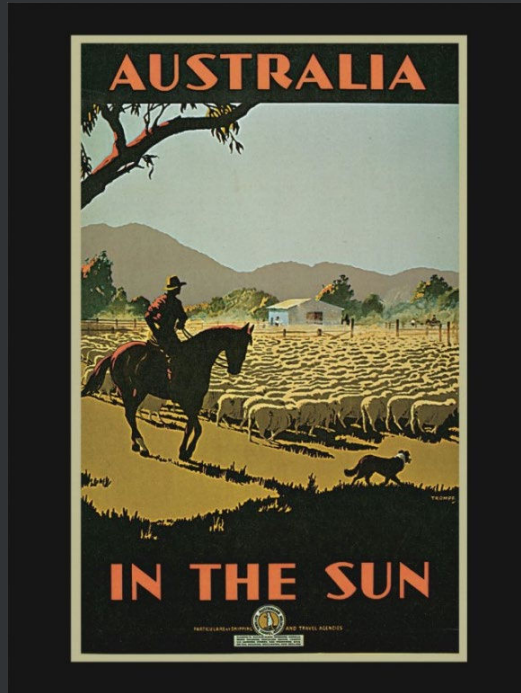




GreenSync

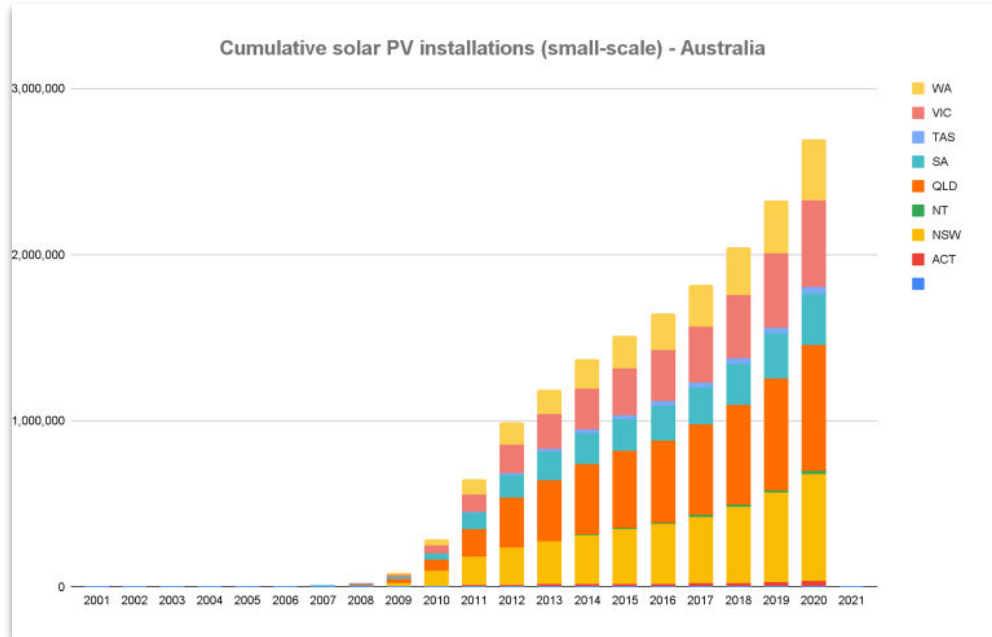
DER Management - Reflections, Lessons, Next Steps



Postcard from Australia

Postcard from Australia

Australia is at the forefront of a global trend... customers' DER transforming the grid



Source: Clean Energy Regulator, Small Scale Installations 2021



Over 3 million households now have solar



The number increased by 365,000 in 2021 alone



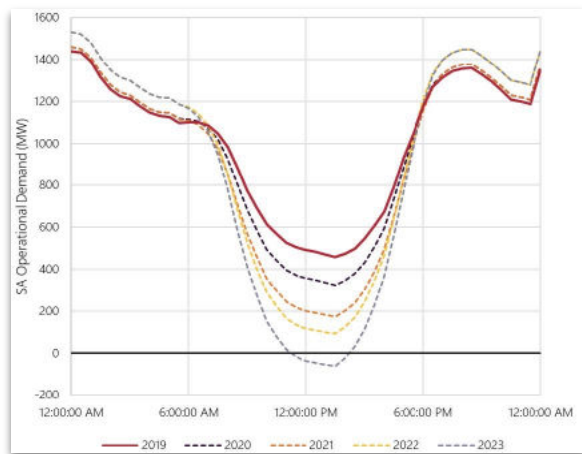
... A 2GW 'virtual' power station in one year



... batteries and electric vehicles to follow

The impacts are material - today

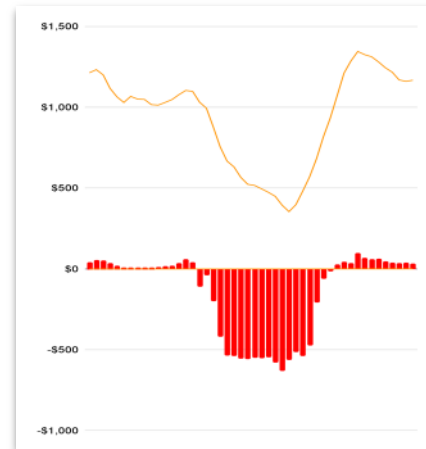
Physical: System Min & Max Demand Risk



AEMO assessment: Effect on South Australia's operational demand from increasing solar PV generation (19 Nov 2019 & projected)

- SA *Smarter Homes* Remote Disconnect in place since 1 Jan 2021
- Service already called on 14th March,
- WA, Qld and Victoria expected to follow within 12-24 months

Financial: Spot Price Impact



AEMO: Price & Demand Data Sunday 14th March 2021

- SA NEM & WEM consistently negative spot prices in Autumn and Spring
- Other states starting to experience significantly lower wholesale prices
- FCAS services increasing in value

Agencies Recognise the Need to Act

Energy Security Board:

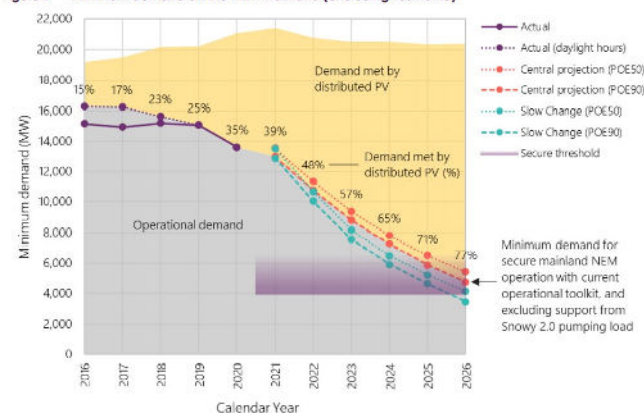
ESB Market Design Final Advice Recommendation 8

To support system security and improved transparency at times of minimum system load, the ESB recommends Energy Ministers adopt a jurisdictional Ministerial lever for emergency backstop measures, as an *immediate reform*. Enduring measures to address system security challenges associated with low minimum system load are being prepared as part of the Plan.

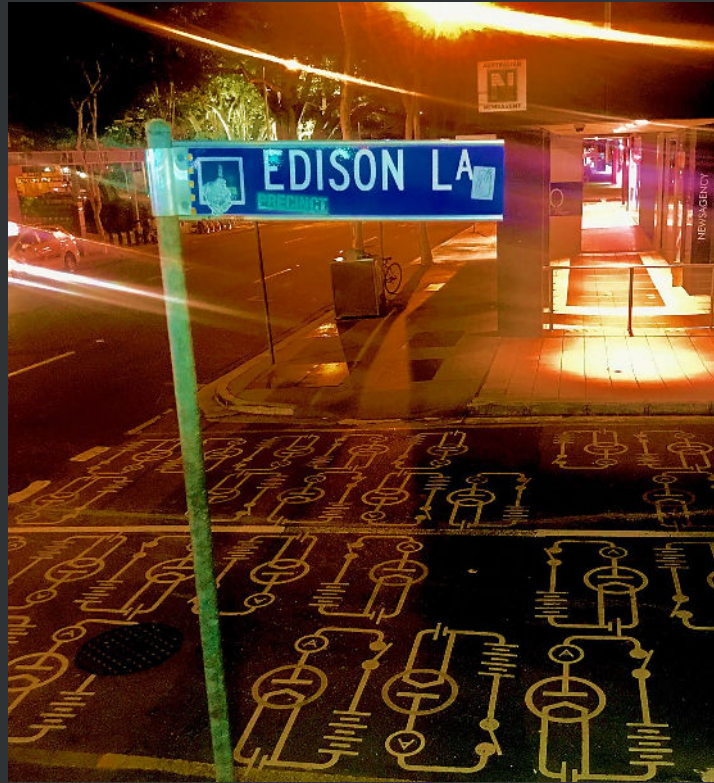
Energy Security Board (ESB) *Post-2025 Market Design Final Advice to Energy Ministers*, 26th August 2021

AEMO: ESOO

Figure 2 Minimum demand on the NEM mainland (excluding Tasmania)

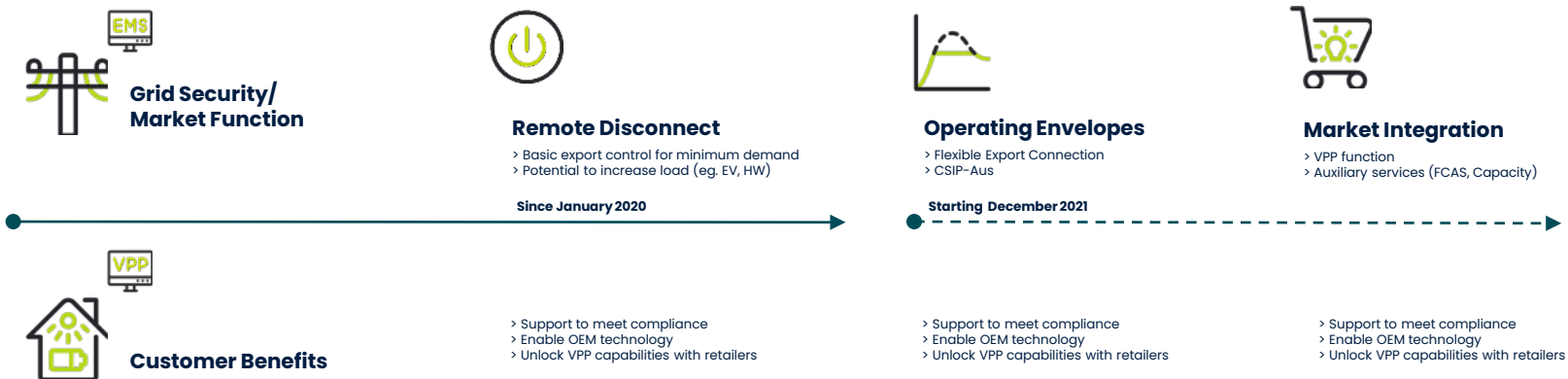


“Without additional operational tools, AEMO may no longer be able to operate the mainland NEM securely in all periods from 2025 due to a lack of security services when demand from the grid is so low. These conditions may occur earlier than 2025 under abnormal network conditions, such as network and generation unit outages, possibly associated with bushfires or storms,” AEMO CEO Mr Westerman.



The Journey

Where are we? Where are we going?



Emerging Compliance Requirements

SA and WA have acted, other states and NEM wide to follow in 12-24 months



Western Australia

- > Over 360,000 existing systems, 850 new per week
- > AEMO forecasts minimum demand risks fr. solar in **2022**
- > WA Government DER Roadmap calls for action
- > DPV Management to start 14th February 2021
 - All new solar PV need to comply



Queensland

- > Over 750,000 existing systems, 1,500 new systems per week
- > AEMO forecasts min. demand risks from solar in **2024**
- > Opt-in flexible export and dynamic control (IEEE 2030.5) fr. 2022



South Australia

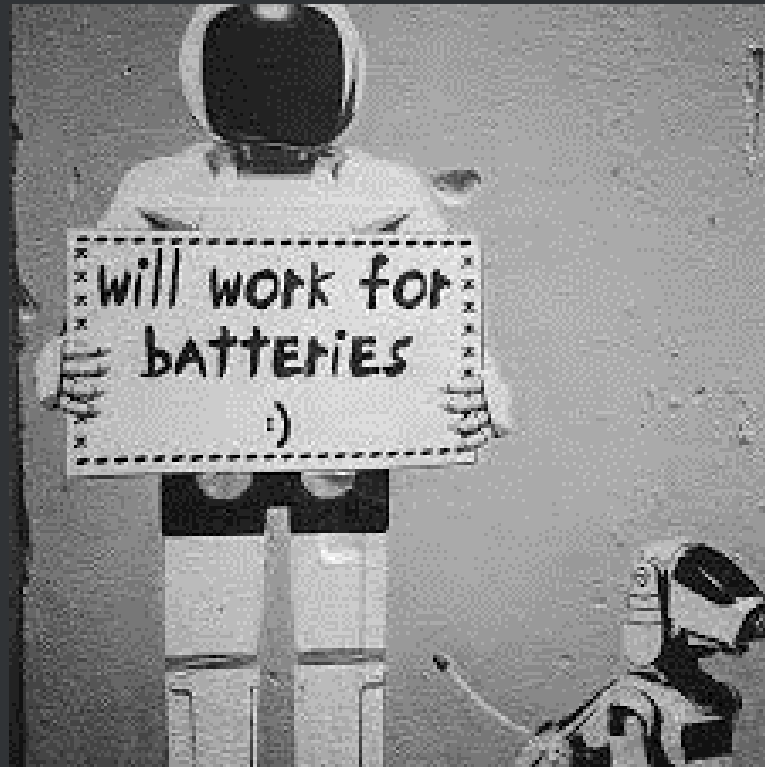
- > 300,000 existing systems, 630 new systems per week
- > AEMO forecast min. demand risks fr. solar in **2021/22**
- > Smarter Homes mandatory since 1st January 2020
 - All new solar PV need to comply
- > Called already on 14th March 2021
- > Dynamic limit capability required fr. 2022



Victoria

- > Over 500,000 existing systems with 1,200 new systems per week, 85% via Solar Homes rebate program
- > AEMO forecasts min. demand risks from solar in **2023/24**
- > DER Roadmap being developed

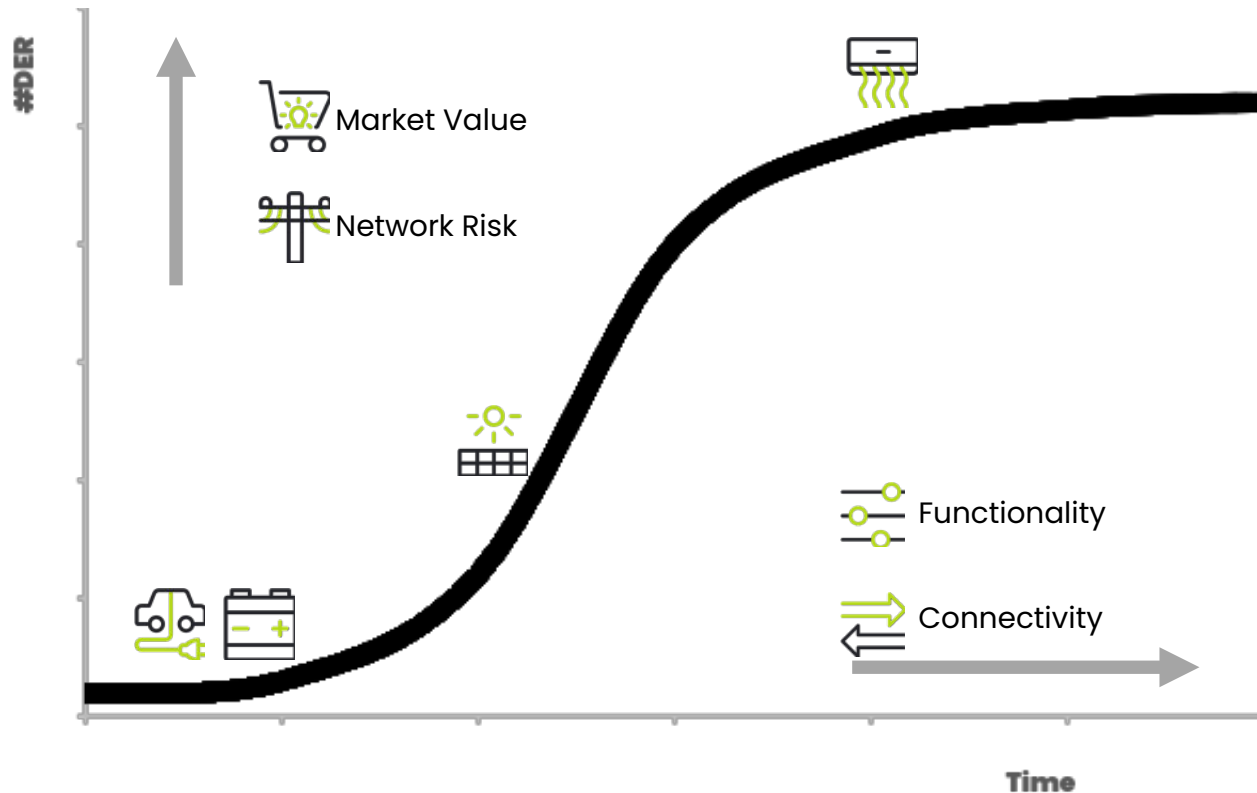




Unlocking value

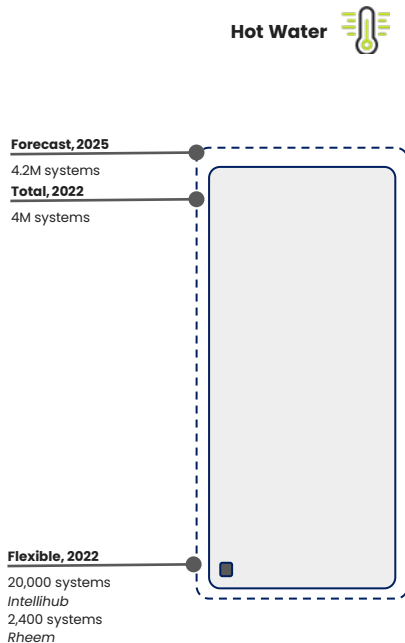
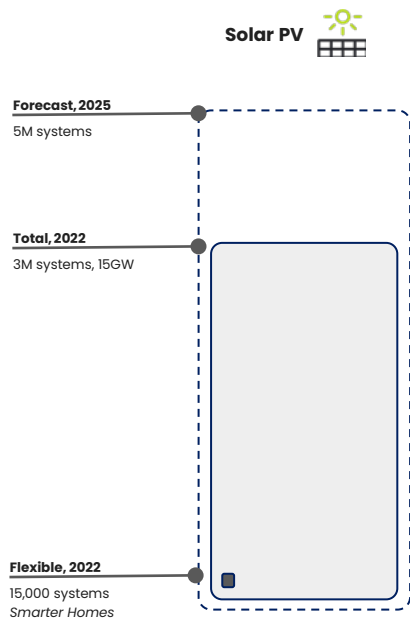
DER Volume Creates Value... and Risk

Without liquidity there's no market



However Most DER Remains Inflexible

DER is increasingly smart, but is not connected for flexibility beyond pilots and trials.





Exchanging value

Getting Started

Avoiding the false dichotomy between connection standards versus market incentives.

1



Smart DER

- > Minimum connectivity
- > Minimum function

2



Default Registration

- > Device # and NMI
- > Commissioning and certification

3



Emergency Response

- > Emergency Disconnect
- > Dynamic Operating Envelopes

4



Enable VPP

- > VPP function in wholesale
- > Provide Auxiliary services (FCAS, Capacity, LV services)

End.

Contact.

bruce.thompson@greensync.com.au