



Changing Energy Solutions

Reducing your carbon footprint while maximising efficiency & cost savings

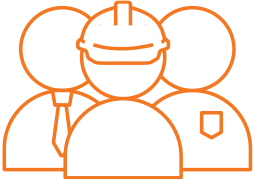


Andrew Blaver, Head of Changing Energy Solutions

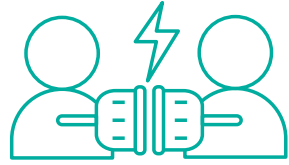


Western Power acknowledges the Traditional Owners of the land on which we meet,
and we recognise their continuing connection to lands, waters, and communities.
We also pay our respects to Elders past, present and emerging.

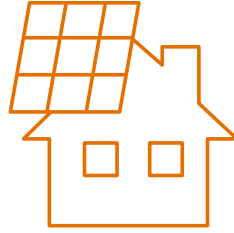
Western Power today



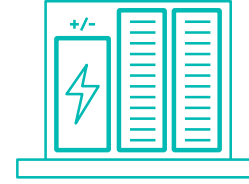
3,200
strong workforce



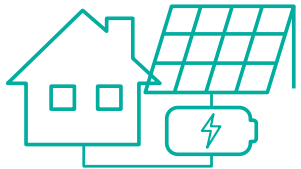
2+ million
people connected



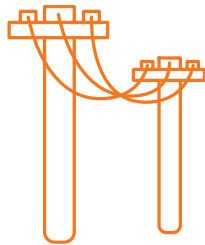
2GW
grid connected
solar



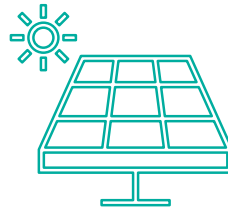
13 community
batteries



168 stand-alone
power systems



104,000km
of power lines



Up to 74%
underlying
demand



4006MW & 626MW
Demand peak & low

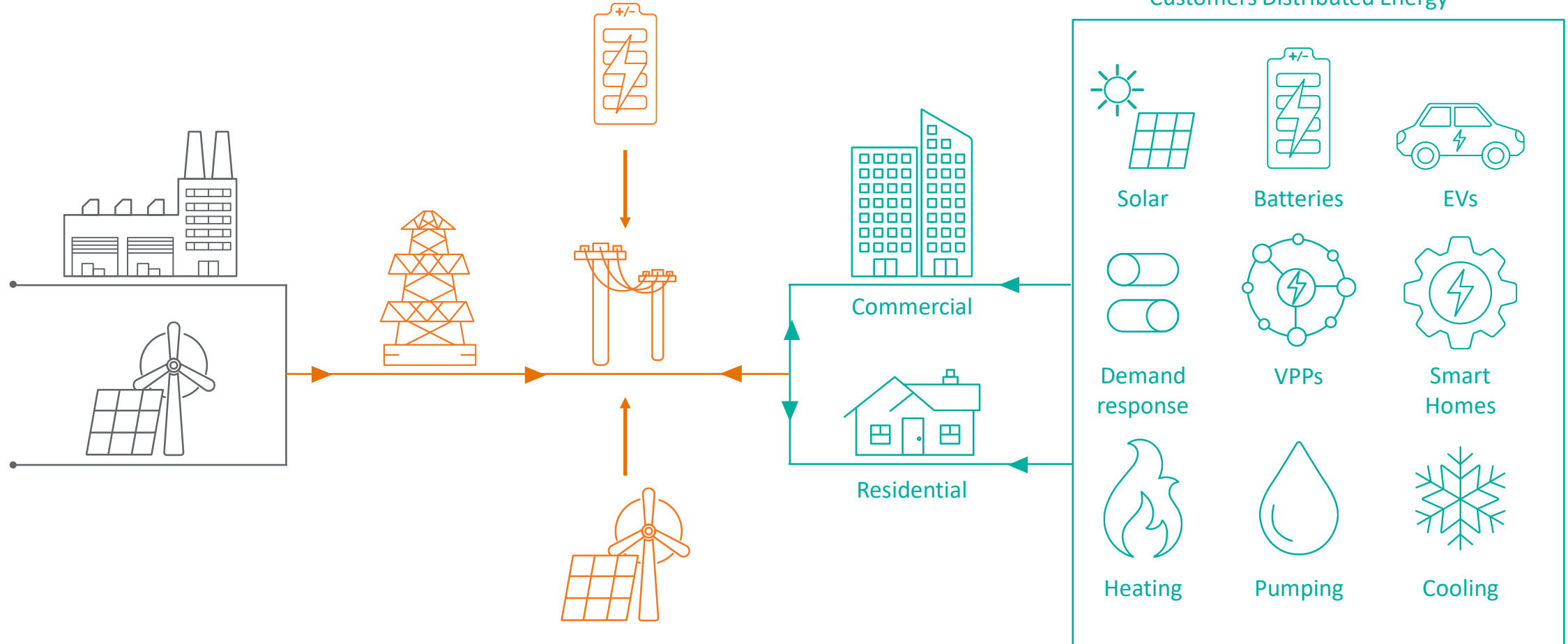
**Our grid
covers
255,000 km²**

What we do

Generation

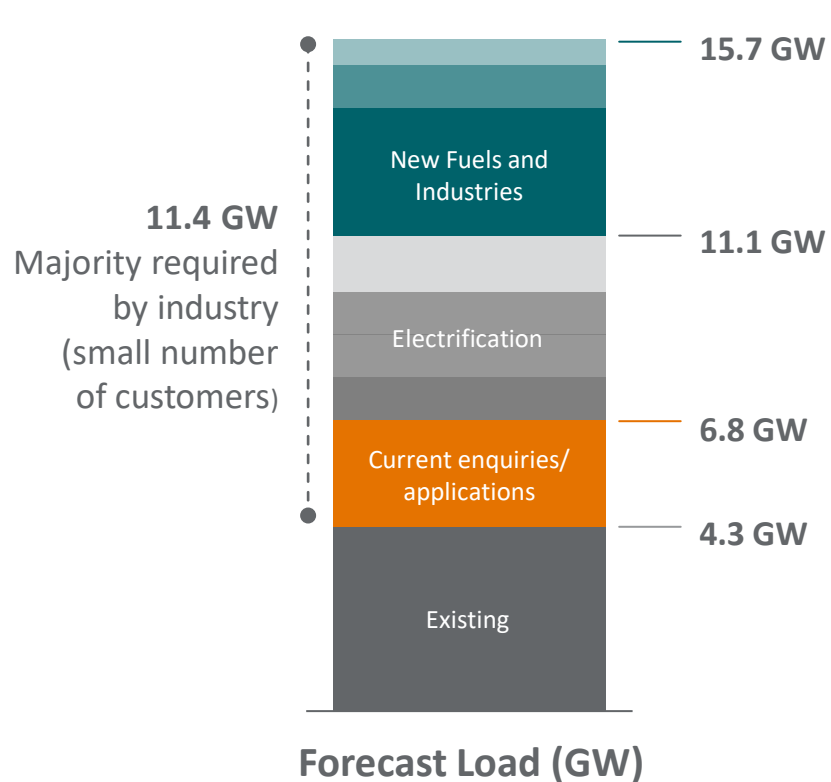
Transmission and distribution

Use

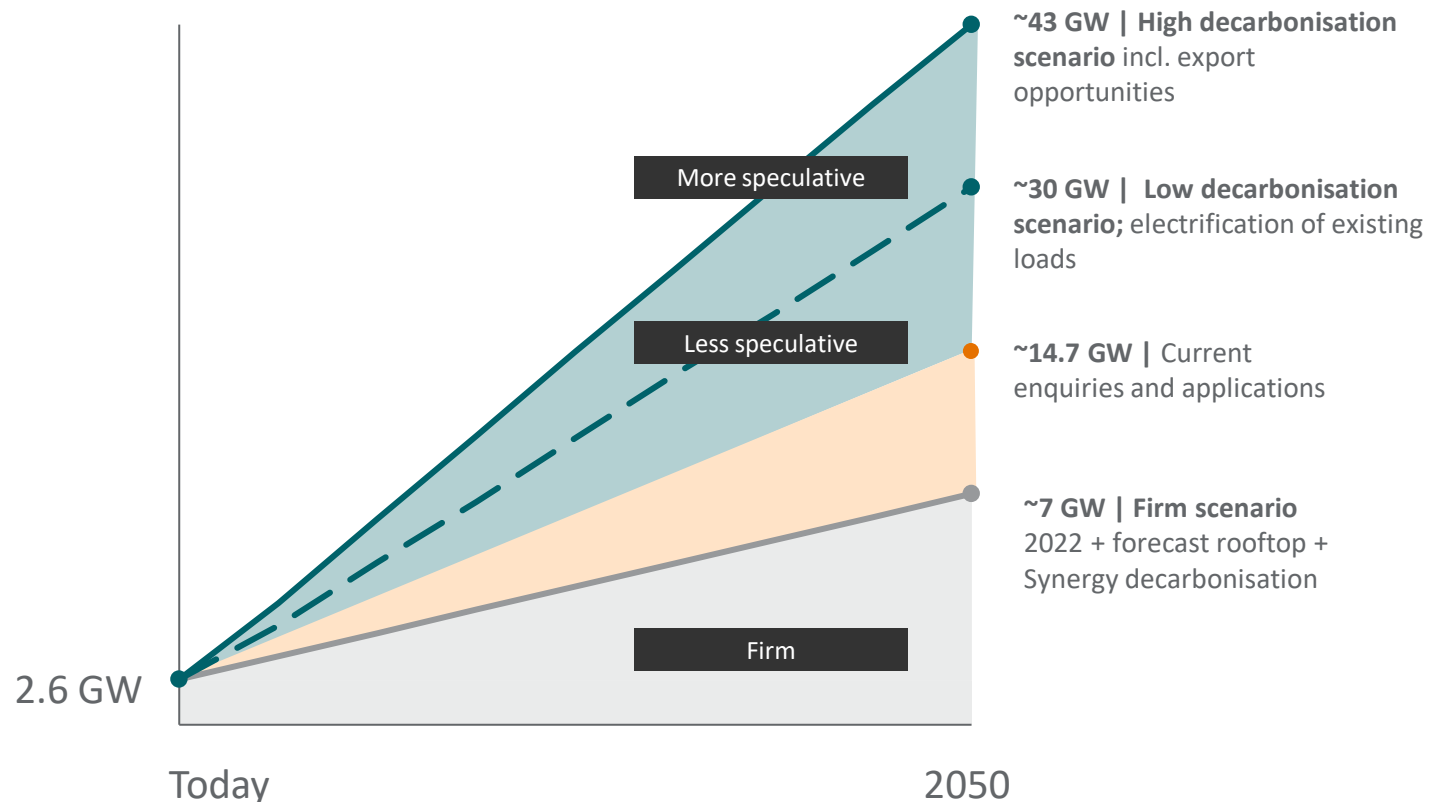


Changing Energy Environment

Load is increasing, with a majority required by industry:



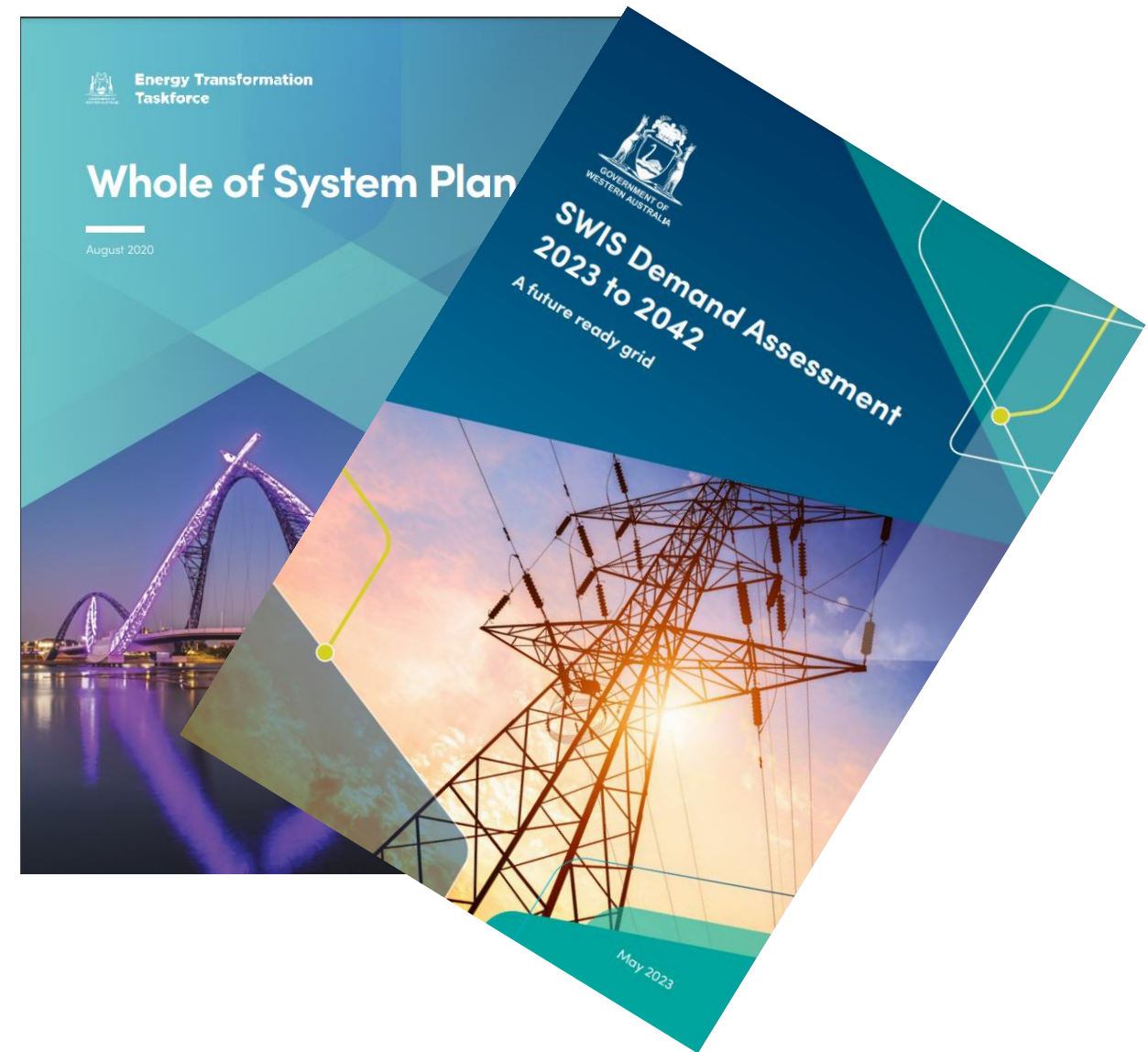
A significant step change in renewable energy generation is anticipated, despite a wide range of scenarios.



Transmission Network Transformation

- **Whole of System Plan (WOSP)** provides a 20-year outlook on the future of our main electricity system – the SWIS.
- **SWIS Demand Assessment (SWISDA)** collates industry data to understand the potential change in electricity demand over the next 20 years.

Responding to emerging industry decarbonisation ambitions, SWISDA considers the requirements of existing industrial users on the SWIS and potential growth in new industries like hydrogen and critical minerals.



Transmission Augmentation

- Significantly increasing the Transmission Network
- Making the most of renewable and other sources of energy
- **Outcome:** supporting increased sustainability in WA



Distributed Energy Resources (DER)

We are at the front edge of a **sustained expansion of Distributed Energy Resources (DER)**. DER are smaller scale devices that can either *use*, *generate* or *store* electricity, are mostly owned by customers, and *passively* connected to the local distribution network.



Aggregated rooftop solar is on track to becoming **the largest, cleanest and cheapest source** of electricity generation.

~2.0 GW
DER
capacity

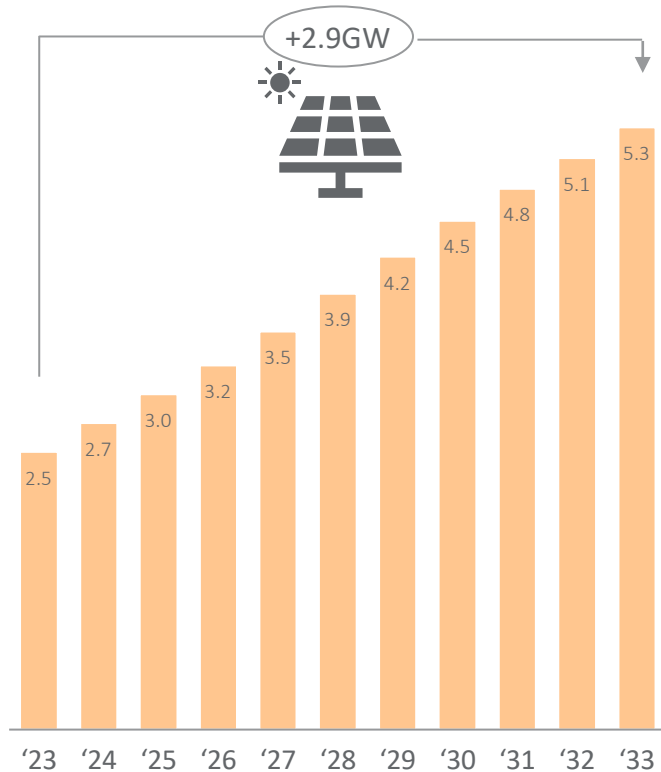
Can serve
up to
75%
underlying
demand


>1 in 3

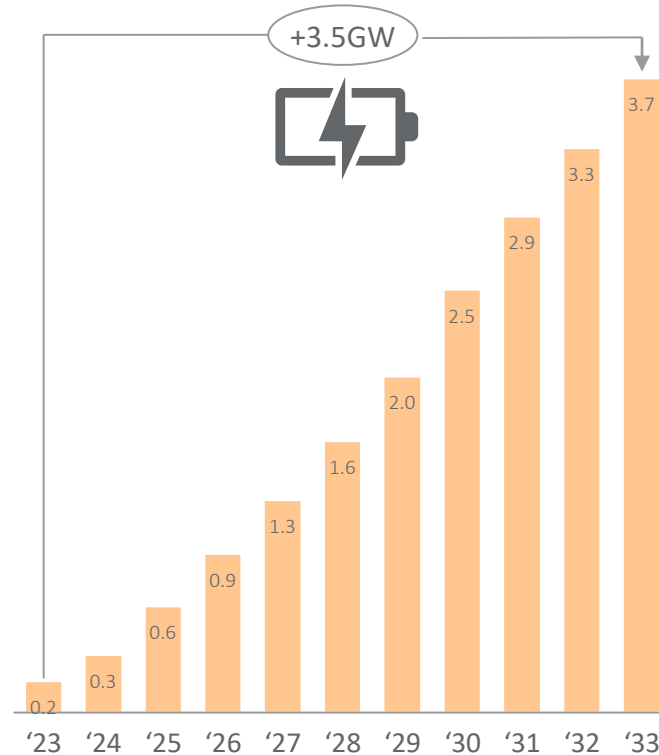


Forecasts of DER Uptake

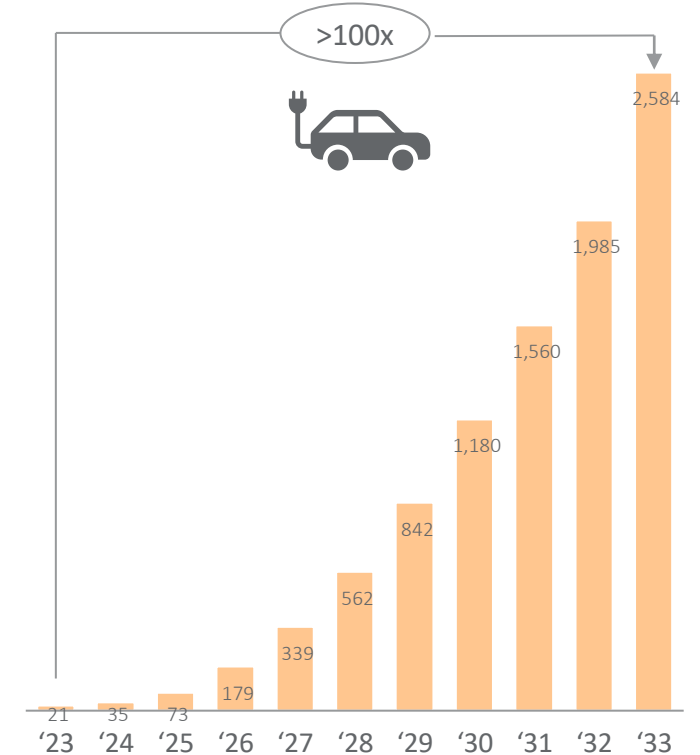
DPV Capacity (GW)



Annual BESS Capacity (GW)



Annual EV Consumption (GWh)

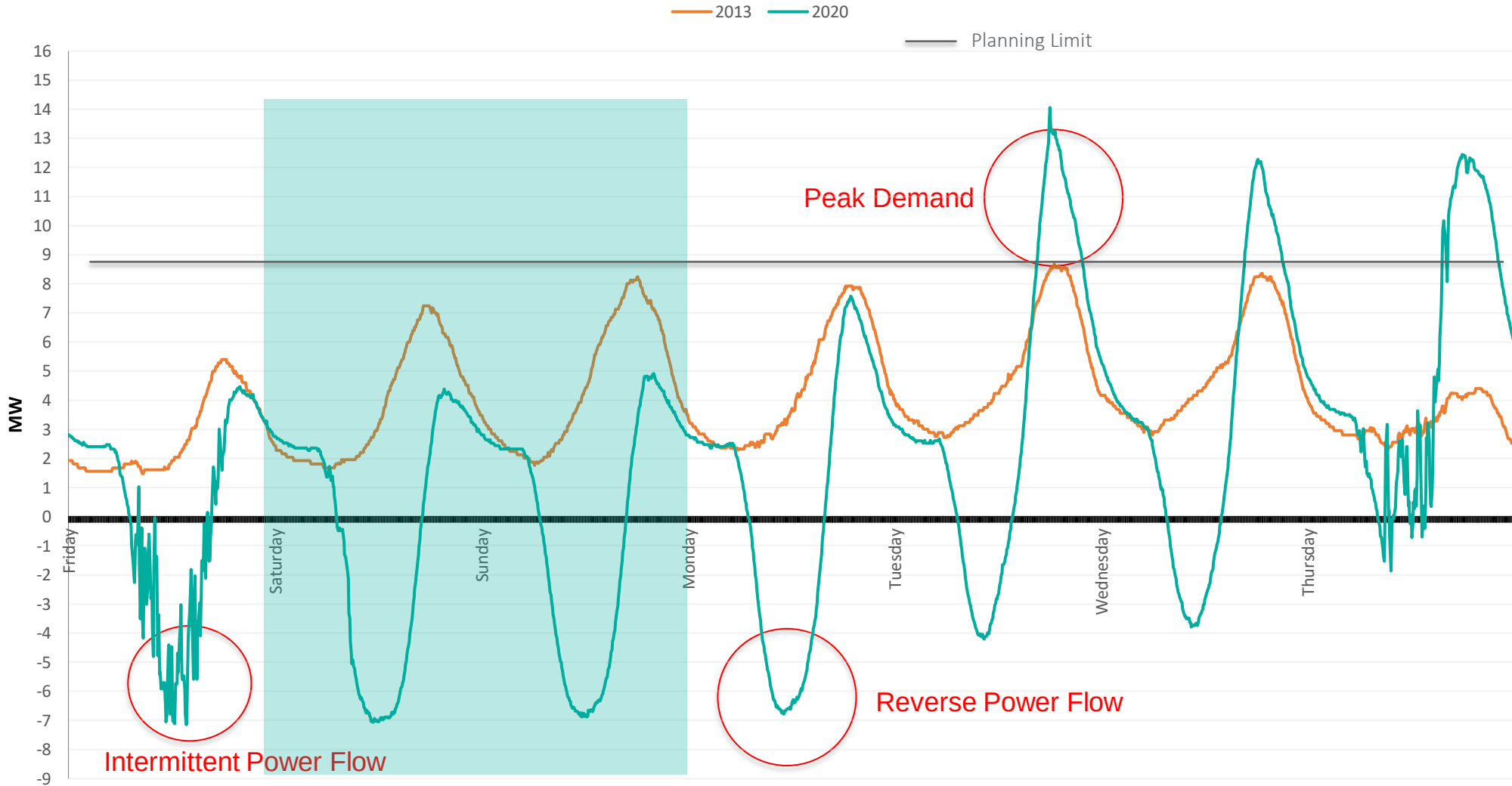


Source: AEMO 2023 WEM ESOO (expected case) –

- DPV - Total installed DPV capacity under three scenarios, 2022-23 to 2032-33 (GW degraded). Note: Rooftop PV includes rooftop PV and PV non-scheduled generation installed capacity
- DESS - Forecast installed DESS capacity in the SWIS under three scenarios from 2022 and 2023 WEM ESOOs, 2022-23 to 2032-33 (GWh degraded)
- EV - Forecast EV consumption by vehicle type under three scenarios, 2022-23 to 2032-33 (TWh)

Challenges and Opportunities

SNR 540 - 2013 VS. 2020



High Voltage (HV) Network: we have *high visibility and control* of connected generators to safely operate the network

Medium Voltage (MV) Network: we have *medium visibility and control...*

Low Voltage (LV) Network: we have *very low visibility and almost no control...* and the largest generator (in aggregate) is now connected here...

Project Symphony

Project Symphony is an innovative project where **customer distributed energy resources** like rooftop solar, battery energy storage and major appliances like air conditioning, will be *orchestrated* as a virtual power plant to **participate in a future energy market and unlock greater economic and environmental benefits** for customers and the wider community.

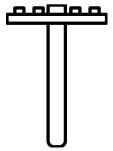


Project Symphony – Scenarios



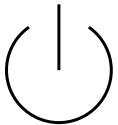
Energy Services
Bi-Directional

Energy Services - Bi-Directional - Balancing Market Offer (BMO): Offering (Sell) or bidding (Buy) energy into the balancing market, issuing, receiving & responding to dispatch instructions and settlement to determine the most economically efficient dispatch of generation to meet system electricity demand at a given time.



Network Support
Services

Network Support Services (NSS): a contracted service provided by a DER aggregator to help manage network constraints such as distribution level peak demand or reverse power flow and/or voltage issues as identified by the Distribution System Operator (DSO).



Constrain to Zero

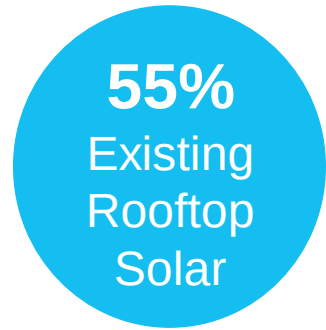
Constrain to Zero: AEMO dispatches an instruction to the Aggregator to constrain energy output from DER to zero export (**net**) or zero output (**gross**). This could be offered as a market service, or incorporated into normal dispatch arrangements if customers are remunerated appropriately.



Contingency Raise

Essential System Services (ESS) Contingency Reserve Raise: Market provision of a response to a locally detected frequency deviation to help restore frequency to an acceptable level in case of a contingency event (such as the loss of a large generator or load).

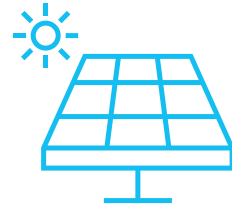
About Project Symphony



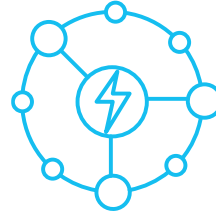
in Southern River



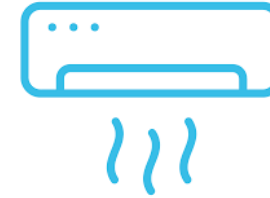
514
customer households



292
solar assets



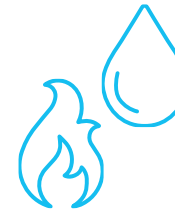
221
third party
aggregator assets



218
aircon assets

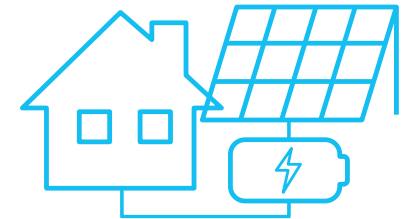


150
battery assets



30
hot water service
assets

=



911
assets

City of Armadale Fitness & Aquatic Centre



City of Armadale Fitness & Aquatic Centre

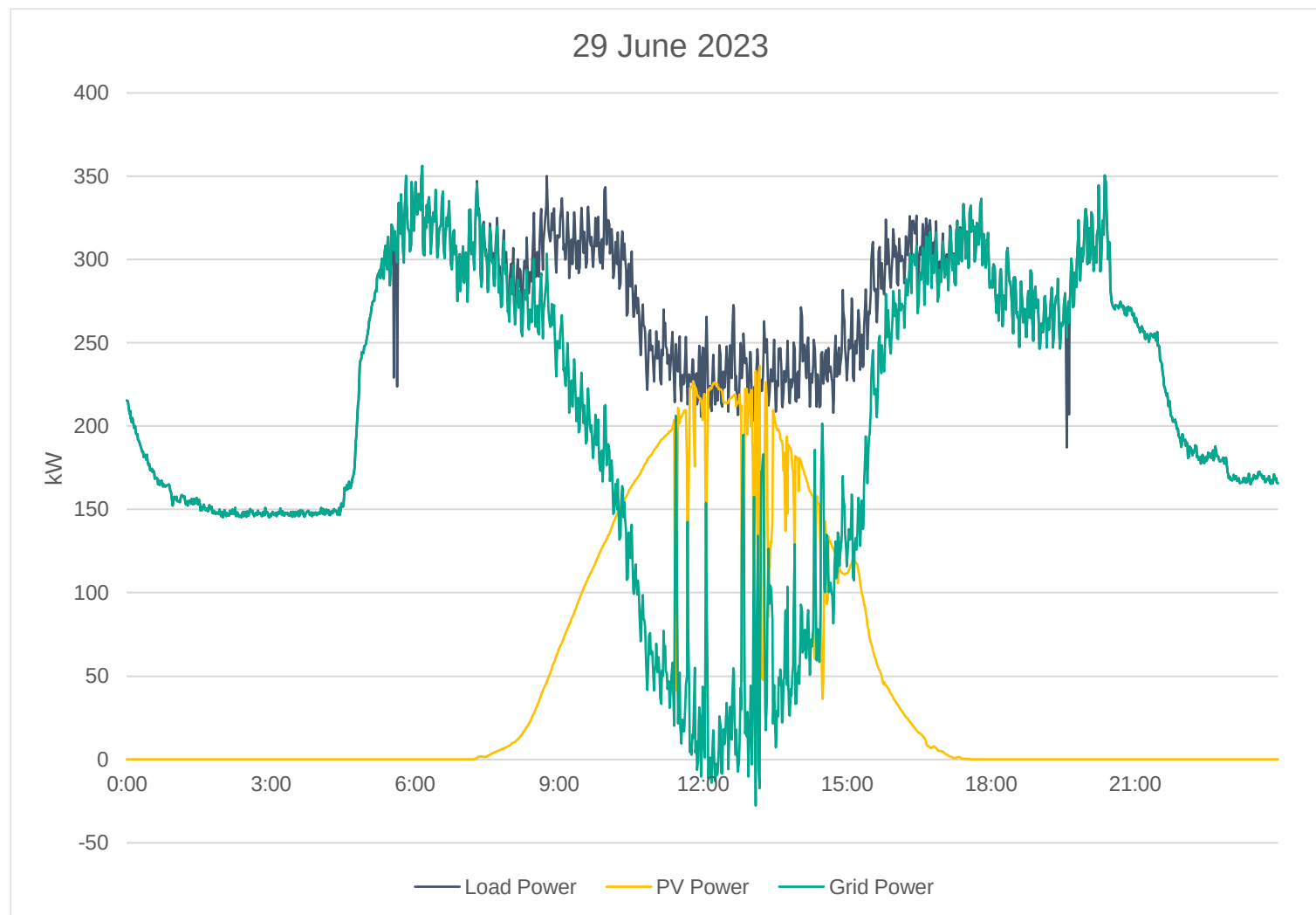
DER Assets:

530kW PV panels, 444kW inverter capacity

Load profile: on average –

- grid demand exceeding 300-350kW during morning and evening peaks,
- 100-150kW excess solar spilling onto the grid during summer

Note: This snapshot is June 2023.



City of Armadale Fitness & Aquatic Centre

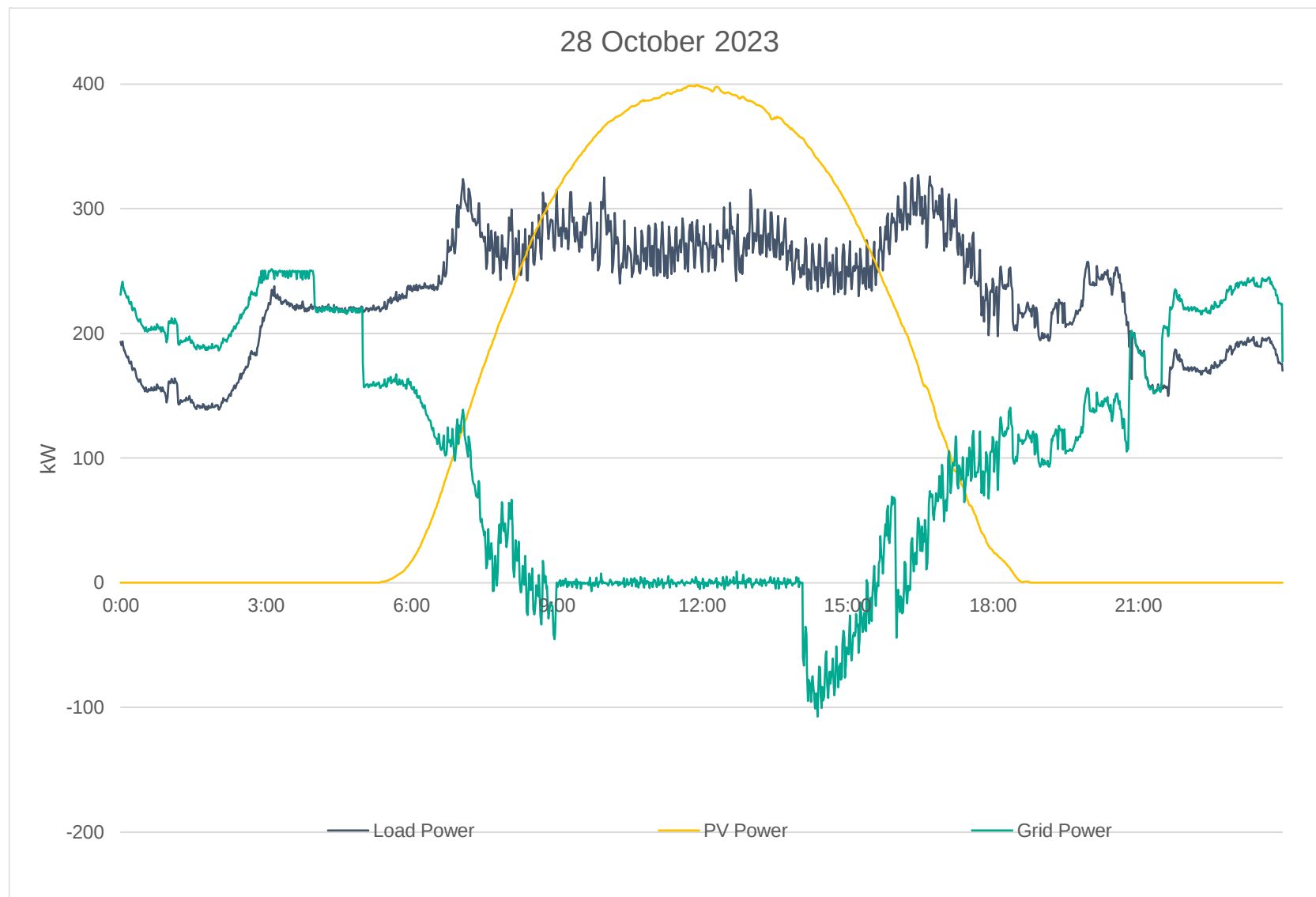
DER Assets:

- 530kW PV panels, 444kW inverter capacity
- Newly installed battery – 250kW / 559kWh

Load profile: on average –

- grid demand under 300kW during morning peak and under 250kW during evening peak,
- with excess solar being captured by battery during summer until SoC at 90-100%

Note: This snapshot October 2023



In partnership with:

City of Armadale Fitness & Aquatic Centre

Learnings for other corporates looking to invest in DER assets:

- **Understand your load profile**
- **Establish an Energy Champion**
- **Quantify benefits of:**
 - Solar (PV),
 - batteries and
 - Tariff impact
- **Look for emerging opportunities** e.g. participation in Virtual Power Plants



How Can Your Organisation Benefit?

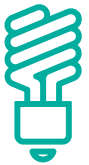


Energy Conservation

Seeking ways to avoid energy use. Often require only changes in behaviour or low-cost investments.

Benefits

- ✓ Cost reduction with immediate to short payback (<2 years).
- ✓ Improved NABERS rating.



Energy Efficiency

Investing in equipment upgrades to do the same with less energy. Often require investment in equipment upgrades with a longer payback period.

- ✓ Cost reduction with longer payback (>2 years).
- ✓ Improved NABERS rating.



Demand Management

Seeking ways to reduce or shift energy use outside of peak periods to reduce cost. May require investment in communications and control equipment.

- ✓ Cost reduction or new revenue.
- ✓ Can be short payback.

How Can Your Organisation Benefit?

Benefits



Renewable Energy Generation & Battery Storage

Investing in equipment to generate (and store) energy on-site and reduce cost and CO2 emissions

- ✓ Solar PV short payback (3-5 years)
- ✓ Storage long payback (>7 years)
- ✓ Improved NABERS rating.



Fuel Switching

Changing the type of fuel used to provide a business process where an alternative fuel source is lower cost or higher efficiency.

- ✓ Cost reduction
- ✓ Longer payback period (>5 years).



Questions





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