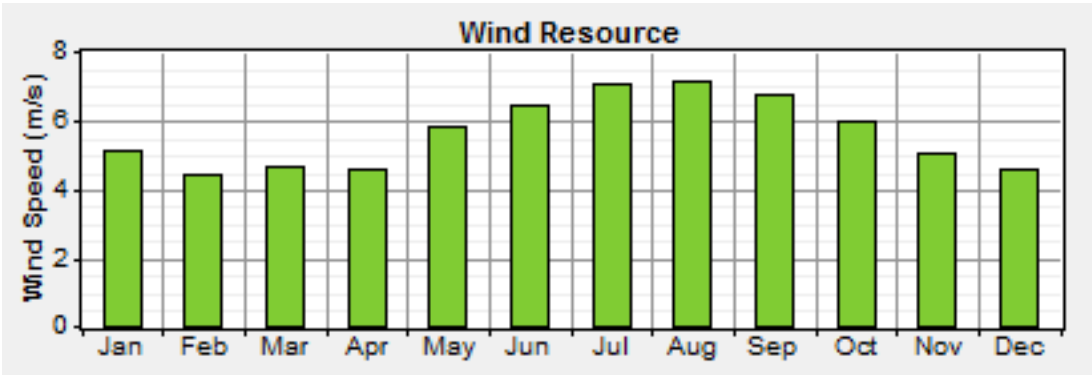
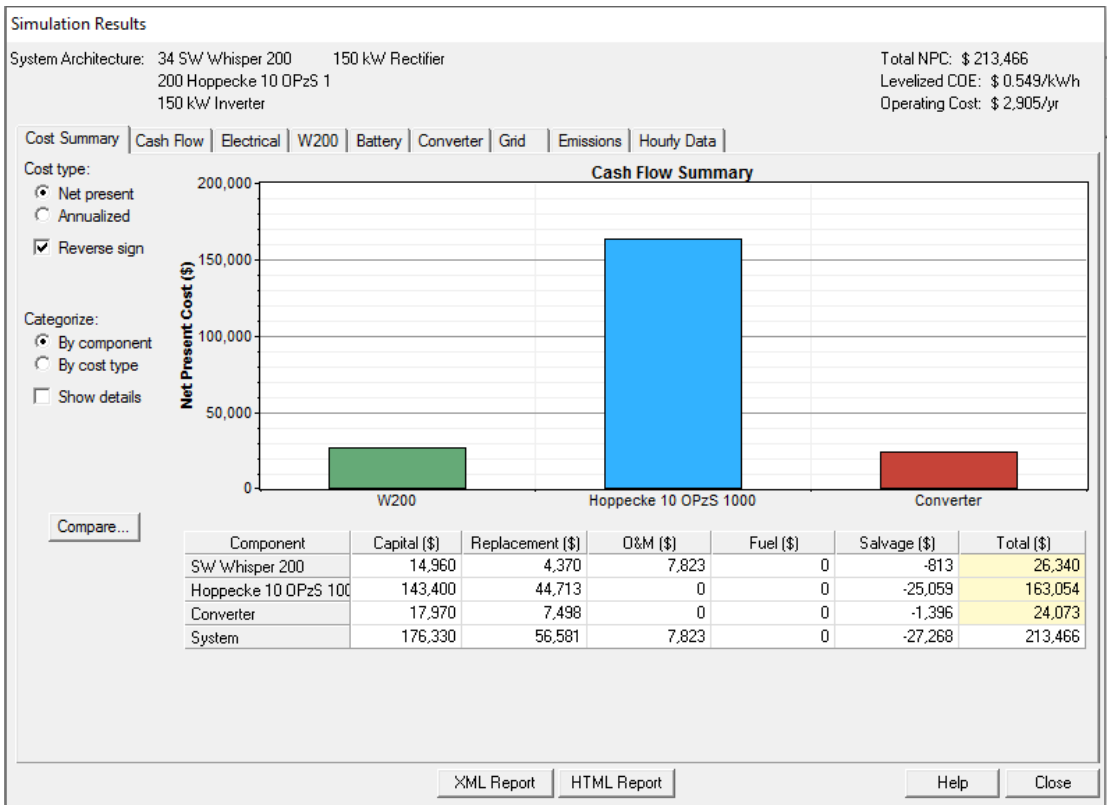
LAMPIRAN





Component	Capital ($)	Replacement ($)	O&M ($)	Fuel ($)	Salvage ($)	Total ($)
SW Whisper 200	14,960	4,370	7,823	0	-813	26,340
Hoppecke 10 OPzS 100	143,400	44,713	0	0	-25,059	163,054
Converter	17,970	7,498	0	0	-1,396	24,073
System	176,330	56,581	7,823	0	-27,268	213,466

Quantity	Value	Units
Total rated capacity	34.0	kW
Mean output	9.5	kW
Capacity factor	28.0	%
Total production	83,467	kWh/yr

Quantity	Value	Units
Minimum output	0.0	kW
Maximum output	34.1	kW
Wind penetration	274	%
Hours of operation	6,887	hr/yr
Levelized cost	0.0247	$/kWh

Quantity	Value
String size	1
Strings in parallel	200
Batteries	200
Bus voltage (V)	2

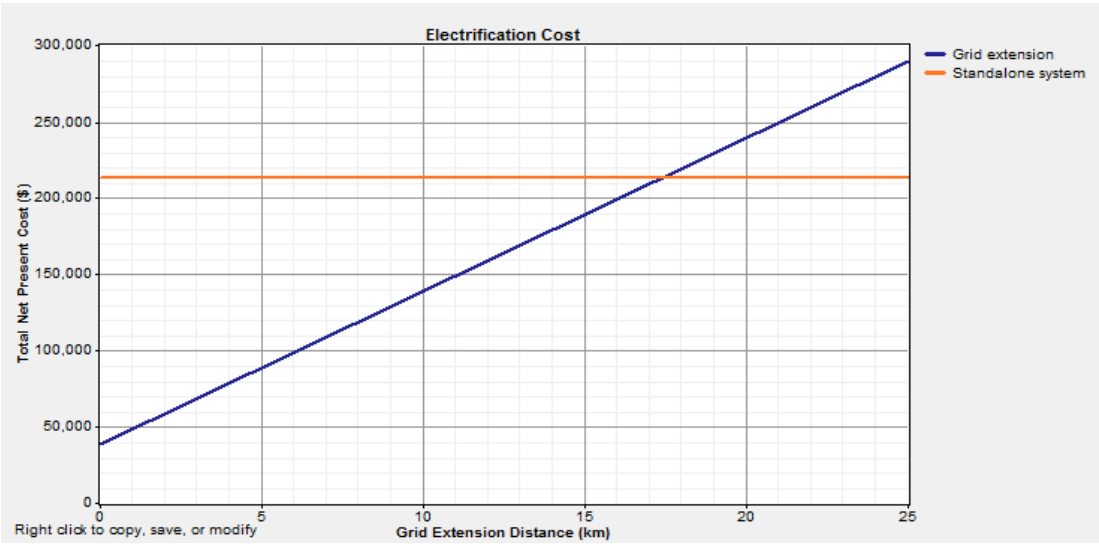
Quantity	Value	Units
Nominal capacity	400	kWh
Usable nominal capacity	280	kWh
Autonomy	80.6	hr
Lifetime throughput	687,600	kWh
Battery wear cost	0.225	$/kWh
Average energy cost	0.000	$/kWh

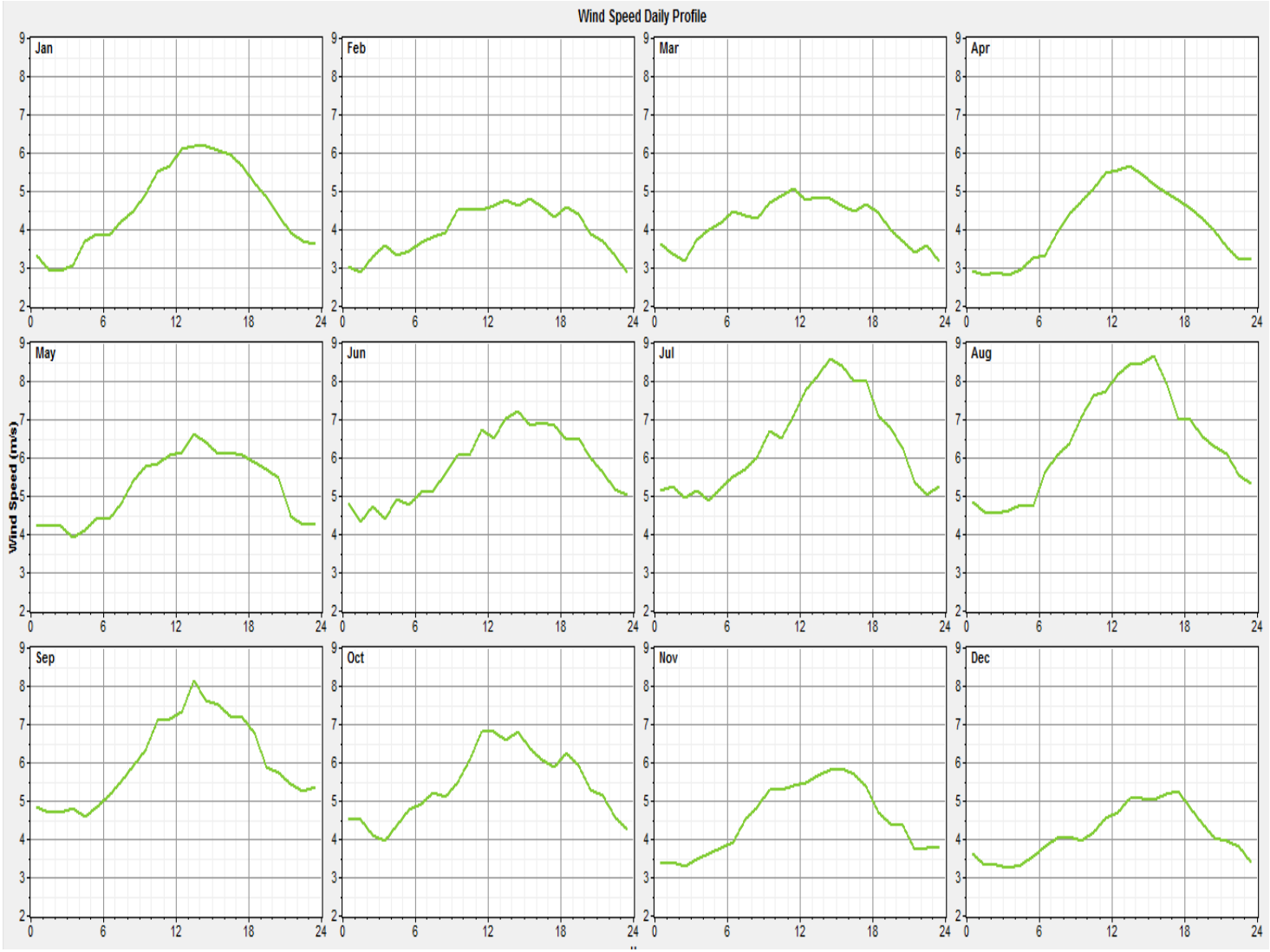
Quantity	Value	Units
Energy in	14,537	kWh/yr
Energy out	12,592	kWh/yr
Storage depletion	82	kWh/yr
Losses	1,862	kWh/yr
Annual throughput	13,579	kWh/yr
Expected life	20.0	yr

Quantity	Inverter	Rectifier	Units
Capacity	150	150	kW
Mean output	3	0	kW
Minimum output	0	0	kW
Maximum output	15	0	kW
Capacity factor	2.3	0.0	%

Quantity	Inverter	Rectifier	Units
Hours of operation	8,754	0	hrs/yr
Energy in	33,799	0	kWh/yr
Energy out	30,419	0	kWh/yr
Losses	3,380	0	kWh/yr

Pollutant	Emissions (kg/yr)
Carbon dioxide	0
Carbon monoxide	0
Unburned hydrocarbons	0
Particulate matter	0
Sulfur dioxide	0
Nitrogen oxides	0


Electrification Cost
Grid extension
Standalone system
Total Net Present Cost ($)
300,000
250,000
200,000
150,000
100,000
50,000
0
0
5
10
15
20
25
Grid Extension Distance (km)
Right click to copy, save, or modify


Wind Speed Daily Profile
Wind Speed (m/s)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

I. System Report - Project2.hmr

Sensitivity case

SW Whisper 200 Capital Cost Multiplier: 1

Vision 6FM200D Capital Cost Multiplier: 1

Converter Capital Cost Multiplier: 1

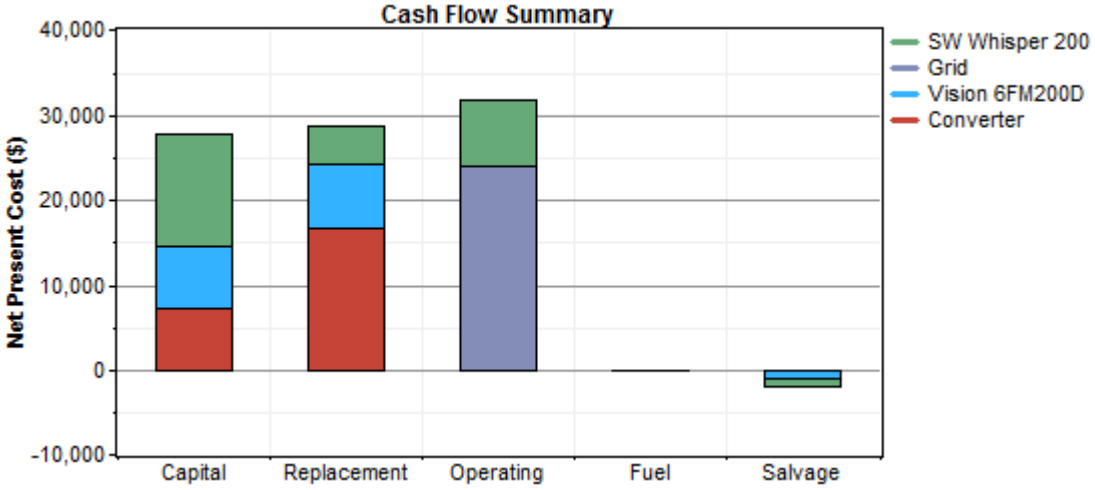
Relative Rectifier Capacity: 90 %

System architecture

Wind turbine	30 SW Whisper 200
Grid	16 kW
Battery	20 Vision 6FM200D
Inverter	50 kW
Rectifier	45 kW

Cost summary

Total net present cost	$ 86,051
Levelized cost of energy	$ 0.197/kWh
Operating cost	$ 4,055/yr

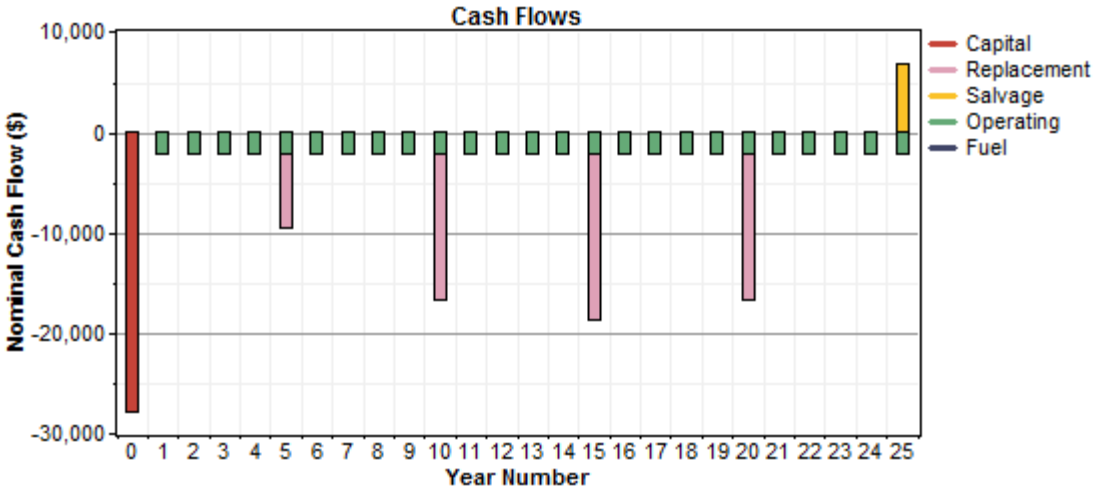


Net Present Costs

Component	Capital	Replacement	O&M	Fuel	Salvage	Total
	($)	($)	($)	($)	($)	($)
SW Whisper 200	13,200	4,574	7,766	0	-954	24,585
Grid	0	0	23,964	0	0	23,964
Vision 6FM200D	7,312	7,439	0	0	-1,132	13,619
Converter	7,230	16,653	0	0	0	23,883
System	27,742	28,665	31,730	0	-2,086	86,051

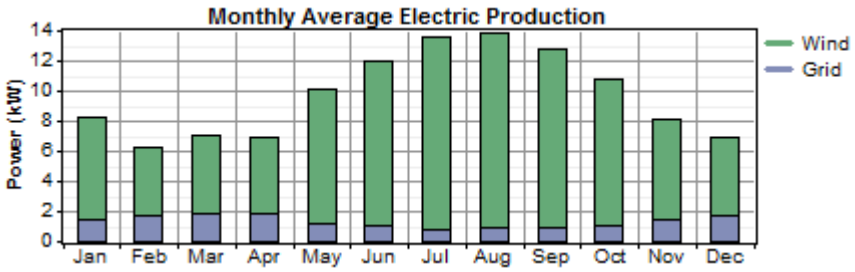
Annualized Costs

Component	Capital	Replacement	O&M	Fuel	Salvage	Total
	($/yr)	($/yr)	($/yr)	($/yr)	($/yr)	($/yr)
SW Whisper 200	918	318	540	0	-66	1,710
Grid	0	0	1,666	0	0	1,666
Vision 6FM200D	508	517	0	0	-79	947
Converter	503	1,158	0	0	0	1,661
System	1,929	1,993	2,206	0	-145	5,984



Electrical

Component	Production (kWh/yr)	Fraction
Wind turbines	73,647	86%
Grid purchases	11,818	14%
Total	85,466	100%



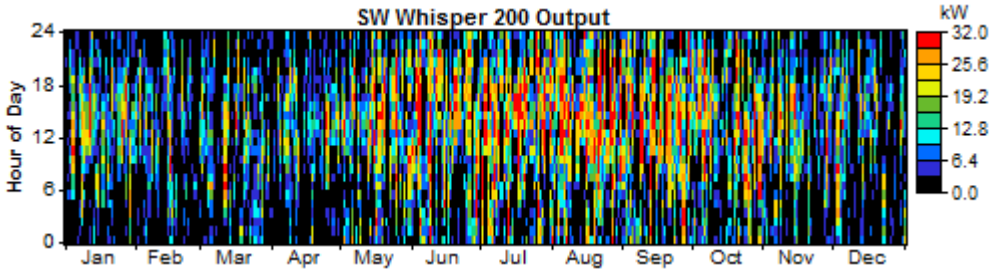
Load	Consumption (kWh/yr)	Fraction
AC primary load	30,441	100%
Total	30,441	100%

Quantity	Value	Units
Excess electricity	52,955	kWh/yr
Unmet load	0.00	kWh/yr
Capacity shortage	0.00	kWh/yr
Renewable fraction	0.862	

DC Wind Turbine: SW Whisper 200

Variable	Value	Units
Total rated capacity	30.0	kW
Mean output	8.41	kW
Capacity factor	28.0	%
Total production	73,647	kWh/yr

Variable	Value	Units
Minimum output	0.00	kW
Maximum output	30.0	kW
Wind penetration	242	%
Hours of operation	6,887	hr/yr
Levelized cost	0.0232	$/kWh



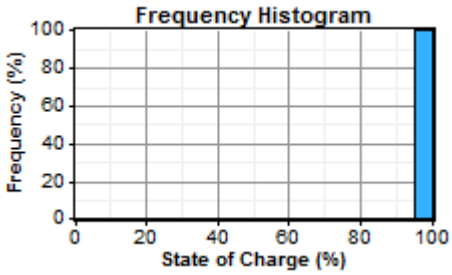
Battery

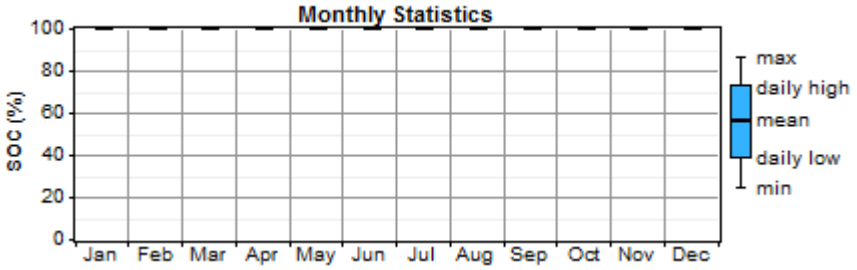
Quantity	Value
String size	1
Strings in parallel	20
Batteries	20
Bus voltage (V)	12

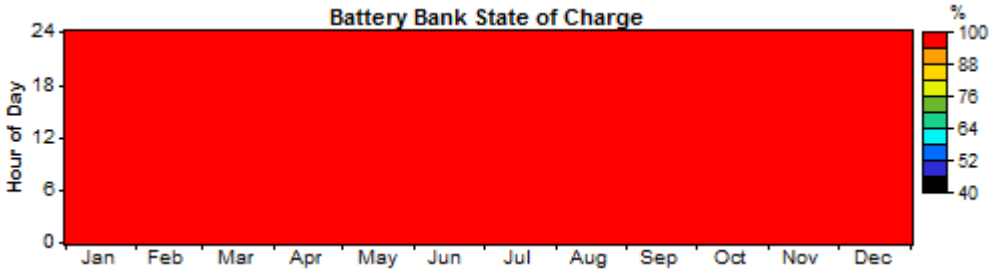
Quantity	Value	Units
Nominal capacity	48.0	kWh
Usable nominal capacity	28.8	kWh
Autonomy	8.29	hr
Lifetime throughput	18,340	kWh
Battery wear cost	0.446	$/kWh
Average energy cost	0.000	$/kWh

Quantity	Value	Units
Energy in	0.00	kWh/yr

Energy out	0.00	kWh/yr
Storage depletion	0.00	kWh/yr
Losses	0.00	kWh/yr
Annual throughput	0	kWh/yr
Expected life	10.0	yr





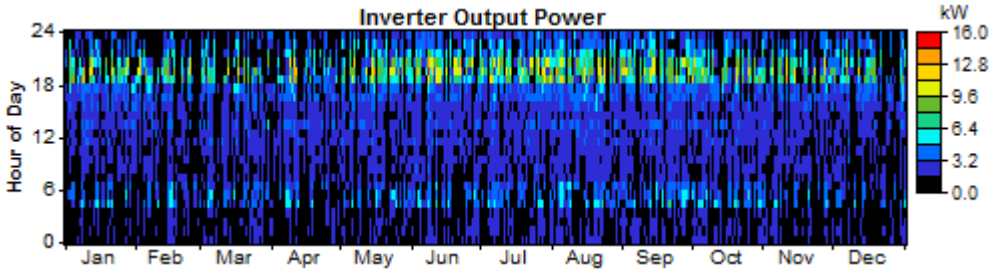


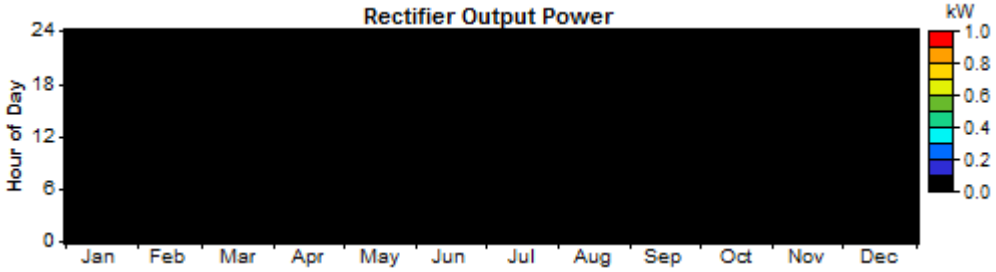
Converter

Quantity	Inverter	Rectifier	Units
Capacity	50.0	45.0	kW
Mean output	2.1	0.0	kW
Minimum output	0.0	0.0	kW
Maximum output	15.4	0.0	kW

Capacity factor	4.3	0.0	%

Quantity	Inverter	Rectifier	Units
Hours of operation	6,887	0	hrs/yr
Energy in	20,692	0	kWh/yr
Energy out	18,623	0	kWh/yr
Losses	2,069	0	kWh/yr





Grid

Rate: Rate 1

Month	Energy Purchased	Energy Sold	Net Purchases	Peak Demand	Energy Charge	Demand Charge
	(kWh)	(kWh)	(kWh)	(kW)	($)	($)
Jan	1,108	0	1,108	14	156	0
Feb	1,148	0	1,148	11	162	0
Mar	1,352	0	1,352	12	191	0
Apr	1,323	0	1,323	13	187	0
May	887	0	887	12	125	0
Jun	732	0	732	10	103	0

Jul	641	0	641	13	90	0
Aug	710	0	710	12	100	0
Sep	712	0	712	13	100	0
Oct	830	0	830	12	117	0
Nov	1,101	0	1,101	13	155	0
Dec	1,274	0	1,274	12	180	0
Annual	11,818	0	11,818	14	1,666	0

Emissions

Pollutant	Emissions (kg/yr)
Carbon dioxide	10,093
Carbon monoxide	0
Unburned hydocarbons	0
Particulate matter	0
Sulfur dioxide	0
Nitrogen oxides	0