



## SOMA Energy Solar Feasibility Study

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## 1. AWS Solar feasibility

Section 1 outlined in the following pages shows the major steps in the solar feasibility study using HOMER. This includes, Electric load, Rate and Solar resource.

**Farm** (meter number: DZ140911)

### 1.1 Electricity rate

Electricity rates (inc. GST) and electricity consumption data was obtained from recent billing from supplied Origin energy bills. These rates below also have the 39% pay on time discount applied.

**Peak:** \$0.2203/kWh

**Off-peak:** \$0.1111/kWh

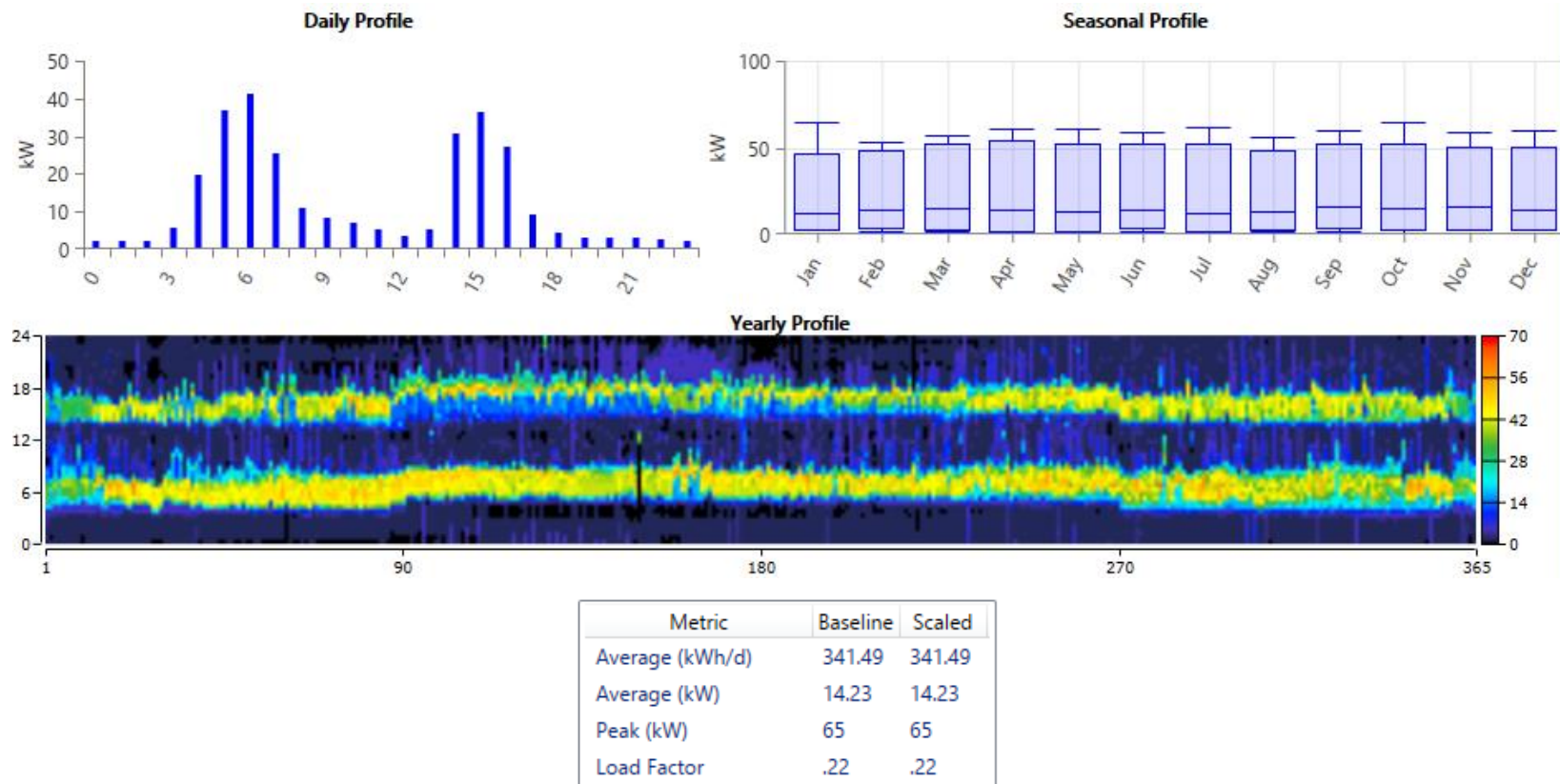
The Solar feed-in tariff for Victoria is a minimum of \$0.113/kWh to allow for correct feed in strategies imposed by the software. The sale capacity (maximum feed in allowed) input into the software is set to 10kW per phase. Pay on discounts as stated on the bill are also factored in.

# Victorian feed-in tariff

The current Victorian minimum feed-in tariff rate is 11.3 cents per kilowatt hour, as of 1 July 2017.

## 1.2 Electric Load - Farm

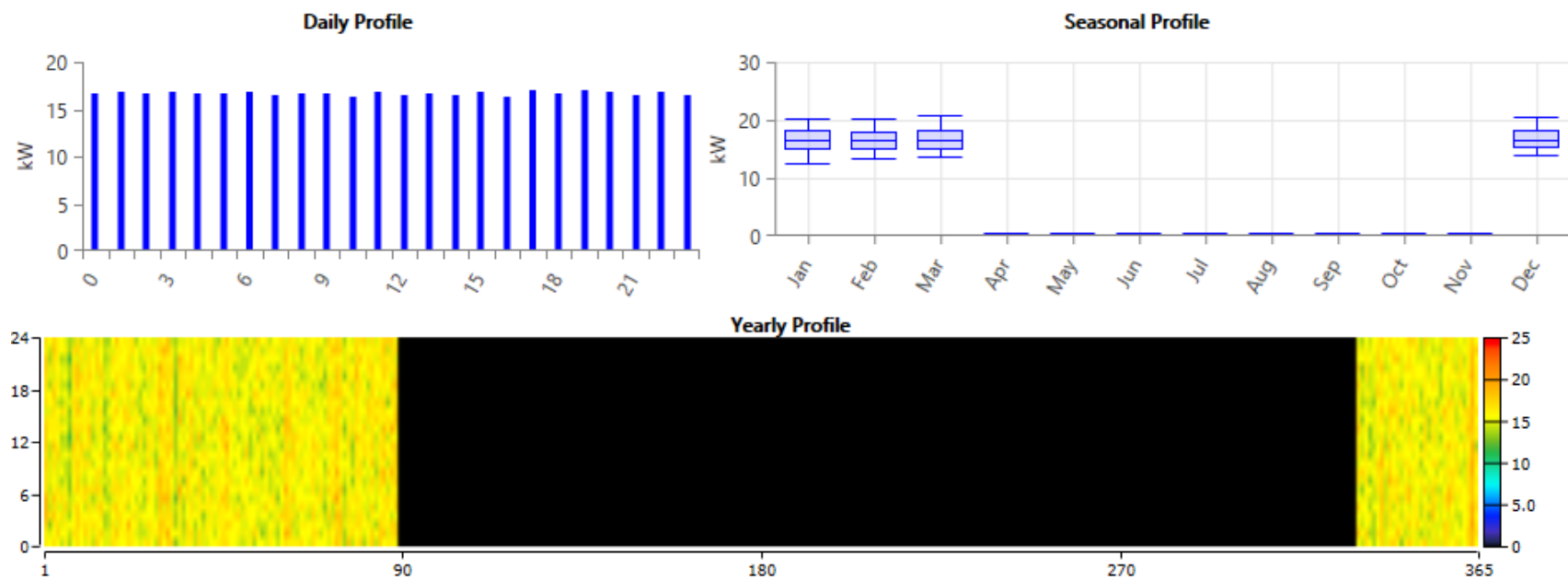
The follow figures in section 1 details the electric load of the main Farm, produced via current meter interval data supplied by client via their distribution network.



**Figure 1.** Electrical load profile of Dairy Farm

### 1.3 Electric Load - Pump 1

After discussion with the client, it was noted that a large Southern Cross water pump is going to be implemented to move 50ML of water. Based on an average current draw as prescribed by the client of 40A at 415V, an instantaneous power draw of 16.6kW is implemented running from December to March 24 hours a day as shown below.



Metric	Baseline	Scaled
Average (kWh/d)	132.07	132.07
Average (kW)	5.5	5.5
Peak (kW)	20.98	20.98
Load Factor	.26	.26

**Figure 2.** Electrical load profile of Pump 1

## 2. Farm system analysis

The Farm system taking into account energy consumption data over 12 months, current electricity rates and cost of components/installation optimized for a 29.7kW Solar array.

### Optimized Solar sizing: 29.7kW

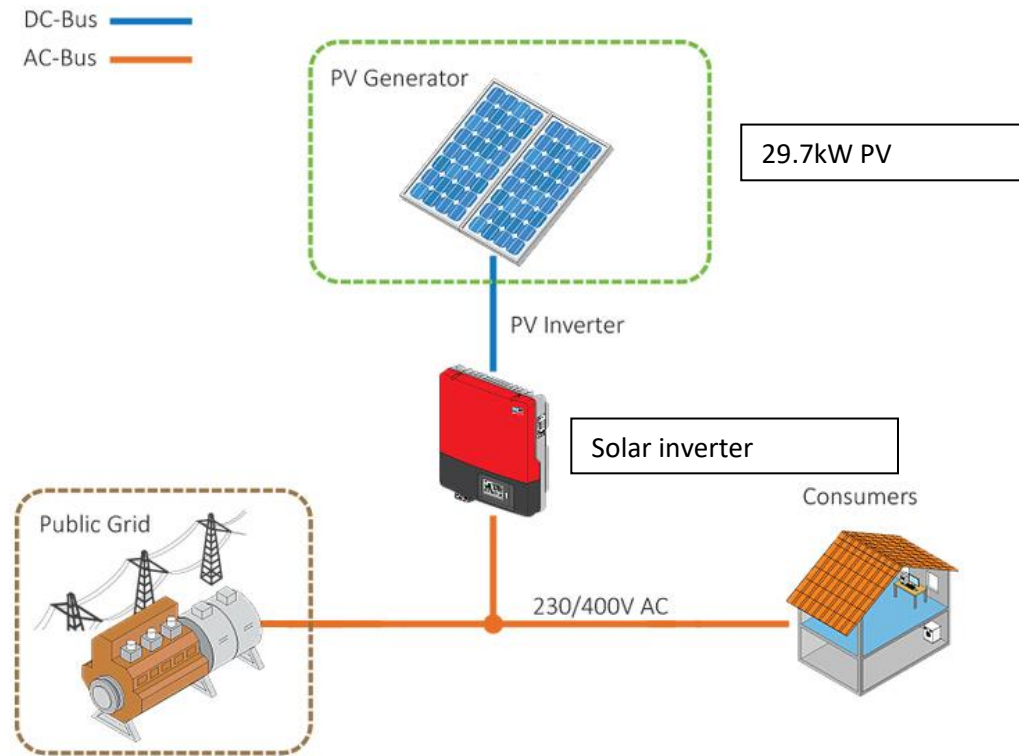


Figure 3. System 1 schematic

## 2.1 Farm - PV Output analysis

The output of the 29.7kW PV array is shown below, with projected total production shown below.

Quantity	Value	Units
Rated Capacity	29.7	kW
Mean Output	4.78	kW
Mean Output	115	kWh/d
Capacity Factor	16.1	%
Total Production	41,840	kWh/yr

Quantity	Value	Units
Minimum Output	0	kW
Maximum Output	30.4	kW
PV Penetration	24.2	%
Hours of Operation	4,377	hrs/yr
Levelized Cost	0.156	\$/kWh

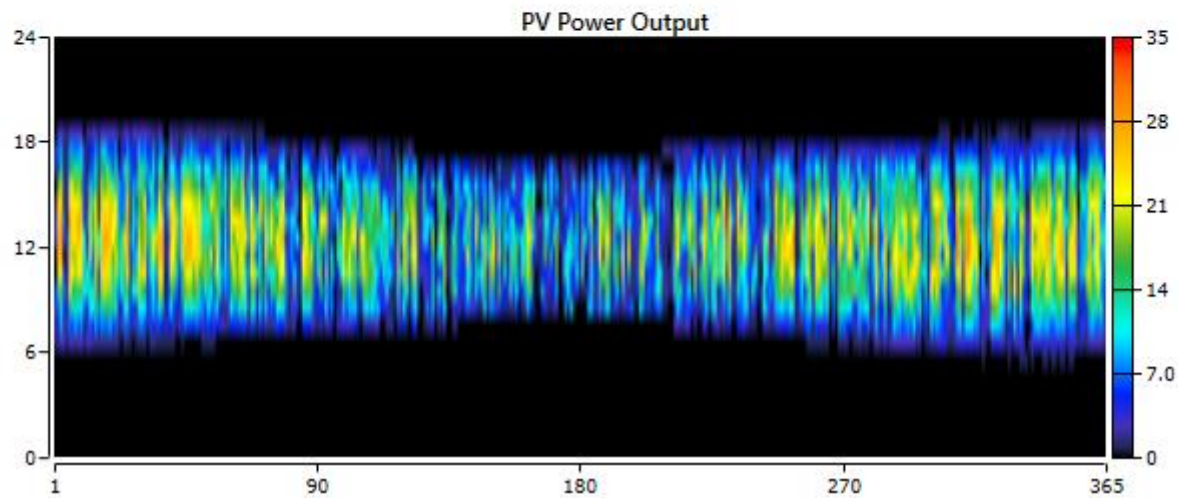


Figure 4. Solar array size and power output profile



**Figure 5:** Indicative solar panel placement (110x 270W panels)

## 2.2 Farm - Electricity bill comparison and savings

Below tables shows the comparison between electricity charges and savings in year 1, showing monthly savings and total yearly savings (green column). A total saving of **\$6,826.75** is projected to occur in the first year.

**Business as Usual Case**

Month	Energy Purchase (kWh)	Energy Charge (\$)
January	21541.51	\$3,526.23
February	20368.64	\$3,272.90
March	24141.71	\$3,861.05
April	10384.43	\$1,733.85
May	9875.28	\$1,673.30
June	9808.52	\$1,652.90
July	9386.52	\$1,538.64
August	9741.98	\$1,650.37
September	11115.78	\$1,846.33
October	11666.77	\$1,912.41
November	11687.75	\$1,931.43
December	23131.81	\$3,699.57
<b>Annual</b>	<b>172850.69</b>	<b>\$28,298.97</b>

**With Renewable Energy System**

Month	Energy Purchase (kWh)	Energy Sold (kWh)	Energy Charge (\$)	Savings (\$)
January	17176.51	234.10	\$2,674.18	\$852.05
February	16540.98	194.38	\$2,541.51	\$731.39
March	20427.60	87.76	\$3,161.94	\$699.11
April	8880.04	1413.42	\$1,288.02	\$445.83
May	8642.19	1142.23	\$1,310.03	\$363.27
June	8727.56	907.25	\$1,345.07	\$307.83
July	8226.03	1102.38	\$1,197.72	\$340.92
August	8144.56	1260.51	\$1,212.46	\$437.91
September	9241.52	1418.04	\$1,337.58	\$508.75
October	9268.32	1625.27	\$1,285.35	\$627.06
November	8854.76	1474.69	\$1,238.66	\$692.77
December	18753.55	176.10	\$2,879.71	\$819.86
<b>Annual</b>	<b>142883.60</b>	<b>11036.14</b>	<b>\$21,472.22</b>	<b>\$6,826.75</b>

**Table 1:** Annual energy bill savings



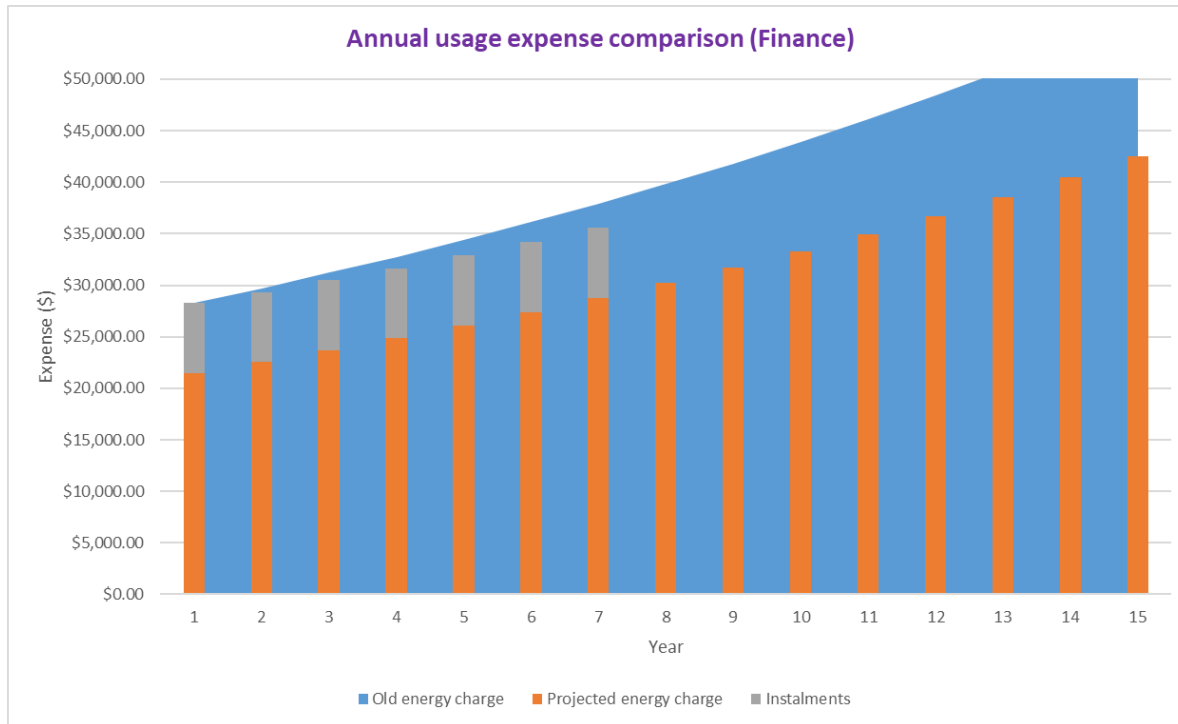
### 3. Overall Net cash position

An overall net cash position for the solar system is shown, which incorporates total yearly savings (including 5% electricity inflation) and Instalments that shows an overall positive cash flow from year 1 of installation.

**Indicative finance plan shows net cash positive outcome from year 1 of system installation.**

Annual expense figures including Finance						
Year	Current usage expense	Projected usage expense	Savings	Instalments	Net Cash Position	TOTAL NCP
1	\$28,303.00	\$21,472.00	\$6,831.00	\$6,809.78	\$21.22	\$21.22
2	\$29,718.15	\$22,545.60	\$7,172.55	\$6,809.78	\$362.77	\$383.99
3	\$31,204.06	\$23,672.88	\$7,531.18	\$6,809.78	\$721.40	\$1,105.39
4	\$32,764.26	\$24,856.52	\$7,907.74	\$6,809.78	\$1,097.96	\$2,203.35
5	\$34,402.47	\$26,099.35	\$8,303.12	\$6,809.78	\$1,493.34	\$3,696.69
6	\$36,122.60	\$27,404.32	\$8,718.28	\$6,809.78	\$1,908.50	\$5,605.20
7	\$37,928.73	\$28,774.53	\$9,154.19	\$6,809.78	\$2,344.41	\$7,949.61
8	\$39,825.16	\$30,213.26	\$9,611.90	\$0.00	\$9,611.90	\$17,561.51
9	\$41,816.42	\$31,723.92	\$10,092.50	\$0.00	\$10,092.50	\$27,654.01
10	\$43,907.24	\$33,310.12	\$10,597.12	\$0.00	\$10,597.12	\$38,251.13
11	\$46,102.60	\$34,975.63	\$11,126.98	\$0.00	\$11,126.98	\$49,378.11
12	\$48,407.73	\$36,724.41	\$11,683.33	\$0.00	\$11,683.33	\$61,061.44
13	\$50,828.12	\$38,560.63	\$12,267.49	\$0.00	\$12,267.49	\$73,328.94
14	\$53,369.53	\$40,488.66	\$12,880.87	\$0.00	\$12,880.87	\$86,209.81
15	\$56,038.00	\$42,513.09	\$13,524.91	\$0.00	\$13,524.91	\$99,734.72

Table 2: Financed position, inc. GST



**Figure 6.** Comparison of electricity charges and finance payments showing potential net cash positive position with 5% electricity price inflation



**Figure 7:** Illustration depicting finance outcome of system

**Projected 1<sup>st</sup> year savings: \$6,831**  
**1<sup>st</sup> year instalment (inc. GST): \$6,809.78**  
**Monthly instalment (inc. GST): \$567.48**