



AUSTRALIAN WIND AND SOLAR

Your best solution for all your power needs



Australian Wind and Solar System Design

Address: Horn Island QLD

Date: 23rd Aug 2021



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1. Design Brief

This document is the product of results from several micro grid design simulations with the intent of identifying the most economically viable on-grid connect energy system given the energy demand data from the customer, for the motel. Price point of possible components, labour and the renewable energy resources at the given location was also included in this design. NASA satellite data is used in conjunction with BOM data to provide accurate readings of daily solar irradiation and daily average winds speeds. The property location is 2 Wees Street, Horn Island QLD 4868



Figure 1: 2 Wees Street, Horn Island QLD 4868

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2. Power Usage

2.1 Electric Load

Meter Interval data from your current electricity retailer from last 12 months in the smallest step possible (60minute interval) was reformulated and then imported into our software to calculate the year around electric load.

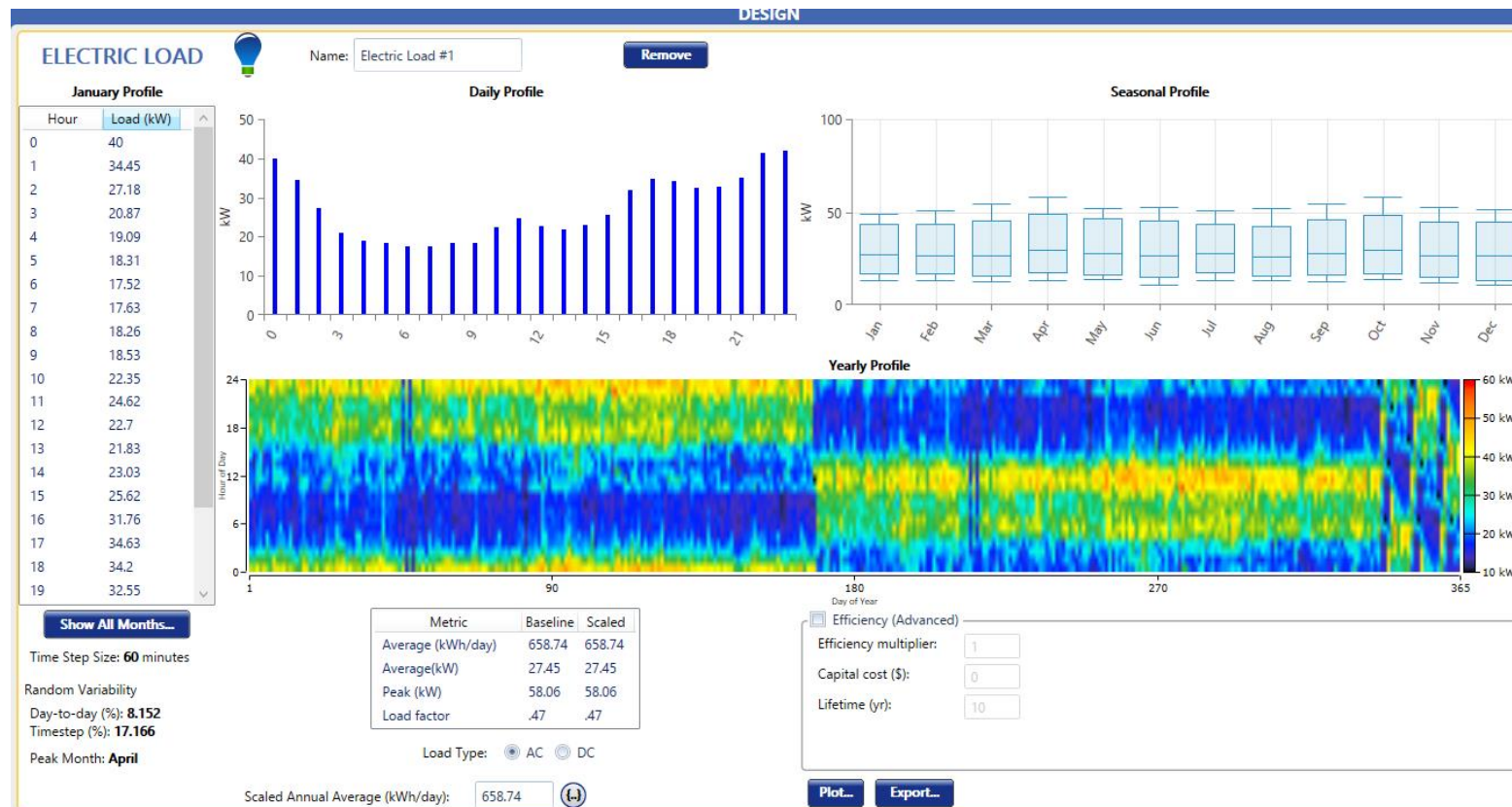


Figure 2: Daily, Seasonal and Yearly profile of House Load.



2.2 Load for each month

The graph below shows load for each month separately.

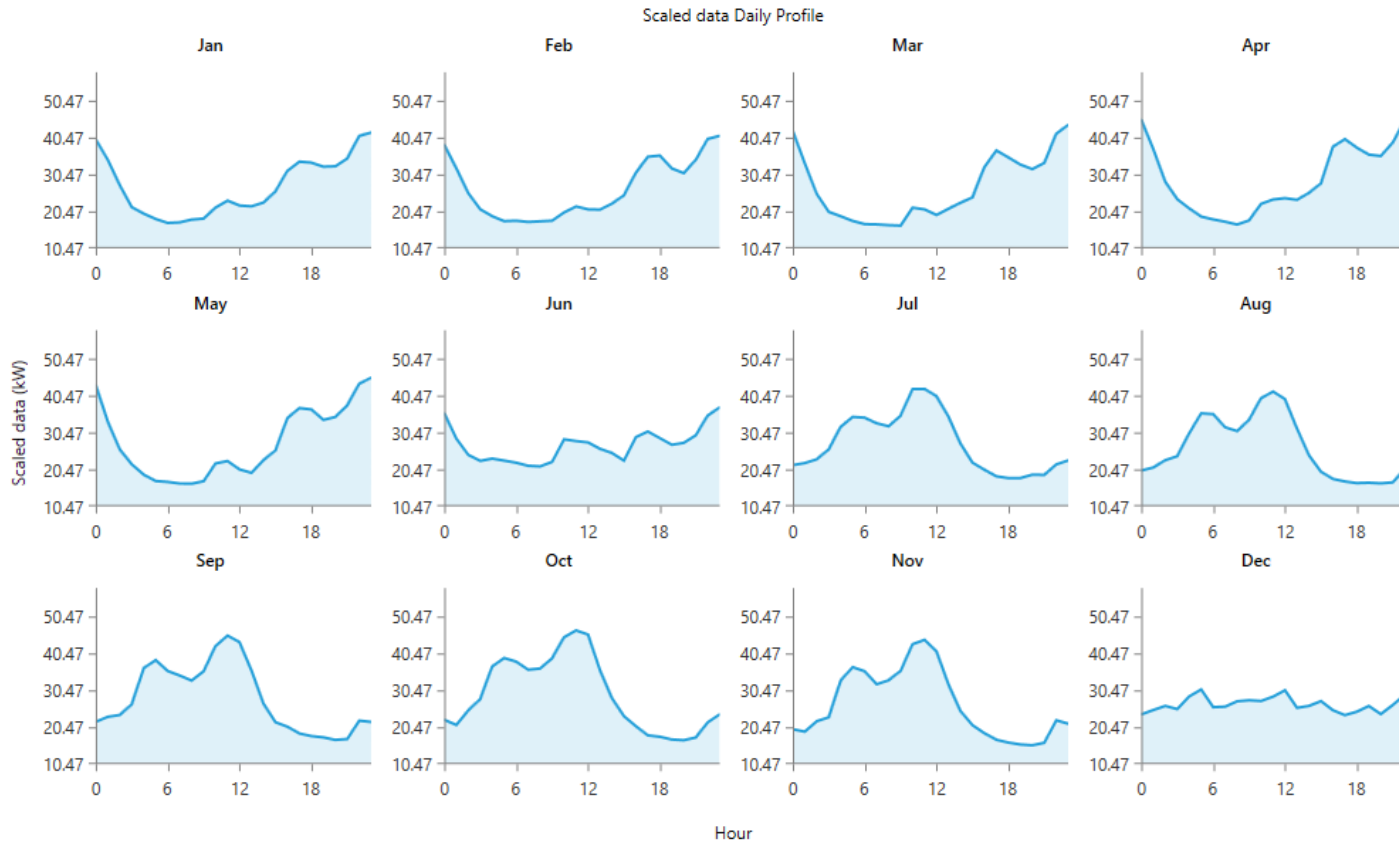


Figure 3: Load Data for Each Month



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2.3 Grid Schedule Rates:

We have considered your grid schedule rates (All Consumptions, Service Fee, Monthly Demand Charge for Tarriff 44) from your electricity provider – Ergon Energy. An export limit of 30kW is considered in the design calculations.

Electricity Charges

Tariff 44 Business Over 100MWh per Annum (Demand Small) (09/12/20 - 08/01/21)									
90704854	108354	109471							
90704854	772548	781103							
90704854	878790	889194	All Consumption	20076	11.668		\$234.25	\$2576.72	
90704854	5278	5334	Monthly Demand Charge for Tariff 44 - \$26.625117 \$/kW			26.000	\$69.23	\$761.48	
			Service Fee	31	4021.494		\$124.67	\$1371.33	
TOTAL								\$428.15	\$4709.53

Figure 4: Grid Schedule Rates



3. Solar and Wind Resource data

3.1 Solar Resource

Data over a 22-year period obtained from the NASA Surface meteorology and Solar Energy database has been used to identify the solar resource for your site.



Figure 5: Solar GHI resource

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4. Design Schematic

The following design schematic represents the on-grid design. The **Grid** represents the power distribution company (Ergon Energy) and the **AC** line is the main Bus bar. The **Electric Load** represents the overall motel load (detailed information about the load is provided in Section-2 of this report). **89kW Solar** is the proposed solar system installation on the motel.

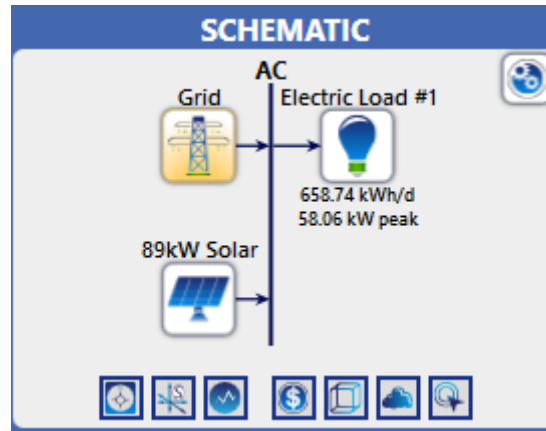


Figure 7: System Design Schematic



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4.2 Electrical Production

The following table shows the overall electrical production. Out of the total consumed energy, 52.3% will be delivered by solar and 47.7% is purchased from grid. There will be a total of 18.7% grid sales.

Production	kWh/yr	%
89kW Solar	160,491	52.3
Grid Purchases	146,282	47.7
Total	306,773	100

Consumption	kWh/yr	%
AC Primary Load	240,440	81.3
DC Primary Load	0	0
Deferrable Load	0	0
Grid Sales	55,396	18.7
Total	295,837	100

Quantity	kWh/yr	%
Excess Electricity	10,937	3.57
Unmet Electric Load	0	0
Capacity Shortage	0	0

Quantity	Value	Units
Renewable Fraction	50.6	%
Max. Renew. Penetration	181	%

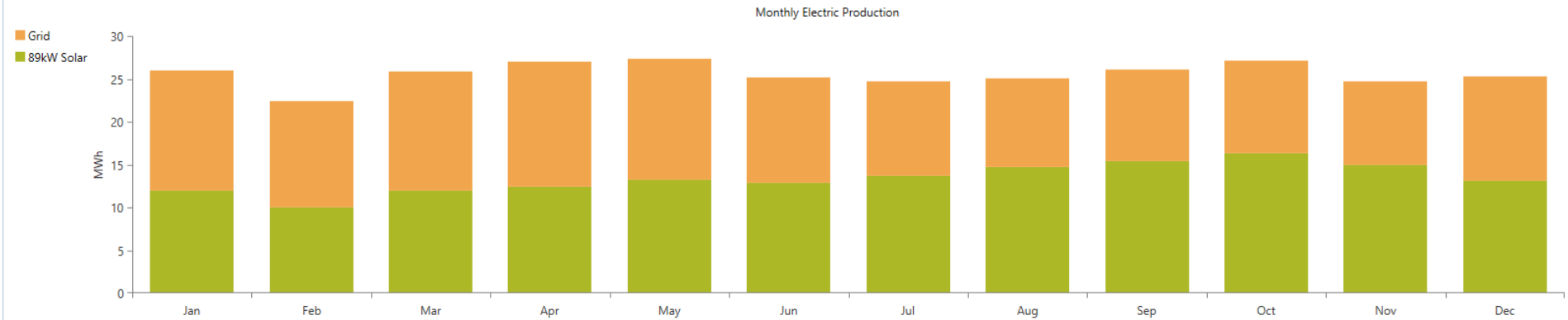


Figure 8: Electricity Production

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4.2 Grid Sales

The following table shows the monthly grid purchase and sales for each month.

Month	Energy Purchased (kWh)	Energy Sold (kWh)	Net Energy Purchased (kWh)	Peak Load (kW)	Energy Charge \$	Demand Charge \$
January	13,943	4,278	9,665	49	\$2,917.96	\$0
February	12,369	3,505	8,864	51	\$2,611.31	\$0
March	13,912	4,582	9,330	55	\$2,886.85	\$0
April	14,672	4,713	9,959	58	\$3,053.99	\$0
May	14,127	5,439	8,688	52	\$2,869.60	\$0
June	12,346	4,749	7,596	53	\$2,508.10	\$0
July	11,034	3,959	7,075	47	\$2,264.05	\$0
August	10,344	4,958	5,386	44	\$2,024.60	\$0
September	10,671	5,010	5,662	47	\$2,096.90	\$0
October	10,824	5,053	5,771	48	\$2,129.11	\$0
November	9,840	4,824	5,016	45	\$1,917.40	\$0
December	12,201	4,326	7,875	52	\$2,507.68	\$0

Figure 9: Grid Sale/purchase



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5. Conclusion

1. The total cost of 89kW System will be approximately \$178,000.00 + gst.
2. The current electricity bills are approximately \$56,000.00/yr and with an investment of \$178,000.00 the bill will reduce to half.
3. The payback period of the system will be 6.3yrs (approximately).
4. Investing in a battery storage will further reduce the bills and the payback.

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