



Solar Analytics - Rooftop PV energy analytics and fault diagnosis

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Head of Data Analytics
Solar Analytics

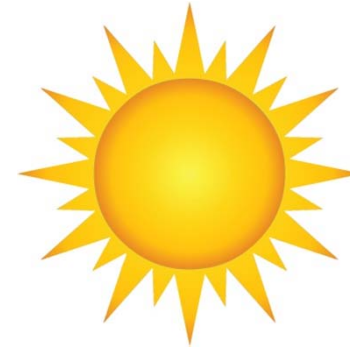
Outline

- About Solar Analytics
- Faults and case studies
- Research projects

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Our Purpose



*To maximise the
value customers
receive from their
solar energy system*

Coal is not good for humanity

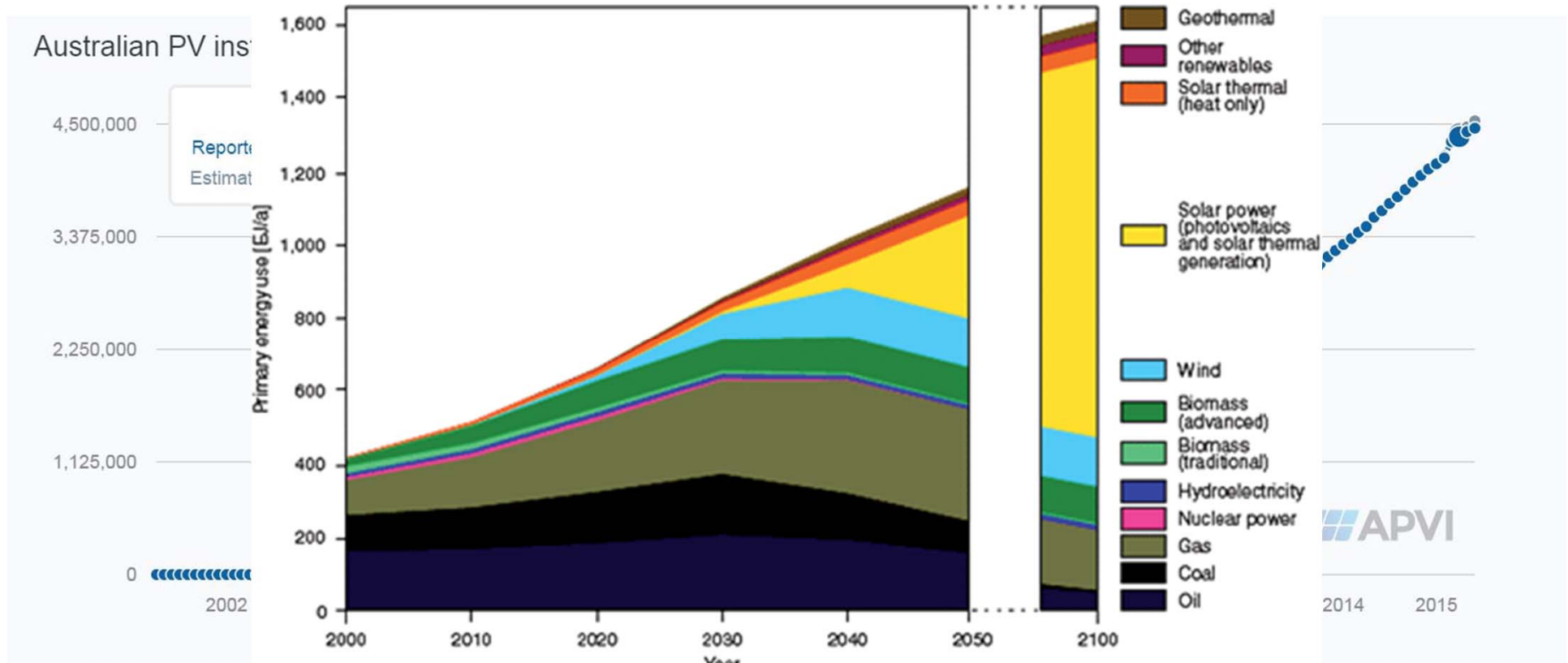


- Pollutes atmosphere
- Degrades land
- Expensive



Doctors report that “coal is a health hazard from start to finish”

... solar energy is the saviour ...



... distributed solar is already colonising our homes ...

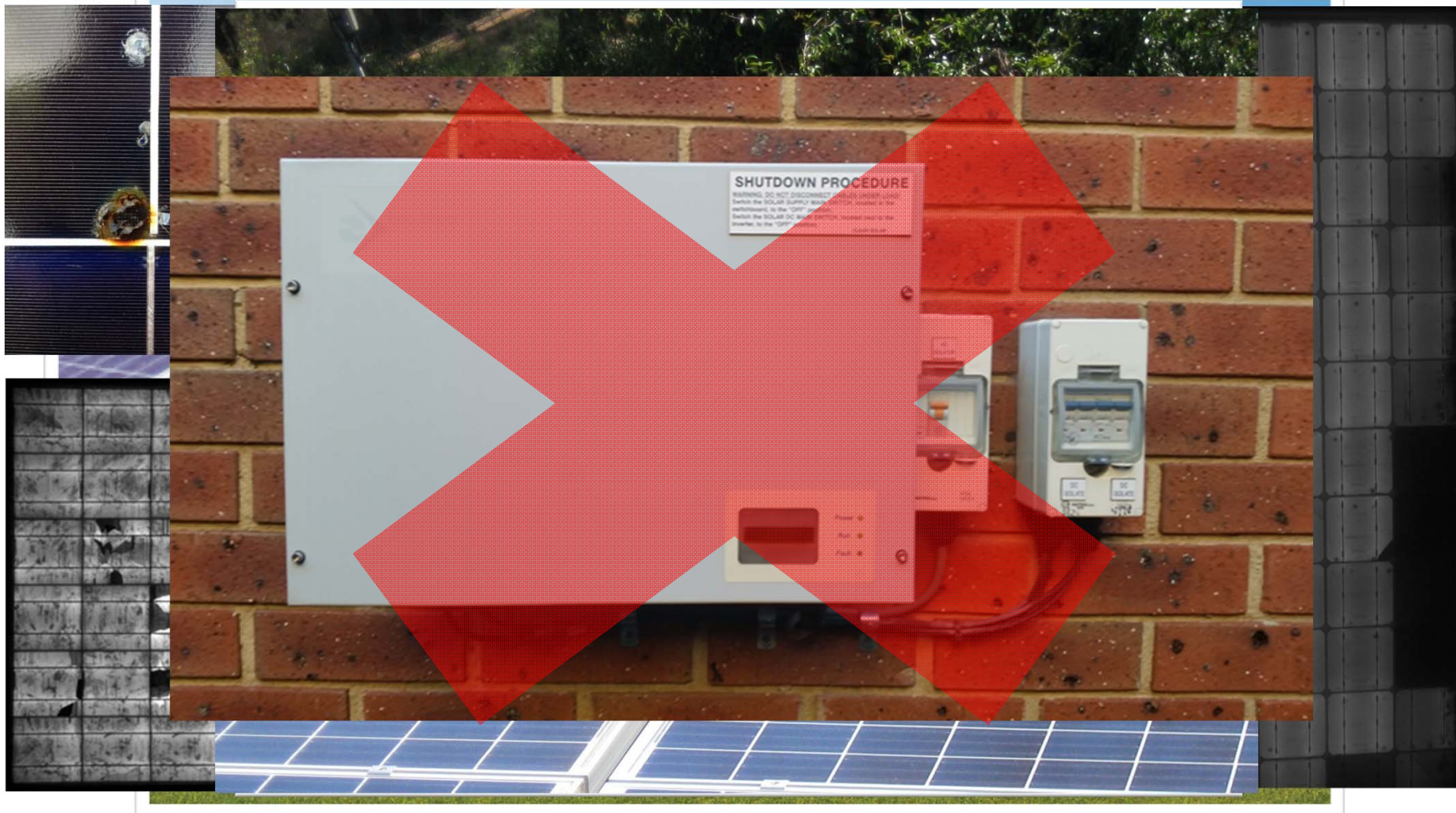


 Cleaner

 Simpler

 Cheaper

...but there's a problem



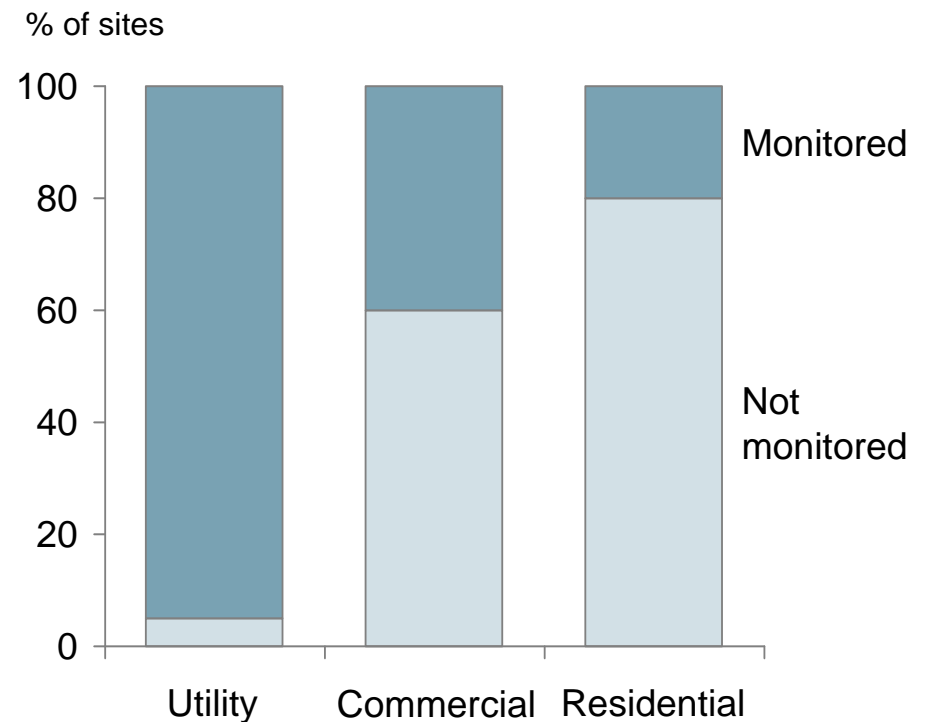
19% CAGR but industry has focussed on large scale monitoring

Leading monitoring providers by revenue











Company	Focus
Skytron Energy	Utility
InAccess	Utility
MeteoControl	Utility/Commercial
FirstSolar	Utility
GreenPower	Utility
SolarLog	Utility/Commercial

Source: GTM research, 2013

Global monitoring penetration



Current residential monitoring products are inadequate

Features	Residential	Commercial	Utility
Production Data 			
Performance Analysis 			
Fault Diagnosis 			

 Readily available
 Available with ~~Solar Analytics~~

Solar Analytics is already providing the solution



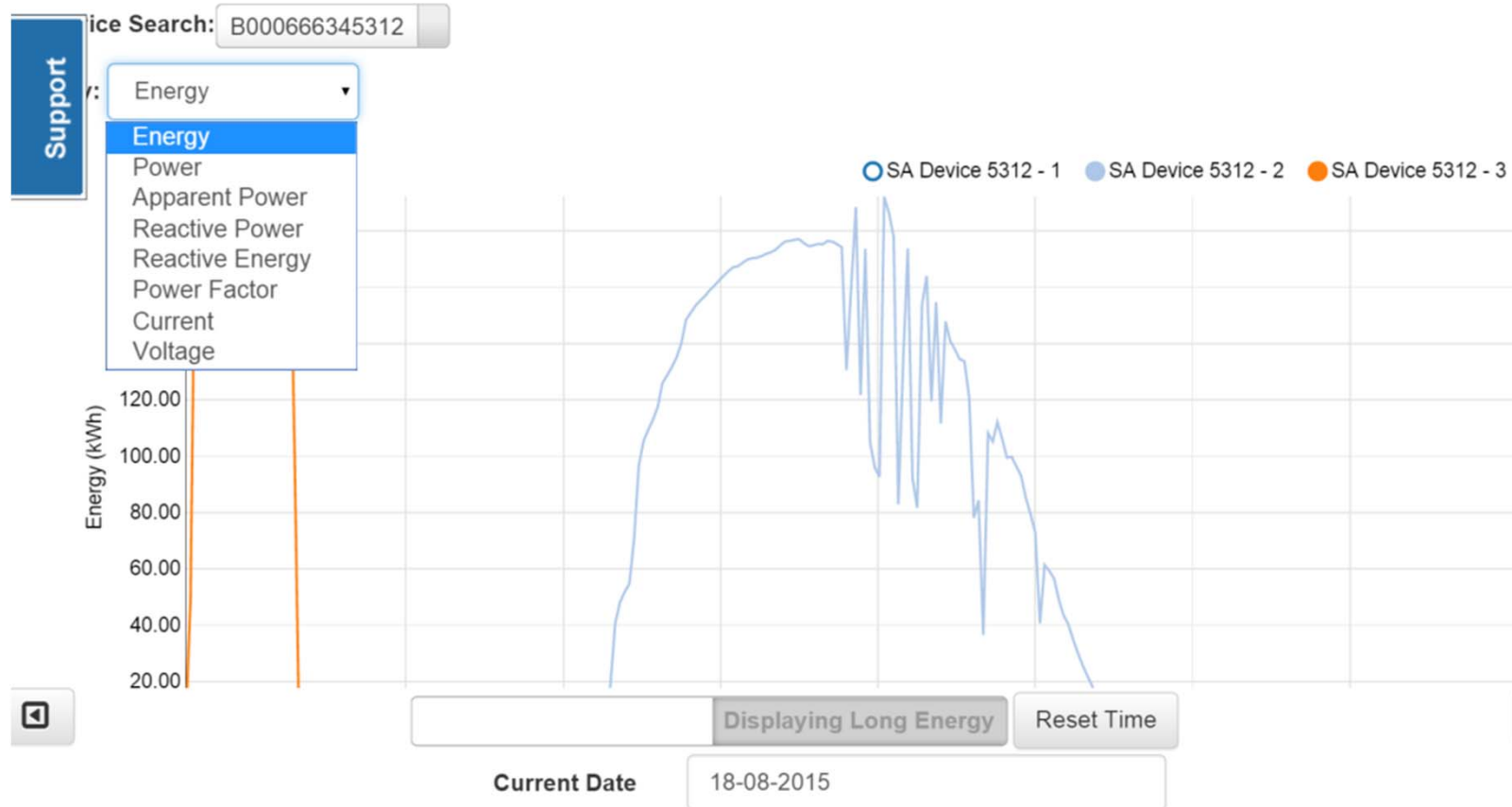
Works with any hardware or even none

Providing useful information

The screenshot displays the Solar Analytics dashboard for 'Dolier EMERALD BEACH 6kW'. At the top, the system status is 'We have found a string fault within your system'. A central live monitor shows '0.337 kW PRODUCED'. A large alert box states: 'A STRING FAULT HAS BEEN DETECTED. Solar Analytics has detected an underperformance issue with your solar system. Over the past week, your system has produced {MER_week} % of the energy expected from it. The likely cause is a disconnection of one or more PV strings or inverters. Your system installer has already been notified of this issue and will likely need some more information from you. Please follow the steps listed here before contacting your installer.' The steps to resolve the issue are: 1. Check your inverter and note any error messages. 2. If possible, note the power value (a number of W or kW) for each 'input' during a sunny period. Many inverter displays will cycle through values and show something like P In1 143 W, P In2 887 W, where In1 and In2 refer to input 1 and input 2. 3. Contact your system installer with the information we have supplied you plus any additional information you have been able to note from the inverter. Buttons for 'CONTACT INSTALLER' and 'MARK FAULT AS RESOLVED' are provided. The dashboard also includes consumption charts, a savings report, and financial metrics: \$123.00 Solar savings, \$339.21 Spent from the grid, and \$3.10 Sold to grid.

- How to fix your system
- When to install batteries
- How to save energy

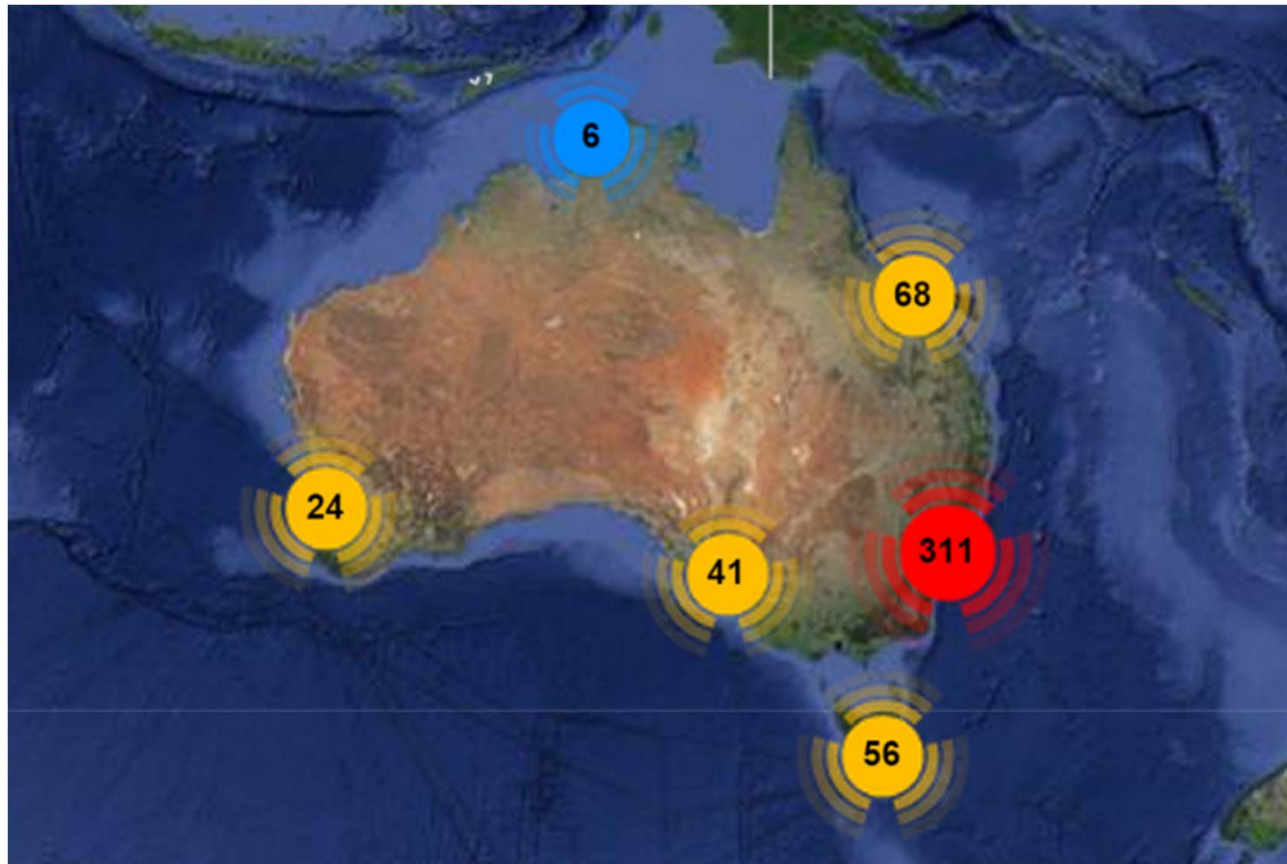
Providing detailed information



Distributed via solar retailers



Current Status: 506 Monitored Sites



People

- **Stefan Jarnason**, Co-founder and Managing Director



- **Valantis Vais**, Co-founder and Board Member



- **Dr Renate Egan**, Co-founder and Commercial Director



- **Dr John Laird**, Co-founder and Software Development Manager



- **Dr Jonathon Dore**, Head of Data Strategy & Analytics



+ 10 (software dev, design, sales, service, ops & analysis)

+ Co-op

History



Choose Suntech, Choose Australian Technology

Envais Solar (Valantis)



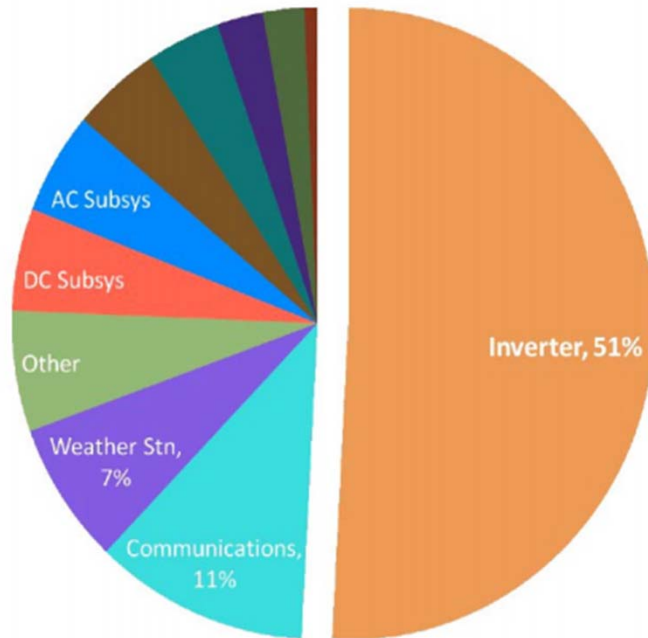


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Breakdown of PV system failure

Frequency of failures per affected subsystem, SunEdison, 2008-2010



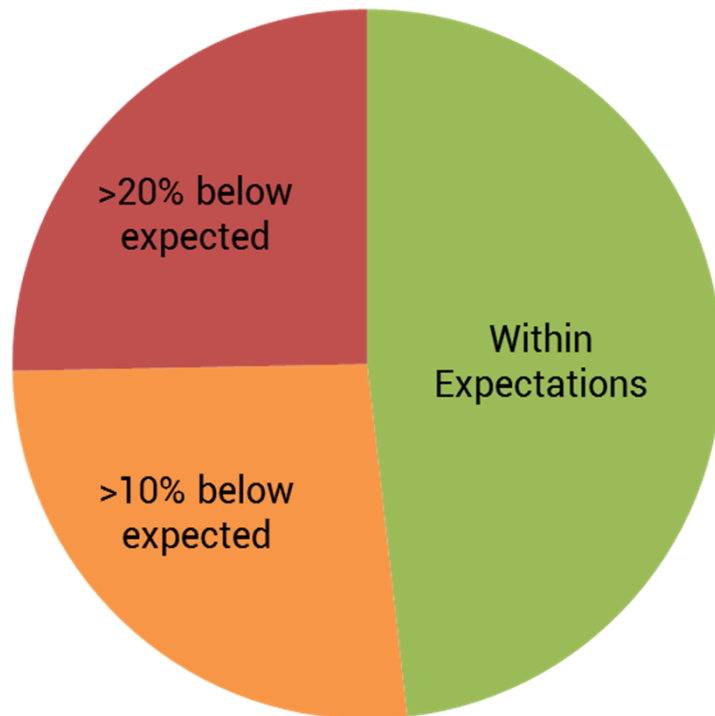
Source: SunEdison. (2011, January). *Owner/Operator Perspective on Reliability Customer Needs and Field Data.*

Solar Analytics Data

- 26% systems underperforming
- 12.1% annual fault rate

Breakdown of PV system underperformance

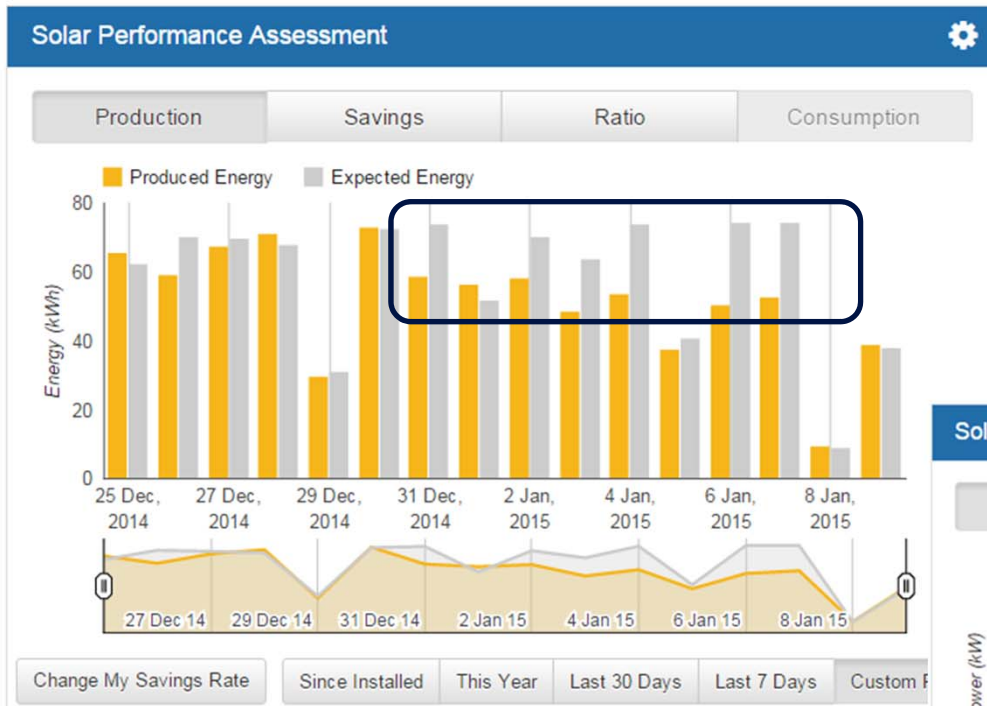
Analysis of 8000 AusGrid PV systems



- Earth leakage
- Soiling
- DC or AC Isolator
- Wiring or connectors
- Intermittent inverter issue
- Microcracks
- Hot spot
- Potential Induced Degradation

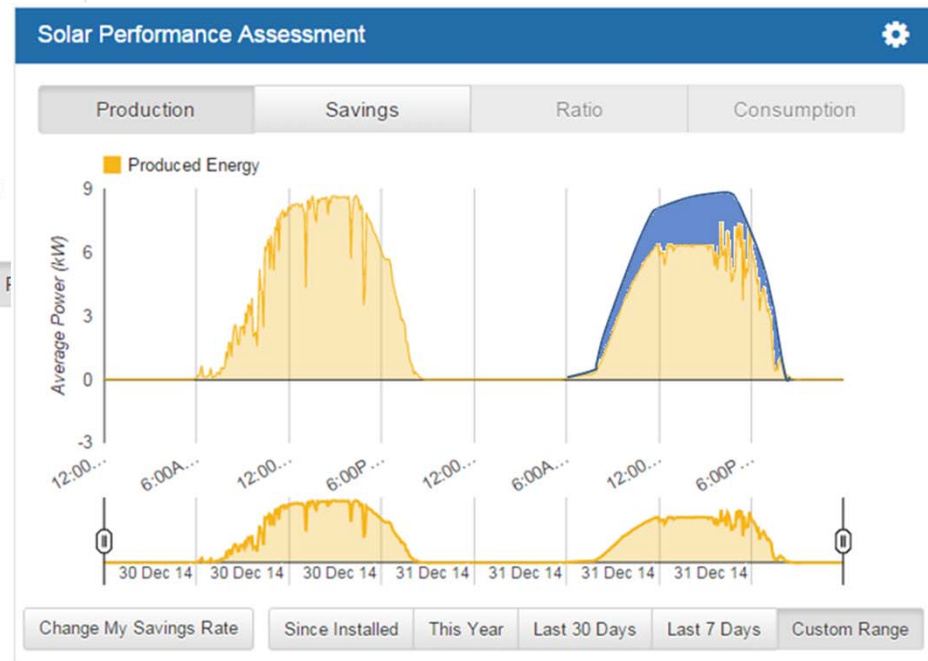
Performance lessons from the real world,
SunWiz 2012

Case Study 1

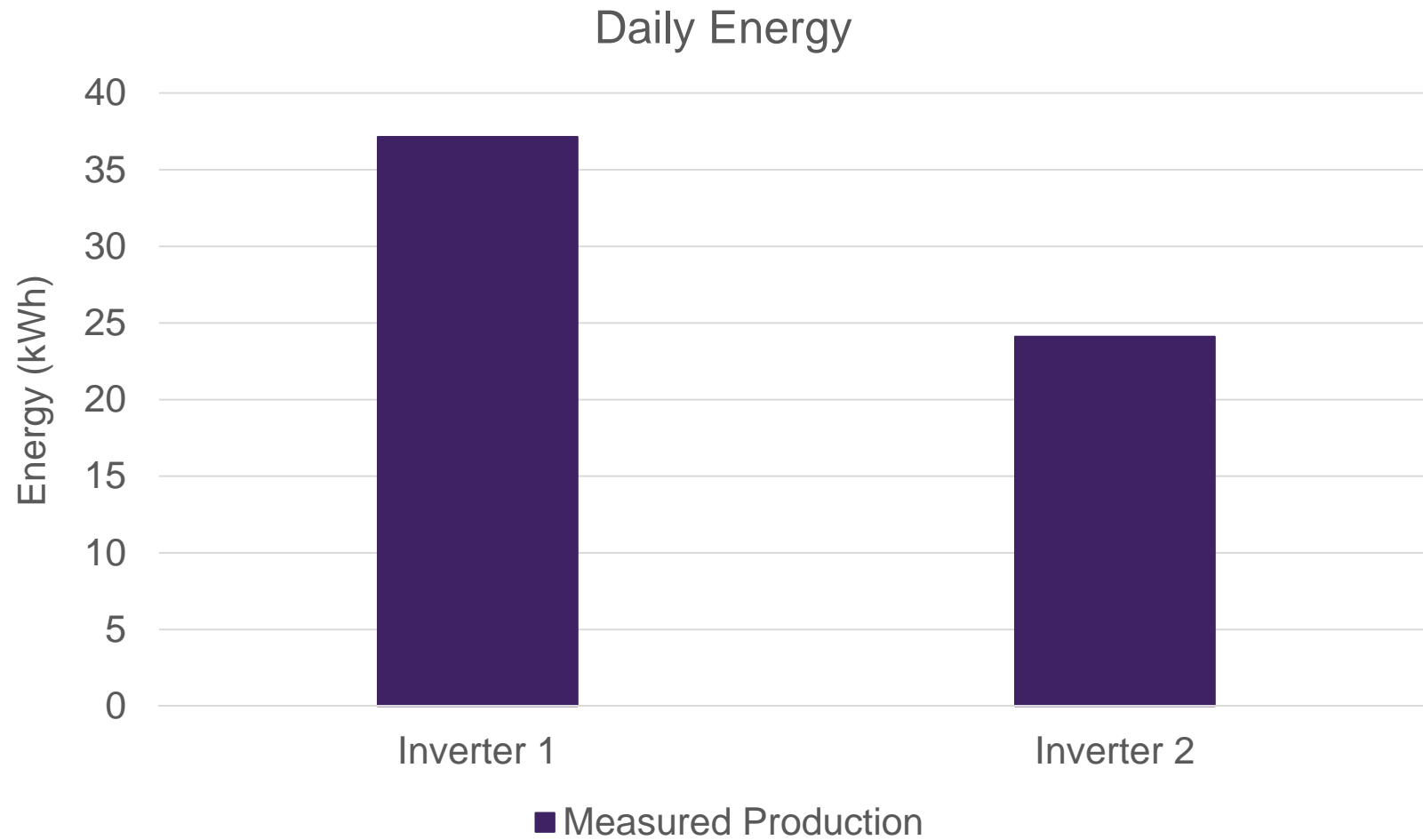


Intermittent string loss

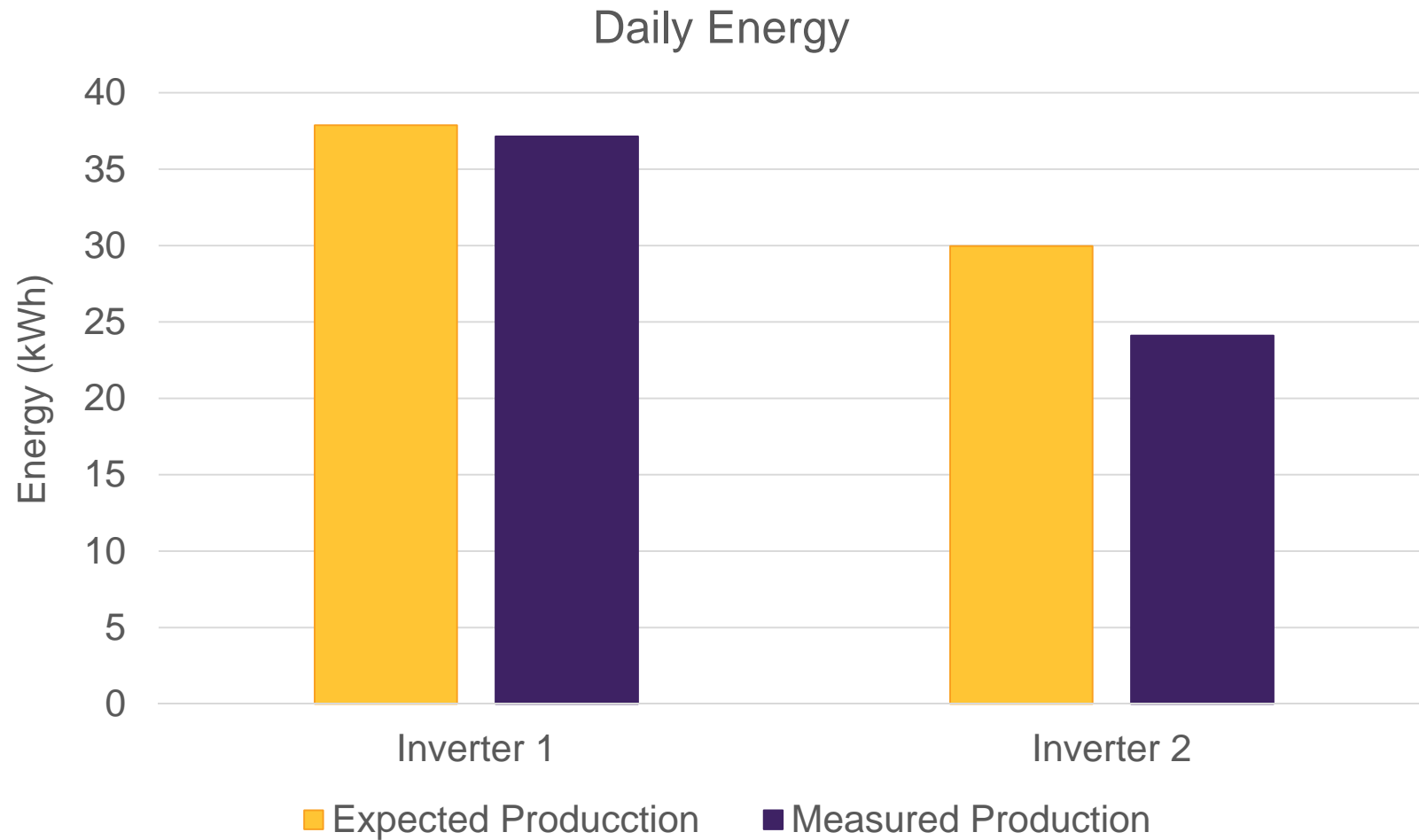
- 10kW system in Tasmania
- 7.5kW @ 32° NW and 2.5 kW @ 122 ° SW



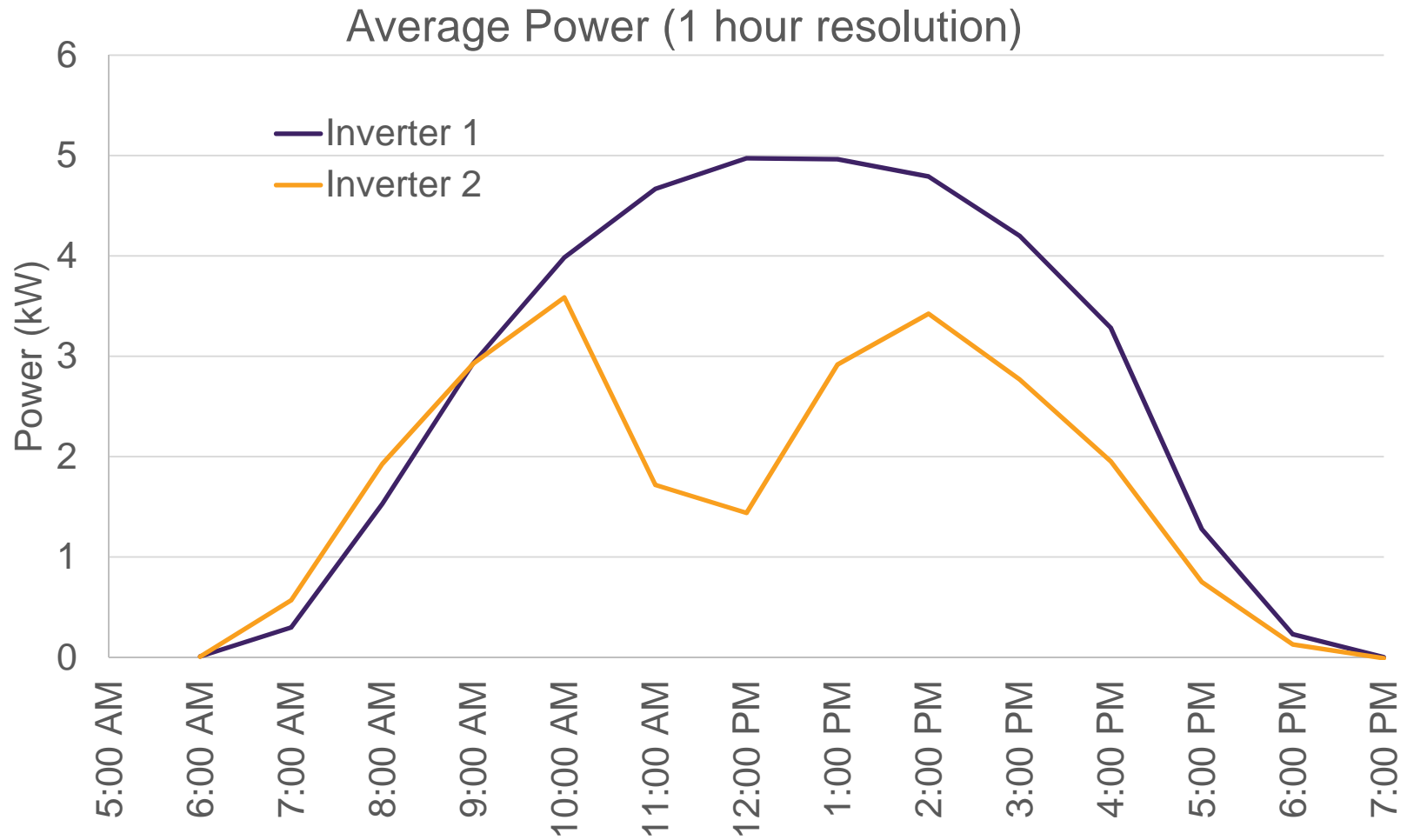
Case Study 2



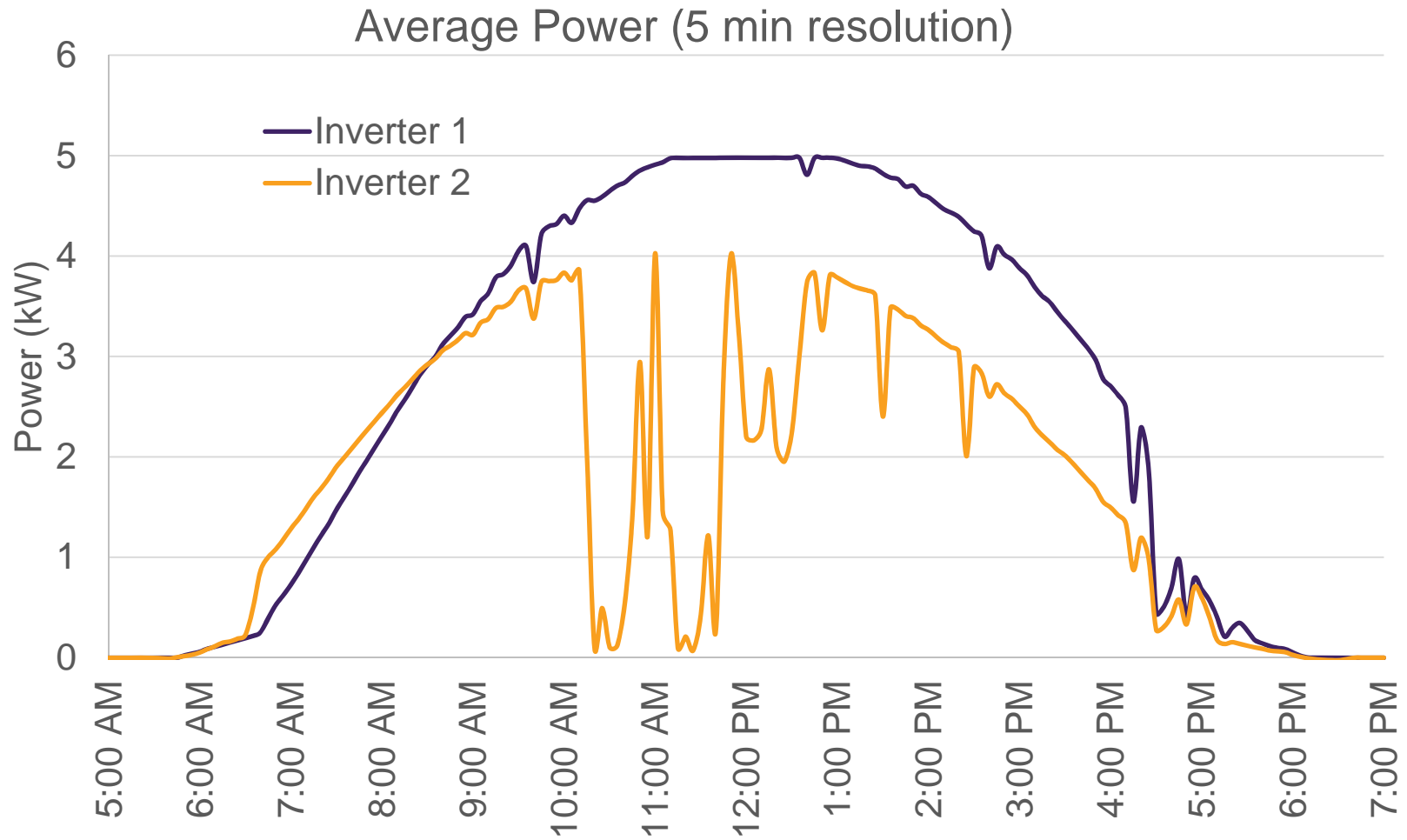
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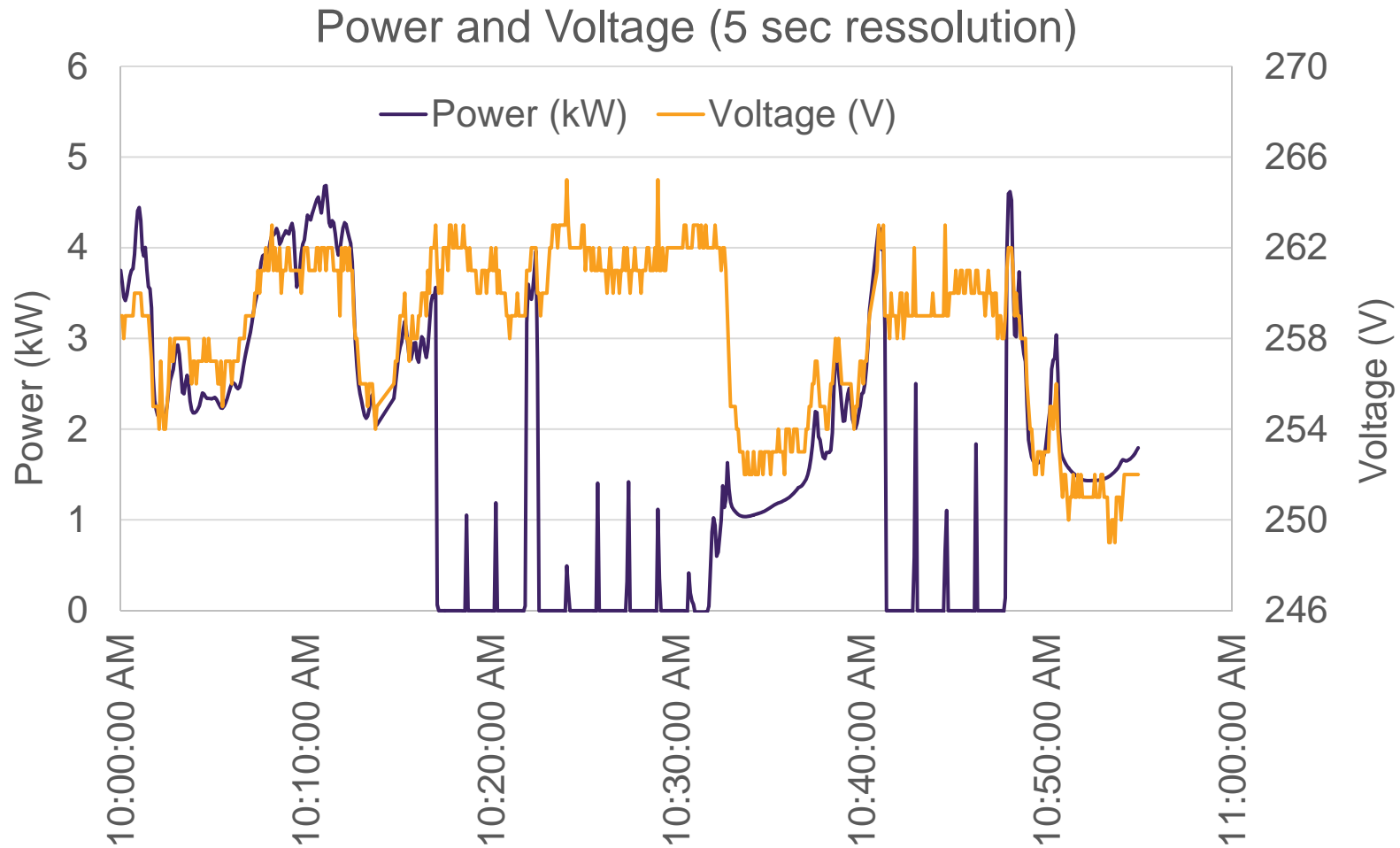
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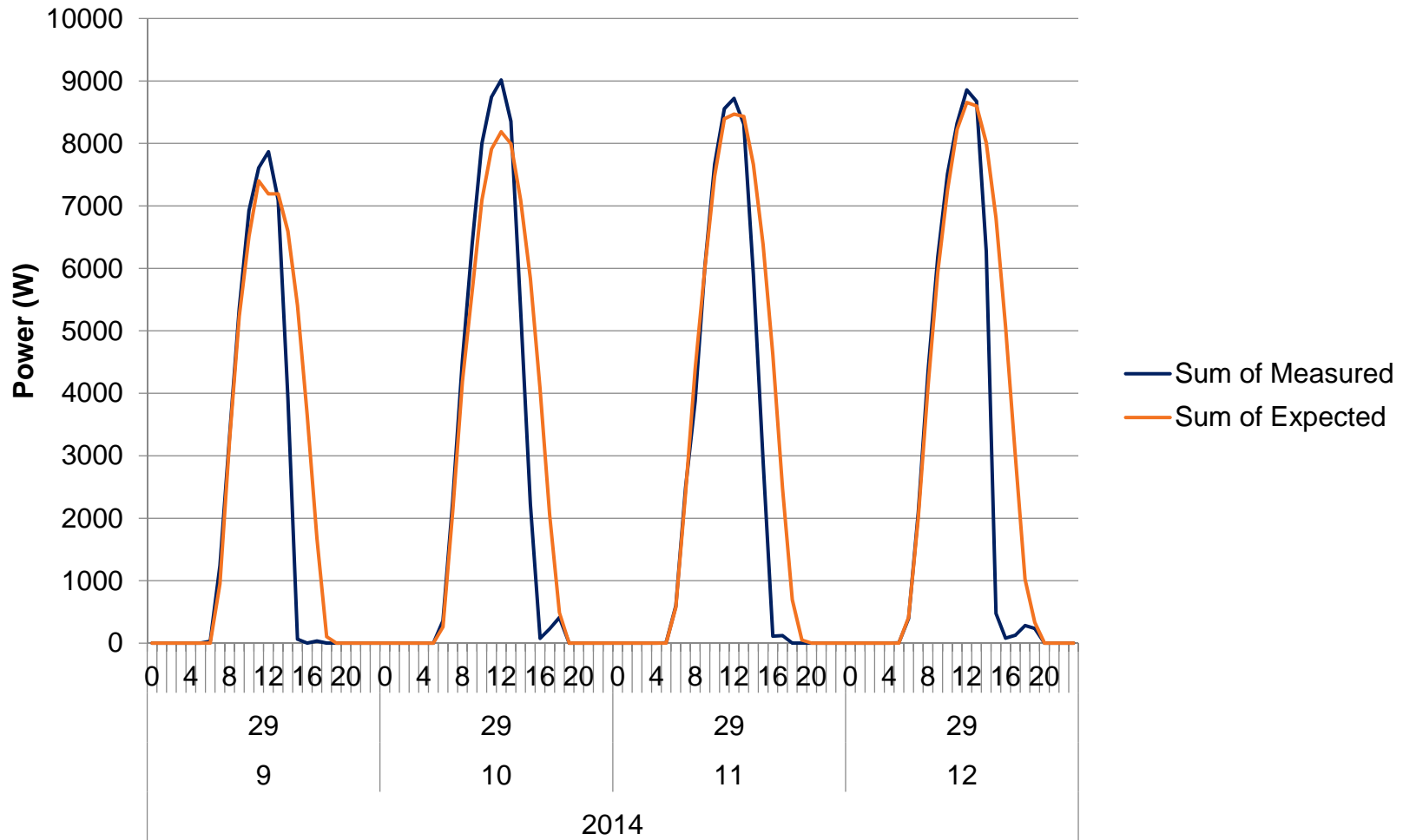
Case Study 2



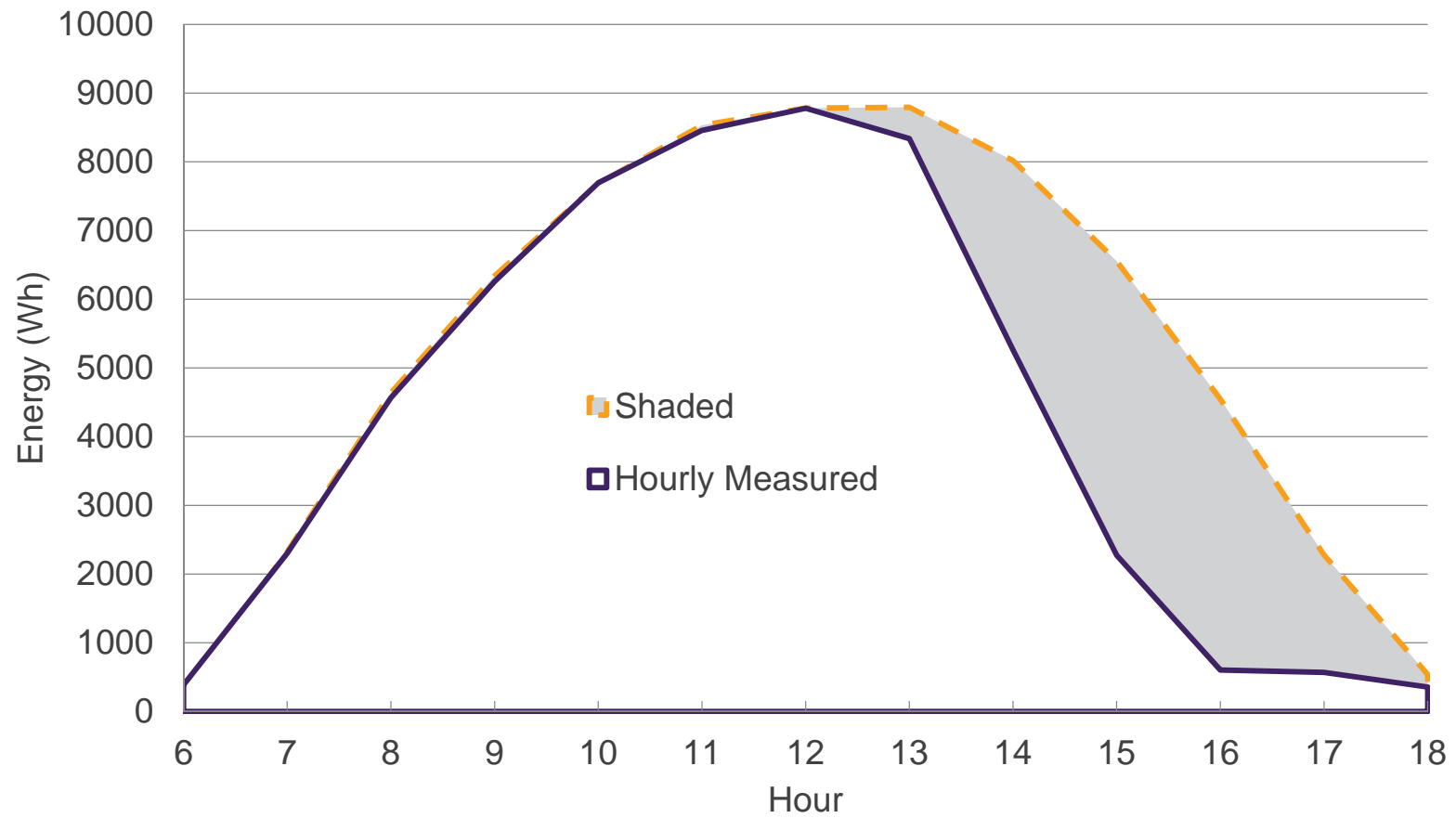
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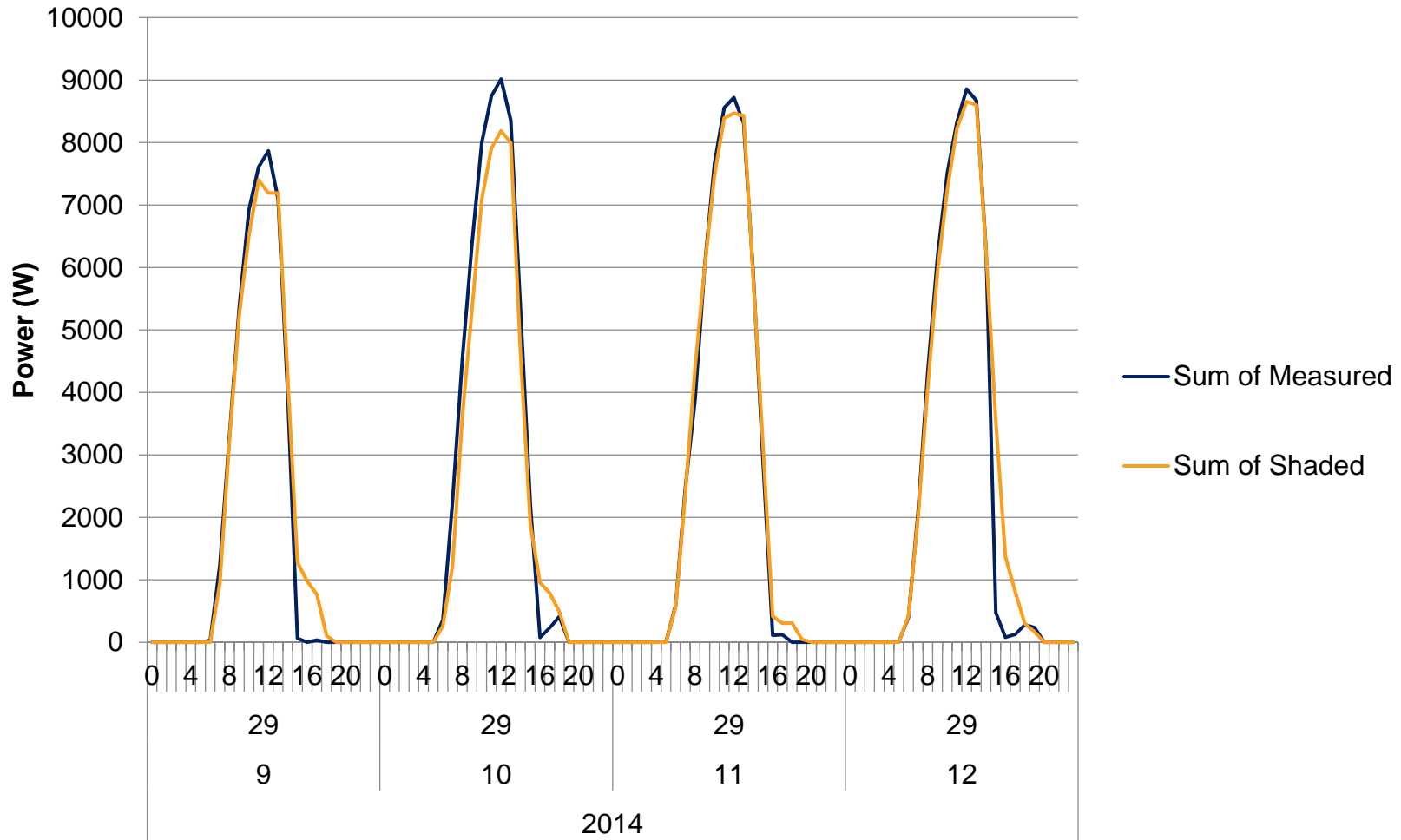
Case Study 3



Case Study 3



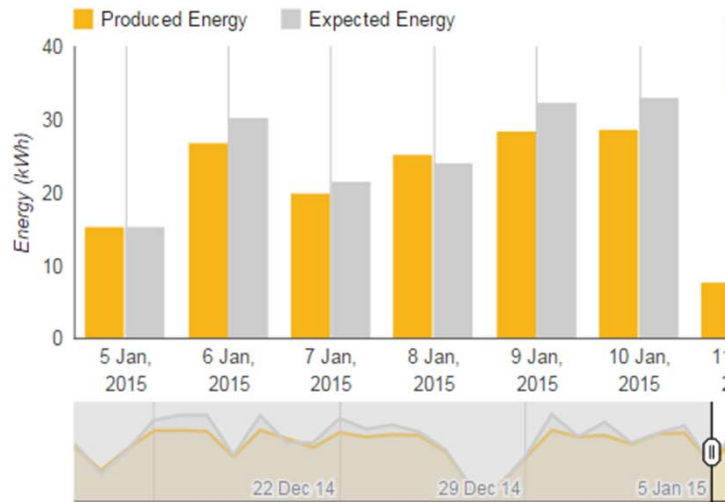
Case Study 3



Case Study 3

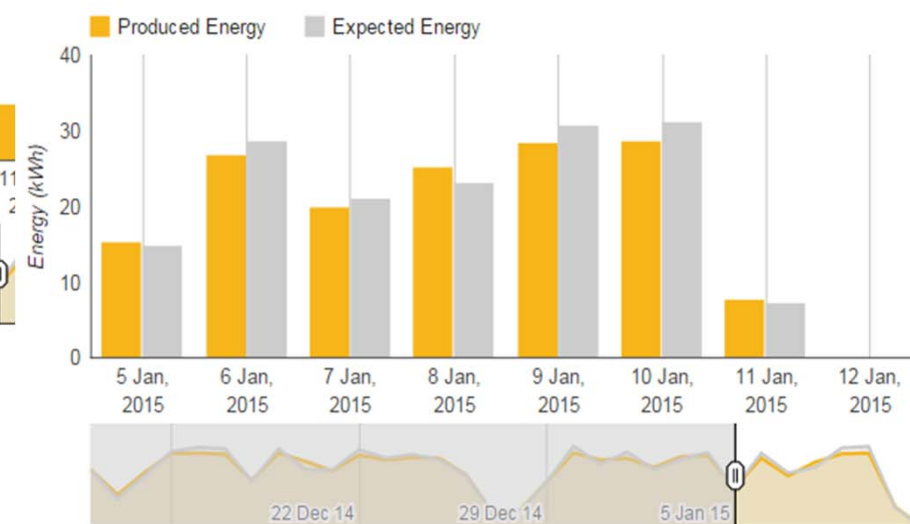
Solar Performance Assessment

Production Ratio Consumption



Solar Performance Assessment

Production Ratio Consumption



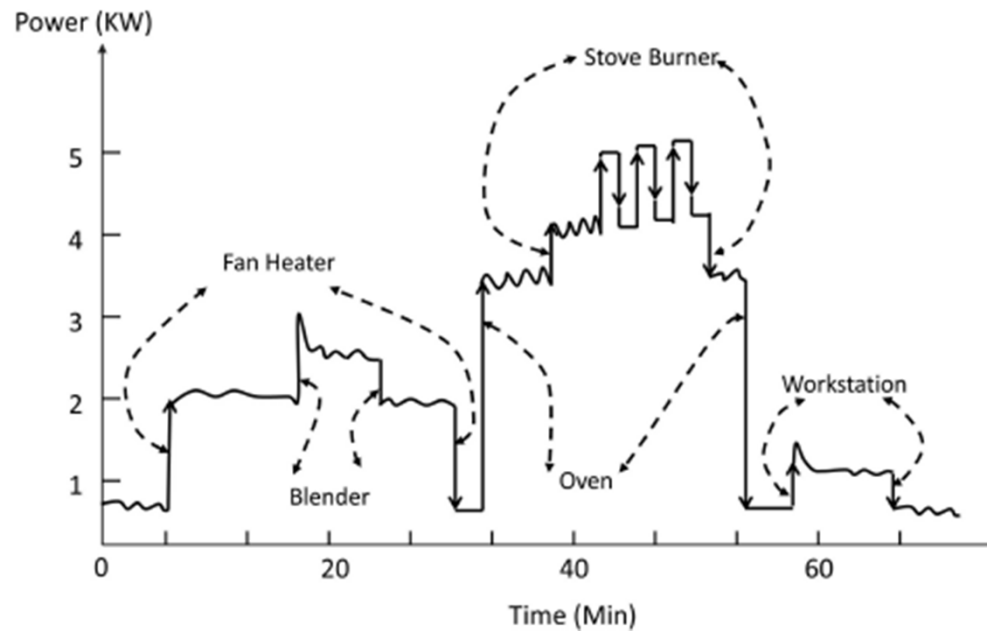


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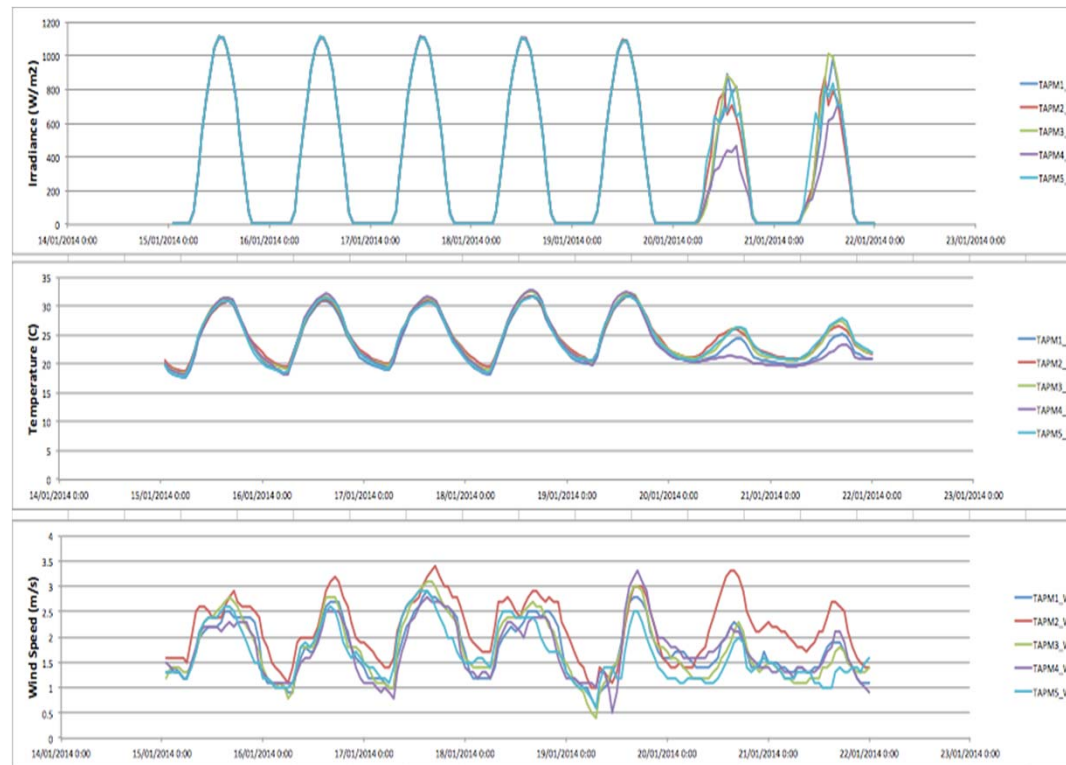
Research Projects

- Load disaggregation (Lachlan McDermid, UNSW)



Research Projects

- PV generation forecasting (Johnathan Lee & Rachel Oh, UNSW)



Research Projects



- PV generation forecasting (Bibek Joshi, UNSW)
- Household consumption forecasting (Baran Yildiz, UNSW)

Proposed Project

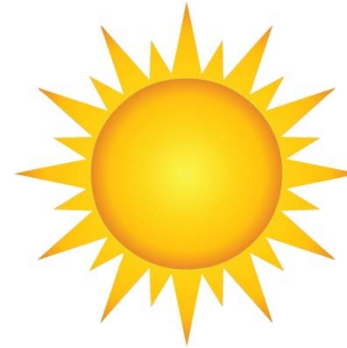


- Hardware development
- Home energy management
- Battery monitoring and optimisation

Future Projects

- ARC Linkage?
- Solar Hot Water?
- Machine Learning?
- Grid Management?

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