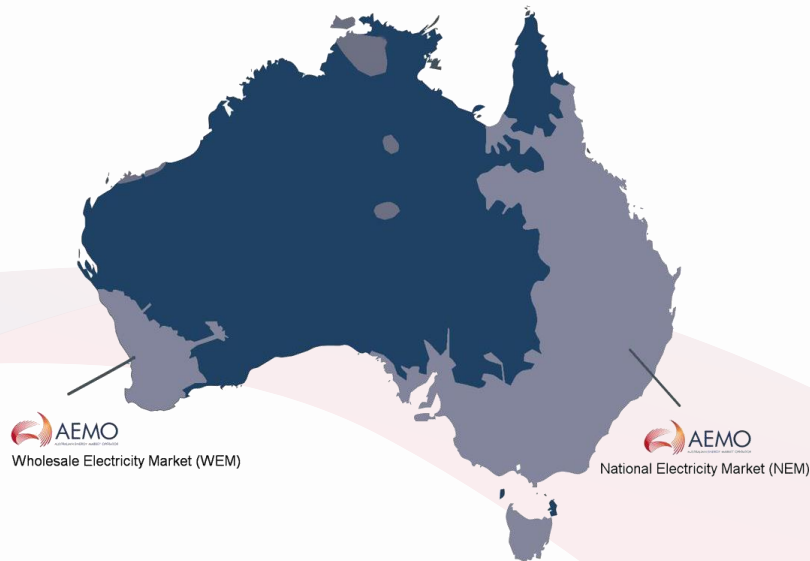


The role of distributed resources in managing Australia's energy transition

Violette Mouchaileh, GM Market Enhancement

About AEMO



We operate Australia's National Electricity Market and power grid in Australia's eastern and south-eastern seaboard, and the Wholesale Electricity Market and power grid in south-west WA.



Both markets supply more than 220 terawatt hours of electricity each year.



We also operate retail and wholesale gas markets across south-eastern Australia and Victoria's gas pipeline grid.



Collectively traded more than A\$20 billion in the last financial year.



Ownership

40%

Market participants

60%

Governments of Australia

Growth of solar

Australia leads the world in household solar PV per capita

6.5 panels are installed every minute

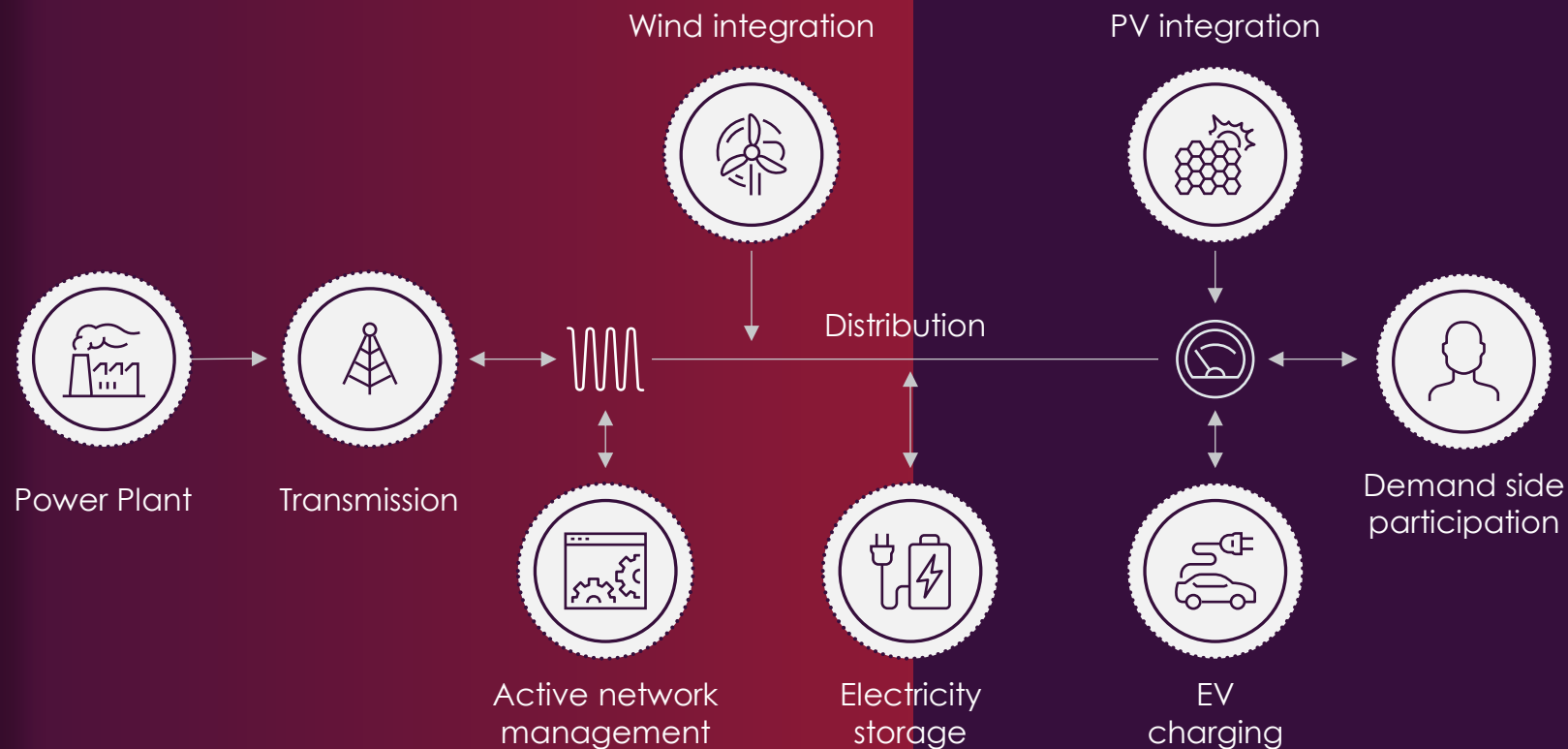
TABLE 2: ANNUAL AND CUMULATIVE INSTALLED PV POWER
2017 IEA-PVPS COUNTRIES

	ANNUAL INSTALLED CAPACITY		CUMULATIVE INSTALLED CAPACITY	
China	53	GW	131	GW
USA	10,6	GW	51	GW
Japan	7	GW	49	GW
Turkey	2,6	GW	3,4	GW
Germany	1,8	GW	42	GW
Australia	1,25	GW	7,2	GW
Korea	1,2	GW	5,6	GW
France	875	MW	8	GW
Netherlands	853	MW	2,9	GW
Chile	668	MW	1,8	GW
Italy	409	MW	19,7	GW

The evolving distributed and digital and data intensive world

What we can see and operate in real time to optimise the market

What we can't see and will see as the system and market evolves



Integrating DER to maximise consumer value



Workstream objectives

Network regulation & pricing facilitate DER and better customer service offerings.

Visibility of DER for operational, forecasting, planning, and market (incl settlement) functions.
A consistent access regime for all market participants within the confines of customer consent and privacy.

Integrate DER into energy, ancillary and reserve markets.
Market arrangement recognise non-retailer models, including third-party/aggregator concepts.
Evolve market arrangement to a distributed market model.

Where appropriate, a nationally consistent approach to DER connections and develop DER technical standards.

To better understand operational challenges and DER capabilities to inform operational processes and tools.

Industry working together to deliver outcomes for consumers

Enablers

Pilot programs

Cyber security

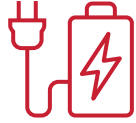
Digital & Technology

Managing security and reliability in a transforming system

Distributed resources are part of the resource mix, providing a range of services including:

- Wholesale market services
 - direct participation pending AEMC rule change
- Ancillary services
- Emergency reserve
- network support services
- New services....??

DER response times



HPR

Tesla
Powerpack
battery

<200ms



Enernoc

cold storage,
industrial load

250ms



HDWF2

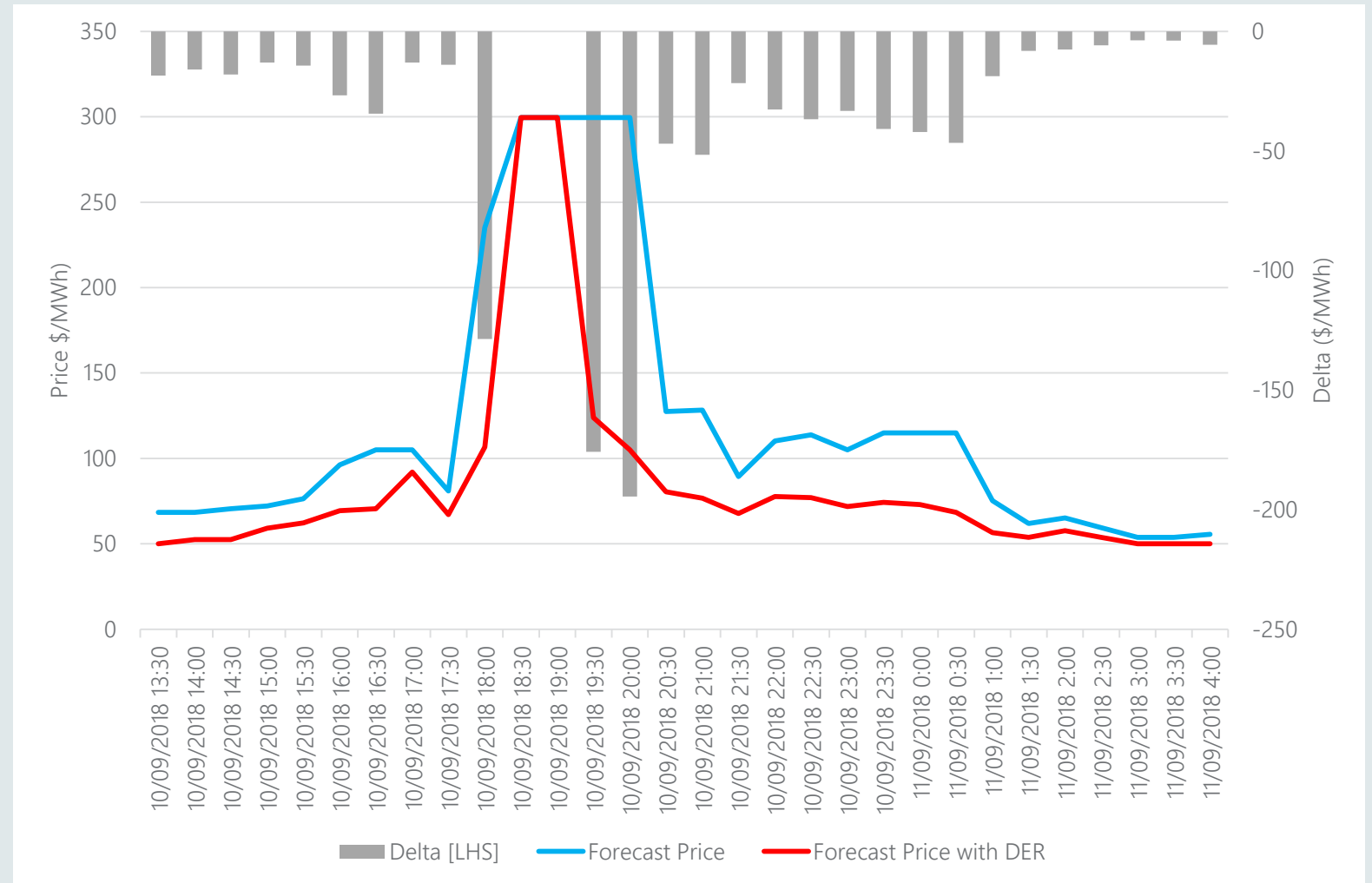
Wind farm
providing
Regulation FCAS

0.325s

Peak (price) shaving

Average of 25%
reduction in per
MW/h price

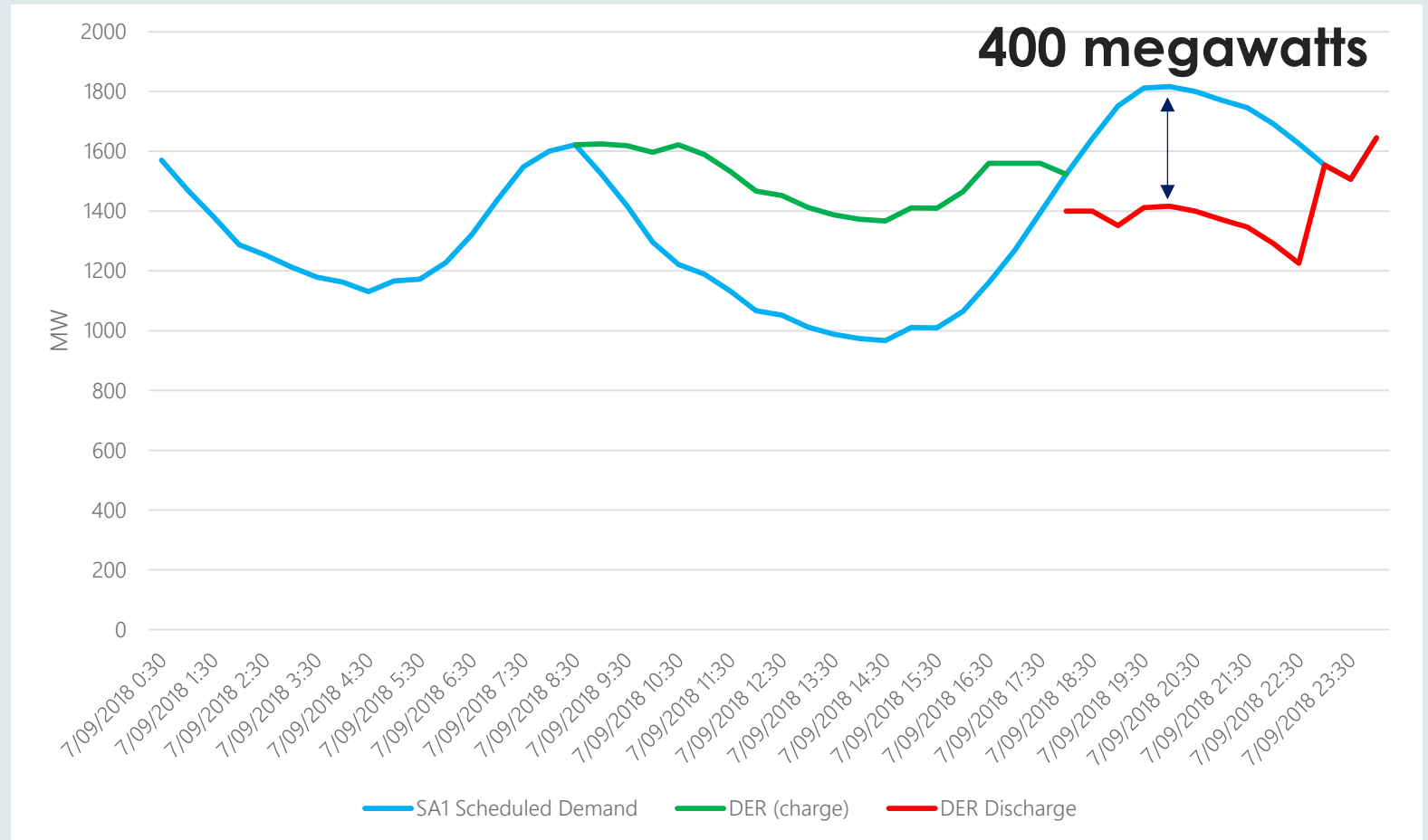
Forecast Price vs Forecast Price with 900MW of DER



Flattening the duck curve

Potentially reducing evening peak by 400 MW

Using DER with storage (charge in the middle of the day and discharge over the evening peak)



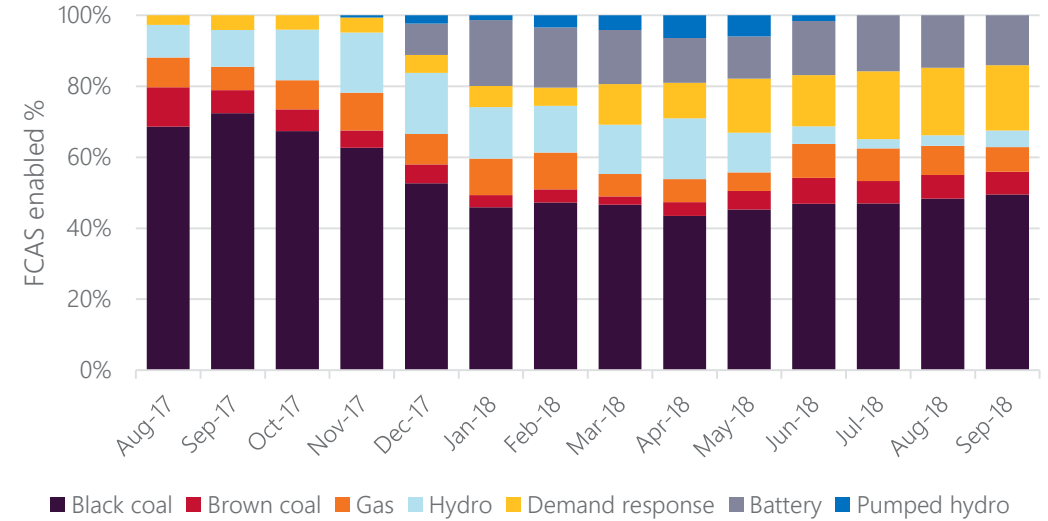
7 Sept 2018 in South Australia

Demand response in FCAS markets

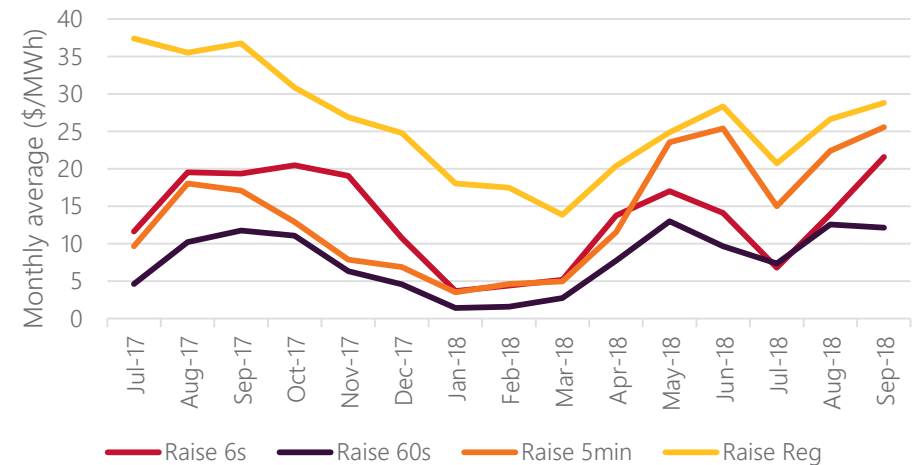
Rule changes were made in 2017 encouraging DR in Ancillary Services

- Demand response and batteries were enabled for FCAS around 3% of the time in August 2017 – by September 2018 this had risen to 32%.
- FCAS prices have rebounded since Q1 2018 driven by:
 - Halving of Raise FCAS supply from hydro generators
 - Isolated high priced events (e.g. 25-8-18 when \$10m in costs were accrued due to a separation event in SA and QLD).

FCAS enabled by fuel type - R6sec

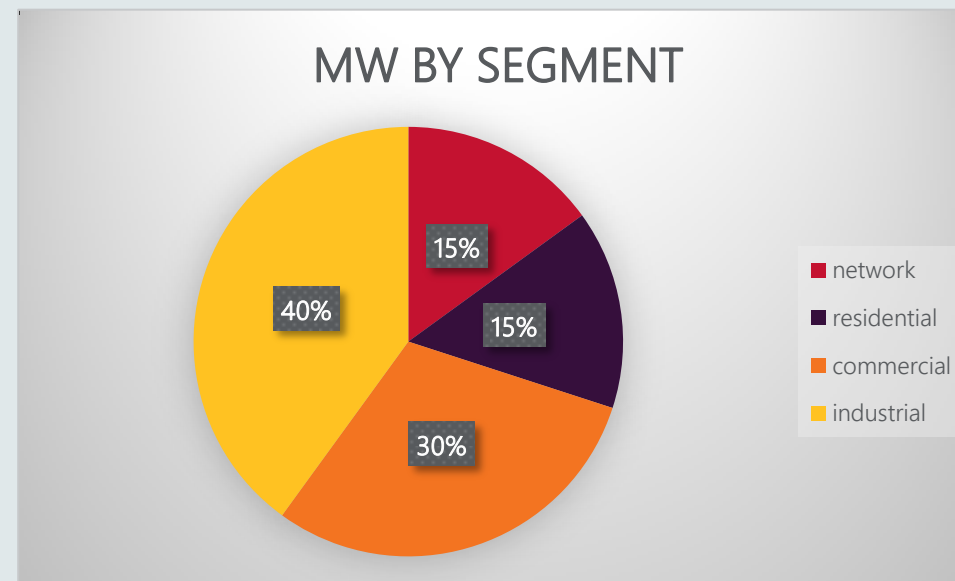
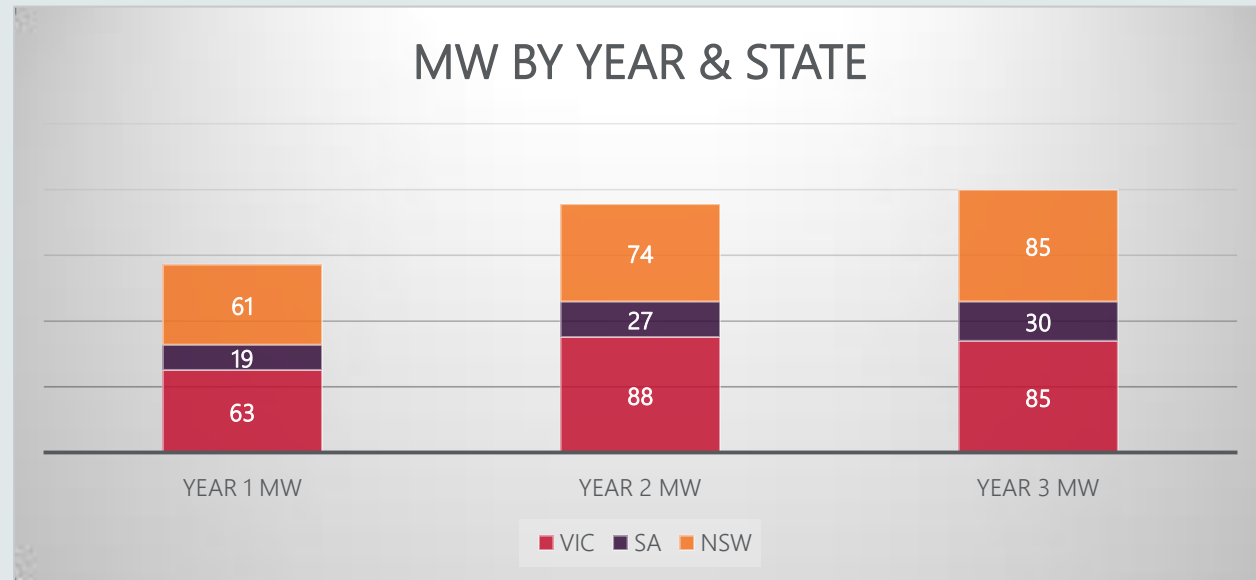


FCAS prices (VIC)



Demand Management & Emergency reserves

ARENA/AEMO demand response trial – piloting DR under a strategic reserve design



Key activities in train



DER Visibility – establishment of DER register. Consider granular visibility as part of Open Energy Networks



Market access – working with AEMC on DER access to energy, ancillary and reserve.



AEMO/ENA Open Networks consultation



Market trials – i.e. Virtual Power Plant trial, demand side management, and distributed markets



Collaboration with ARENA/AEMC/AER/ENA and others through Distributed Energy Integration Program (DEIP)