Peak Power Demand & Energy Storage

A Webinar Presented for:

green power ACADEMY **&** ELECTRICITY STORAGE MARKETS 18 - 19 JUNE LONDON

by

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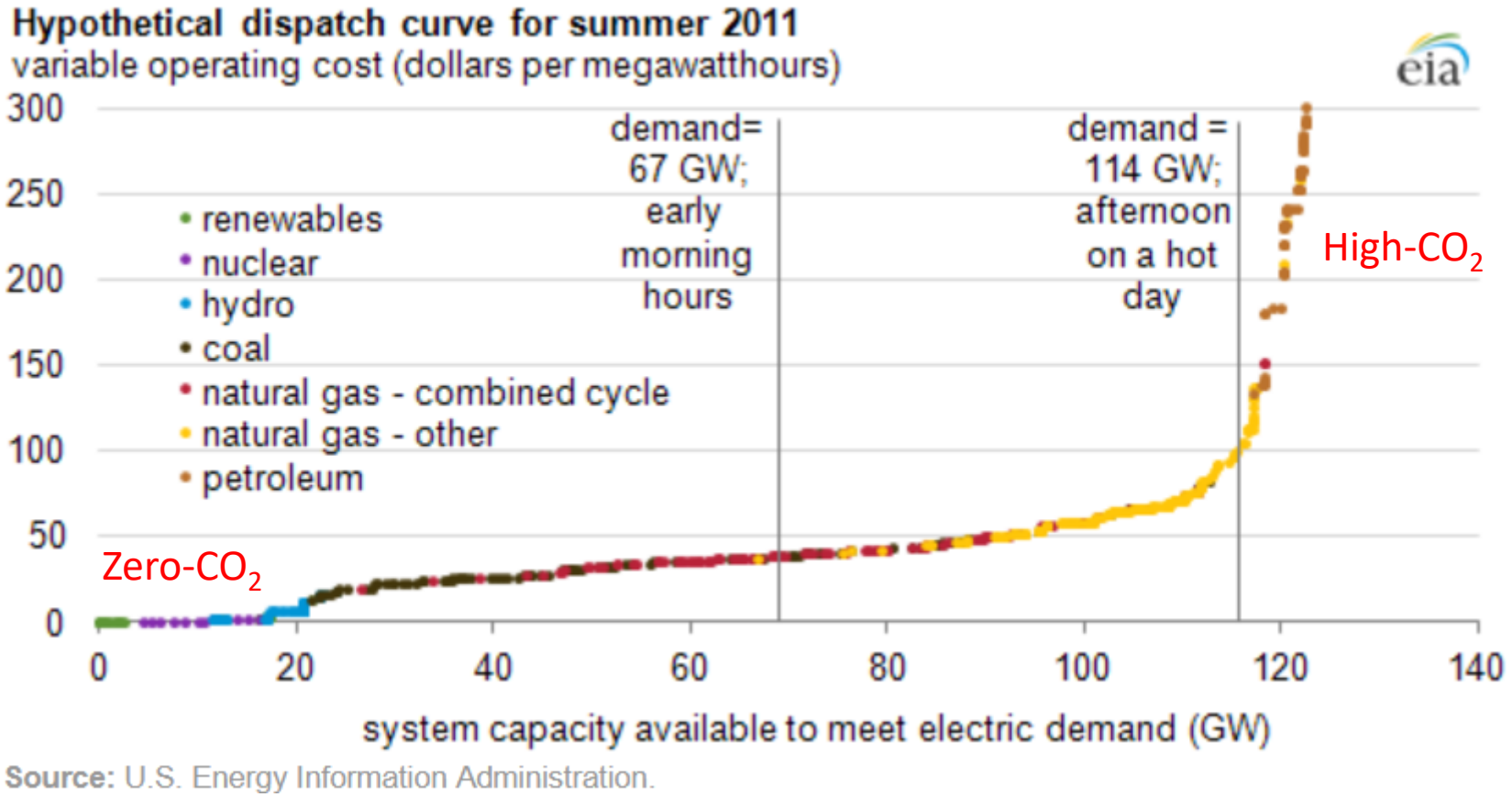
Why does Peak Power need Storage?

Because…

…it is usually **short-lived**
but **expensive** to provide,
both in terms of
energy cost and
system **capacity**;
and tends to be **high carbon**.

Dispatch Curves & Peak Power



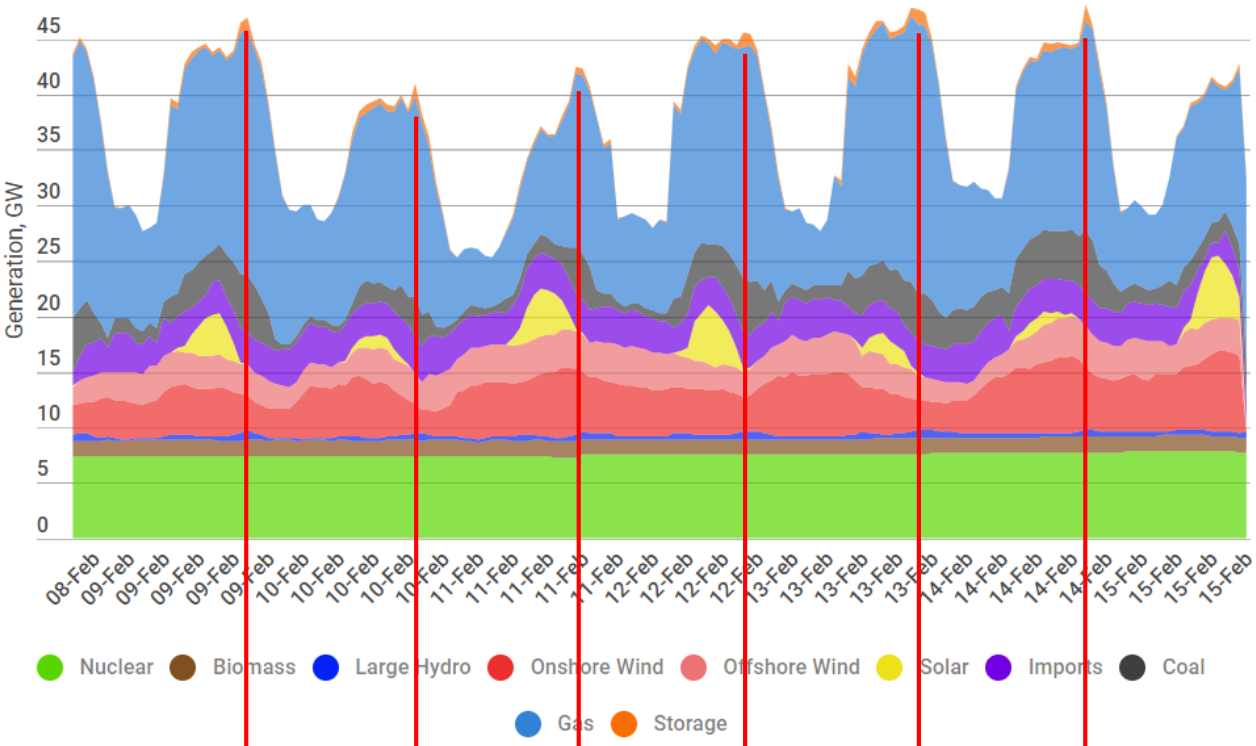
https://www.eia.gov/todayinenergy/detail.php?id=7590

Demand vs CO_2

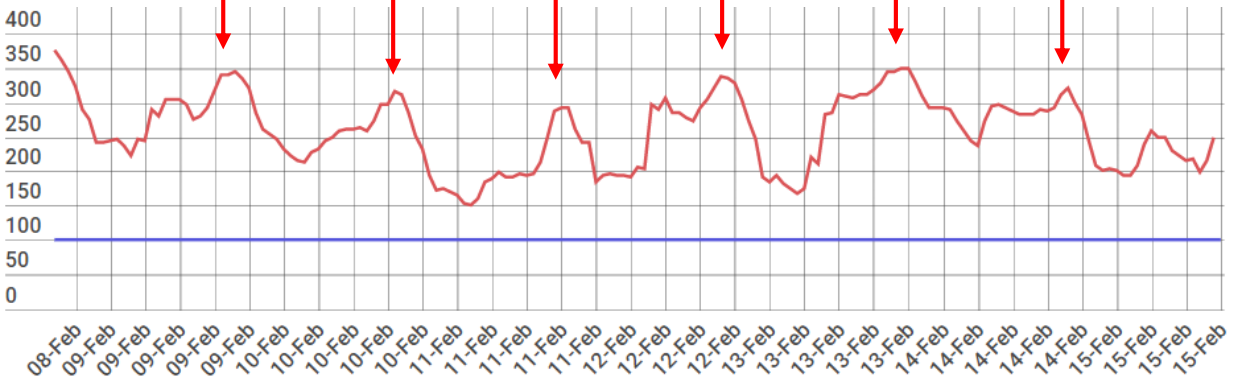
It depends on the electricity mix:

Source: www.mygridgb.co.uk/last-7-days/

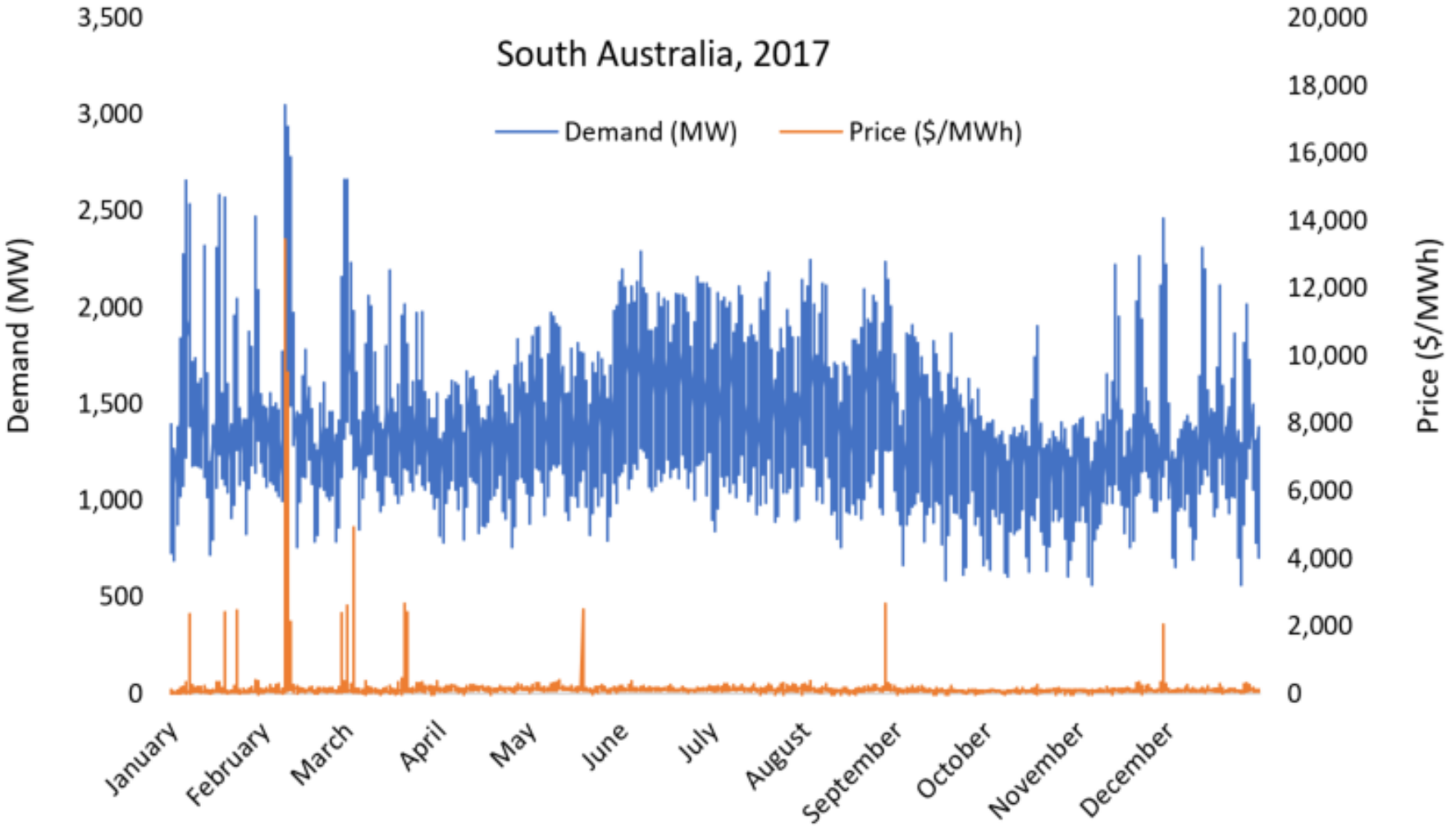
Electricity Mix, GW



Carbon Intensity, gCO2eq./kWh

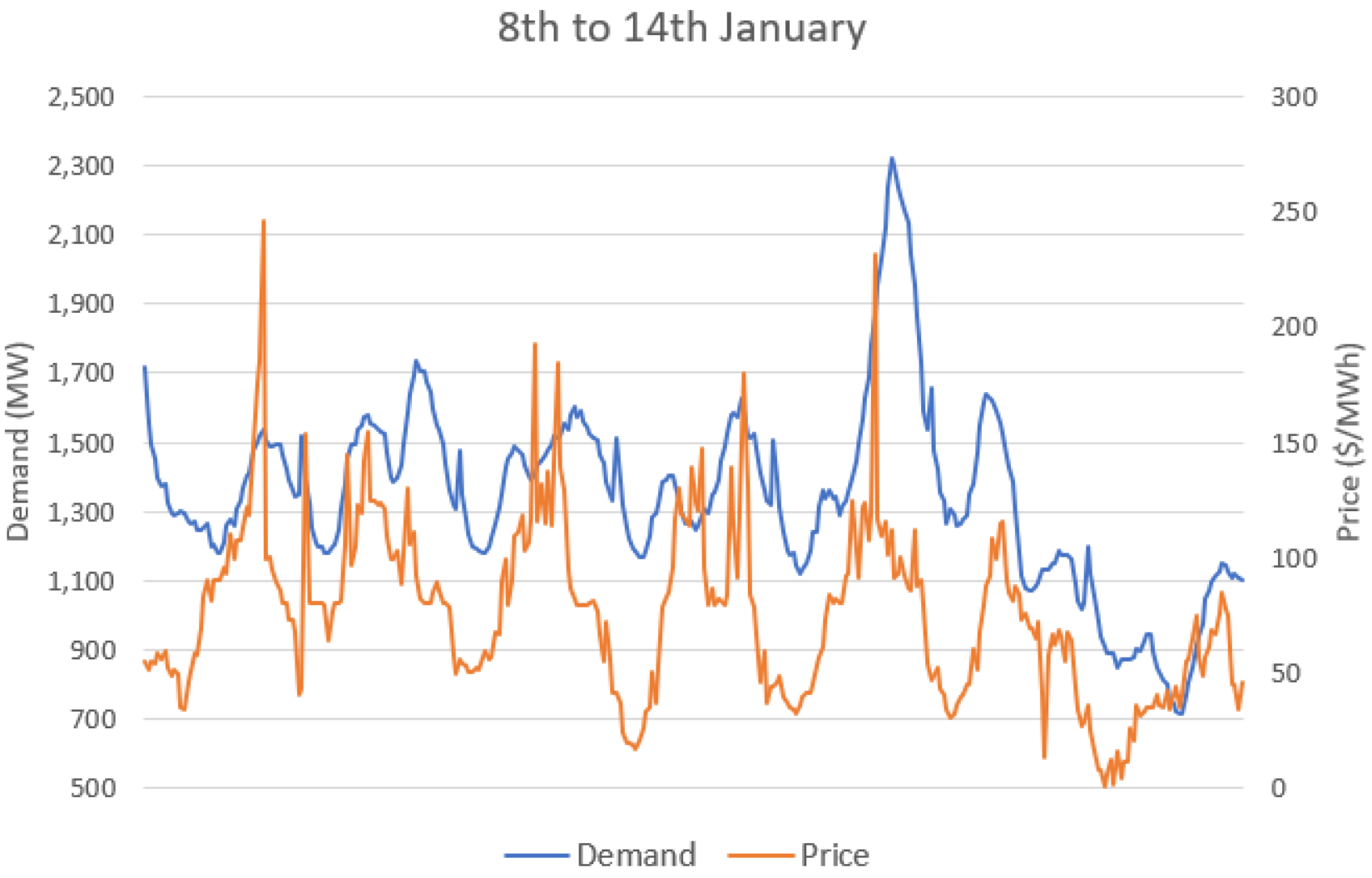


Electricity in South Australia



Analysis by Grey Cells Energy based on data source: AEMO
(https://aemo.com.au/Electricity/National-Electricity-Market-NEM/Data-dashboard#aggregated-data)

Example zoomed-in view…



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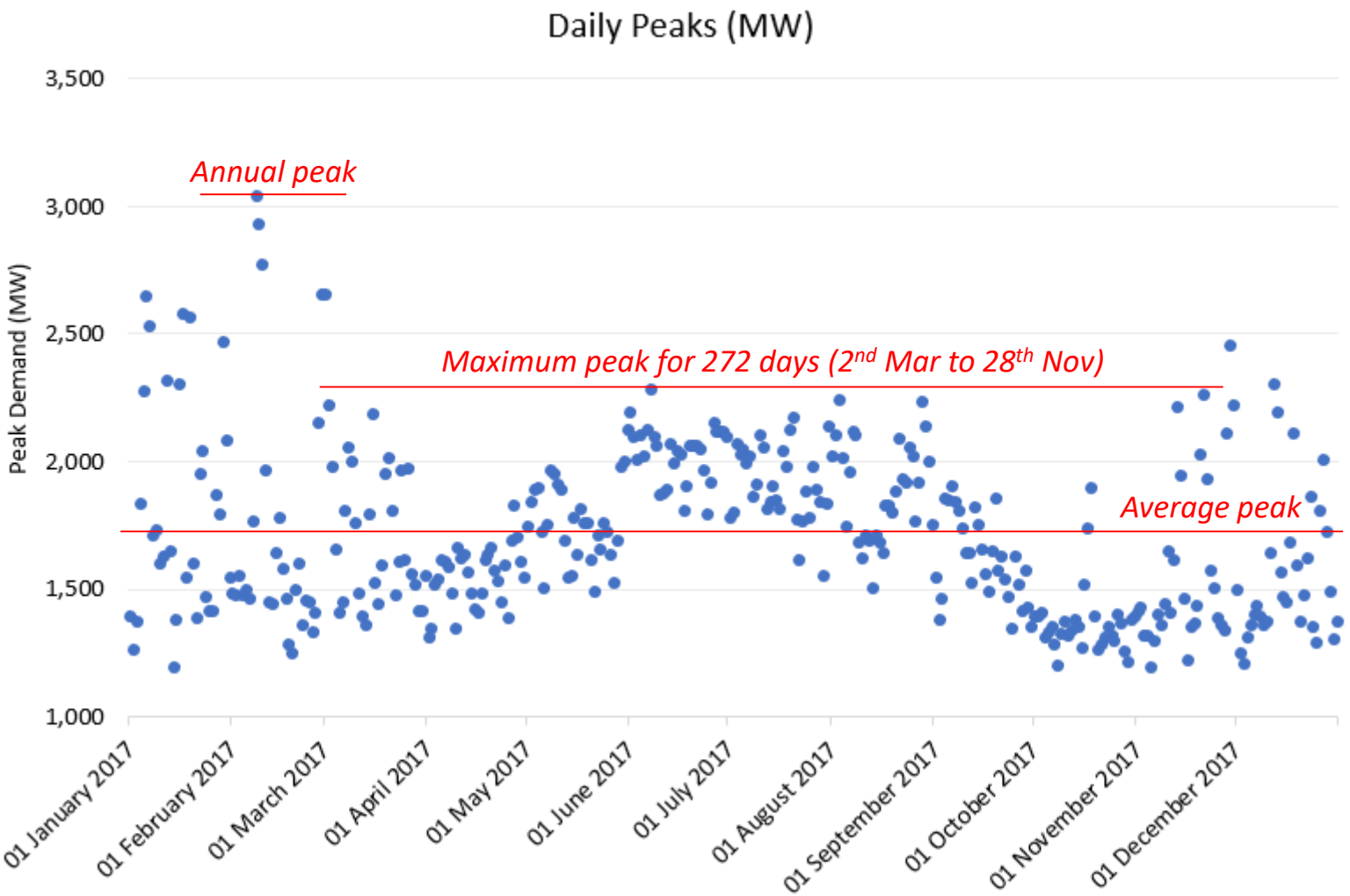
Focus on Peak Demand



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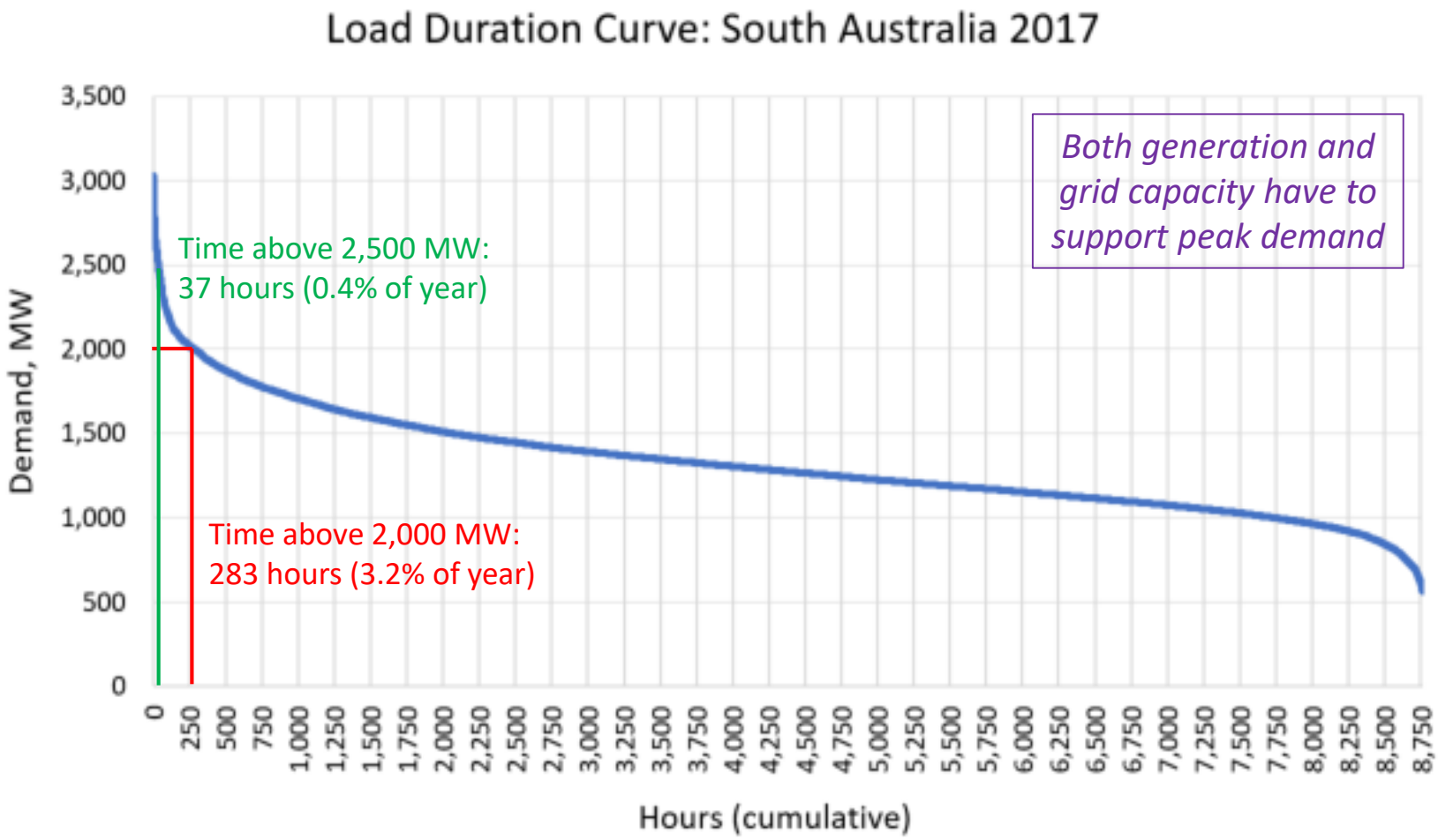
Load Duration Curve



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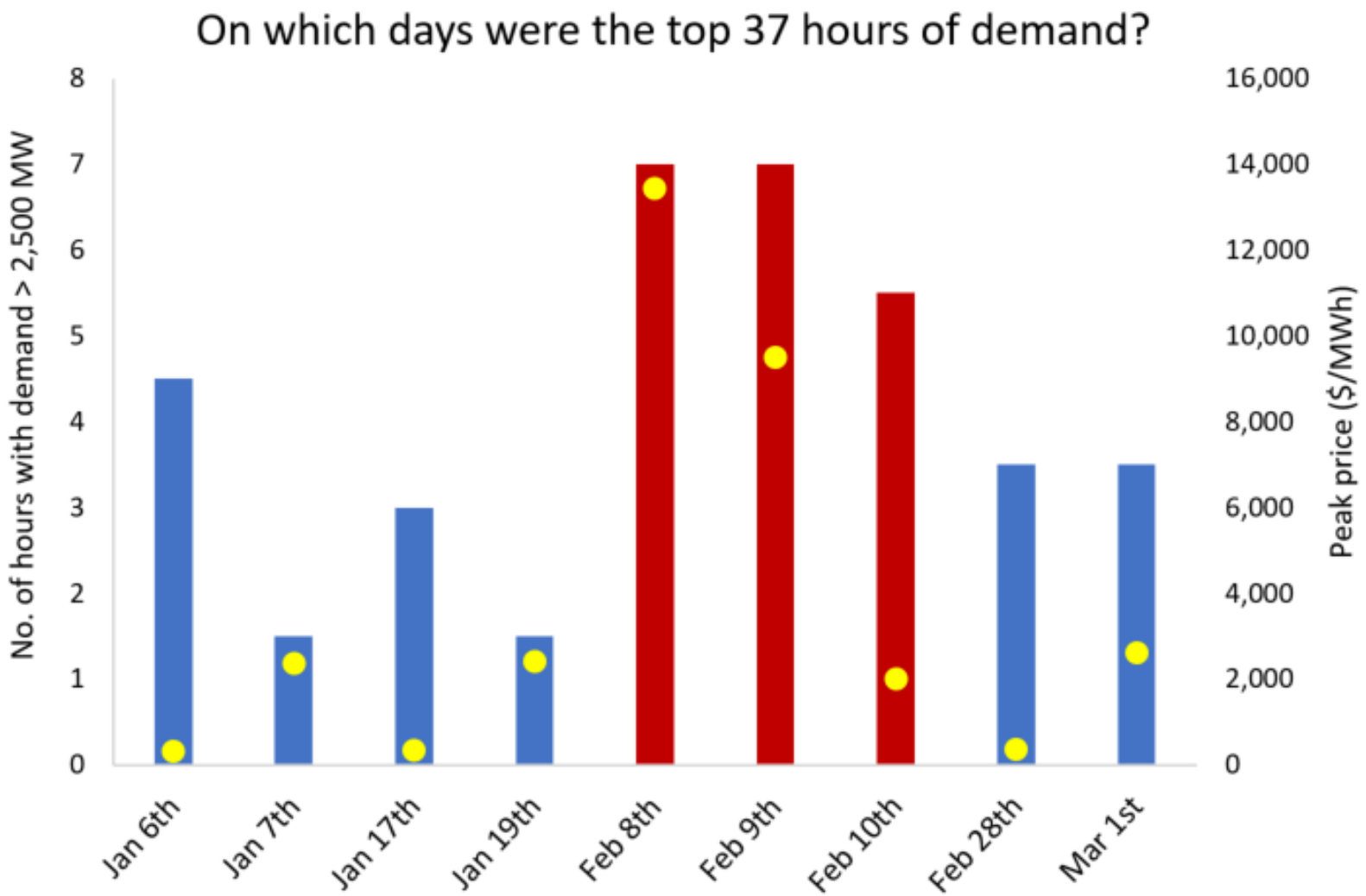
37 hours above 2,500 MW



Analysis by Grey Cells Energy based on data source: AEMO
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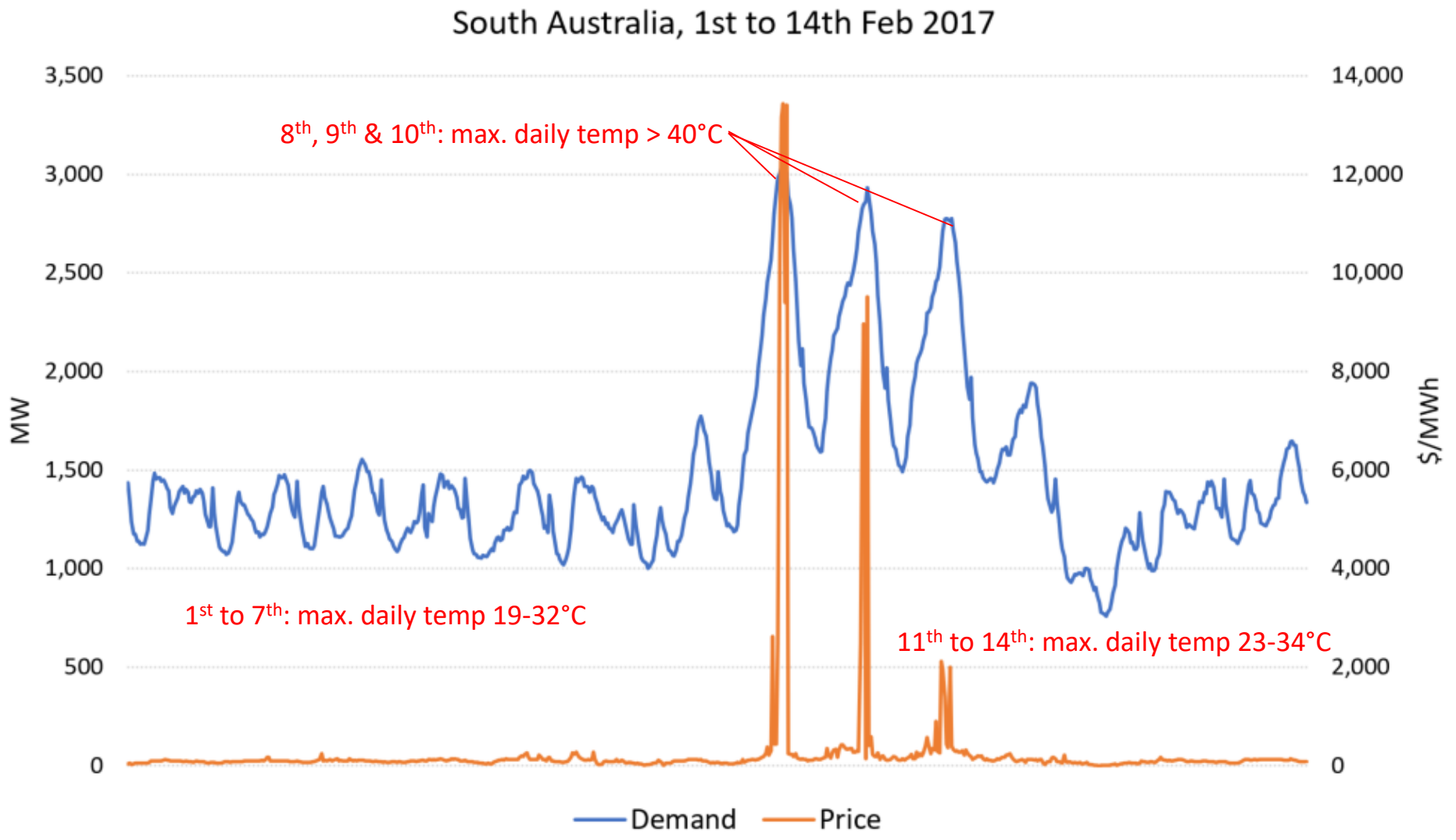
The first two weeks of February 2017



Analysis by Grey Cells Energy based on data source: AEMO
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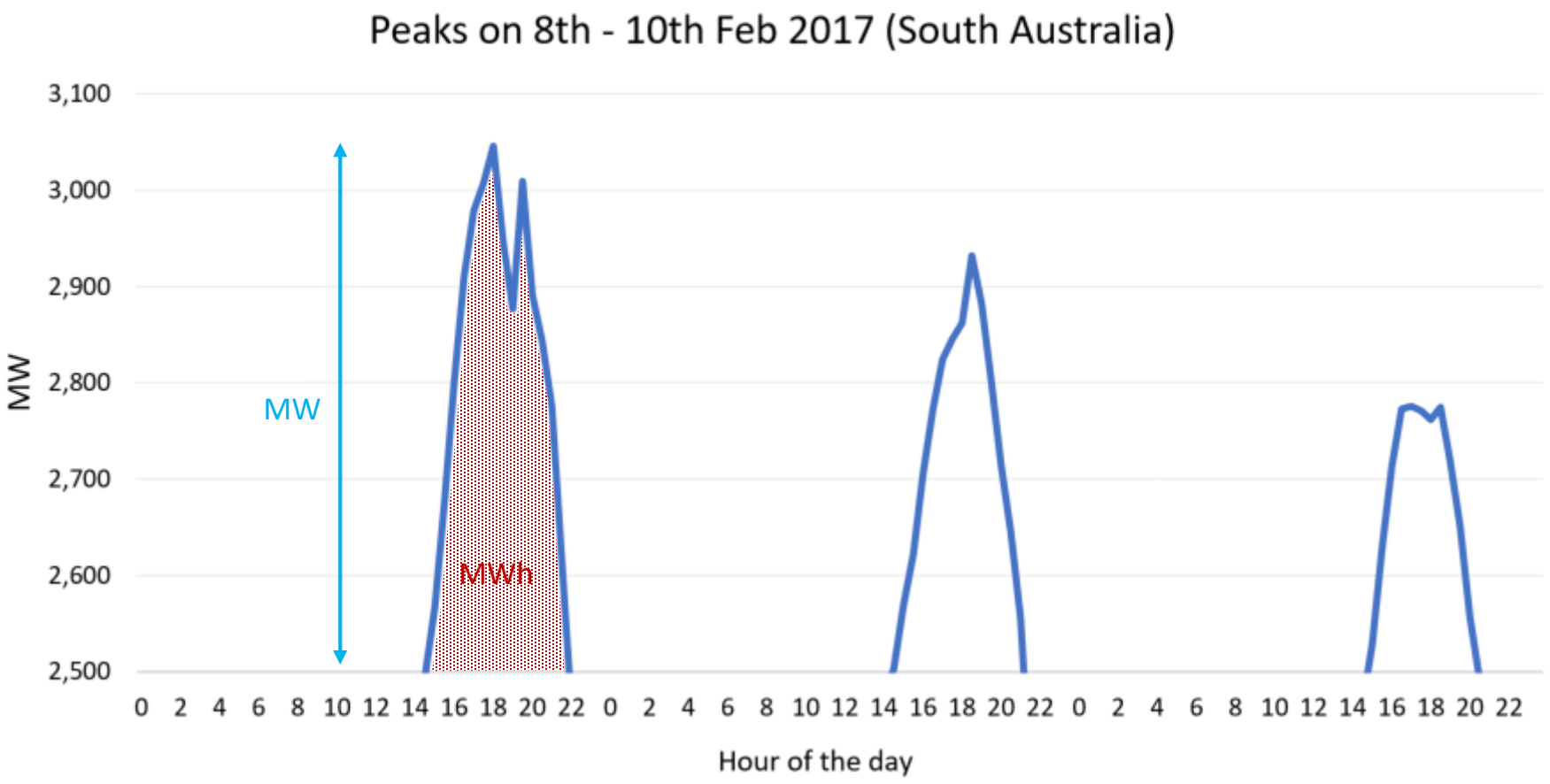
Three peaks above 2,500 MW



	MW	MWh	Duration (h)
Feb 8th	545	2,474	4.5
Feb 9th	432	1,616	3.7
Feb 10th	275	1,076	3.9

$\frac{\text{MWh}}{\text{MW}}$

“3 – 4 hours” elsewhere…

1. SDG&E's Escondido energy storage project
   - 30 MW, 120 MWh (**4 hours**)
   - “daily ramping and peak shaving services”

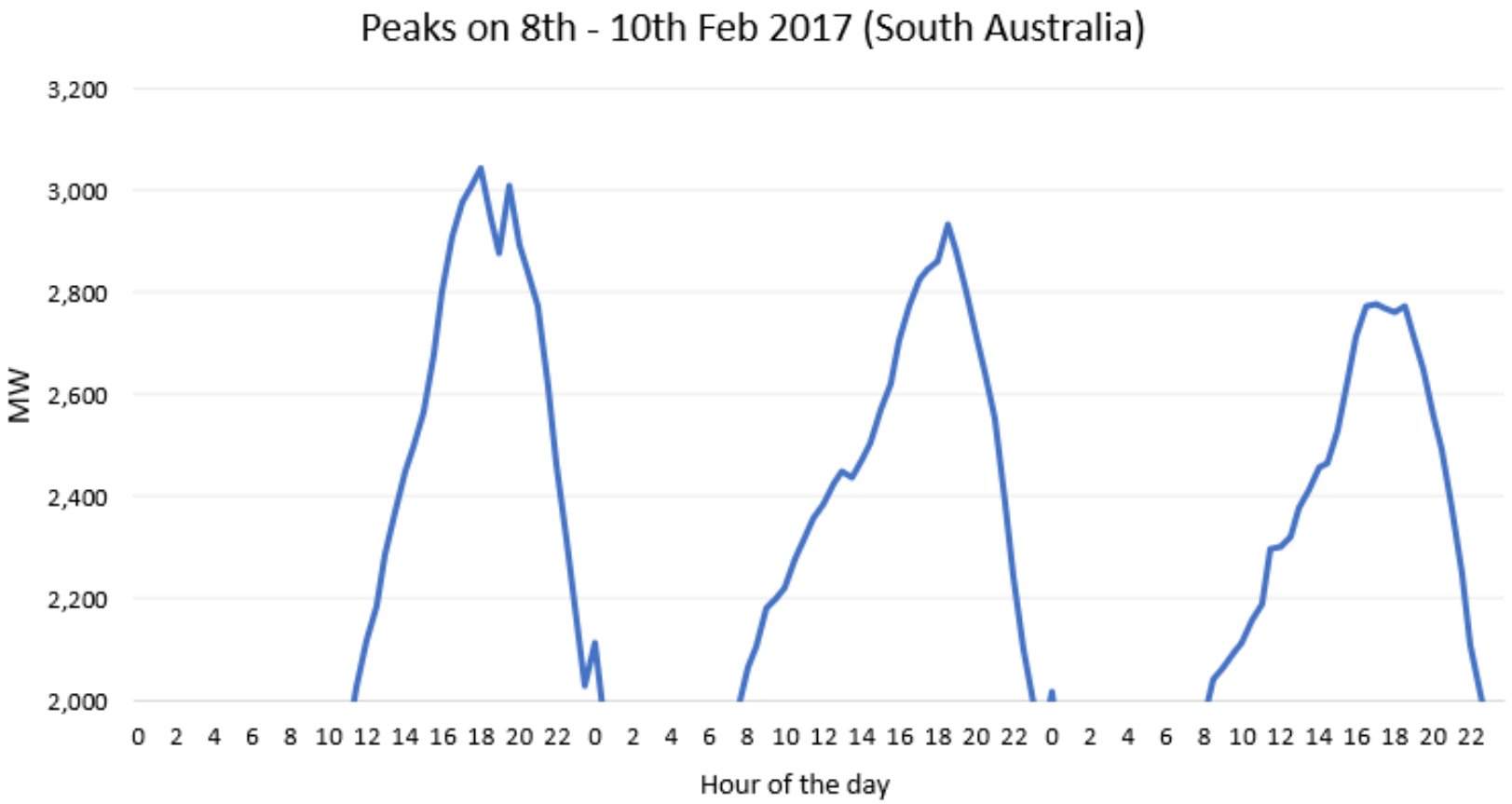
2. Neoen/Tesla’s Hornsdale Power Reserve
   - 100 MW, 129 MWh, partitioned:
   - 70 MW, 10 mins (grid services) + 30 MW, **3 hours** (arbitrage)

3. UK National Grid’s battery de-rating for Capacity Market auction (Feb 2018)
   - **4 hours+** rated at 96% (down to 30 mins at <18%)

Example references:

1. https://www.utilitydive.com/news/project-of-the-year-aes-escondido-energy-storage-project/511157/
2. https://reneweconomy.com.au/explainer-what-the-tesla-big-battery-can-and-cannot-do-42387/
3. https://www.cleanenergynews.co.uk/news/storage/de-rating-of-battery-projects-to-be-cut-by-80-in-upcoming-capacity-market-a

Shaving further (to 2,000 MW)?



	MW	MWh	Duration (h)
Feb 8th	1045	7,479	7.2
Feb 9th	932	7,436	8.0
Feb 10th	776	6,092	7.9

Summary: Storage as Peak Power Supply

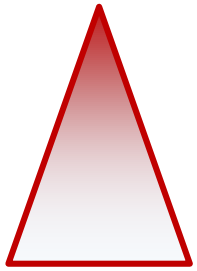
Opportunities

- Maintain less generating capacity, utilise it more
- Remove most expensive supply (lower prices)
- Shift clean energy to peak times (& avoid oversupply off-peak)

Risks

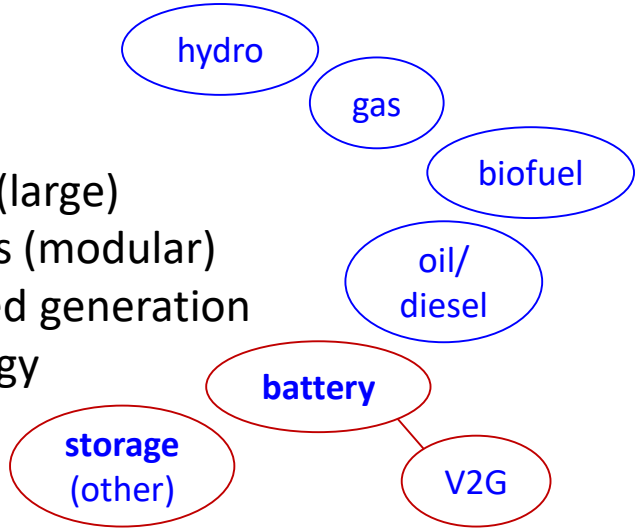
- Insufficient value and/or utilisation (business case)
- Business model cannibalisation / market saturation
- Competitive alternatives ⇨

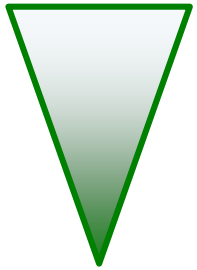
Other ways of meeting Peak Demand



Generation:

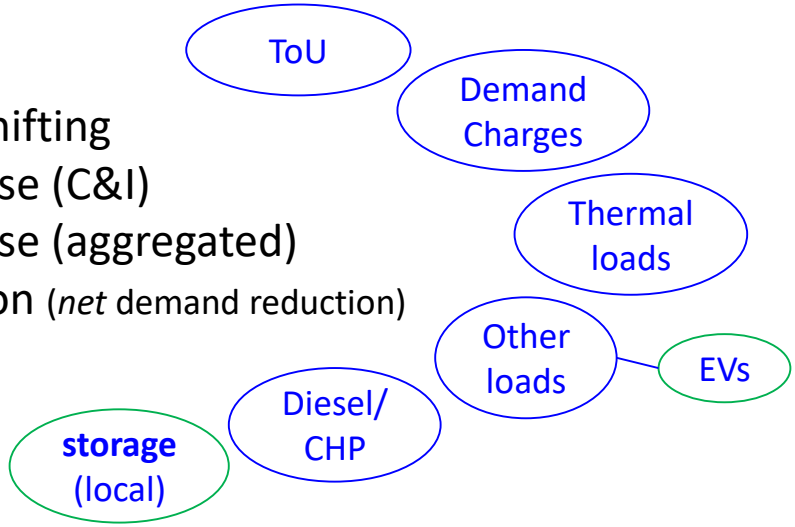
- Flexible power plants (large)
- Flexible generator-sets (modular)
- Aggregated, distributed generation
- Discharge stored energy





Demand Reduction:

- Demand time-shifting
- Demand response (C&I)
- Demand response (aggregated)
- Onsite generation (*net* demand reduction)



Thanks for Listening!

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Explore these & more issues at:

green power ACADEMY