

# South Australia Separation 2022

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Operational DER Management

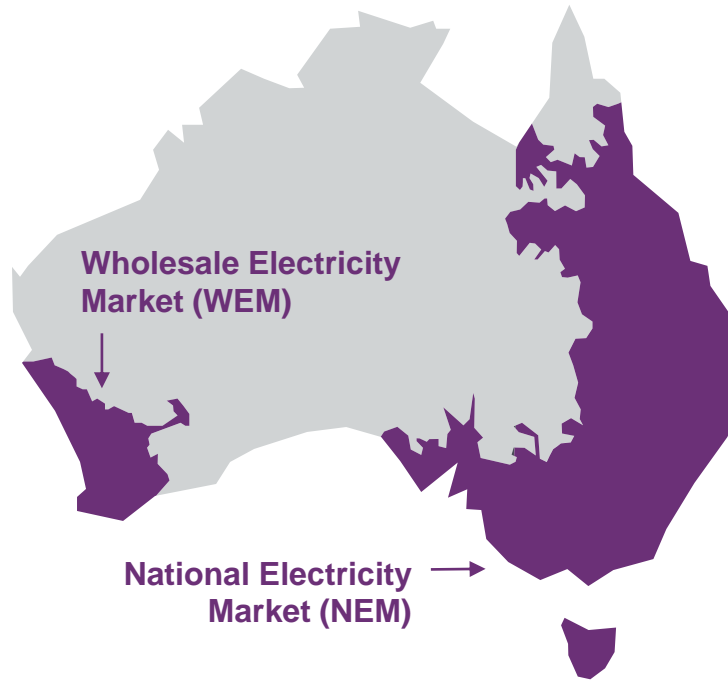


# About AEMO

- AEMO is a member-based, not-for-profit organisation.
- We are the independent energy market and system operator and system planner for the National Electricity Market (NEM) and the WA Wholesale Electricity Market (WEM).
- We also operate retail and wholesale gas markets across south-eastern Australia and Victoria's gas pipeline grid.



## Electricity



## Gas

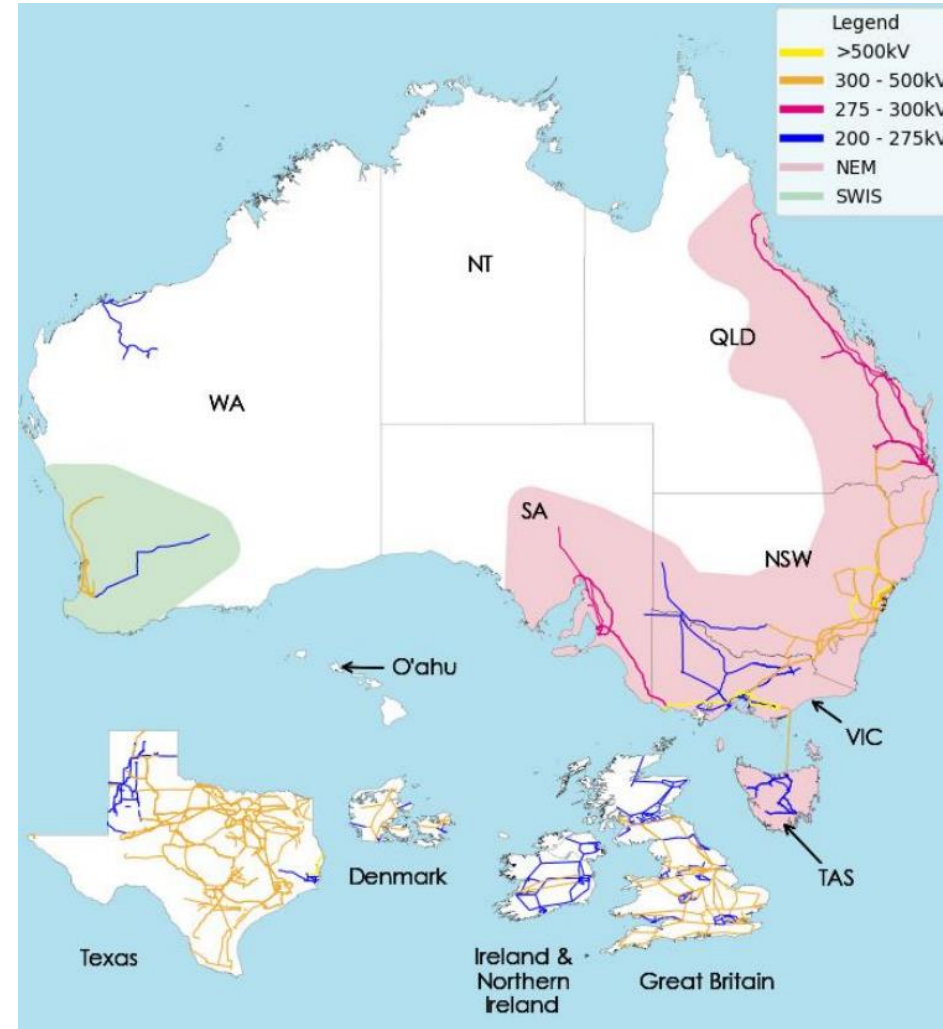


Declared Wholesale Gas Market (DWGM)

Short Term Trading Market (STTM) and Gas Supply Hub (GSH)

# About South Australia

- Demand:
  - Peak: 3,000 MW
  - Average: 1,500 MW
  - Minimum: 100 MW
- Capacity:
  - 2,700 MW gas-powered generation
  - 2,400 MW wind
  - 2,300 MW of distributed solar PV (DPV)
  - 600 MW of utility solar PV
  - 260 MW of utility BESS
- Interconnection:
  - 1 x 650 MW AC (dual circuit)
  - 1 x 220 MW DC



# South Australia

Figure 1: Annual minimum demand (actual and forecast)

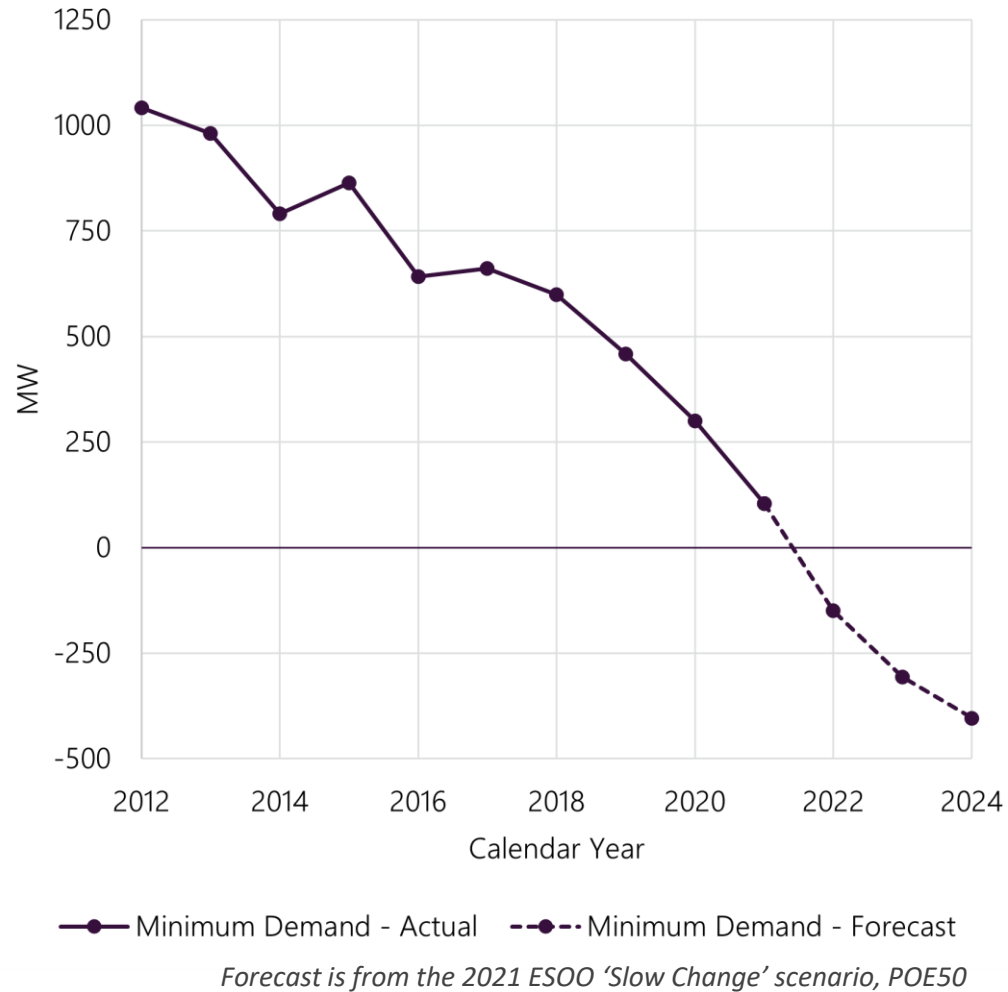
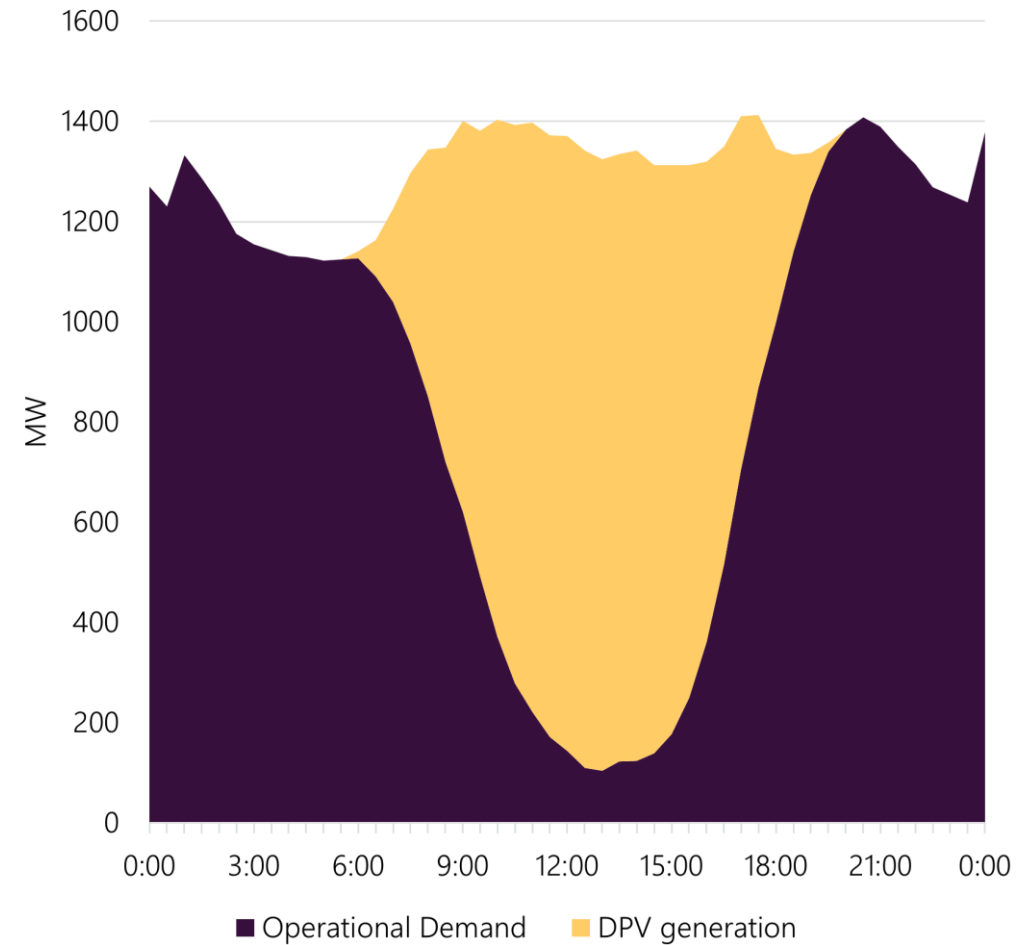
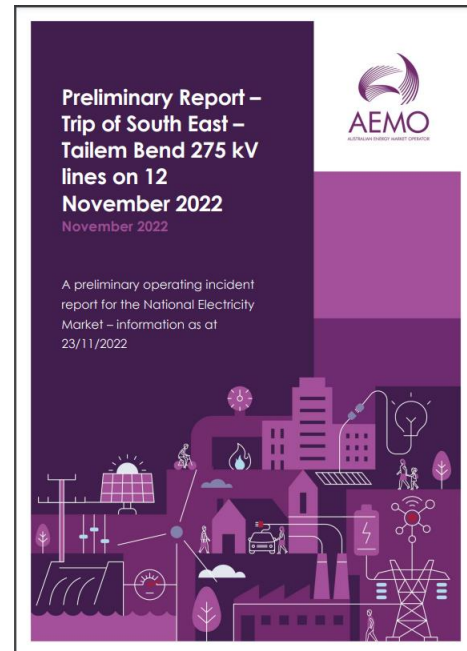


Figure 2: SA Demand profile, 21st November 2021

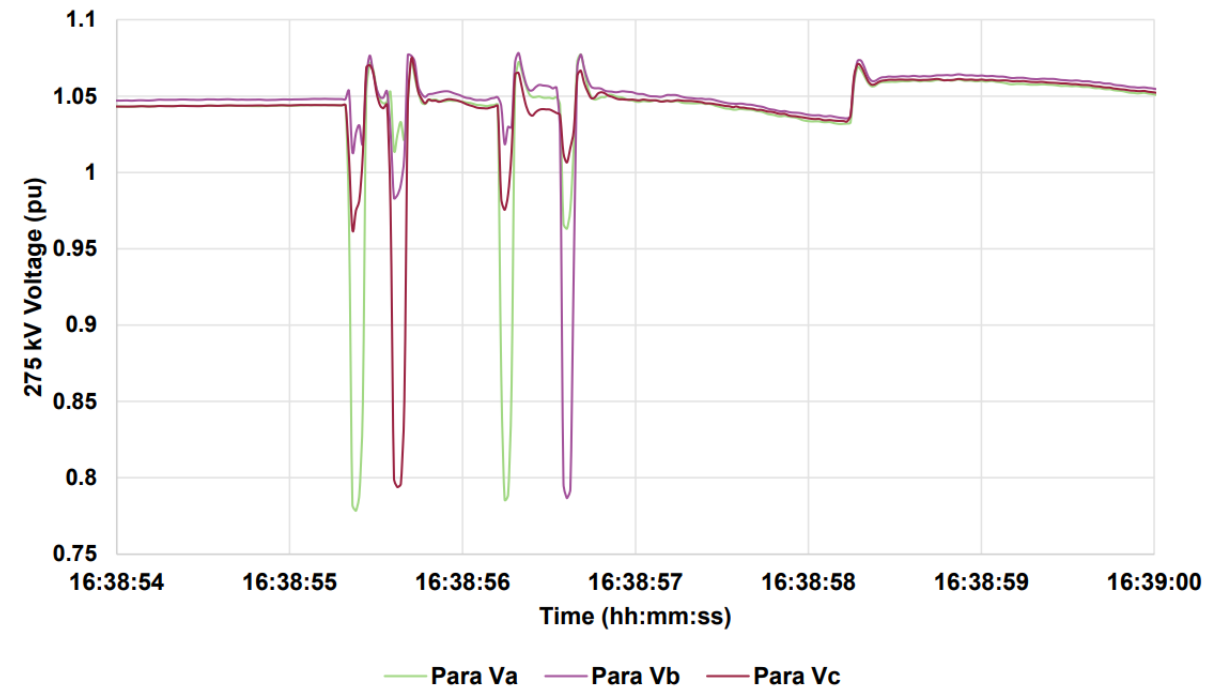
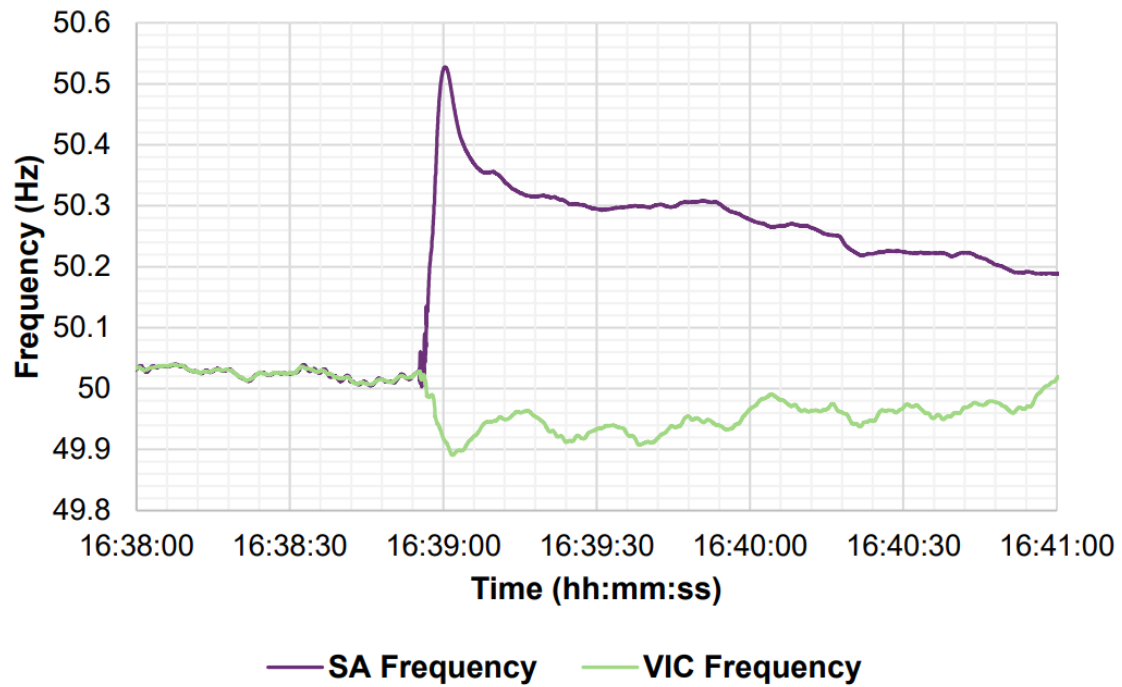


# The event

- Severe weather disconnects multiple transmission lines
- Synchronous separation of South Australia occurs Saturday 12<sup>th</sup> November 2022 @ 1639 hrs
- Operated as an island until Saturday 19<sup>th</sup> November

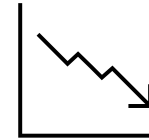


# Separation event



# Operational challenges

- Demand falls below Minimum System Load (MSL) required for essential units to remain online
- DPV Contingency (DPVC) risk exceeding frequency control capabilities



# DPV Contingency

- DPV generation has been observed to suddenly disconnect following power system disturbances
- This DPV “shake-off” presents a generation contingency risk, and can occur in addition to the loss of a generating unit



Behaviour of distributed resources  
during power system  
disturbances

May 2021

Overview of key findings

A report for the National Electricity Market and South-West Interconnected System

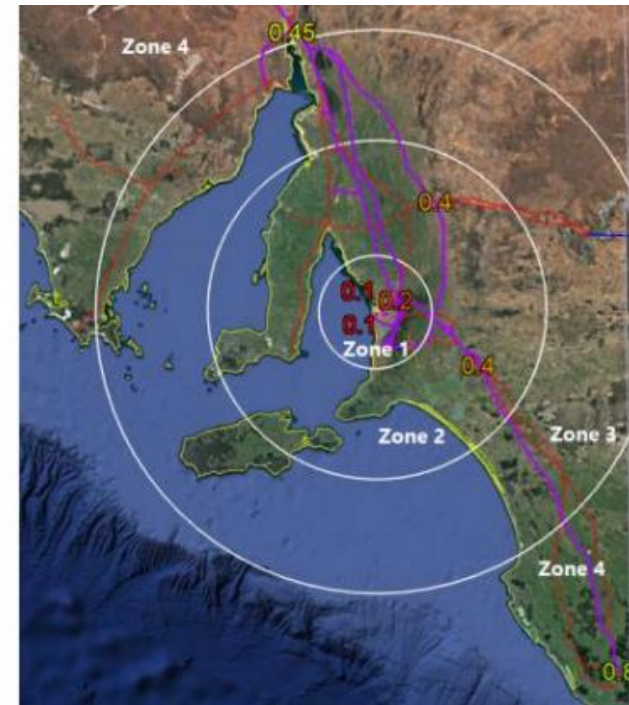
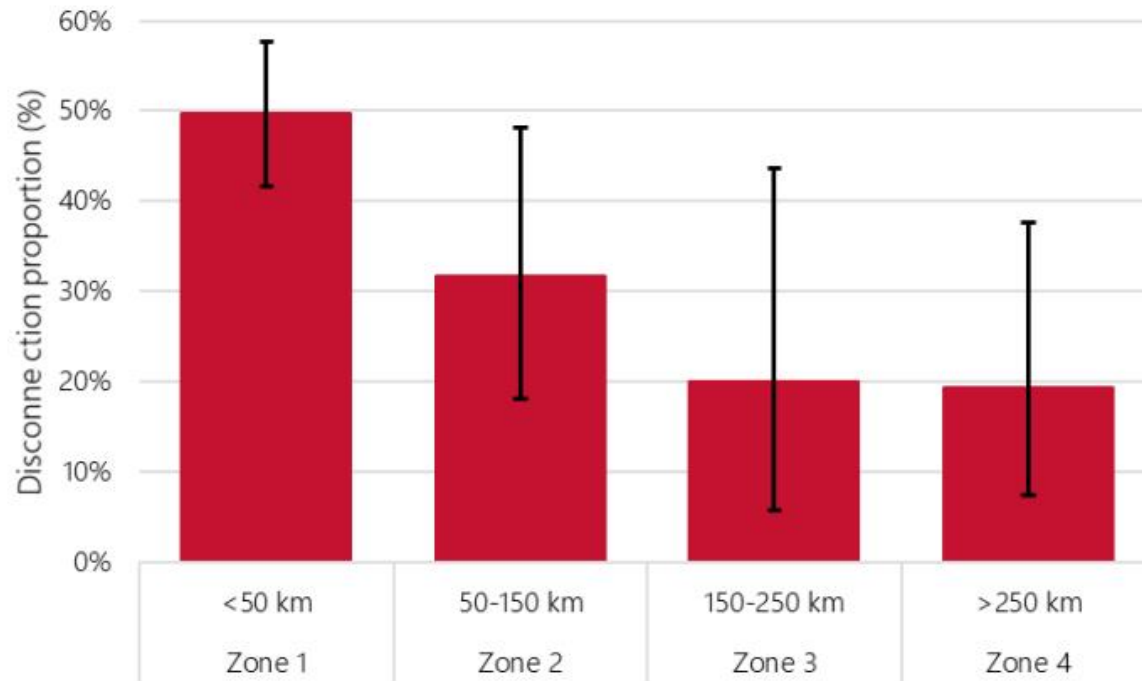




# Distributed PV “shake-off”

- Up to 40% of distributed PV in a region can disconnect in response to power system disturbances

Example disturbance in South Australia (3 March 2017)



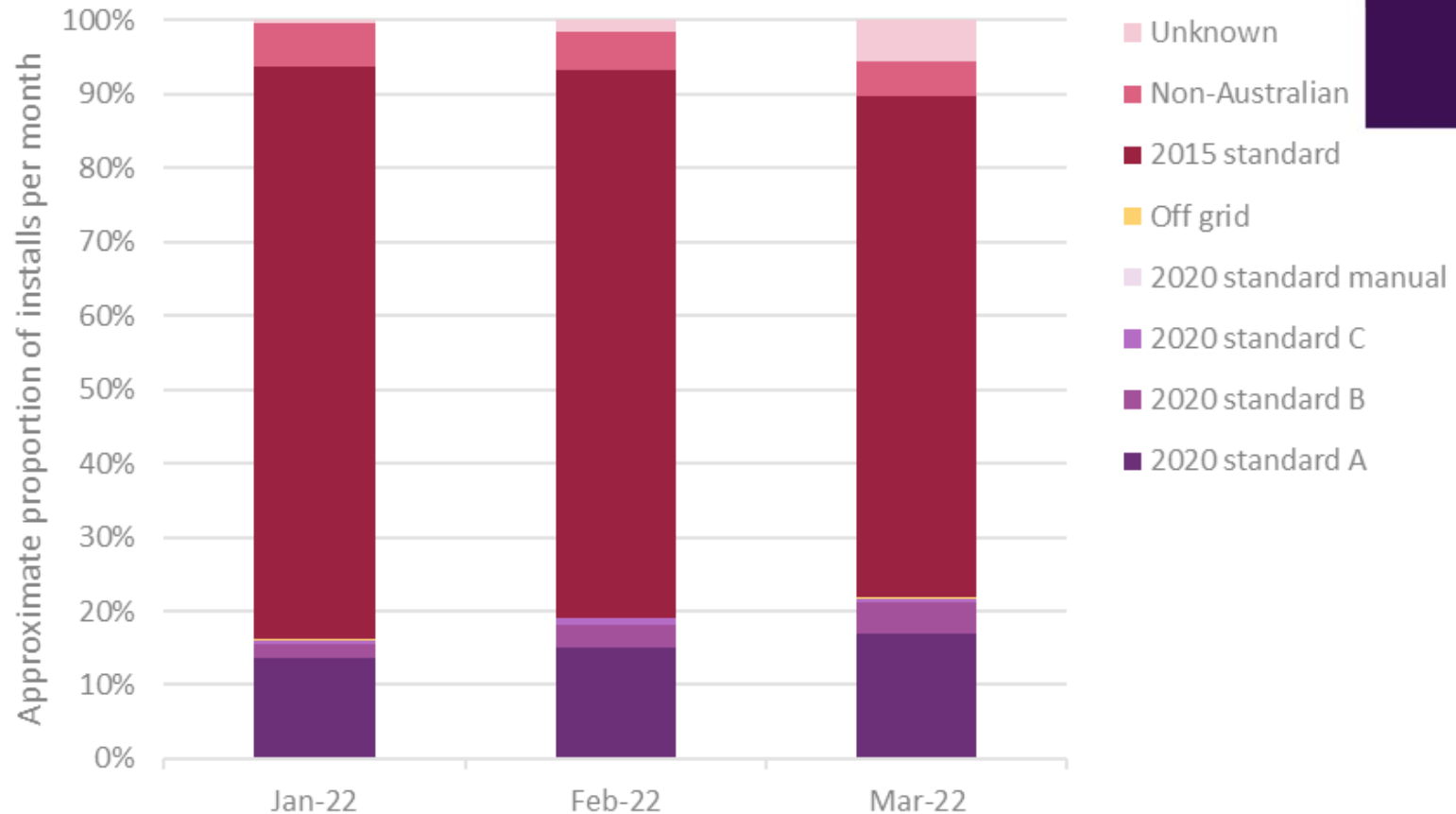
# Updated standards

- Australian Standard AS/NZS4777.2:2020 mandatory from December 2021
- Improved disturbance ride-through requirements

# Compliance with technical standards

- 10 manufacturers provided installation data since 1 Jan 2021
- Suggests that only ~40% are being set correctly to AS/NZS4777.2:2020 Standard
- Majority are being set to older 2015 standard

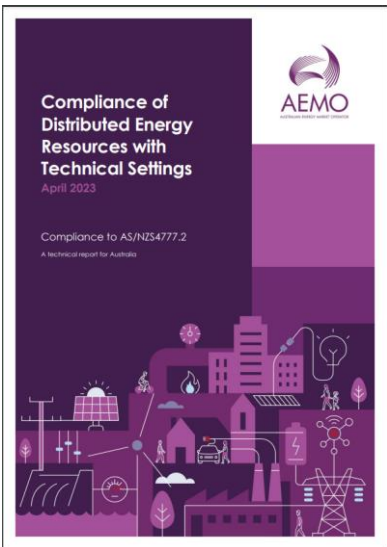
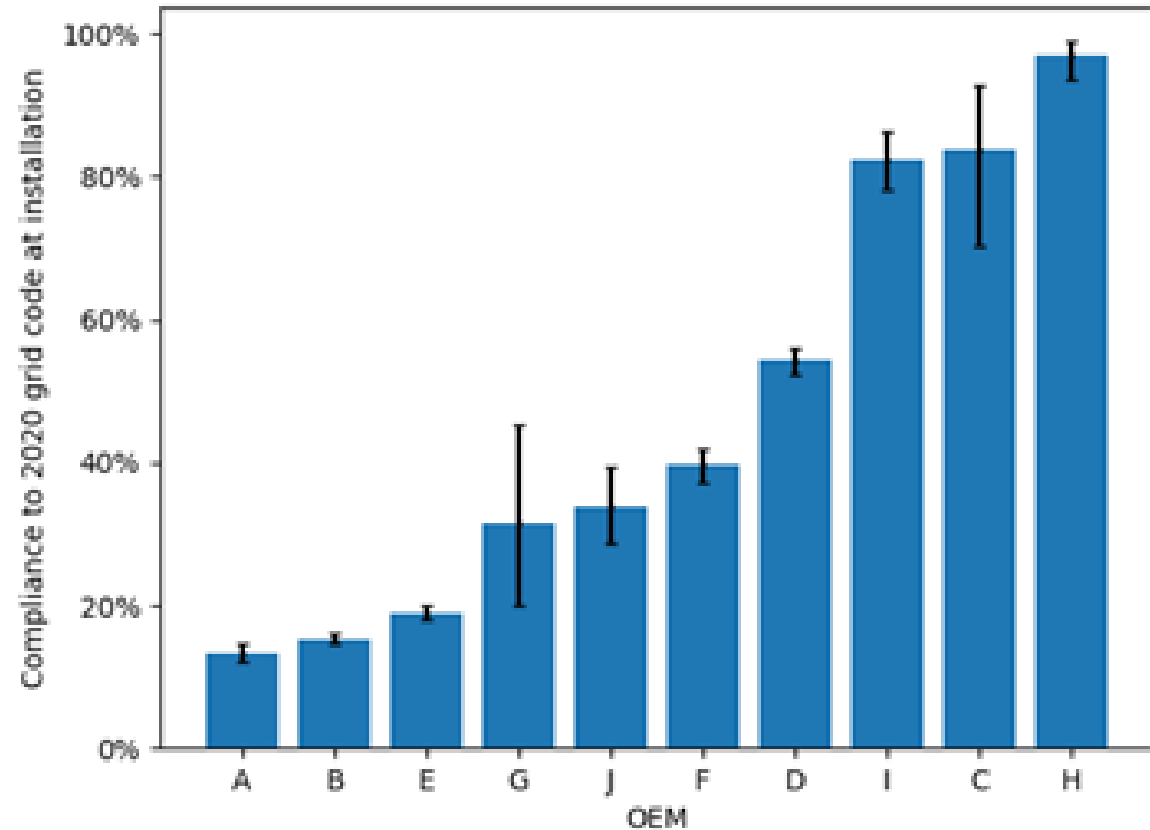
Proportion installs by standard (multiple OEMs)



# Compliance with standards

- Compliance rates vary significantly between Original Equipment Manufacturers (OEMs)

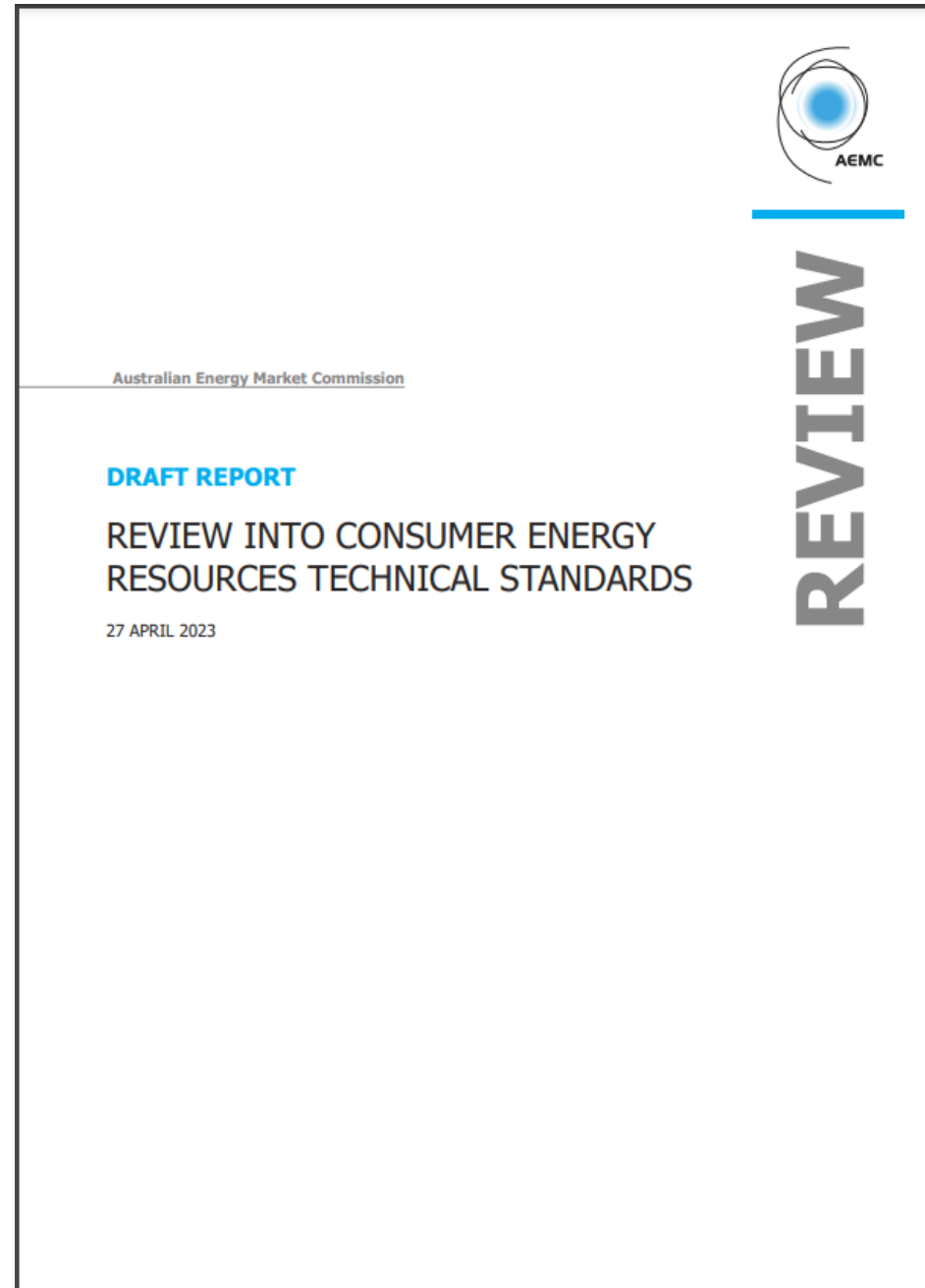
Compliance rates to 2020 standard (Q1 2022 installs in the NEM)



<https://aemo.com.au/-/media/files/initiatives/der/2023/compliance-of-der-with-technical-settings.pdf?la=en&hash=FC30DF5A3B9EF853093709012242D897>

# Compliance frameworks

- Governance frameworks for DER compliance are under review



# Actions in November 2022 event

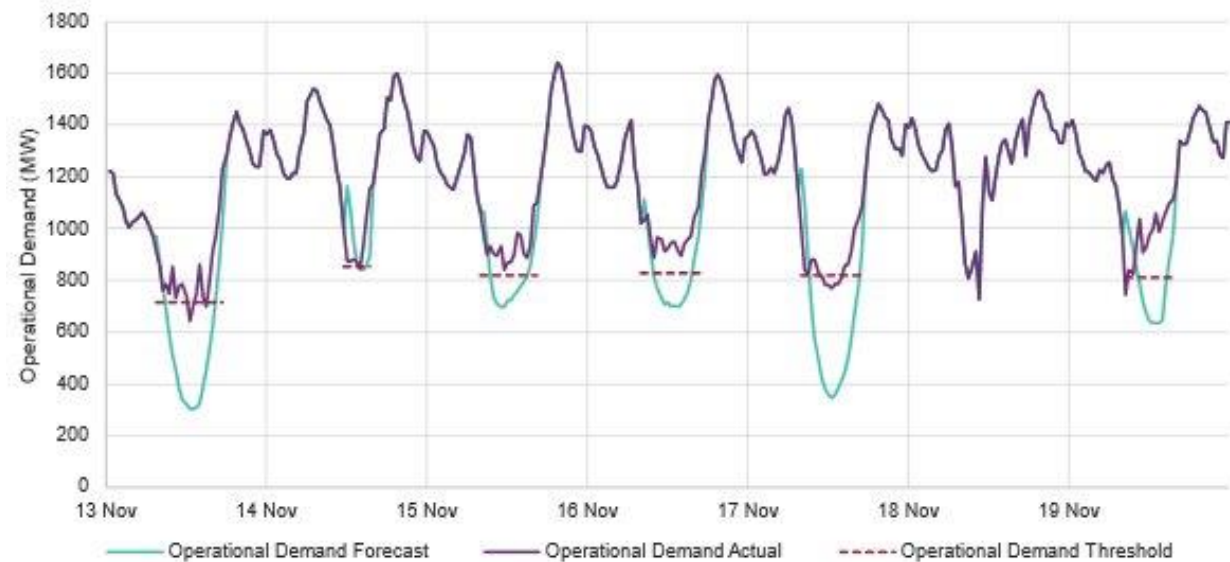
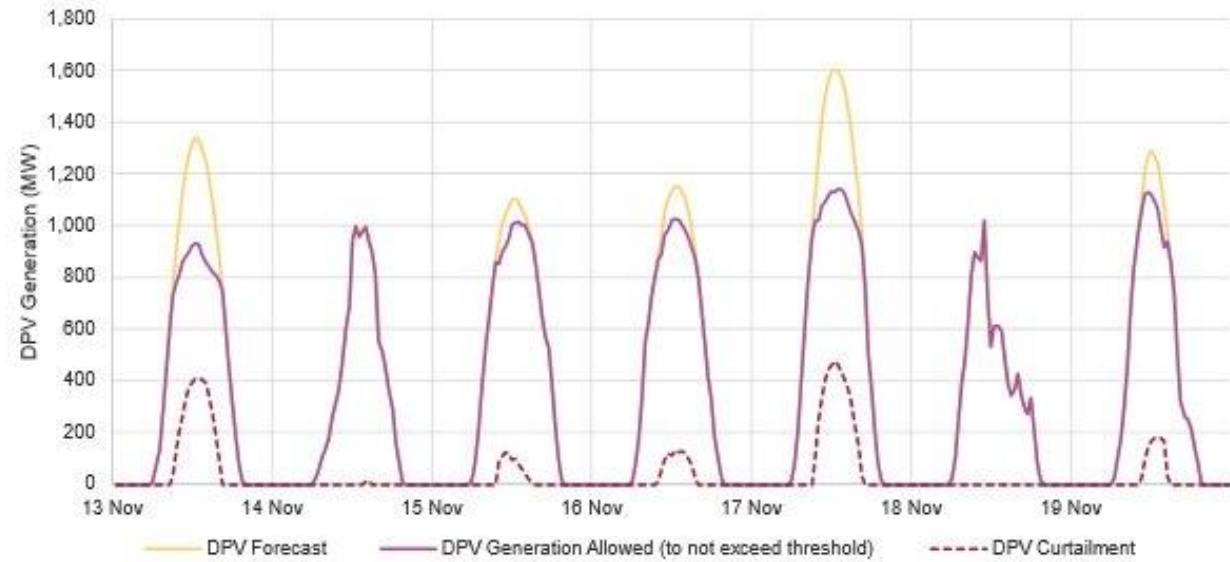
- Constrain down/offline generating units not required for essential services
- Constrain BESS output to maximise headroom and footroom for frequency response
- Curtail DPV generation to maintain contingency size within manageable thresholds

Scheduled Battery storage registered in South Australia:

Name	Registered capacity (MW)
Hornsedale Power Reserve	150 MW
Lake Bonney BESS	25 MW
Dalrymple North BESS	30 MW
<i>Torrens Island BESS</i>	<i>250 MW</i>
<i>Tailem Bend 2 Hybrid Renewable Power Station</i>	<i>50 MW</i>

# DPV Curtailment

- Emergency DPV curtailment required for six of seven days
- Approximately 400 MW of DPV generation curtailed
- DPV curtailment requirement forecast to exceed capabilities on 17<sup>th</sup> & 19<sup>th</sup> Nov. AEMO implemented bespoke procedures.
- DPV curtailment instruction delivered in the form of a demand threshold.



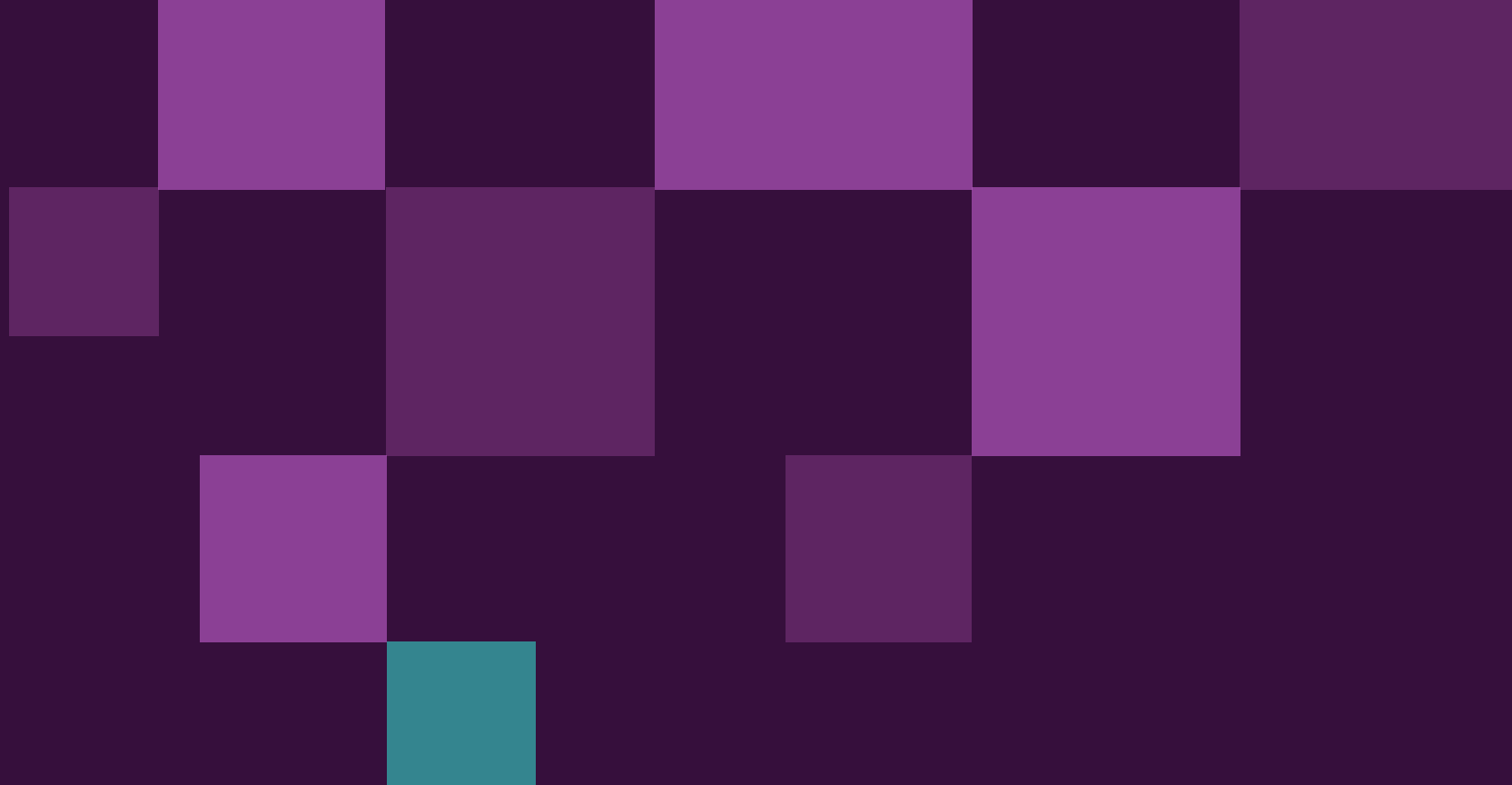
# Outcomes

- Activated sustained curtailment of DPV to support power system security
- Maintained sufficient supply and N-1 security during islanded event during high levels of variable renewable generation



# Next steps

- DER compliance
- “Very Fast” FCAS markets (Oct 2023)
- BESS capacity increasing
- Improving AEMO’s procedures & tools for DPV management, implementing in other regions



*For more information*  
please visit [www.aemo.com.au](http://www.aemo.com.au)

