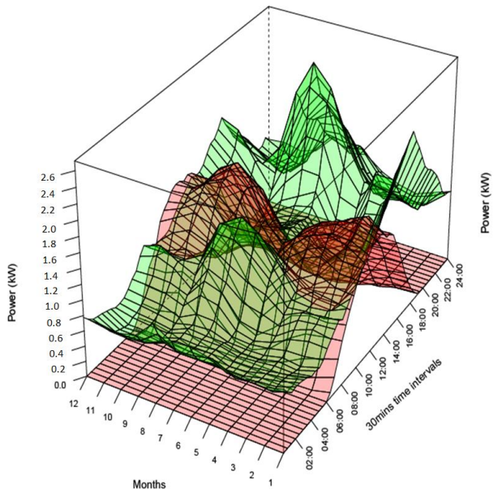
RP1013

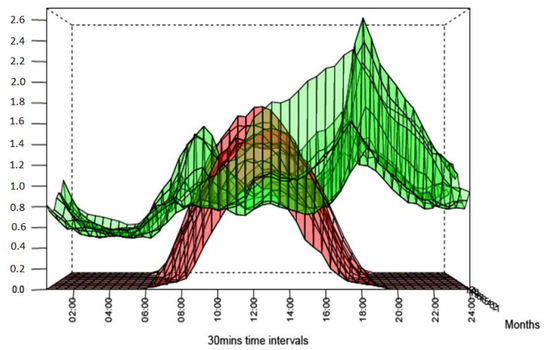
IMPACT OF PV ON NET RESIDENTIAL ENERGY DEMAND AND PEAK DEMAND?

Introduction

The purpose of the work is to better understand how PV implementation can impact on residential net energy demand and residential peak consumption patterns in the context of real-world deployment. In particular:

1. What's the potential for household PV





to reduce net residential energy consumption supplied from the grid?

2. What's the potential for PV to reduce net peak demand seen by the grid?

Data

A set of published data from utility Ausgrid has been released as a part of Australia's first commercial scale smart grid trial. More than 100 houses with PV.

- Time Span: July 2012 – Jun 2013
- Location: New South Wales, Australia
- Number of Households sampled: 3652

What's been measured:

- Measured data Resolution:
  - 30-minute interval
- Total Data points sampled:
  - 0.32 billion data points

Results

Figure 1: Average electricity consumption (green) and PV generation (red) pattern for a suburb in NSW (Wallsend) across a 12 month period. Monthly average daily values with half hour resolution.

Figure 1 illustrates the average daily half hourly households' electricity demand, and PV generation for a typical suburb (Wallsend north of Sydney), across 12 months in FY2013 in NSW Australia. It reveals a clear pattern where peak demand hours and PV supply does not match well at all, in particular on a half hourly basis where residential peak starts in the later evening hours.

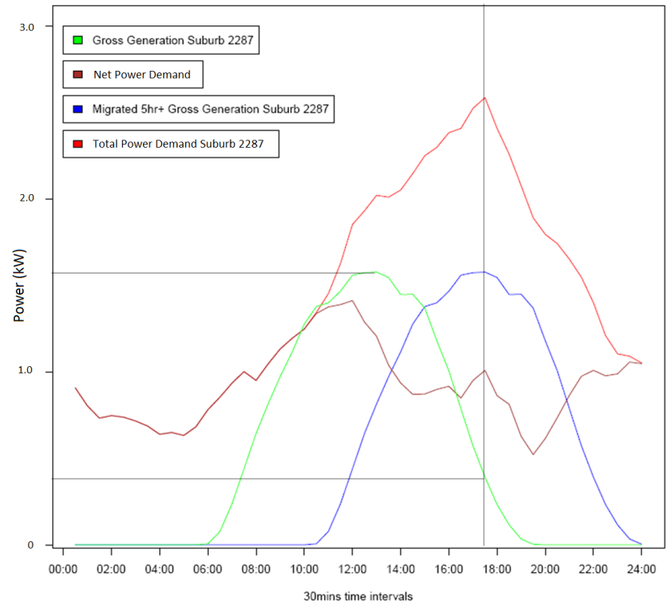


Figure 1: Mean energy consumption and generation pattern for a suburb in NSW (2287) + Simulation on net power demand for 5-hour lag on PV Generation output during Jan

Figure 2 illustrates the average daily mean half hourly households power demand, energy generation of households with PV for a suburb during January. Also, a simulation of PV output have been generated with a 5 hours lag time to match the residential peak demand hours in the evening. It has shown remarkable peak reduction potential in the Net Power Demand simulation, which is generated by subtracting real residential power demand with shifted PV output. Also, during summer seasons, PV have demonstrated considerable capability of offset peak hour demand even without storage (still output 25% Peak PV Generation)

Conclusions

- Highlights PV generation does not match well with peak hour demand in residential sector
- Simulation of shifting PV generation to match evening peak hours reveals significant potential of peak demand reduction opportunities.

Further information

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