

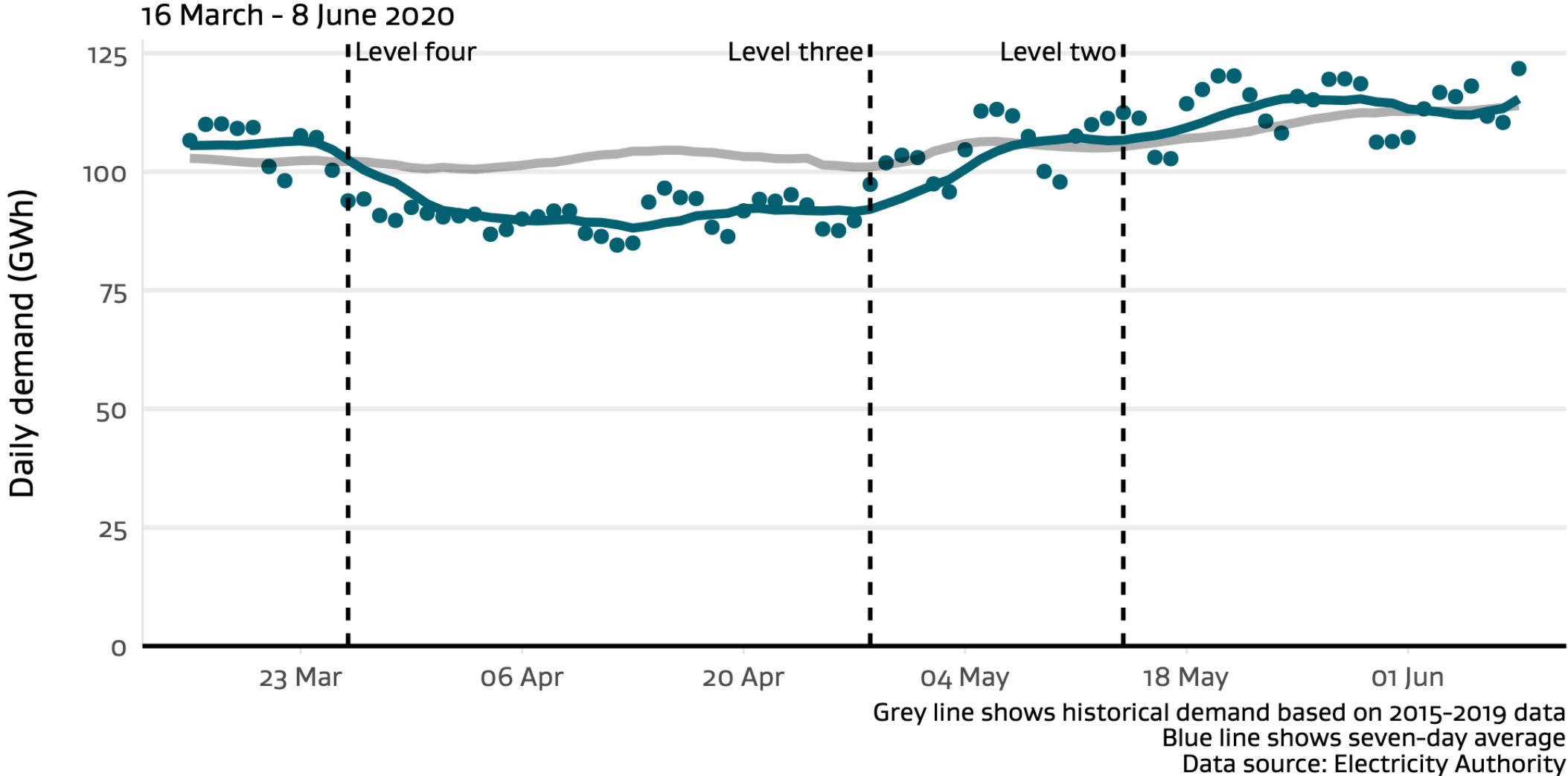
How do household electricity consumption patterns change after PV adoption?

19th of November 2020

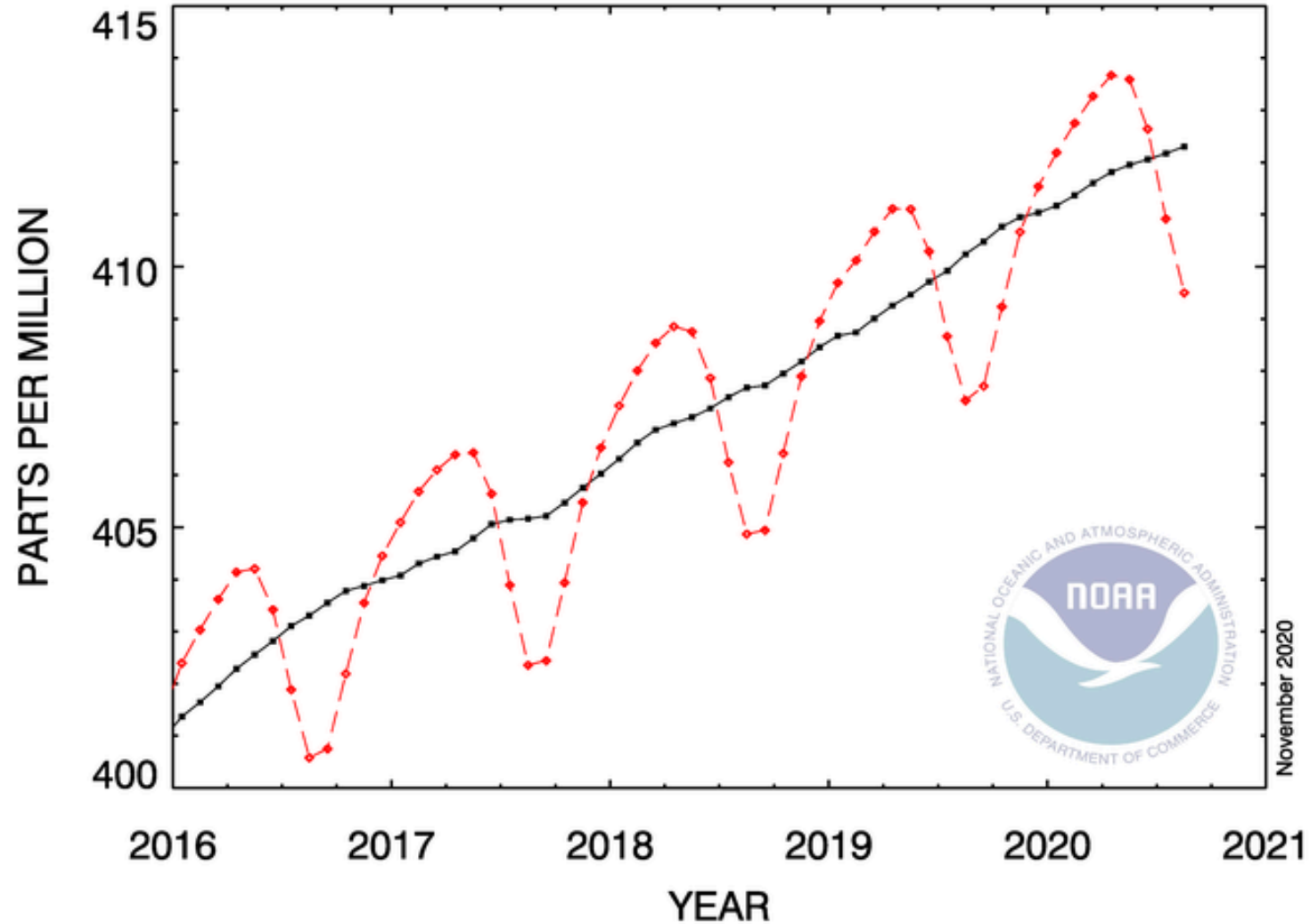
Carsten Dortans

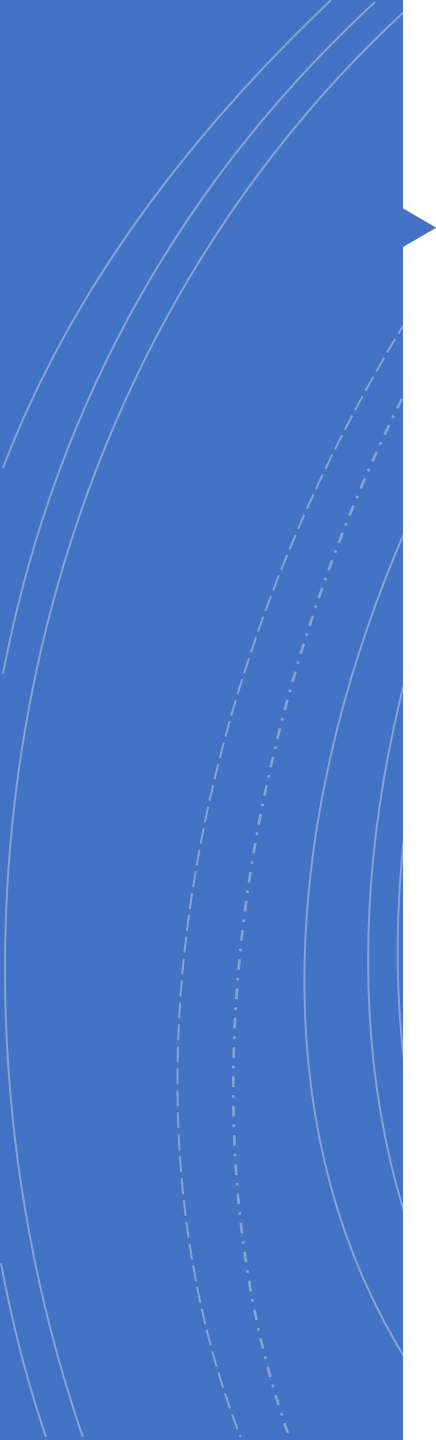
14th OERC Symposium

Daily *electricity* demand in New Zealand



Recent global monthly mean CO₂





“It does look like CO₂ continues to increase at the same rate as in previous years, which illustrates that we need to make aggressive investments in renewable energy sources to tackle our global heating emergency.”

National Oceanic and Atmospheric Administration, 2020.

Solar generation in New Zealand

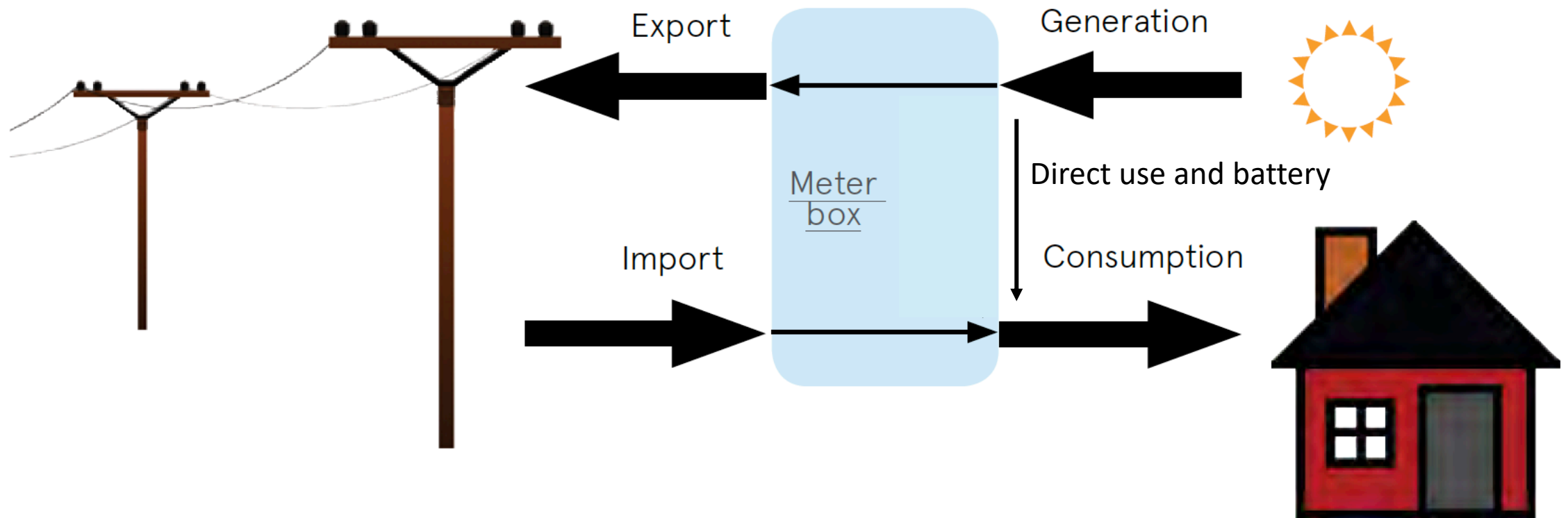


Solar thermal systems

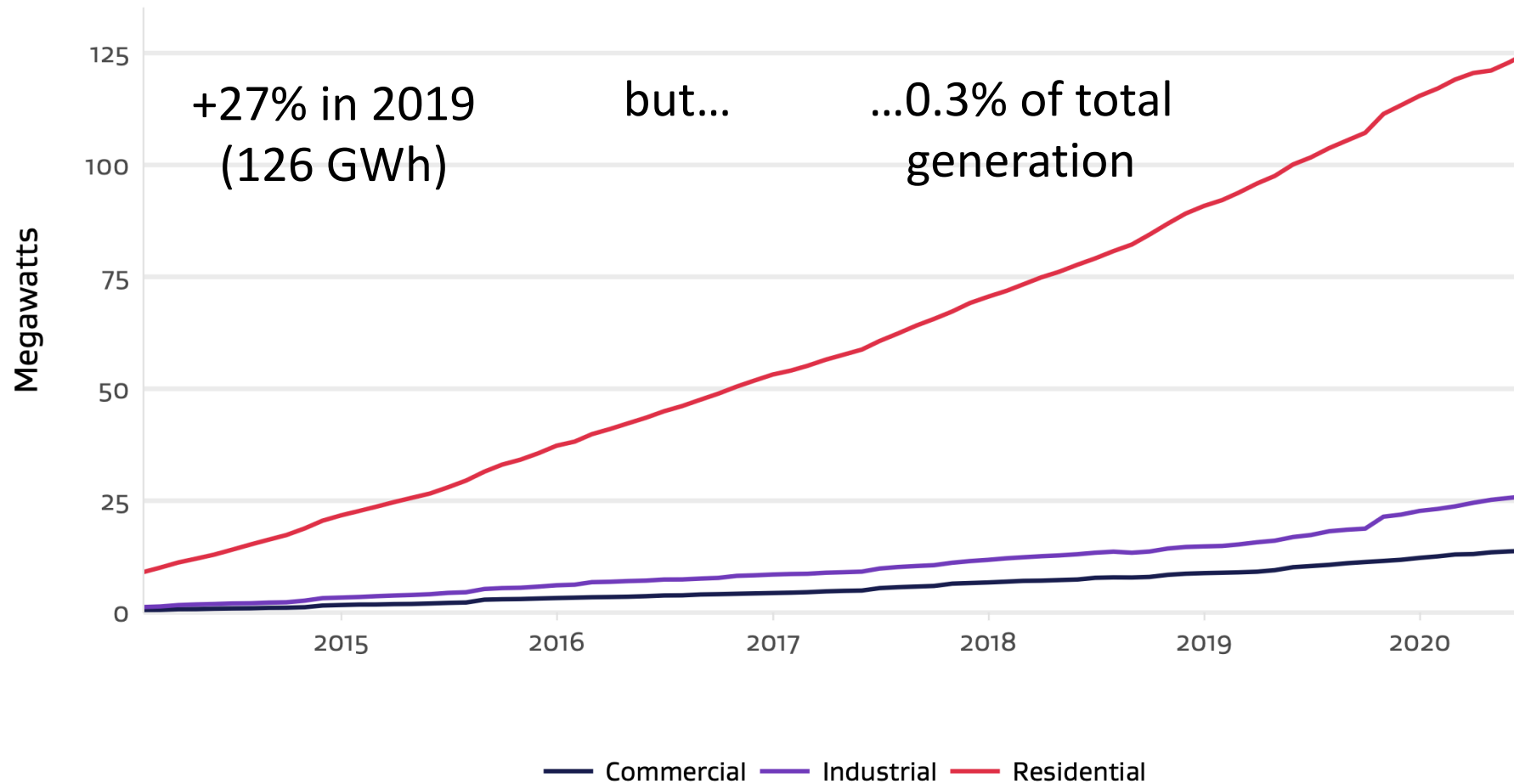


Solar PV systems

Solar electricity: How it works



Solar capacity by sector

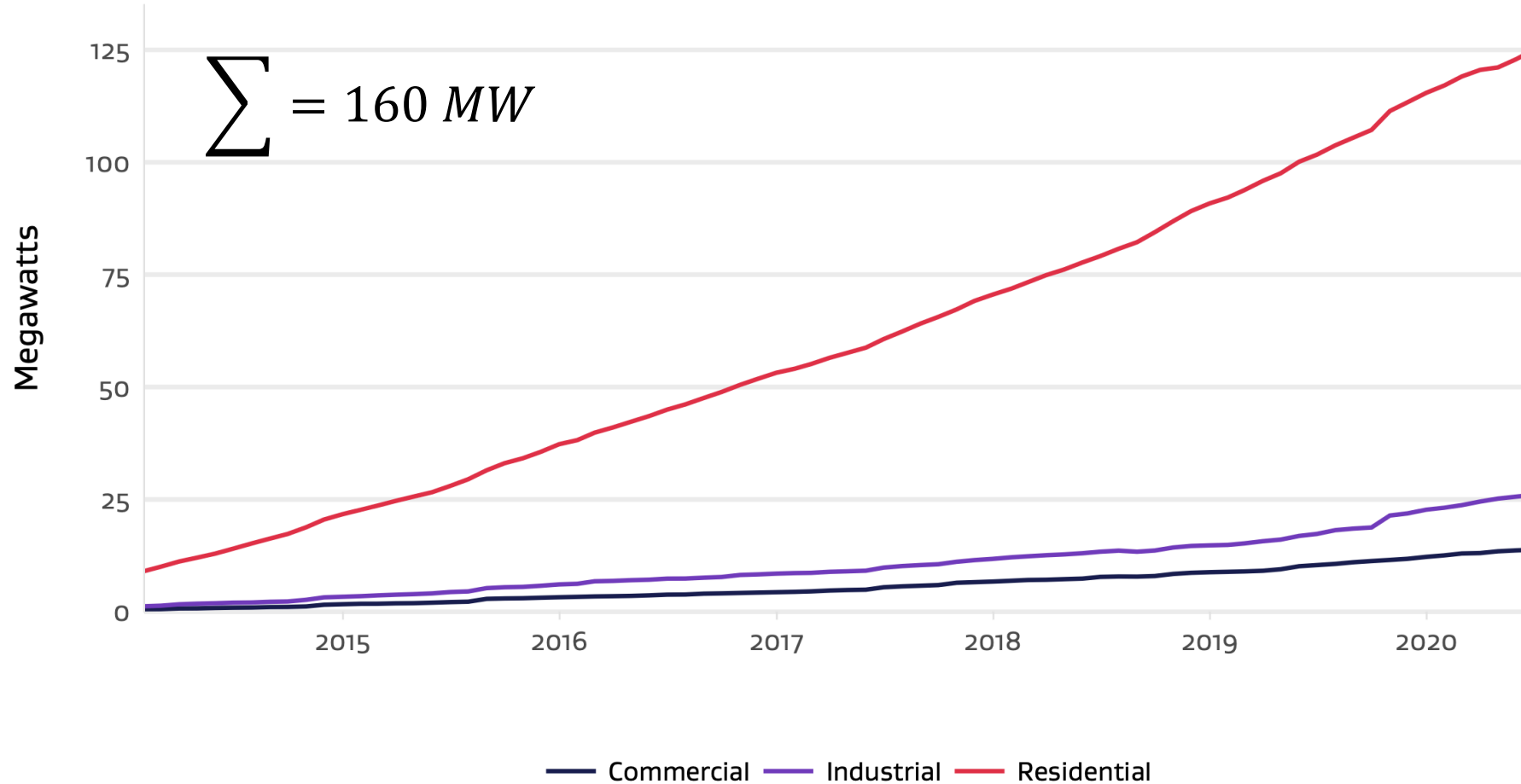


+27% in 2019
(126 GWh)

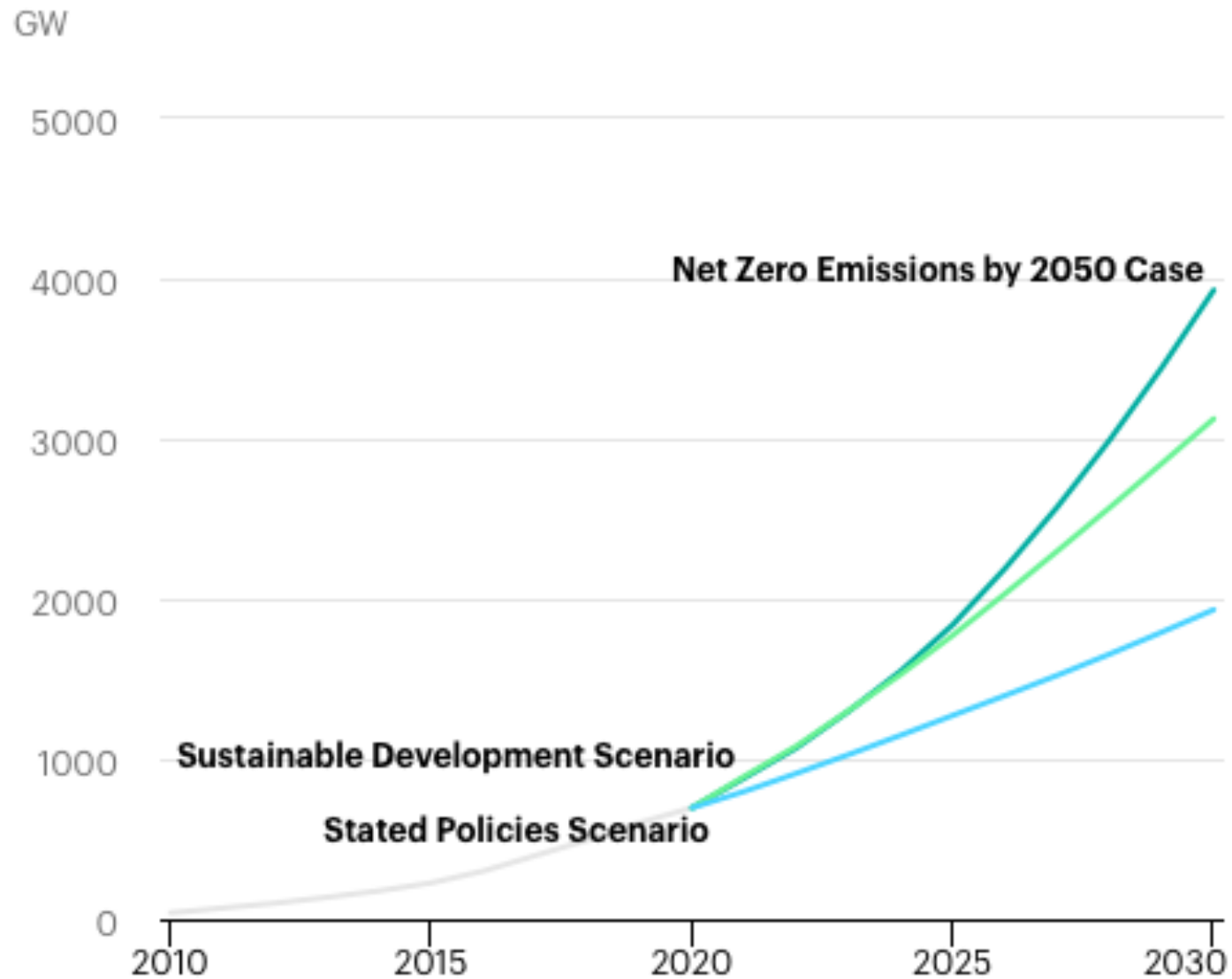
but...

...0.3% of total
generation

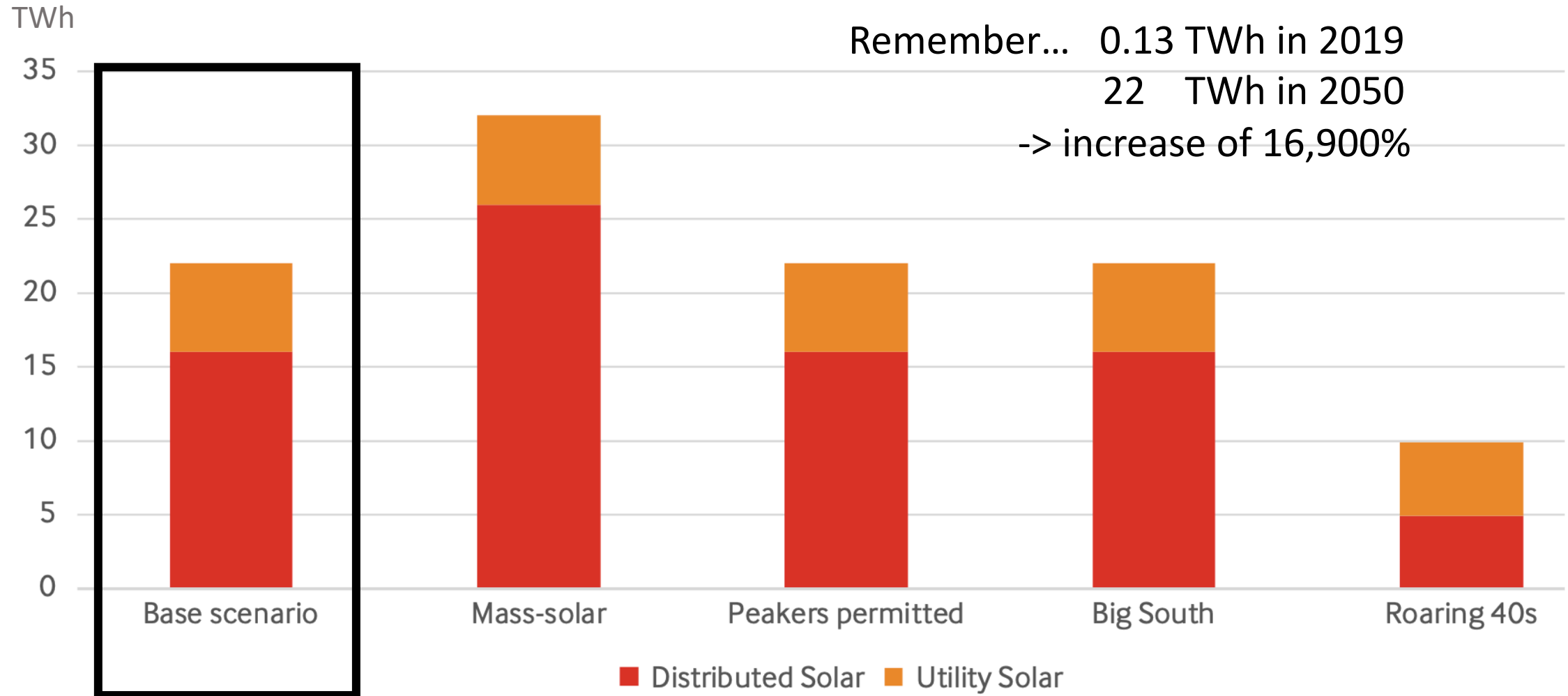
Solar capacity by sector (2)



Global installed solar PV by scenario



Solar generation in NZ in 2050



Solar and its challenges...

- Aligning solar with evening peak
- Aligning solar with winter peak
- Building solar in the right places

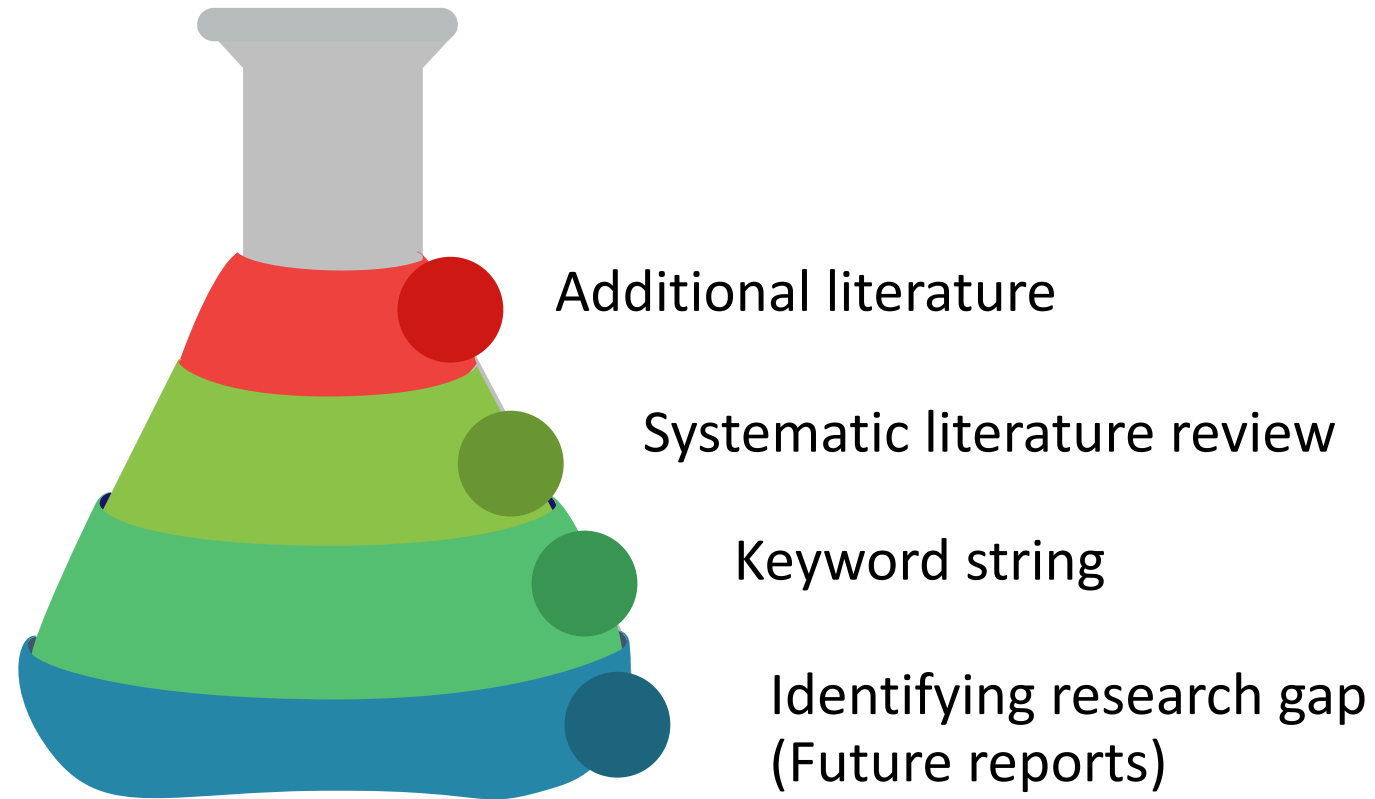




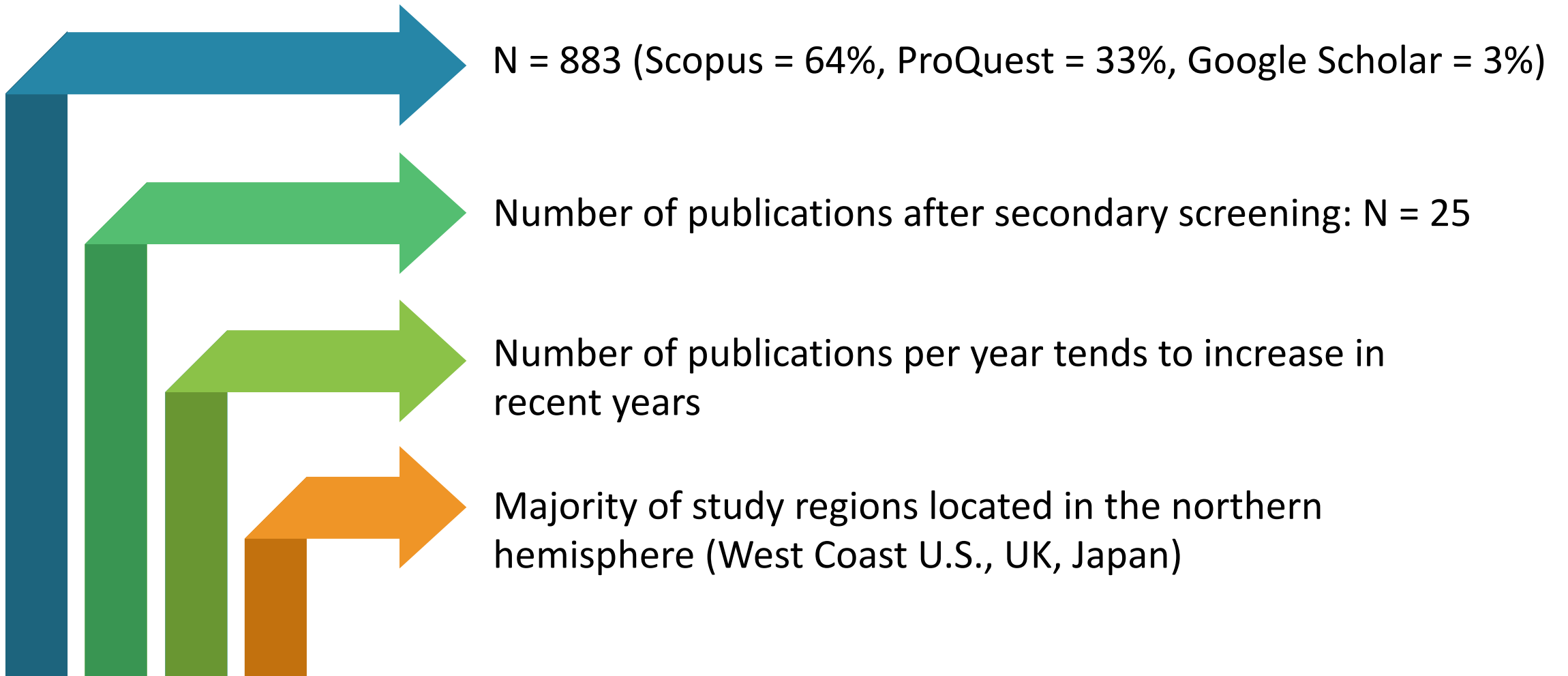
How do electricity consumption patterns change after the adoption of solar?

What impact does the adoption of solar have on the local and national electricity grid?

Methodology



Results



Results (2)

Findings are ambiguous...



- 01 Decrease in total electricity consumption
- 02 Increase and decrease in total electricity consumption over time
- 03 Unclear results

Results (3)

**Reduction of 15% of
initial consumption**
Darby (2006)

**Maximising/Minimising
self-consumption**
Sommerfeld et al. (2017)

**“Reduced” electricity
consumption**
Rai & McAndrews
(2012)

**Reduction of 9.5% of
initial consumption**
Borbely & Kerai (2014)

**Threshold of
3,500kWh p.a.**
Haas et al. (1999)



Results (4)

The ambiguity is caused by:



Self-reported vs. monitored data



The study size



The focus of the study



The study participants and their environment

Where to from here?

How do these findings guide my research?



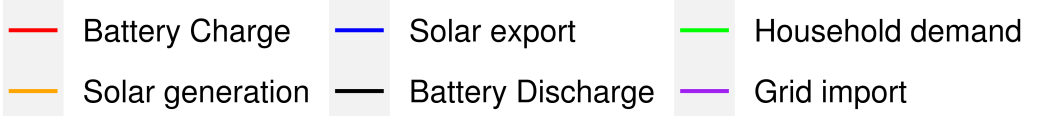
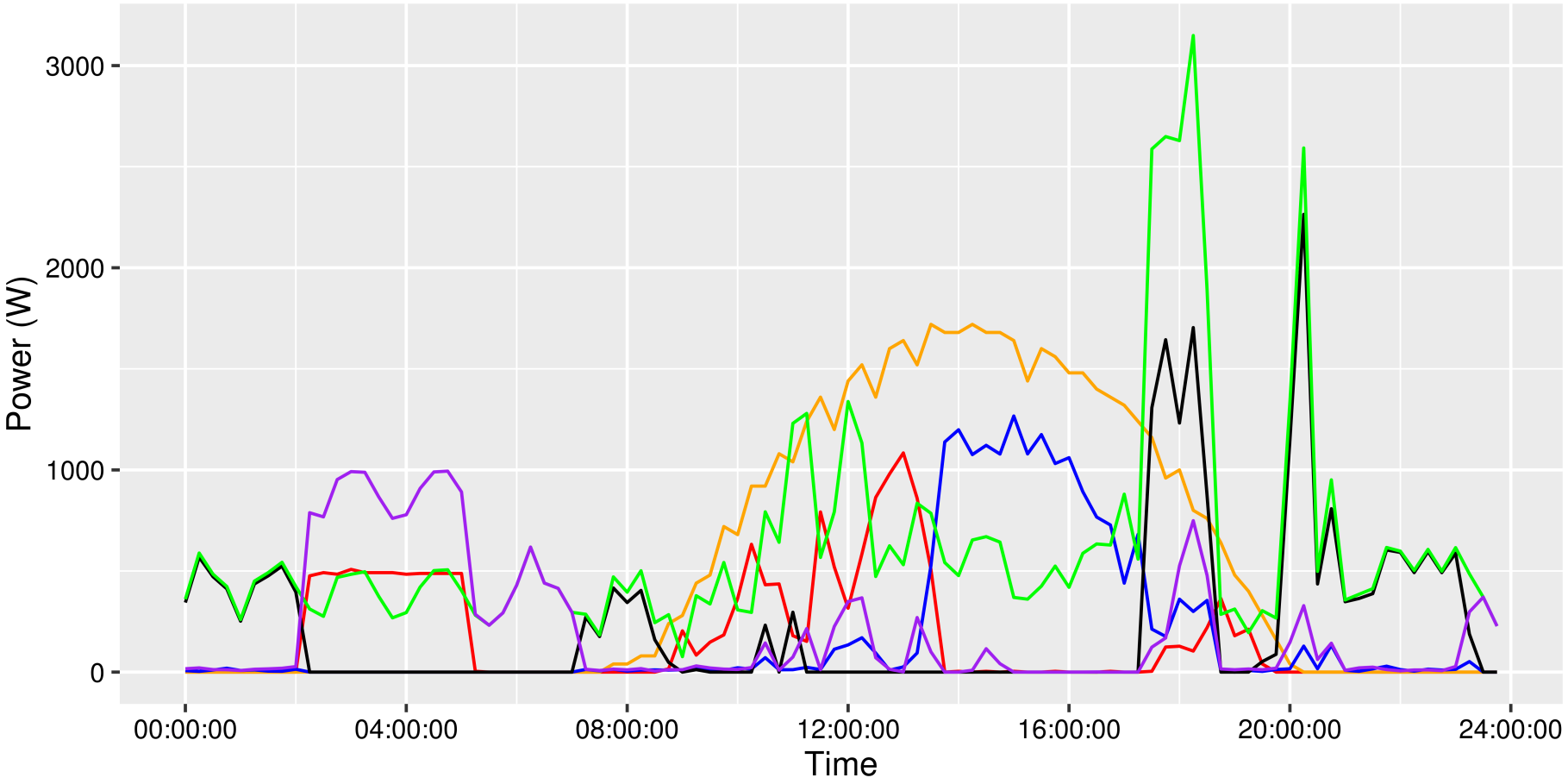
- Pursue a more holistic approach by using self-reported (interviews) and monitored (consumption) data
- Using two data sets from large NZ energy companies
- Focus on how the changed consumption pattern looks from *the grid* perspective



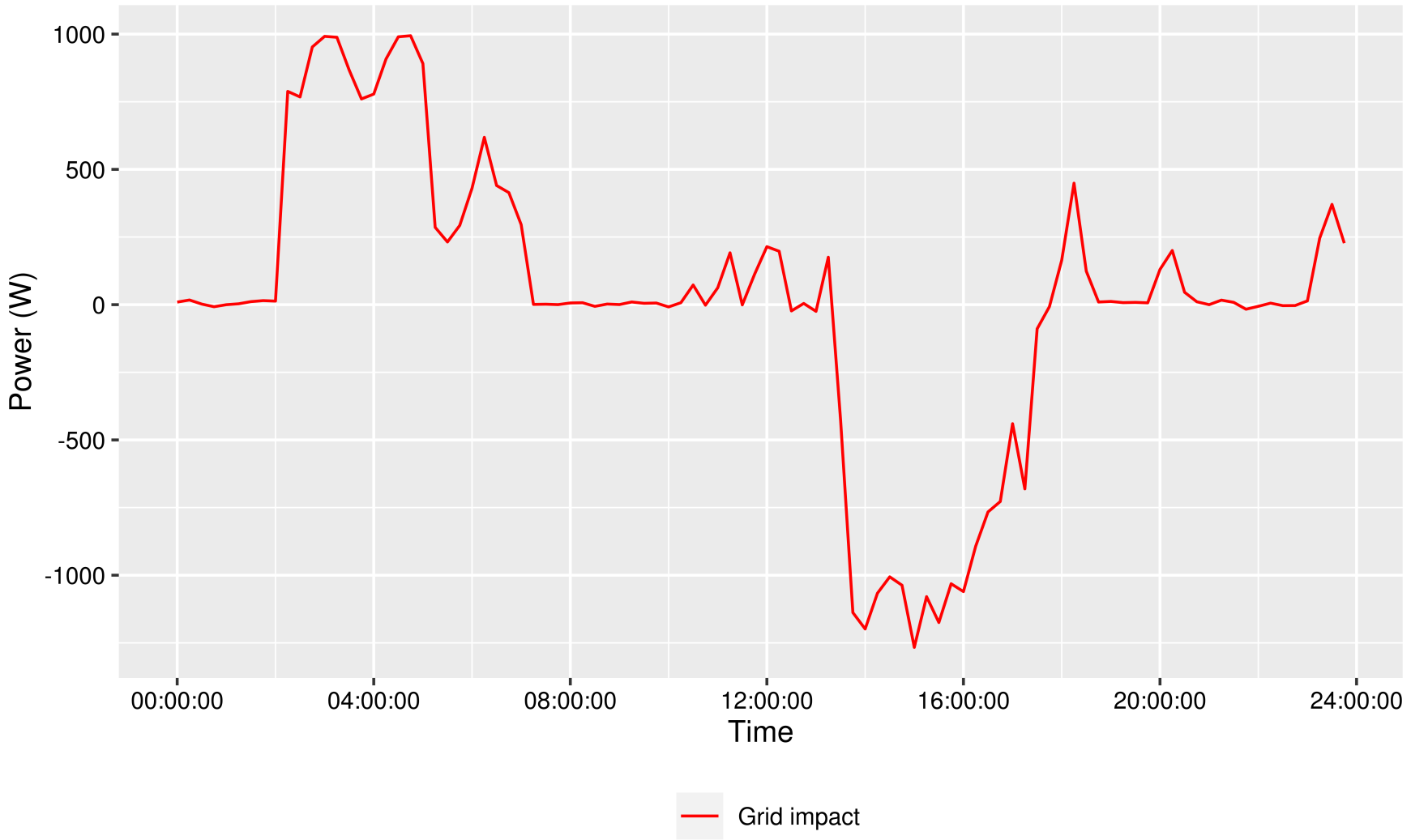
Progress so far:

- Ethics application approved
- 22 interviews conducted (more planned)
- Data agreement signed
- Literature review in final stages
- Preliminary results (qualitative) indicate no change in total consumption but the timing of activities

Preliminary data



Preliminary data (2)



Thank you for your attention!

