2	23.2	0	391	
February	22.8	72.8%	129.08	5.58	101.4	7.2	23.0	0	358	
March	21.3	71.5%	93.62	4.72	101.6	6.7	21.7	0	350	
April	18.8	70.3%	99.90	3.42	101.8	6.2	19.7	0	264	
May	15.8	71.9%	77.81	2.64	101.8	2.6	17.2	68	180	
June	13.5	69.5%	87.90	2.36	101.9	4.1	14.9	135	105	
July	12.6	67.5%	60.14	2.50	101.8	3.1	13.9	167	81	
August	13.9	61.7%	66.96	3.47	101.7	4.6	14.4	127	121	
September	16.2	62.1%	55.50	4.67	101.7	3.6	16.3	54	186	
October	18.1	64.2%	65.10	5.64	101.5	6.7	18.2	0	251	
November	19.3	67.5%	97.20	6.33	101.3	6.7	20.0	0	279	
December	21.3	68.8%	77.50	6.72	101.2	6.7	21.9	0	350	
Annual	18.0	68.2%	1,005.57	4.54	101.6	5.3	18.7	552	2,916	

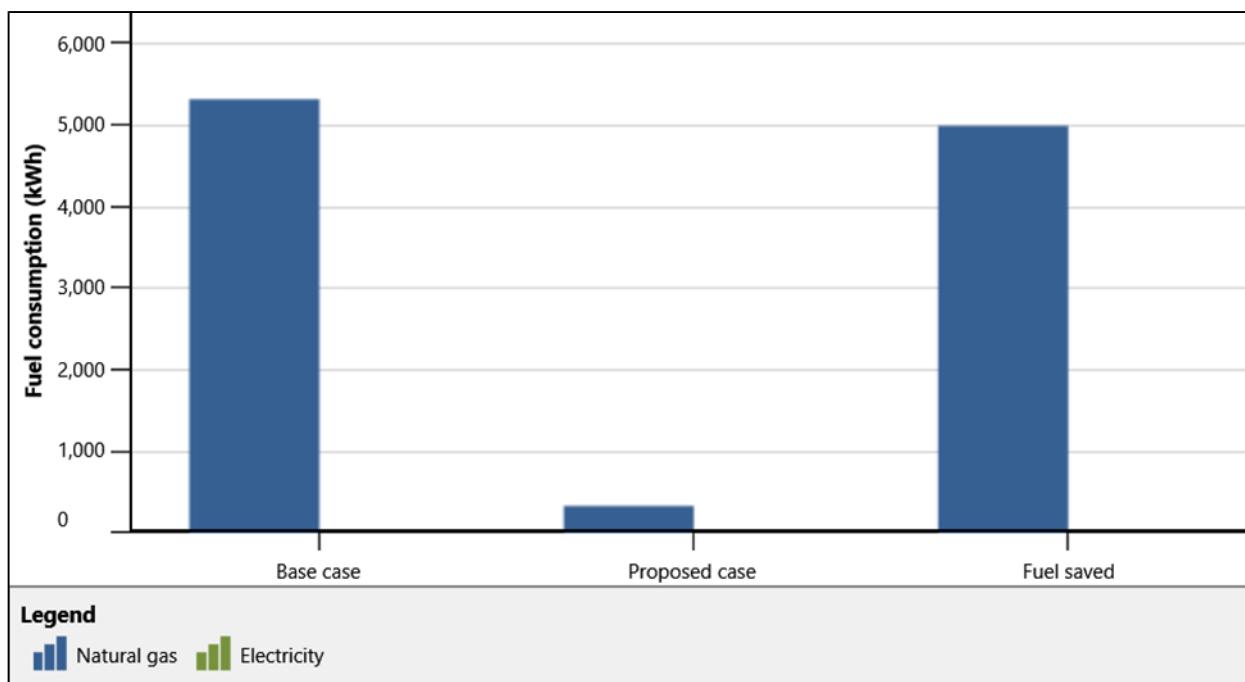
Energy savings | Fuel summary

Energy savings



Fuel consumption	Heating kWh	Cooling kWh	Electricity kWh	Total kWh
Base case	5,324	0	0	5,324
Proposed case	326	0	0	326
Fuel saved	4,998	0	0	4,998
Fuel saved - percent	93.9%	0%	0%	93.9%

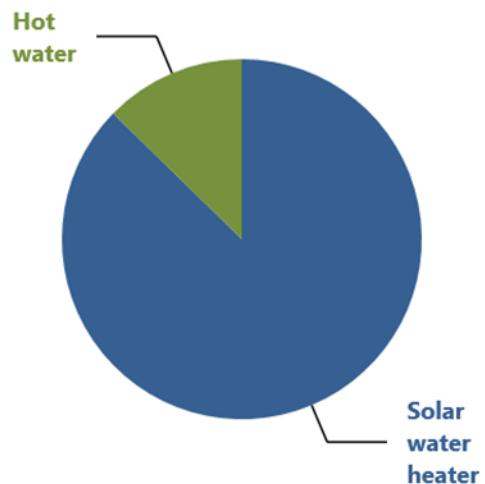
Fuel summary



Fuel type	Fuel	Base case	Proposed case	Savings
	Unit	Fuel consumption	Fuel consumption	Fuel saved
Natural gas	m³	501	30.7	470
Electricity	kWh	0	0	0
Fuel type	Fuel	Base case	Proposed case	Savings
	Fuel rate	Fuel cost	Fuel cost	Savings
Natural gas	0.30 AUD/m³	AUD 150	AUD 9.21	AUD 141
Electricity	0.10 AUD/kWh	AUD 0	AUD 0	AUD 0
Total		AUD 150	AUD 9.21	AUD 141

End-use

Fuel saved



Fuel saved

Section	kWh	%
Solar water heater	4,364	87.3%
Hot water	634	12.7%

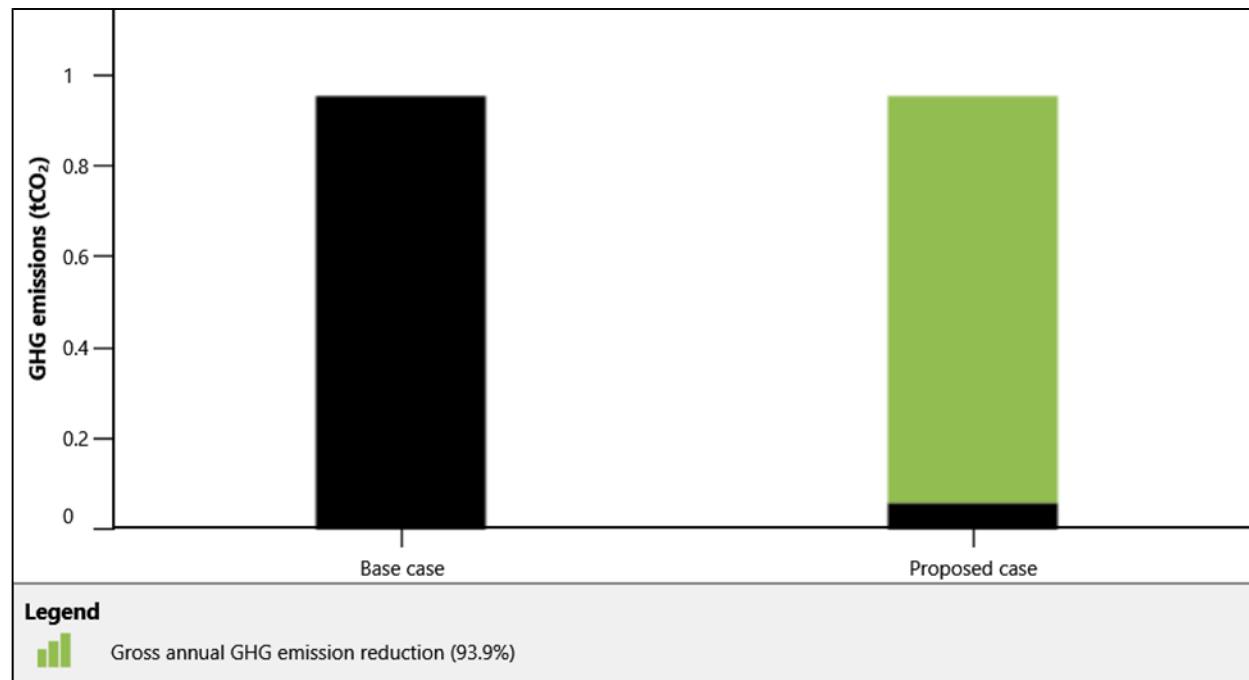
Target

Summary

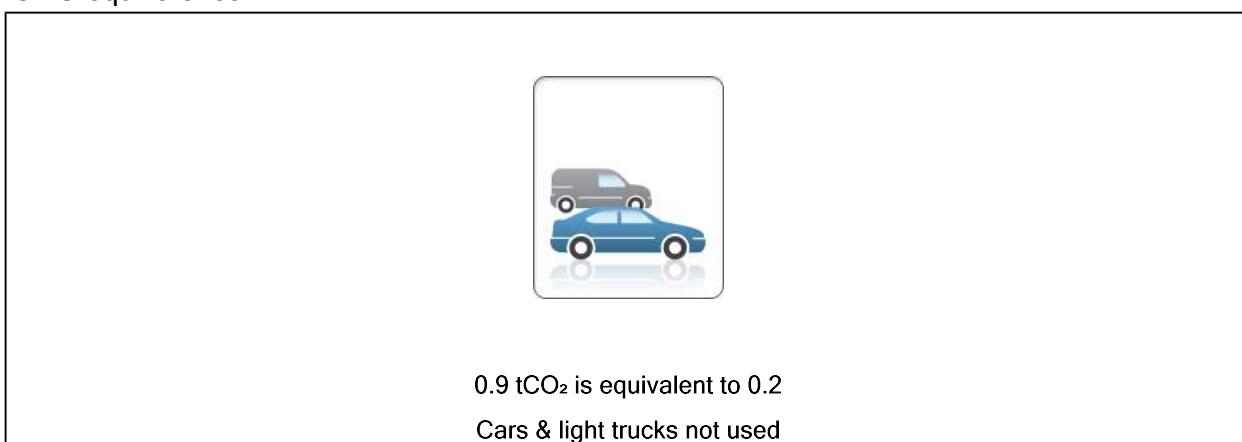
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Base case	5,324	150	0.96
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GHG emissions

GHG emissions



GHG equivalence



GHG emissions

Base case	1	tCO ₂
Proposed case	0.1	tCO ₂
Gross annual GHG emission reduction	0.9	tCO ₂

Financial viability

Financial parameters

General		
Fuel cost escalation rate	%	2%
Inflation rate	%	2%
Discount rate	%	9%
Reinvestment rate	%	9%
Project life	yr	20
Finance		
Debt ratio	%	70%
Debt	AUD	3,967
Equity	AUD	1,700
Debt interest rate	%	7%
Debt term	yr	15
Debt payments	AUD/yr	436

Costs | Savings | Revenue

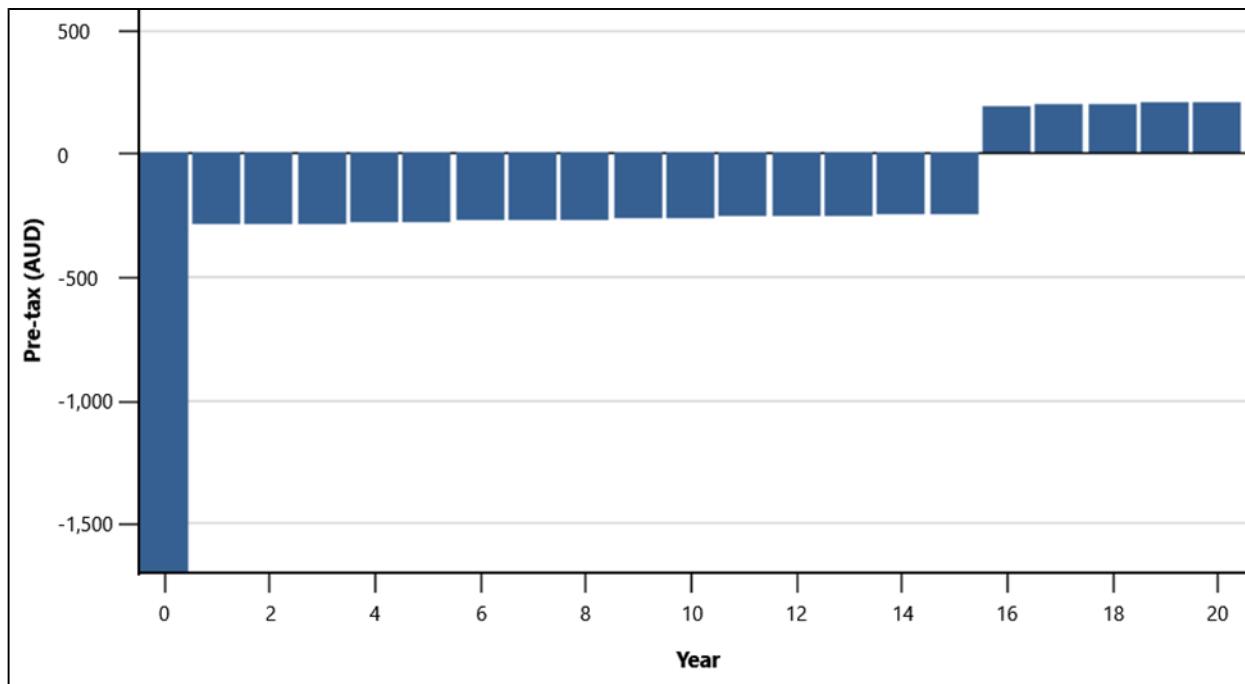
Initial costs			
Incremental initial costs	100%	AUD	5,668
Total initial costs	100%	AUD	5,668
Yearly cash flows - Year 1			
Annual costs and debt payments			
O&M costs (savings)		AUD	0
Fuel cost - proposed case		AUD	9
Debt payments - 15 yrs		AUD	436
Total annual costs		AUD	445
Annual savings and revenue			
Fuel cost - base case		AUD	150
GHG reduction savings		AUD	0
Total annual savings and revenue		AUD	150
Net yearly cash flow - Year 1		AUD	-294

Financial viability

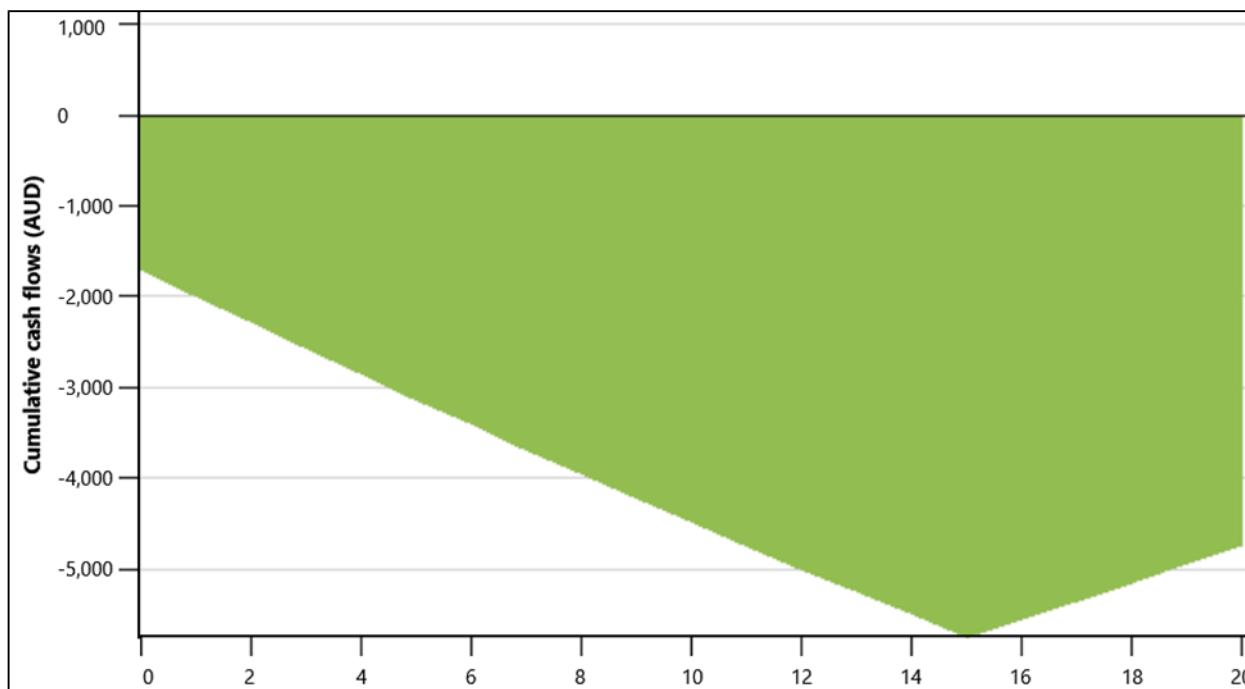
Pre-tax IRR - equity	%	-15.2%
Pre-tax MIRR - equity	%	-5.7%
Pre-tax IRR - assets	%	Negative
Pre-tax MIRR - assets	%	-9%
Simple payback	yr	40.2
Equity payback	yr	> project
Net Present Value (NPV)	AUD	-3,701
Annual life cycle savings	AUD/yr	-405
Benefit-Cost (B-C) ratio		-1.2
Debt service coverage		0.33
GHG reduction cost	AUD/tCO ₂	508

Cash flow

Annual



Cumulative

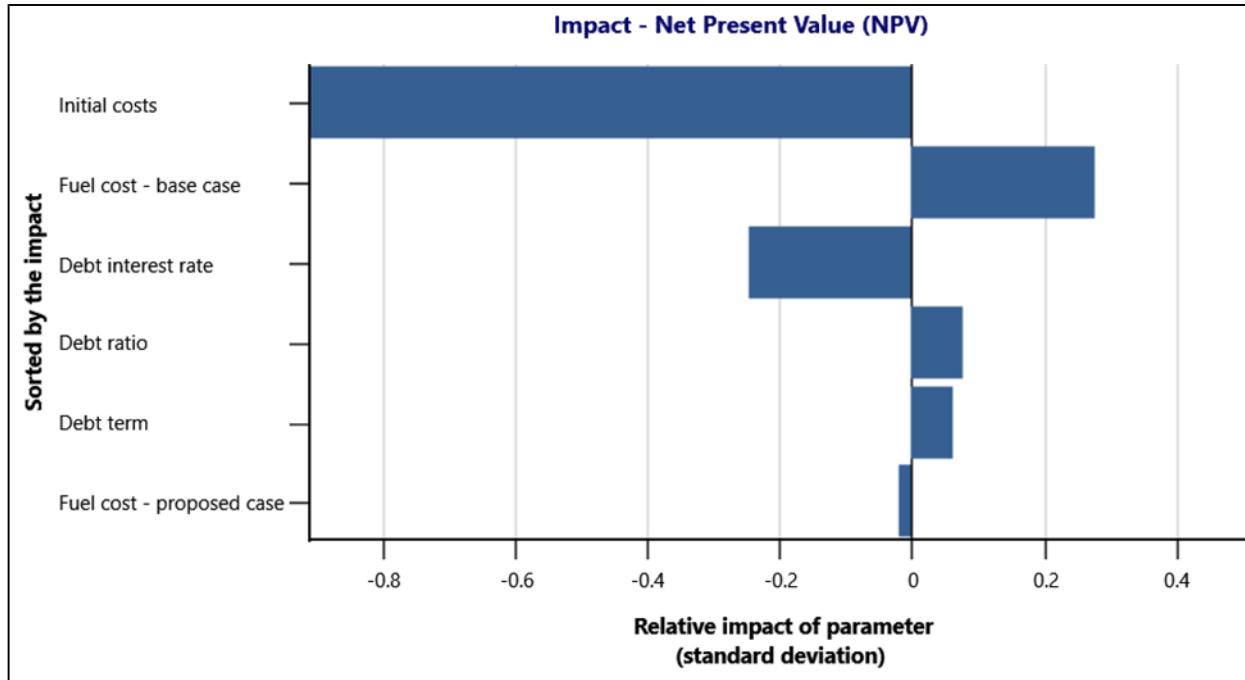


Yearly cash flows

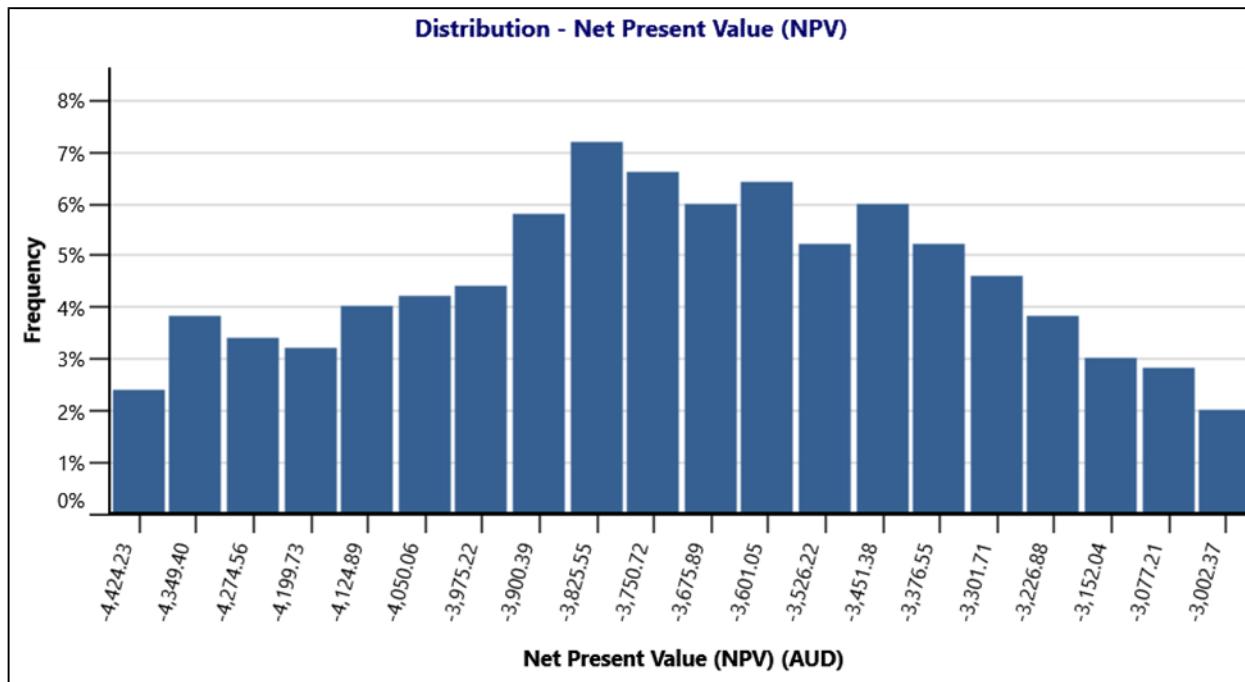
Year #	Pre-tax AUD	Cumulative AUD
0	-1,700	-1,700
1	-292	-1,992
2	-289	-2,281
3	-286	-2,567
4	-283	-2,849
5	-280	-3,129
6	-277	-3,406
7	-274	-3,679
8	-270	-3,950
9	-267	-4,217
10	-264	-4,480
11	-260	-4,740
12	-257	-4,997
13	-253	-5,250
14	-249	-5,500
15	-246	-5,745
16	194	-5,552
17	198	-5,354
18	202	-5,153
19	206	-4,947
20	210	-4,737

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	5,668	25%	4,251	7,084
Fuel cost - proposed case	AUD	9	25%	7	12
Fuel cost - base case	AUD	150	25%	113	188
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	-3,716
Level of risk				%	10%
Minimum within level of confidence				AUD	-4,462
Maximum within level of confidence				AUD	-2,965

Analysis type

Feasibility

