



North Beach Passivhaus Plus

International Passivhaus Open Day

June 2024

Acknowledgement of Country

We would like to begin by acknowledging the Whadjuk people, Traditional Custodians of the land on which we gather today, and pay our respects to their Elders past and present. We extend that respect to Aboriginal and Torres Strait Islander peoples here today.

Statistics

12th Passivhaus built in Australia



3rd Passivhaus built in WA



1st Passivhaus Plus Built in WA



Statistics

Design: By Owners (2016 – 2017)

Builder: ISMART Building Group

Build Cycle Time (from Slab Concrete Pour to Move in): 8 months



Statistics

Thermal Envelope

- Concrete Slab: R 0.15
- External Walls: R 2.38
- Roof Vaulted: R 4.74
- Roof Truss: R 5.46

Domestic Hot Water

- Heat Pump Stiebel Eltron

Window Frame – UPVc

- Kommerling Gold C70: U 1.62 w/m²K

Double Glazing

- Veridian Lightbridge Grey
 - Ug: 1.37 w/m²K
 - G-value: 0.40

Ventilation

- Brink Renovent 400



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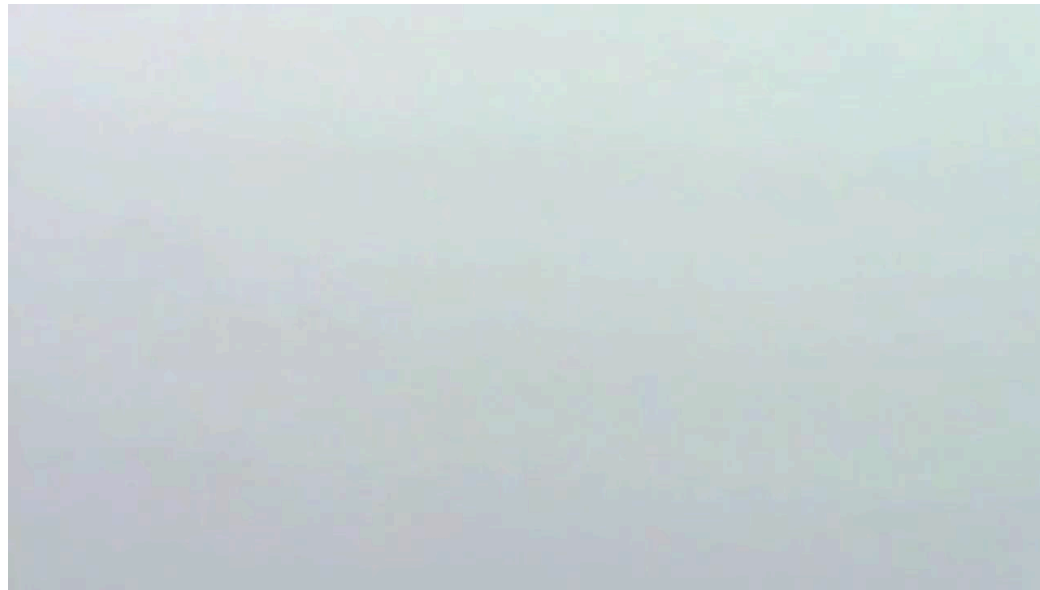
Ventilation

- Brink Renovent 400

Not too different than NCC requirements for Perth climate zone. Why the difference in performance?



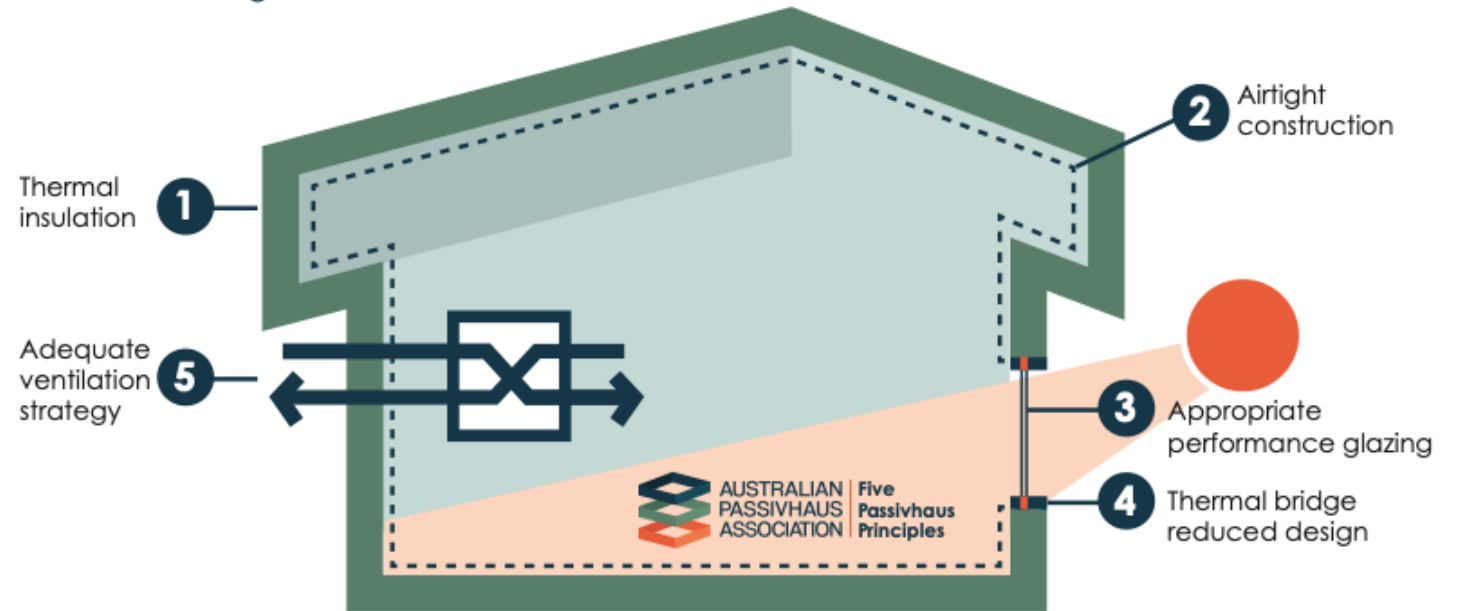
PASSIVE HOUSE EXPLAINED IN 90 SECONDS



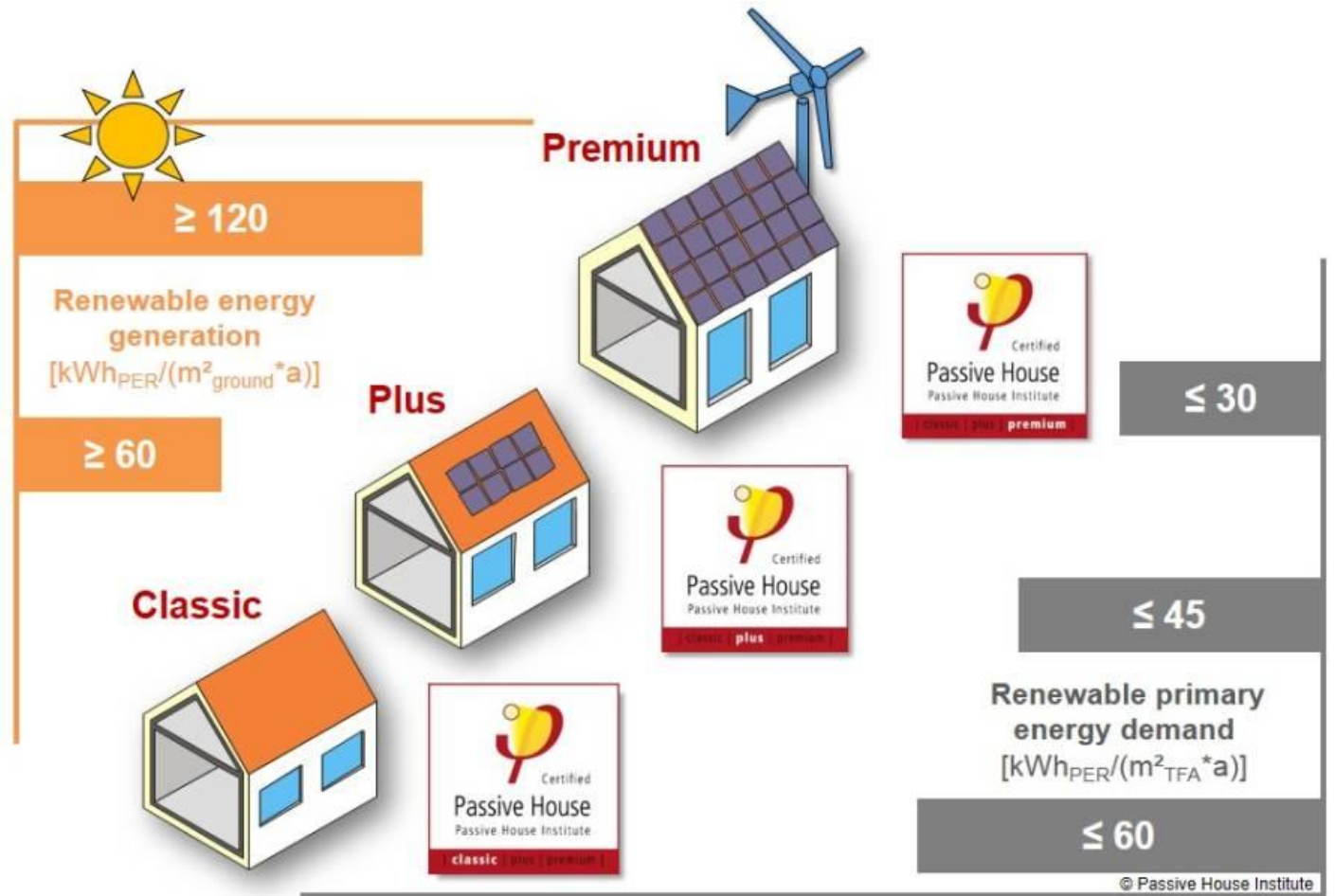
What is Passivhaus

FIVE PRINCIPLES OF PASSIVHAUS

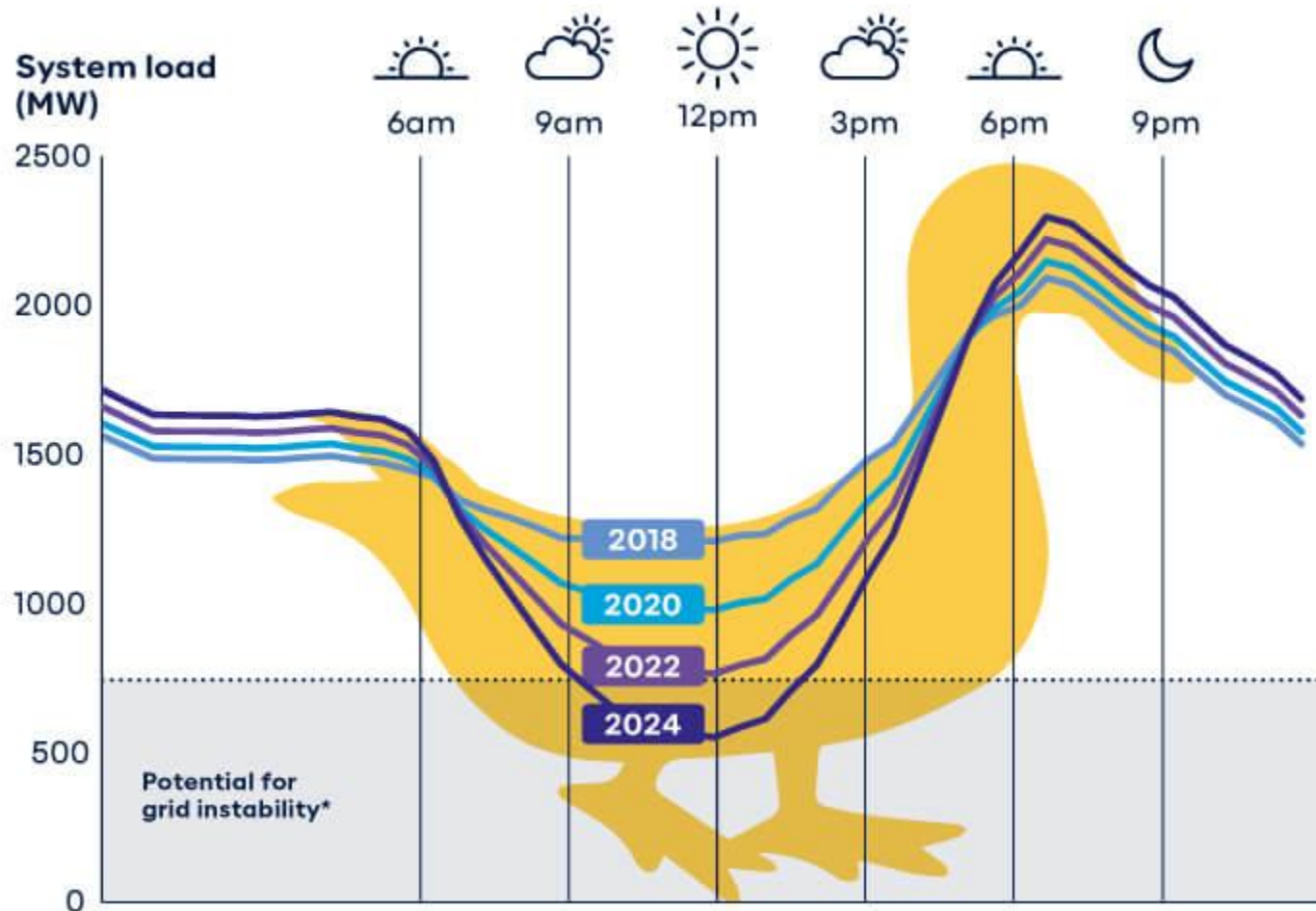
The following five principles are central to Passivhaus design and construction



Passivhaus Classes



Just adding Solar PV won't get us there.....



Source: Synergy Duck Curve



BENEFITS OF PASSIVHAUS

The benefits of passivhaus extend far beyond
The natural energy-related assumptions.
Below is a list of some of the benefits you
Can expect to receive from a passivhaus building:

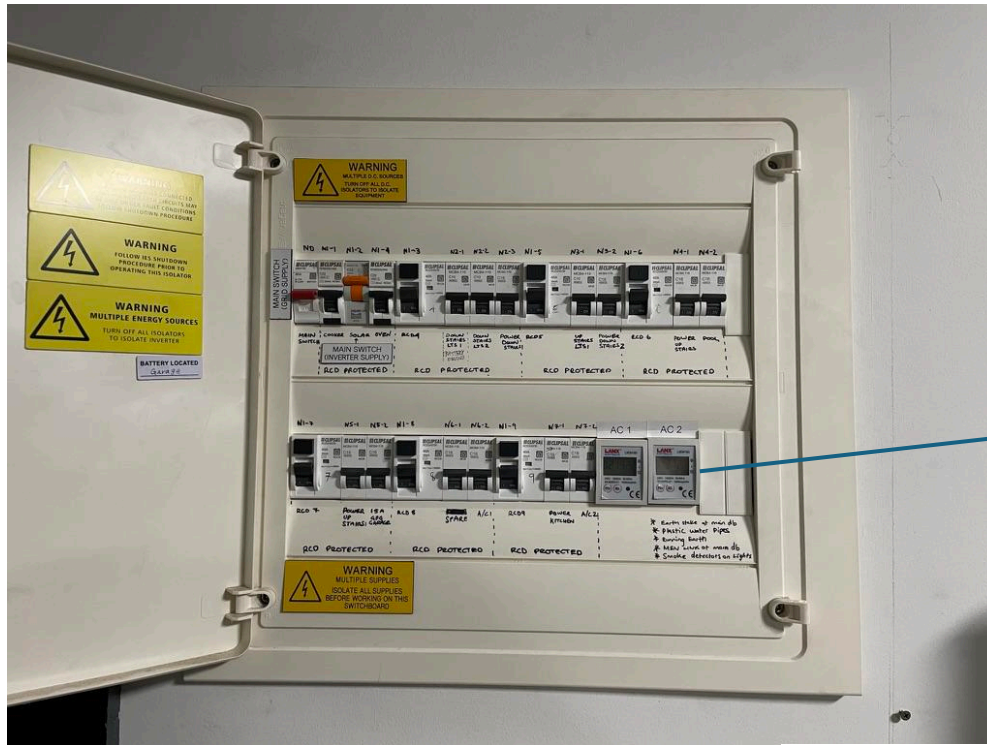
- > Healthy and quiet
- > Increased comfort
- > Low operational costs
- > Versatile
- > Dust free and clean
- > Healthy
- > Energy efficient
- > Predictable
- > Resilient
- > Clean and fresh air
- > Construction quality and durability



**AUSTRALIAN
PASSIVHAUS
ASSOCIATION**

Energy Monitoring Plan

Initial Phase – Monitoring A/C circuits only



ISMART Building Group supplied power meters at no cost to client



A/C Consumption Tracking – Initial Phase

		2020							2021						
AC Consumption per month	kWh	30-Jun-20	31-Jul-20	31-Aug-20	30-Sep-20	31-Oct-20	30-Nov-20	31-Dec-20	31-Jan-21	28-Feb-21	31-Mar-21	30-Apr-21	31-May-21	30-Jun-21	31-Jul-21
AC 1	cumm	2.8	8.7	16.7	18.2	53	132.3	312.6	539.2	707.1	893	986	1004.4	1021.1	1045.9
	monthly	2.8	5.9	8	1.5	34.8	79.3	180.3	226.6	167.9	185.9	93	18.4	16.7	24.8
AC 2	cumm	3.2	13.3	45.5	49.8	61.3	84.4	195.6	349.7	445.8	552.3	584.6	588.1	610.3	631.1
	monthly	3.2	10.1	32.2	4.3	11.5	23.1	111.2	154.1	96.1	106.5	32.3	3.5	22.2	20.8
installed May 20															
Monthly consumption kWh		6.0	16.0	40.2	5.8	46.3	102.4	291.5	380.7	264.0	292.4	125.3	21.9	38.9	45.6
Monthly cost @ \$/kWh	0.28	\$ 1.68	\$ 4.48	\$ 11.26	\$ 1.62	\$ 12.96	\$ 28.67	\$ 81.62	\$ 106.60	\$ 73.92	\$ 81.87	\$ 35.08	\$ 6.13	\$ 10.89	\$ 12.77
Cummulative Cost		\$ 1.68	\$ 6.16	\$ 17.42	\$ 19.04	\$ 32.00	\$ 60.68	\$ 142.30	\$ 248.89	\$ 322.81	\$ 404.68	\$ 439.77	\$ 445.90	\$ 456.79	\$ 469.56
Average			\$ 3.08	\$ 5.81	\$ 4.76	\$ 6.40	\$ 10.11	\$ 20.33	\$ 31.11	\$ 35.87	\$ 40.47	\$ 39.98	\$ 37.16	\$ 35.14	\$ 33.54

12 months Cooling / Heating energy consumption: 1631.4 kWh / 205 m²= 7.95 kWh/m².a

Cost to heat / cool the home and operate
between 20C and 25 C all year round / 24 hours/day

= \$489.42

Energy Monitoring Plan

Current Phase – Monitoring ALL CIRCUITS online



<https://wattwatchers.com.au/product/auditor-6m/>



ALL CIRCUITS Consumption Tracking – Current Phase

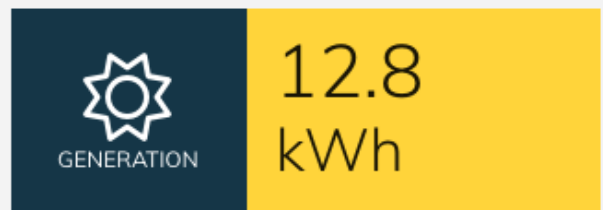
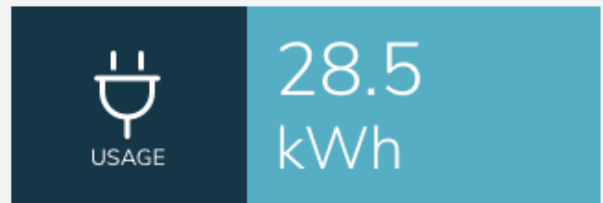
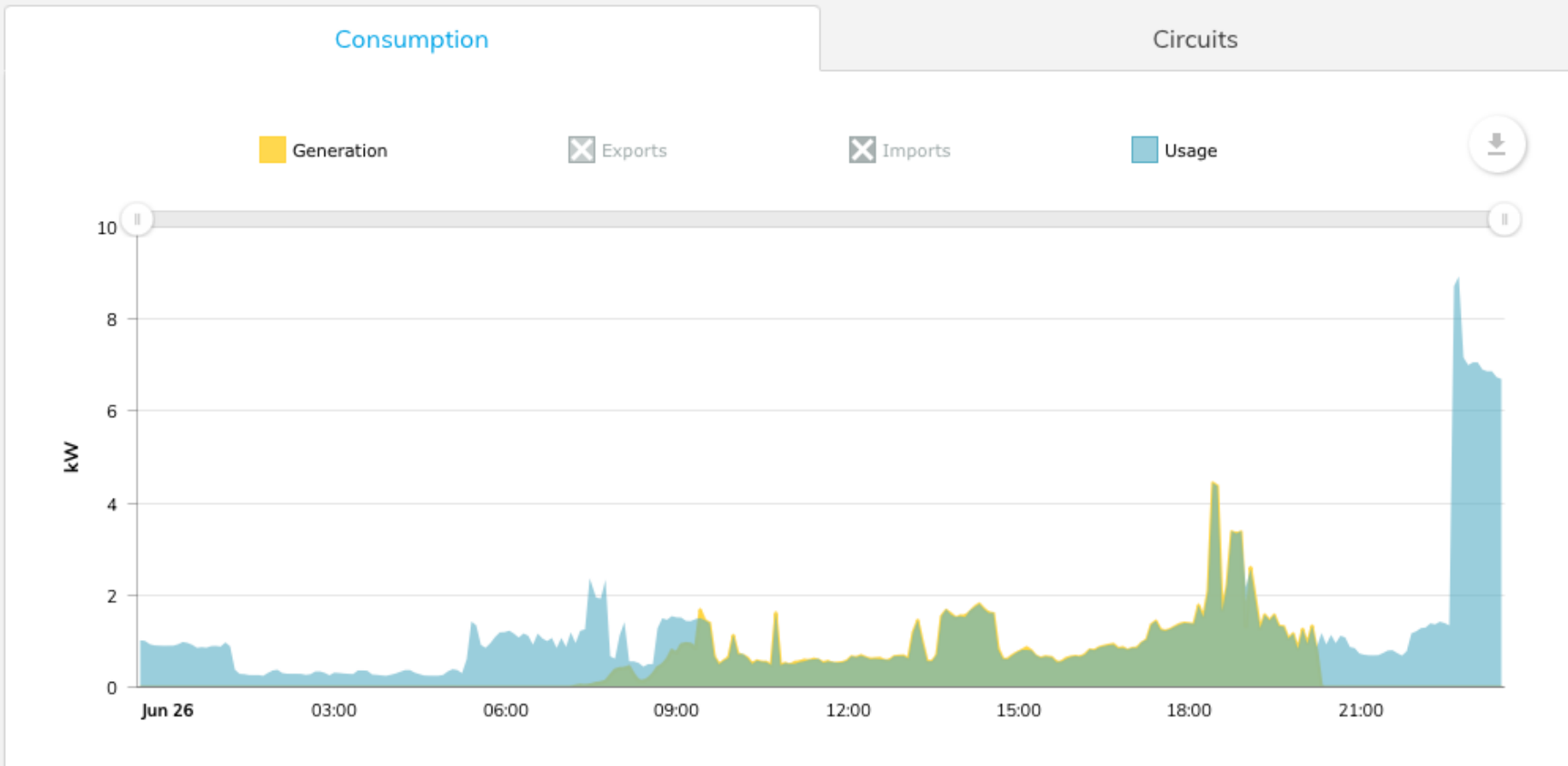
- <https://wattwatchers.app/site/consumption>
- <https://energyefficiencyperth.com.au/real-time-performance>



North Beach Passive House

Auditor 6M #2 (DDC5335289907) ▼

📅 26 Jun – 26 Jun ▼



North Beach Passive House

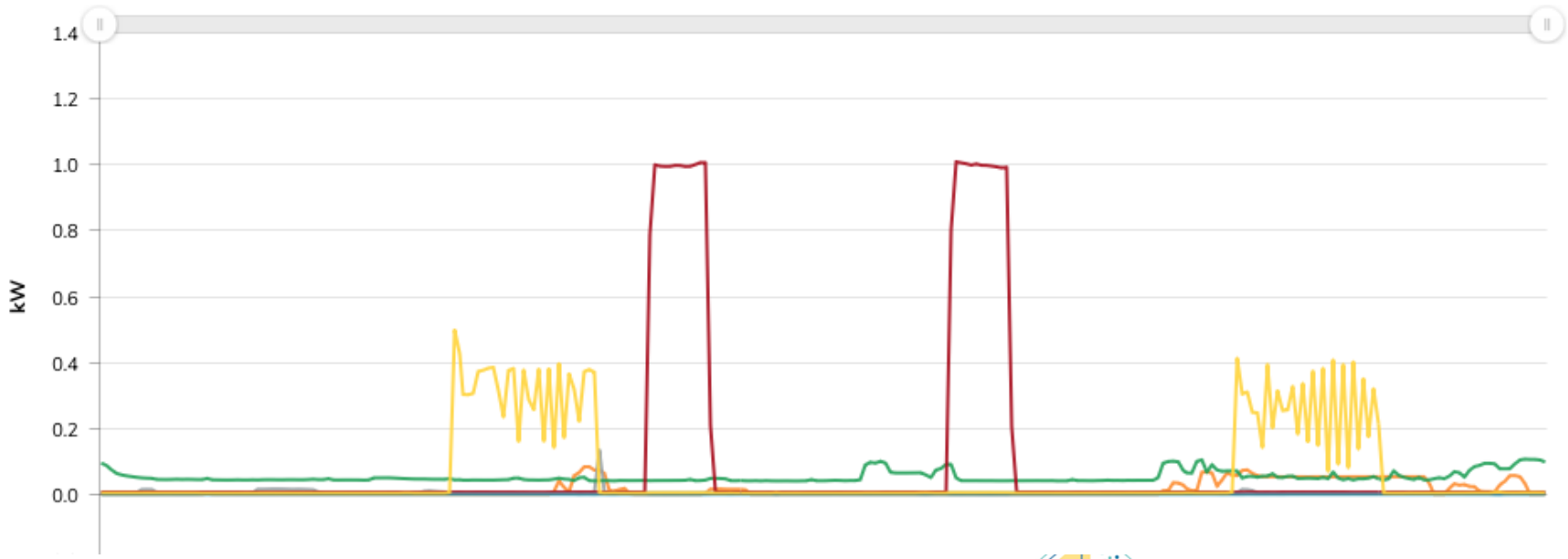
Auditor 6M #2 (DDC5335289907) ▼

26 Jun - 26 Jun ▼

Consumption

Circuits

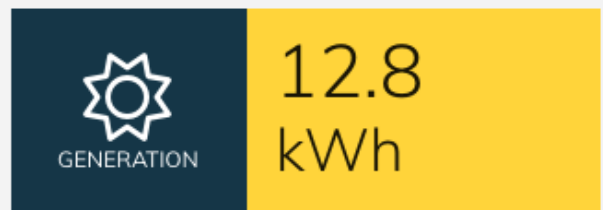
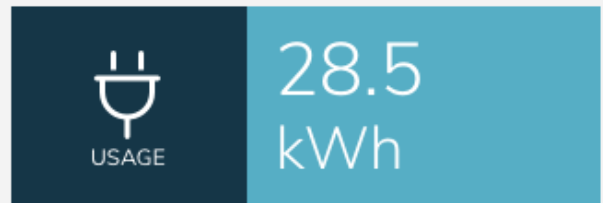
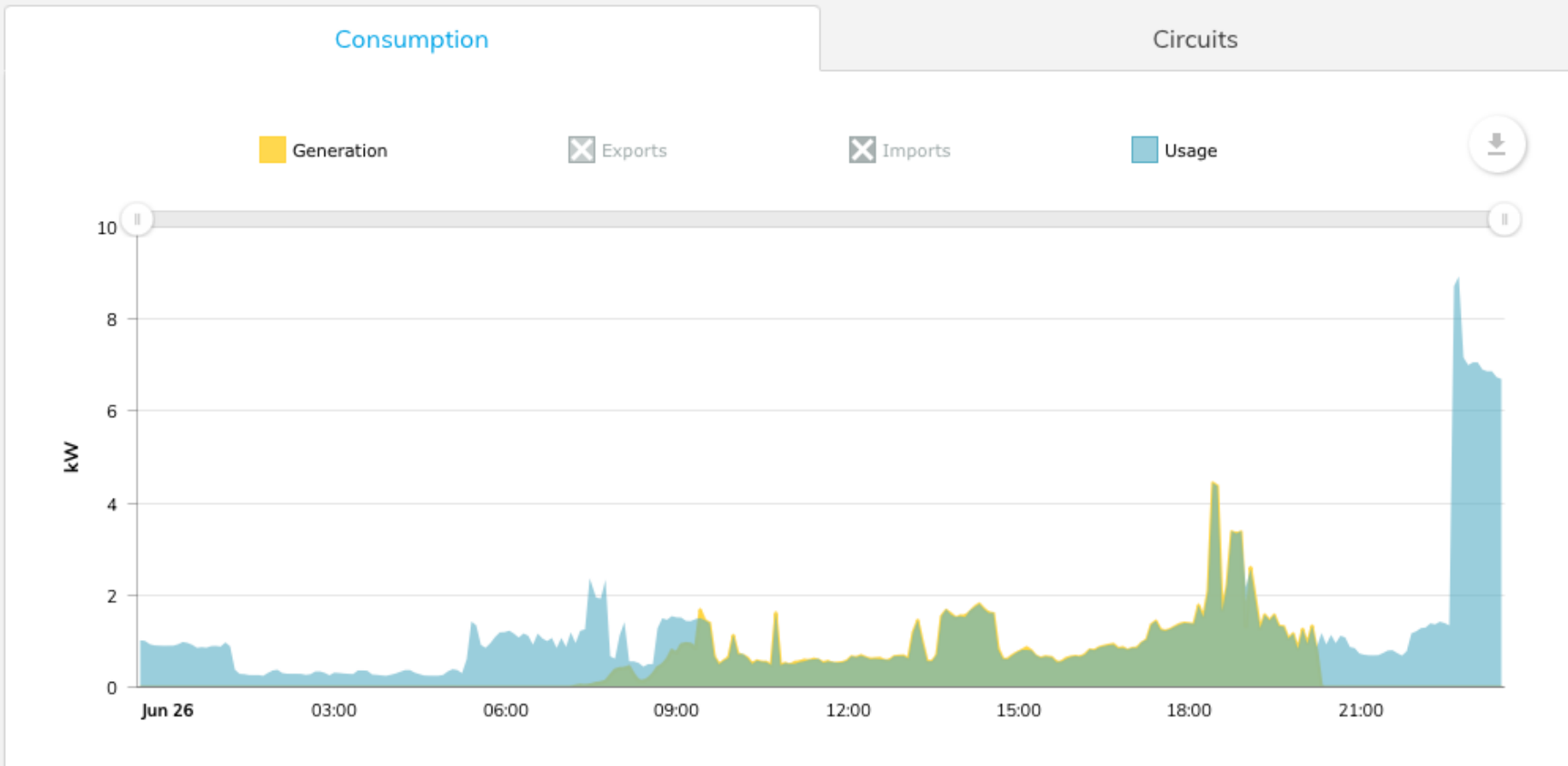
- 1. Upstairs Lights #1
- 2. Upstairs Power #1
- 3. Upstairs Power #2
- 4. Pool pump
- 5. 15A GPO Garage
- 6. Air conditioning Upstairs



North Beach Passive House

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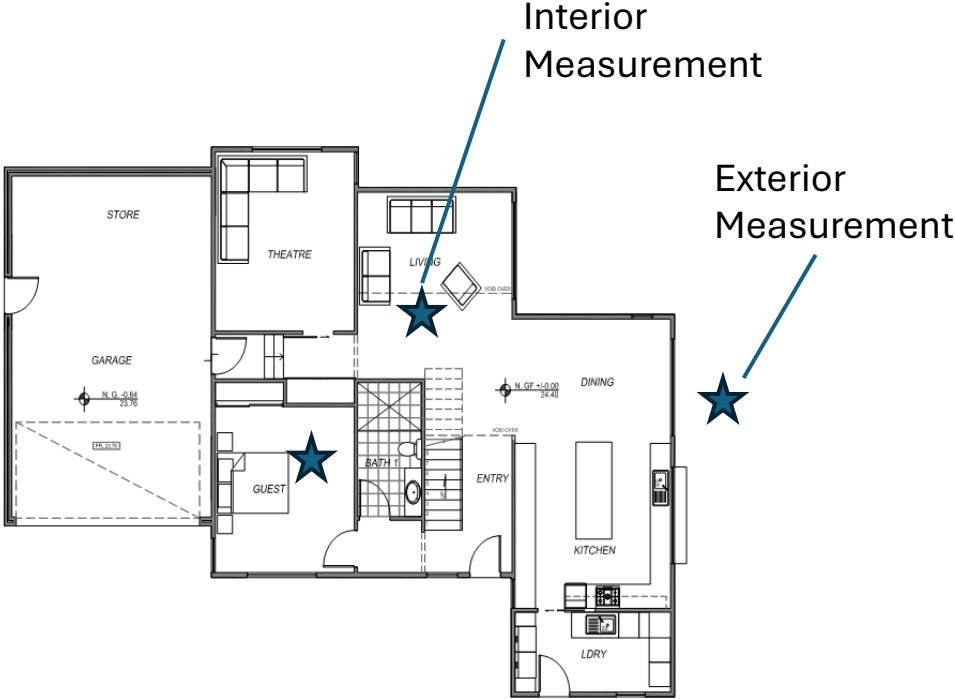
Solar Performance

- <https://monitoring.solaredge.com/solaredge-web/p/site/1012888/#/dashboard>

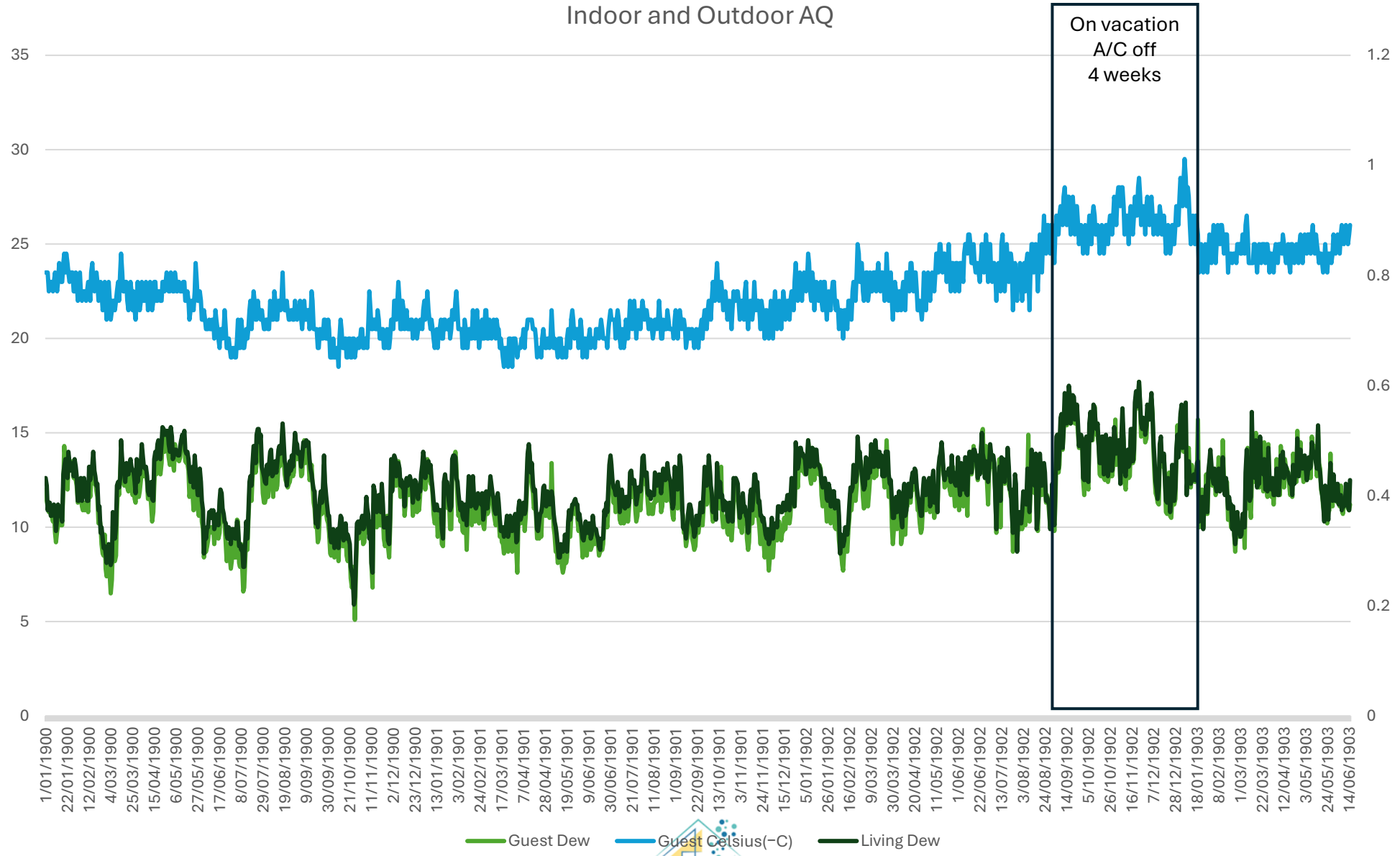


Temperature Monitoring Plan

Initial Phase – EL-USB-2

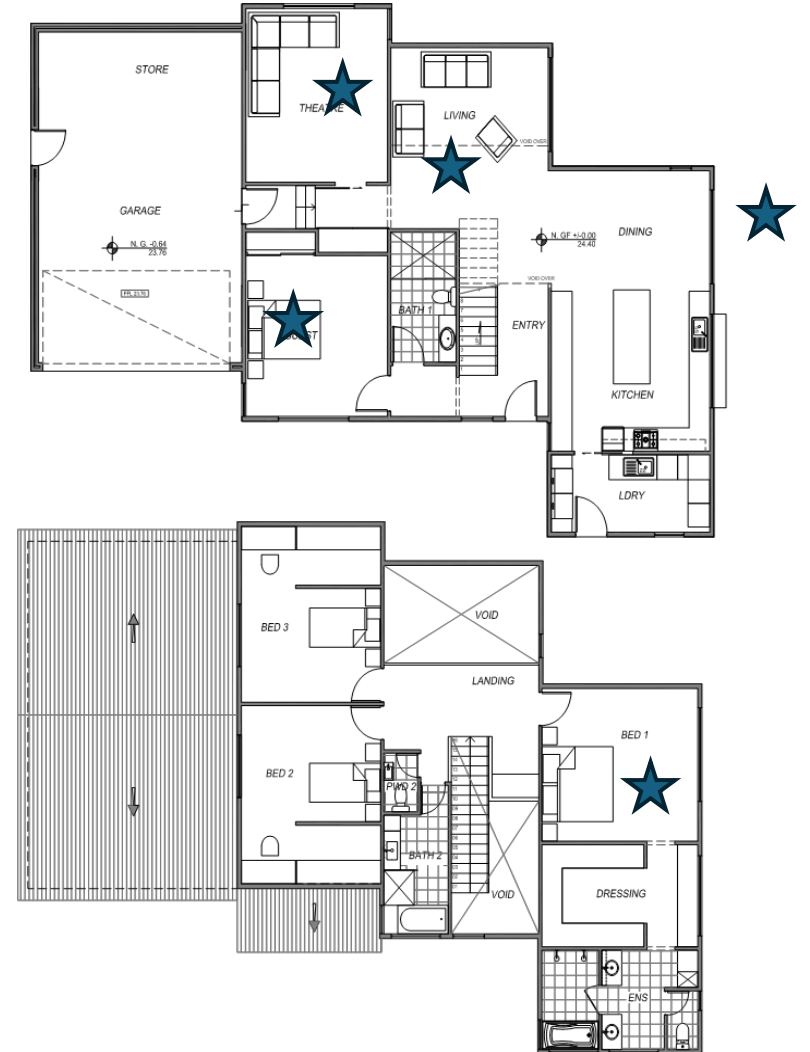
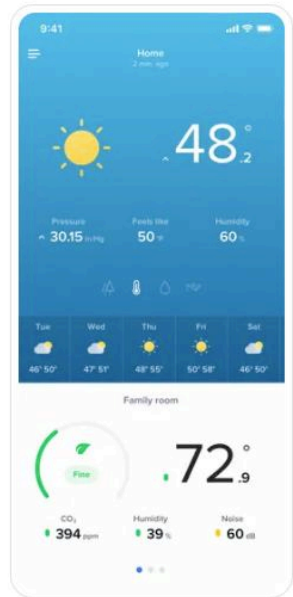


53B Sorrento Indoor and Outdoor AQ



Temperature Monitoring Plan

- Current Phase (Late 2023) – Netatmo



Netatmo App

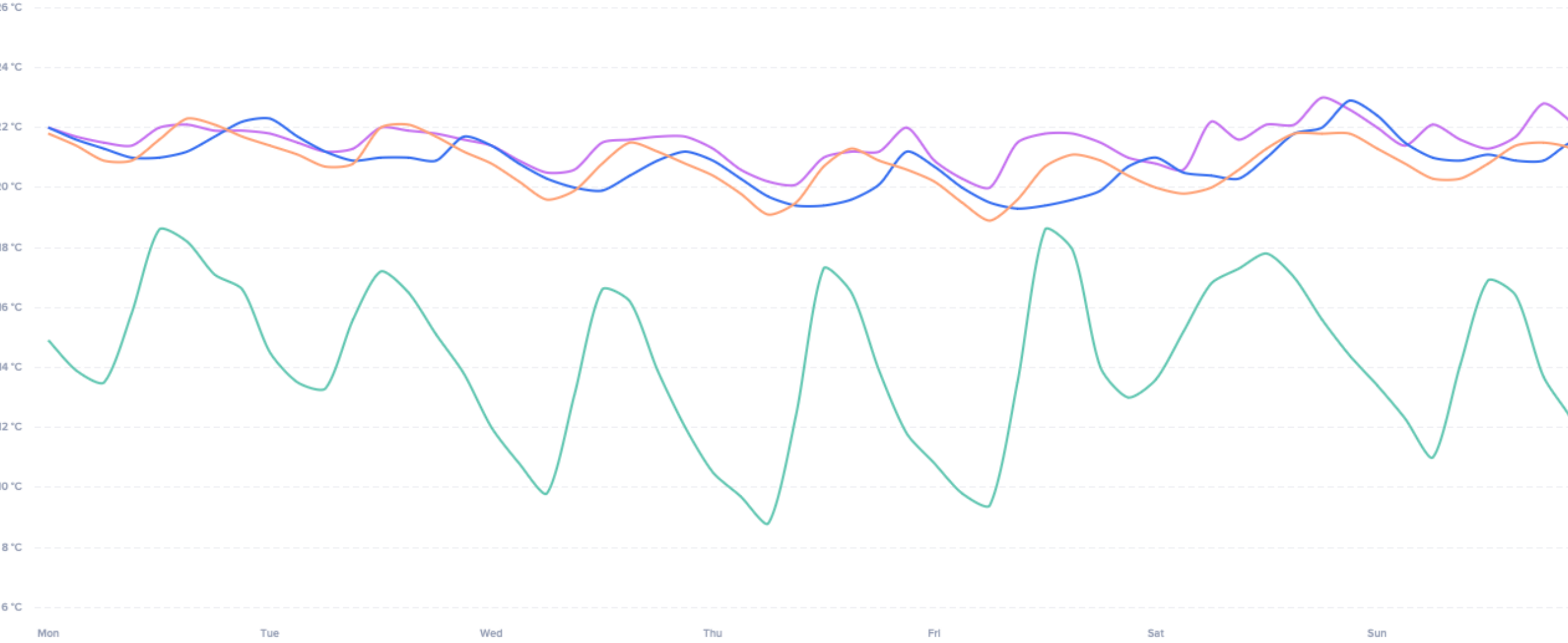
- <https://home.netatmo.com/control/compare>
- <https://energyefficiencyperth.com.au>

Netatmo Smart Home Weather Station. Easily assess your environment with the Netatmo Smart Home Weather Station.

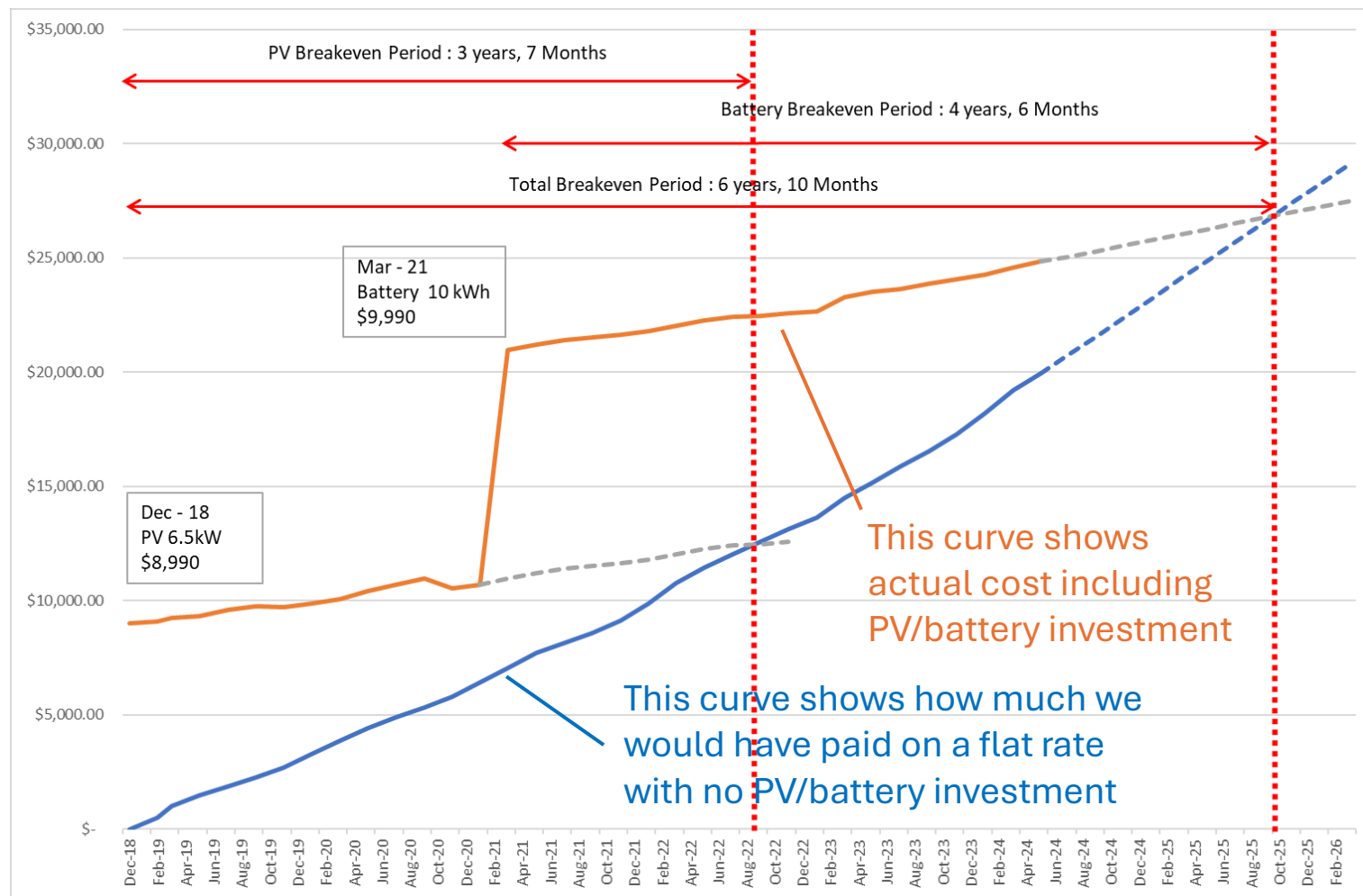


Multi products

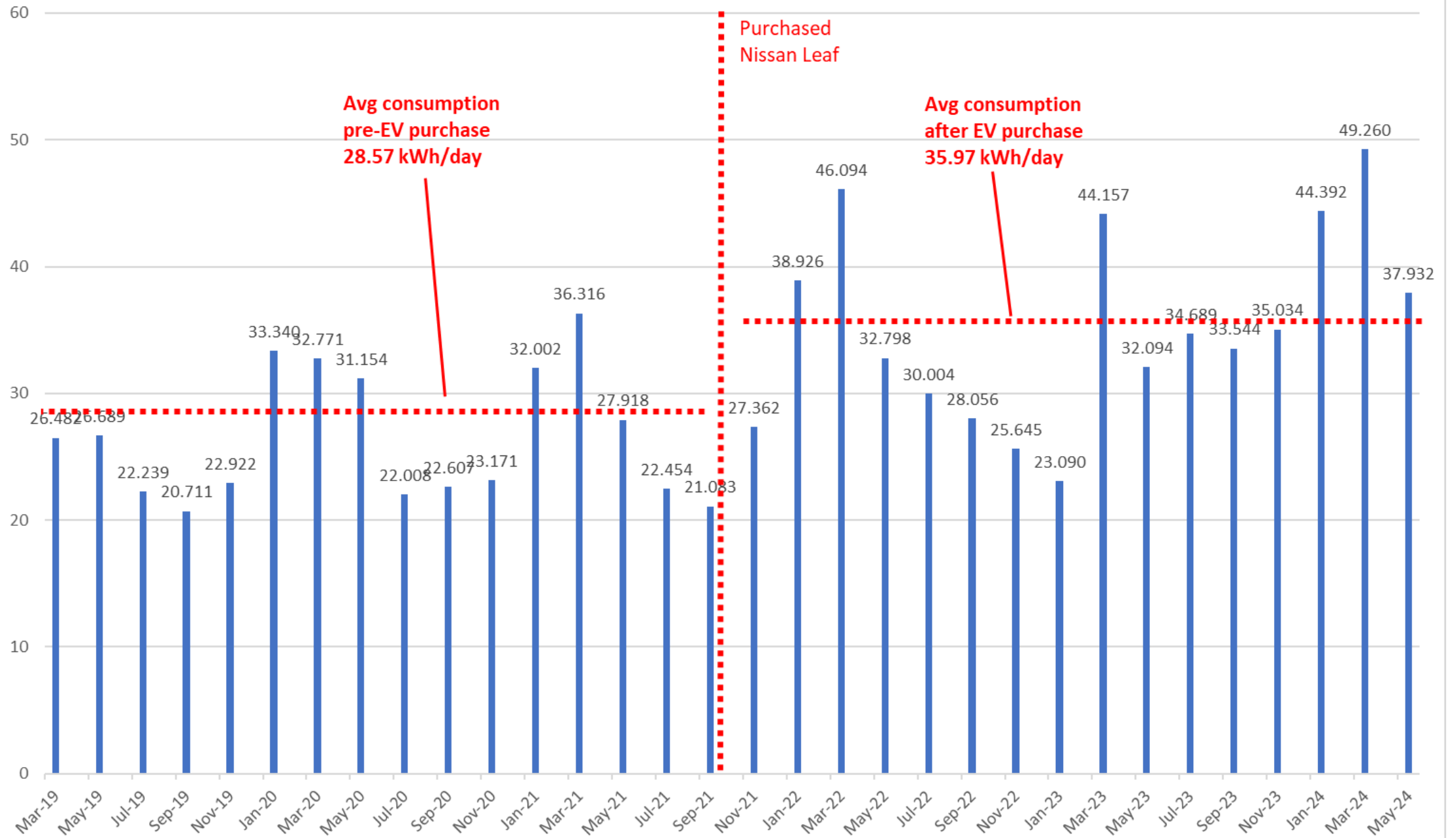
Master Bedroom - Temperature Theatre - Temperature Living Room - Temperature Outdoor - Temperature



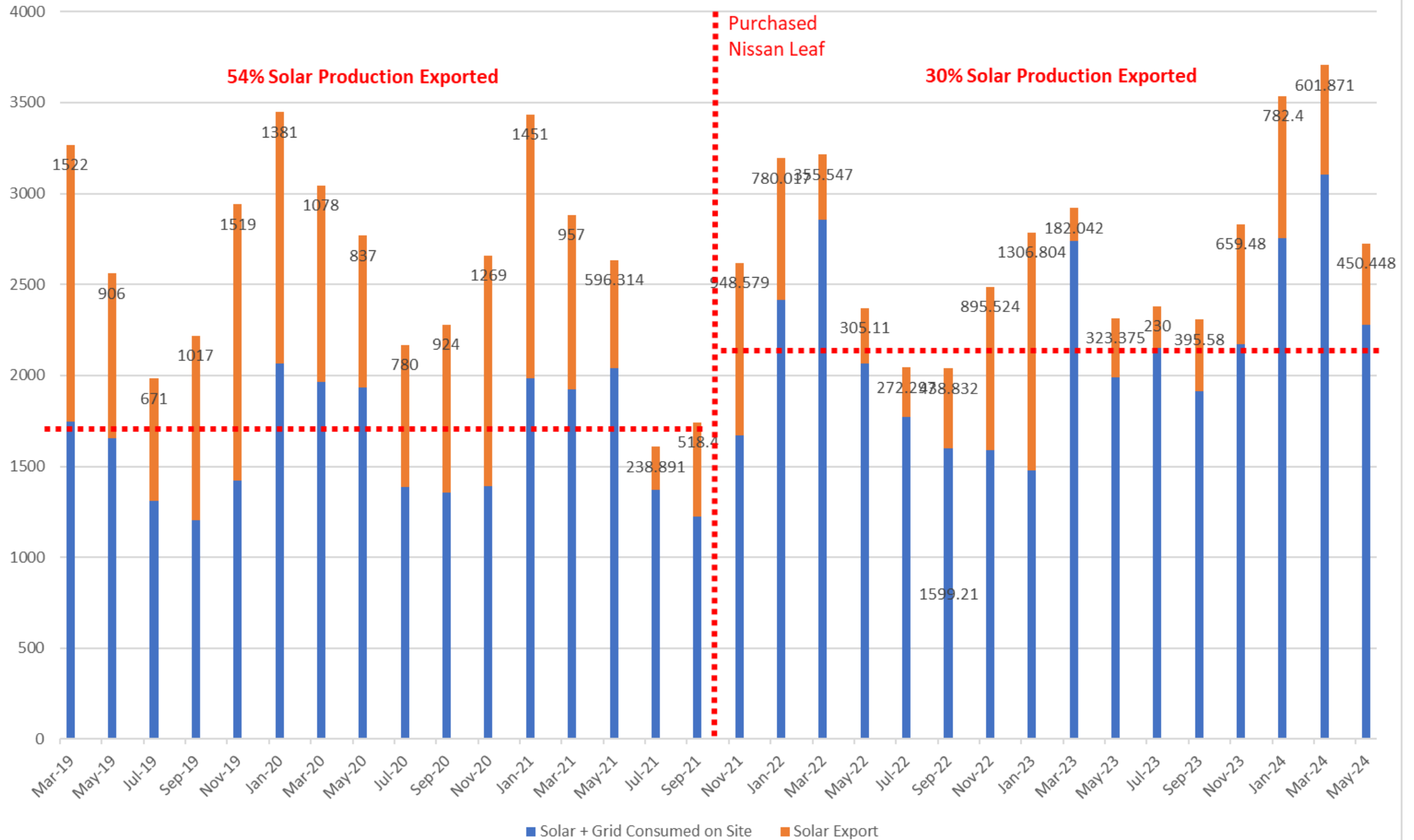
PV and Battery Economics



Average Consumption kWh per day (solar + import)



EV is charged from solar during "work from home days" and at night from the grid on other days



Battery Economics

- Renew – SUNULATOR Solar Feasibility Calculator – FREE

renew.

About us

Our work

Membership

Sustainability Resources

renew. Sunulator Training 01 - Consumption - Sept 2016

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1/01/2014	0.197	0.194	0.192	0.199	0.190	0.175	0.214	0.192	0.184	0.212	0.170	0.257	0.206	0.248	0.145	0.230	0.185
2/01/2014	0.215	0.197	0.183	0.184	0.210	0.177	0.225	0.177	0.199	0.188	0.190	0.208	0.254	0.140	0.307	0.159	0.294
3/01/2014	0.307	0.301	0.387	0.453	0.466	0.458	0.453	0.396	0.447	0.391	0.405	0.431	0.395	0.307	0.159	0.277	0.201
4/01/2014	0.272	0.265	0.263	0.354	0.373	0.270	0.256	0.257	0.256	0.256	0.290	0.259	0.307	0.734	1.115	1.511	0.830
5/01/2014	0.128	0.131	0.135	0.221	0.296	0.221	0.199	0.188	0.184	0.173	0.201	0.252	0.184	0.131	0.644	0.196	0.175
6/01/2014	0.234	0.230	0.243	0.232	0.226	0.226	0.221	0.219	0.168	0.175	0.179	0.177	0.215	0.390	0.375	0.366	0.199
7/01/2014	0.312	0.336	0.564	0.559	0.566	0.570	0.573	0.578	0.570	0.566	0.562	0.561	0.679	0.675	0.365	0.660	0.356
8/01/2014	0.794	0.835	0.795	0.610	0.612	0.604	0.585	0.584	0.584	0.584	0.584	0.584	0.608	0.256	0.380	0.343	0.358
9/01/2014	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.535	0.238
10/01/2014	0.159	0.141	0.137	0.135	0.131	0.131	0.163	0.161	0.155	0.166	0.169	0.156	0.169	0.156	0.219	0.598	0.840
11/01/2014	0.141	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
12/01/2014	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314
13/01/2014	0.594	0.595	0.226	0.232	0.325	0.194	0.214	0.148	0.142	0.175	0.131	0.144	0.241	0.342	0.282	0.376	0.927
14/01/2014	0.211	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217	0.217
15/01/2014	0.257	0.235	0.175	0.168	0.168	0.150	0.111	0.115	0.117	0.117	0.114	0.121	0.133	0.432	0.265	0.500	0.619
16/01/2014	0.230	0.188	0.181	0.168	0.168	0.133	0.121	0.113	0.119	0.115	0.117	0.113	0.140	0.263	0.394	0.328	0.177
17/01/2014	0.179	0.172	0.157	0.144	0.131	0.122	0.122	0.122	0.121	0.144	0.117	0.131	0.156	0.164	0.377	1.265	0.672
18/01/2014	0.197	0.146	0.185	0.131	0.131	0.138	0.135	0.135	0.130	0.130	0.138	0.138	0.138	0.160	0.300	0.278	0.928
19/01/2014	0.201	0.164	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114
20/01/2014	0.451	0.226	0.186	0.135	0.150	0.141	0.131	0.168	0.164	0.124	0.153	0.303	0.182	0.857	0.375	0.464	0.417
21/01/2014	0.111	0.130	0.126	0.148	0.163	0.111	0.115	0.117	0.108	0.121	0.102	0.121	0.550	0.995	0.690	0.734	0.429
22/01/2014	0.137	0.146	0.137	0.133	0.126	0.128	0.126	0.130	0.163	0.122	0.119	0.113	0.353	0.565	0.373	0.475	0.637
23/01/2014	0.126	0.124	0.121	0.119	0.119	0.119	0.121	0.126	0.131	0.122	0.122	0.148	0.217	1.069	1.065	1.243	0.481
24/01/2014	0.139	0.243	0.133	0.124	0.122	0.122	0.122	0.121	0.119	0.126	0.119	0.126	1.076	0.953	1.781	2.240	1.332

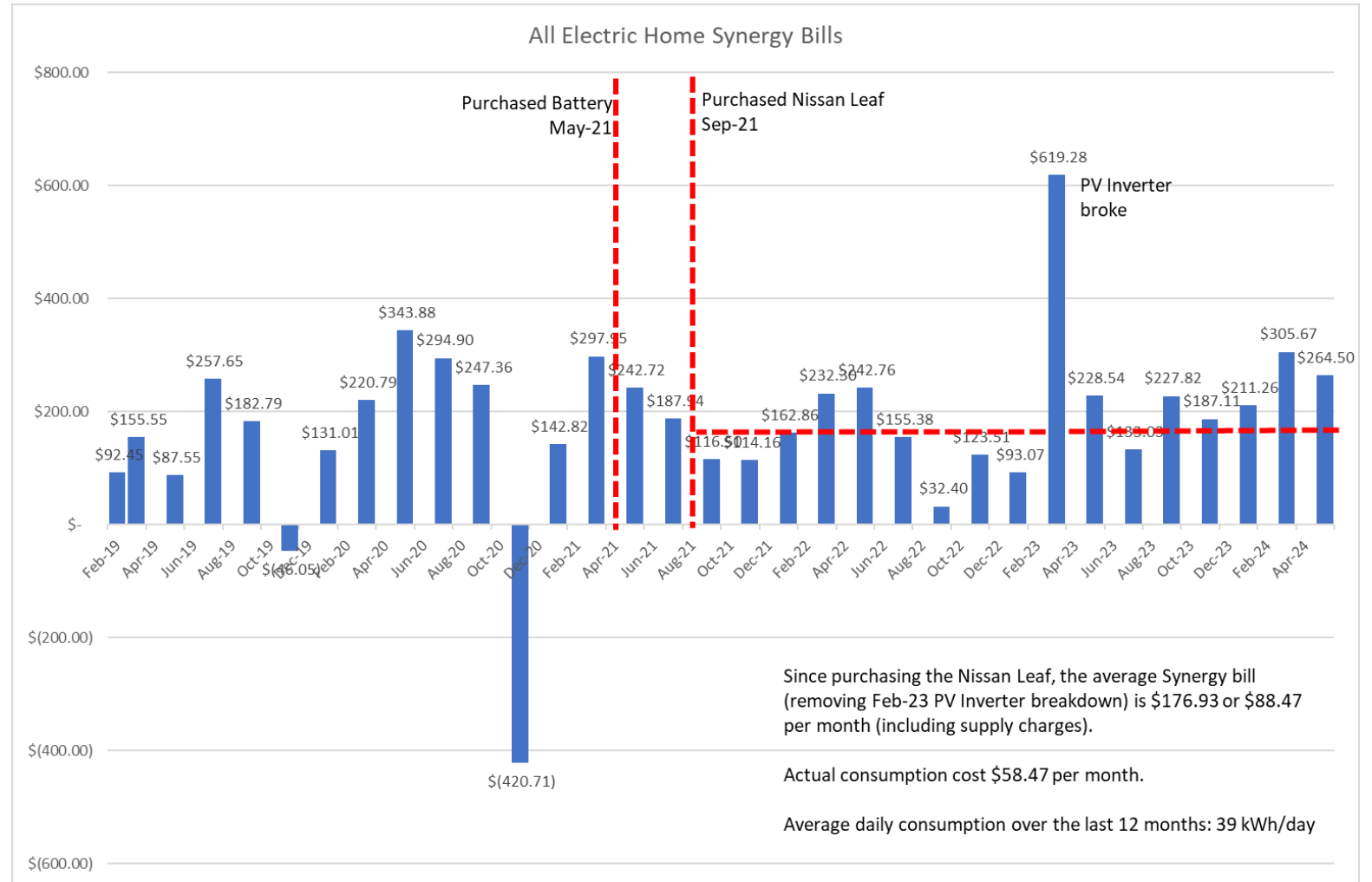
Watch on YouTube

Average: 21/02/1908 Count: 14 Min: 0/01/1909 Max: 1/01/2014 Sum: 3/01/2014

Sunulator Training 01: Consumption

Training video 1 of 7 on how to use Sunulator, Renew's free solar feasibility calculator. To view more Sunulator training, [click here](#).

All Electric Home Synergy Bills



Lessons Learned

Design and Construction

- Work with qualified professionals
 - Certified Passivhaus designers
 - Certified Passivhaus Tradesperson
- Educate yourself through Passivhaus Association, Renew.org, AIRAH (Building Science Forum), Library
- Efficiency Matrix videos
- Energy Efficiency Perth > Resources Page

Thermal Performance

- Majority of Passivhaus in Australia are overheating in the summer (20C – 25C)
 - Ensure appropriate external shading on critical windows
 - Central ducted units or multi-head/multiple split A/Cs will guarantee getting cool and heat to all corners of the house.
- *It does not take much more effort to achieve high performance outcomes in Perth climate zone, but it requires a systems approach!!*



Lessons Learned

Solar PV / Battery

- Install as much solar PV as your roof space and budget allow. You can never have too much!
- Think of platforms that allow integration and control due to weather, changing rates, EV charger compatibility
- Batteries can be economically feasible despite current thinking/advice. Need to understand your own individual consumption, time of use, and rates

Indoor Air Quality

- Invest in indoor air monitors
 - <https://www.ikea.com/au/en/p/vindstyrka-air-quality-sensor-smart-60498233/>
 - <https://www.netatmo.com/en-gb/smart-weather-station>



Thank You

