



System Simulation Report



File: Fapote Mini Grid Site.homer

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Location: 54CM+Q7 Fapote, Nigeria (8°10.3'N, 4°8.0'E)

Total Net Present Cost: \$937,388.00

Levelized Cost of Energy (\$/kWh): \$0.156

Notes:

Sensitivity variable values for this simulation

Variable	Value	Unit
Renewable Fraction	0	%



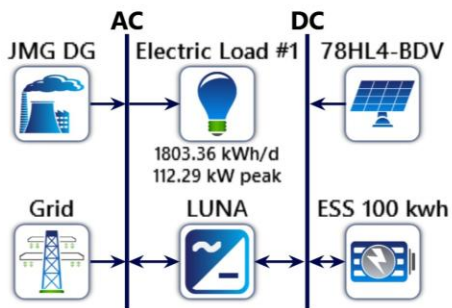
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System Architecture

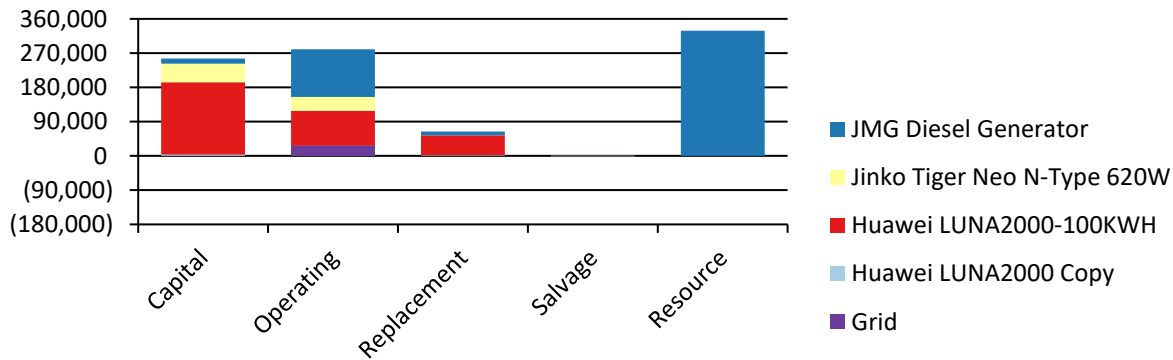
Component	Name	Size	Unit
Generator	JMG Diesel Generator	130	kW
PV	Jinko Tiger Neo N-Type 620W	450	kW
Storage	Huawei LUNA2000-100KWH	10	strings
System converter	Huawei LUNA2000 Copy	150	kW
Grid	Grid	112	kW
Dispatch strategy	HOMER Load Following		

Schematic





Cost Summary



Net Present Costs

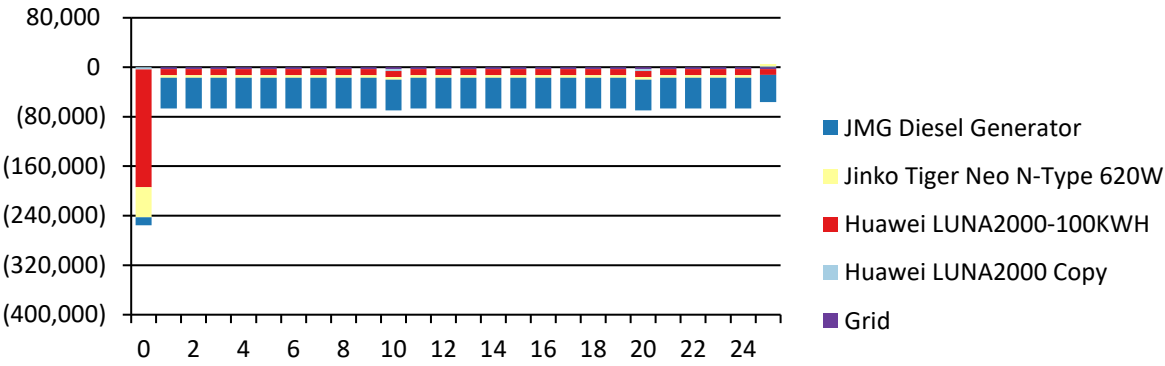
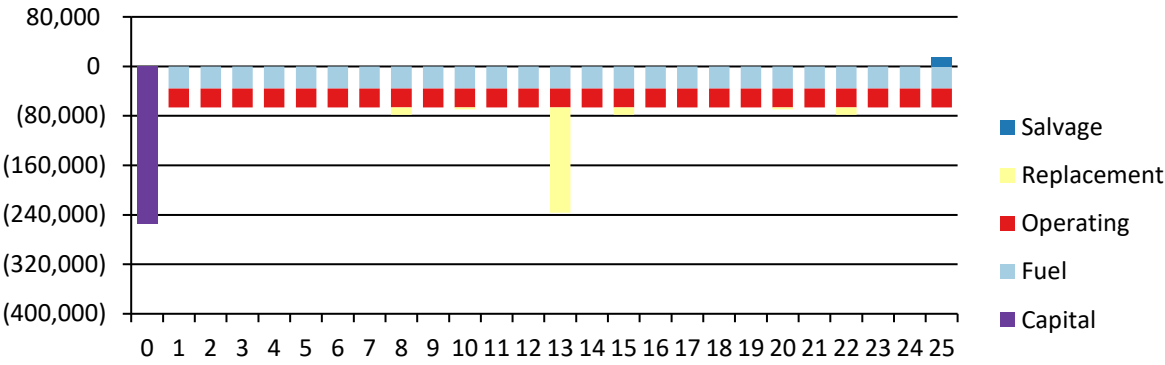
Name	Capital	Operating	Replacement	Salvage	Resource	Total
Grid	\$0.00	\$27,168	\$0.00	\$0.00	\$0.00	\$27,168
Huawei LUNA2000 Copy	\$3,714	\$195.96	\$1,659	-\$144.85	\$0.00	\$5,424
Huawei LUNA2000-100KWH	\$190,000	\$91,442	\$52,080	-\$67.74	\$0.00	\$333,454
Jinko Tiger Neo N-Type 620W	\$48,626	\$36,119	\$0.00	-\$707.43	\$0.00	\$84,038
JMG Diesel Generator	\$13,000	\$125,174	\$10,574	-\$540.76	\$328,986	\$477,193
System	\$255,340	\$280,100	\$64,313	-\$1,461	\$328,986	\$927,278

Annualized Costs

Name	Capital	Operating	Replacement	Salvage	Resource	Total
Grid	\$0.00	\$2,971	\$0.00	\$0.00	\$0.00	\$2,971
Huawei LUNA2000 Copy	\$406.19	\$21.43	\$181.43	-\$15.84	\$0.00	\$593.22
Huawei LUNA2000-100KWH	\$20,778	\$10,000	\$5,695	-\$7.41	\$0.00	\$36,466
Jinko Tiger Neo N-Type 620W	\$5,318	\$3,950	\$0.00	-\$77.36	\$0.00	\$9,190
JMG Diesel Generator	\$1,422	\$13,689	\$1,156	-\$59.14	\$35,978	\$52,186
System	\$27,924	\$30,632	\$7,033	-\$159.75	\$35,978	\$101,407



Cash Flow





Electrical Summary

Excess and Unmet

Quantity	Value	Units
Excess Electricity	72,282	kWh/yr
Unmet Electric Load	0	kWh/yr
Capacity Shortage	0	kWh/yr

Production Summary

Component	Production (kWh/yr)	Percent
Jinko Tiger Neo N-Type 620W	633,904	82.9
JMG Diesel Generator	101,063	13.2
Grid Purchases	29,711	3.89
Total	764,678	100

Consumption Summary

Component	Consumption (kWh/yr)	Percent
AC Primary Load	658,225	100
DC Primary Load	0	0
Deferrable Load	0	0
Total	658,225	100



Generator: JMG Diesel Generator (Diesel)

JMG Diesel Generator Electrical Summary

Quantity	Value	Units
Electrical Production	101,063	kWh/yr
Mean Electrical Output	48.0	kW
Minimum Electrical Output	32.5	kW
Maximum Electrical Output	111	kW

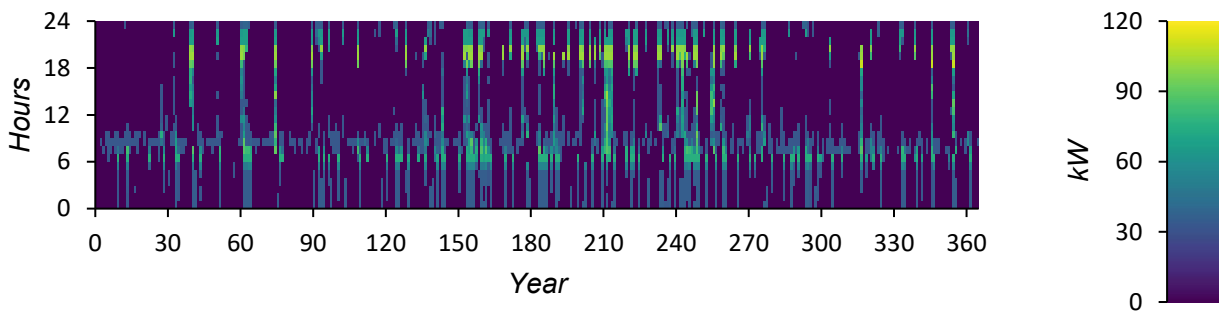
JMG Diesel Generator Fuel Summary

Quantity	Value	Units
Fuel Consumption	32,707	L
Specific Fuel Consumption	0.324	L/kWh
Fuel Energy Input	321,837	kWh/yr
Mean Electrical Efficiency	31.4	%

JMG Diesel Generator Statistics

Quantity	Value	Units
Hours of Operation	2,106	hrs/yr
Number of Starts	335	starts/yr
Operational Life	7.12	yr
Capacity Factor	8.87	%
Fixed Generation Cost	11.9	\$/hr
Marginal Generation Cost	0.260	\$/kWh

JMG Diesel Generator Output (kW)





PV: Jinko Tiger Neo N-Type 620W

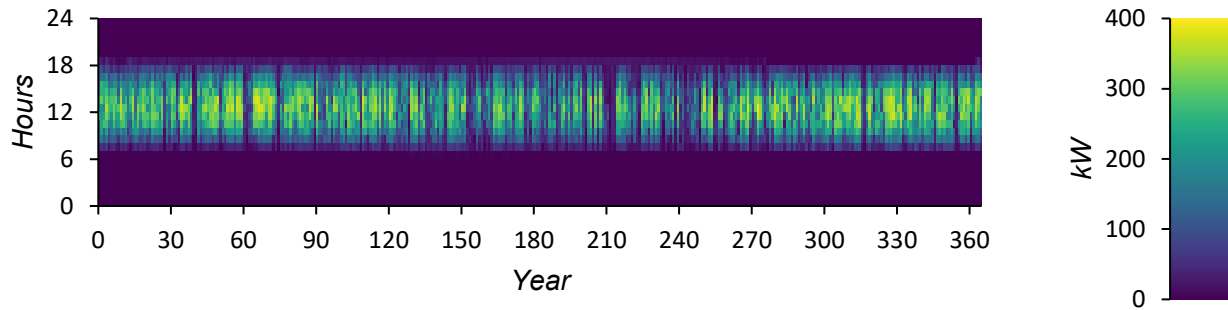
Jinko Tiger Neo N-Type 620W Electrical Summary

Quantity	Value	Units
Minimum Output	0	kW
Maximum Output	394	kW
PV Penetration	96.3	%
Hours of Operation	4,336	hrs/yr
Levelized Cost	0.0162	\$/kWh
Clipped production	0	kWh

Jinko Tiger Neo N-Type 620W Statistics

Quantity	Value	Units
Rated Capacity	450	kW
Mean Output	72.4	kW
Mean Output	1,737	kWh/d
Capacity Factor	16.1	%
Total Production	633,904	kWh/yr

Jinko Tiger Neo N-Type 620W Output (kW)



Storage: Huawei LUNA2000-100KWH

Huawei LUNA2000-100KWH Properties

Quantity	Value	Units
Batteries	10.0	qty.
String Size	1.00	batteries
Strings in Parallel	10.0	strings
Bus Voltage	691	V

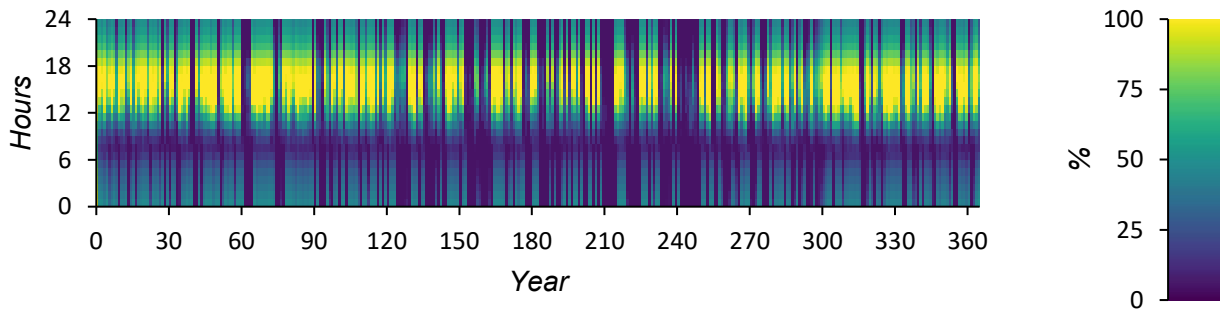
Huawei LUNA2000-100KWH Result Data

Quantity	Value	Units
Average Energy Cost	0	\$/kWh
Energy In	240,571	kWh/yr
Energy Out	237,690	kWh/yr
Storage Depletion	733	kWh/yr
Losses	3,614	kWh/yr
Annual Throughput	239,493	kWh/yr
Annual EFCs	239	1/yr
Average Daily EFCs	0.656	1/day

Huawei LUNA2000-100KWH Statistics

Quantity	Value	Units
Autonomy	12.6	hr
Storage Wear Cost	0.0571	\$/kWh
Nominal Capacity	1,000	kWh
Usable Nominal Capacity	950	kWh
Lifetime Throughput	3,000,000	kWh
Expected Life	12.5	yr

Huawei LUNA2000-100KWH State of Charge (%)





Converter: Huawei LUNA2000 Copy

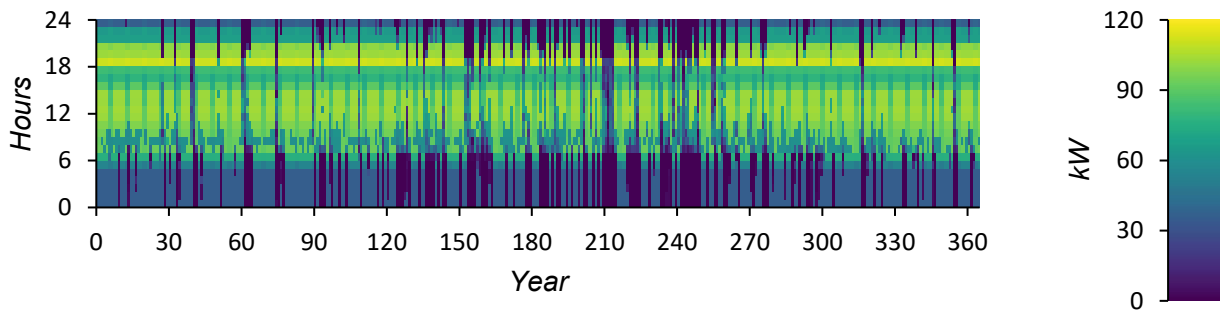
Huawei LUNA2000 Copy Electrical Summary

Quantity	Value	Units
Hours of Operation	7,647	hrs/yr
Energy Out	527,451	kWh/yr
Energy In	558,741	kWh/yr
Losses	31,289	kWh/yr

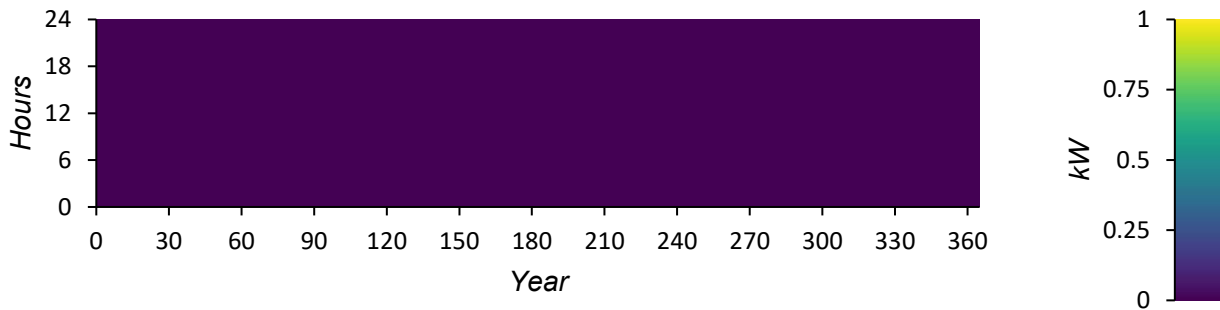
Huawei LUNA2000 Copy Statistics

Quantity	Value	Units
Capacity	150	kW
Mean Output	60.2	kW
Minimum Output	0	kW
Maximum Output	112	kW
Capacity Factor	40.1	%

Huawei LUNA2000 Copy Inverter Output (kW)



Huawei LUNA2000 Copy Rectifier Output (kW)





Grid: Grid

Grid rate: Demand 1

Month	Energy Purchased (kWh)	Energy Sold (kWh)	Net Energy Purchased (kWh)	Peak Demand (kW)	Energy Charge	Demand Charge
January	0	0	0	101	\$0.00	\$0.00
February	0	0	0	100	\$0.00	\$0.00
March	0	0	0	100	\$0.00	\$0.00
April	0	0	0	76.1	\$0.00	\$0.00
May	0	0	0	100	\$0.00	\$0.00
June	0	0	0	100	\$0.00	\$0.00
July	0	0	0	100	\$0.00	\$0.00
August	0	0	0	91.0	\$0.00	\$0.00
September	0	0	0	100	\$0.00	\$0.00
October	0	0	0	100	\$0.00	\$0.00
November	0	0	0	100	\$0.00	\$0.00
December	0	0	0	83.1	\$0.00	\$0.00
Annual	0	0	0	101	\$0.00	\$0.00

Grid rate: Rate 1

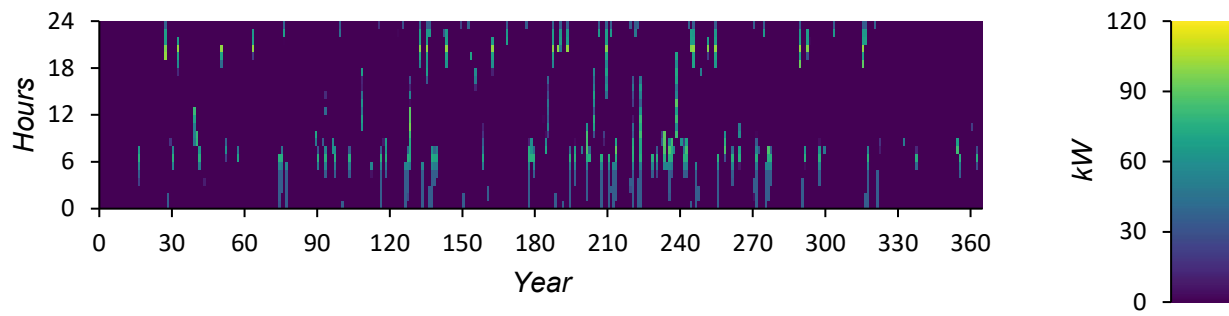
Month	Energy Purchased (kWh)	Energy Sold (kWh)	Net Energy Purchased (kWh)	Peak Demand (kW)	Energy Charge	Demand Charge
January	901	0	901	0	\$90.13	\$0.00
February	1,425	0	1,425	0	\$142.53	\$0.00
March	1,300	0	1,300	0	\$129.98	\$0.00
April	2,219	0	2,219	0	\$221.88	\$0.00
May	3,936	0	3,936	0	\$393.55	\$0.00
June	1,850	0	1,850	0	\$185.03	\$0.00
July	4,873	0	4,873	0	\$487.31	\$0.00
August	5,690	0	5,690	0	\$569.00	\$0.00
September	3,266	0	3,266	0	\$326.57	\$0.00
October	2,333	0	2,333	0	\$233.30	\$0.00
November	1,323	0	1,323	0	\$132.26	\$0.00
December	596	0	596	0	\$59.58	\$0.00
Annual	29,711	0	29,711	0	\$2,971	\$0.00

Grid rate: All

Month	Energy Purchased (kWh)	Energy Sold (kWh)	Net Energy Purchased (kWh)	Peak Demand (kW)	Energy Charge	Demand Charge
January	901	0	901	101	\$90.13	\$0.00
February	1,425	0	1,425	100	\$142.53	\$0.00
March	1,300	0	1,300	100	\$129.98	\$0.00
April	2,219	0	2,219	76.1	\$221.88	\$0.00
May	3,936	0	3,936	100	\$393.55	\$0.00
June	1,850	0	1,850	100	\$185.03	\$0.00
July	4,873	0	4,873	100	\$487.31	\$0.00
August	5,690	0	5,690	91.0	\$569.00	\$0.00
September	3,266	0	3,266	100	\$326.57	\$0.00
October	2,333	0	2,333	100	\$233.30	\$0.00
November	1,323	0	1,323	100	\$132.26	\$0.00
December	596	0	596	83.1	\$59.58	\$0.00
Annual	29,711	0	29,711	101	\$2,971	\$0.00



Energy Purchased From Grid (kW)



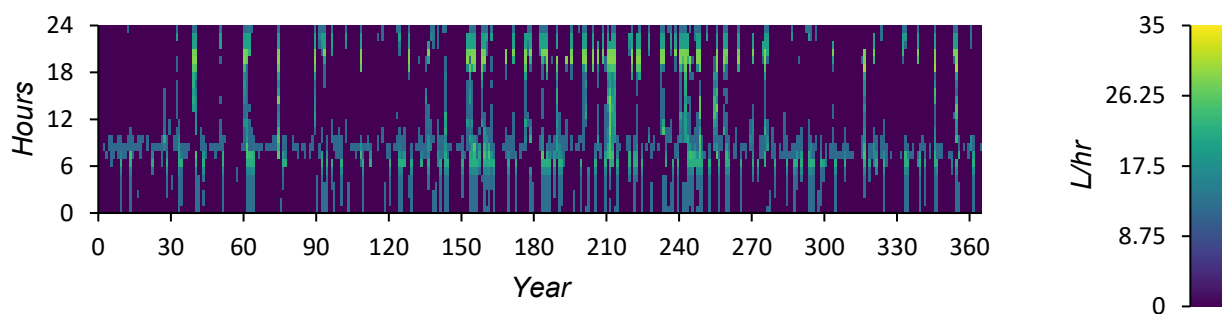
Energy Sold To Grid (kW)

Fuel Summary

Diesel Consumption Statistics

Quantity	Value	Units
Total fuel consumed	32,707	L
Avg fuel per day	89.6	L/day
Avg fuel per hour	3.73	L/hour

Diesel Consumption (L/hr)



Emissions

Pollutant	Quantity	Unit
Carbon Dioxide	104,392	kg/yr
Carbon Monoxide	540	kg/yr
Unburned Hydrocarbons	23.5	kg/yr
Particulate Matter	3.27	kg/yr
Sulfur Dioxide	291	kg/yr
Nitrogen Oxides	547	kg/yr

Compare Economics

IRR (%): **67.1**

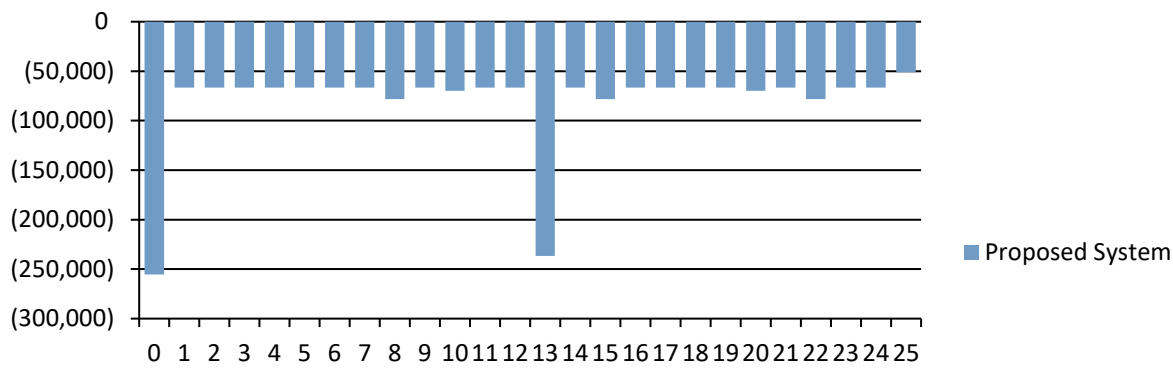
Discounted payback (yr): **1.73**

Simple payback (yr): **1.51**

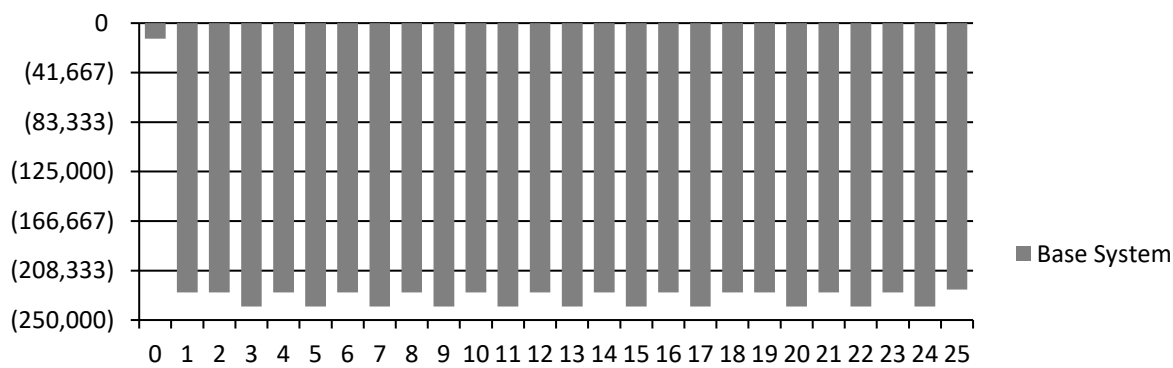
	Base System	Proposed System
Net Present Cost	\$2.13M	\$937,388
CAPEX	\$13,000	\$255,277
OPEX	\$231,955	\$74,595
LCOE (per kWh)	\$0.355	\$0.156
CO2 Emitted (kg/yr)	486,412	104,392
Fuel Consumption (L/yr)	151,586	32,707



Proposed Annual Nominal Cash Flows



Base System Annual Nominal Cash Flows



Cumulative Discounted Cash Flows

