

Summer Seasonal Preparation

Energy Charter Presentation - November 2023



Empowering South Australia

Acknowledgement of Country

SA Power Networks acknowledges the multiple Traditional Owners of the lands that host the South Australian electricity network and their connections to land, sea and community. We would also like to and pay our respects to Elders past present, and acknowledge that these are living cultures.

Empowering South Australia, 2023
by Presten Warren (b. 2000)



About SA Power Networks

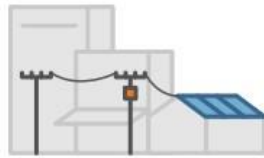


Delivering power to 99% of South Australia's 1.7 million population

2,400 employees in more than 30 sites across the state

Major apprentice program – over 500 apprentices since 2000

Significant contributor to the South Australian community through sponsorship and events



Sole distributor in South Australia

Supplying 900,000 homes and businesses

Peak demand 3,145 MW

Electricity distributed 9,636 GWh



Provide network coverage over 178,000 sq km

Network route length 89,000 kilometres

Operate the oldest network fleet in the National Electricity Market (NEM)



Highest roof-top solar penetration in the NEM (~30%)

South Australia is second only to Denmark in proportion of variable renewable generation



Benchmark well despite impact of significant DER and low customer density

National Benchmark Performance

1. South Australia

2. Queensland

3. Victoria

4. New South Wales

5. Tasmania

6. Australian Capital Territory

System Reliability

Average minutes off supply per annum

185

2005/06

135

2021/22

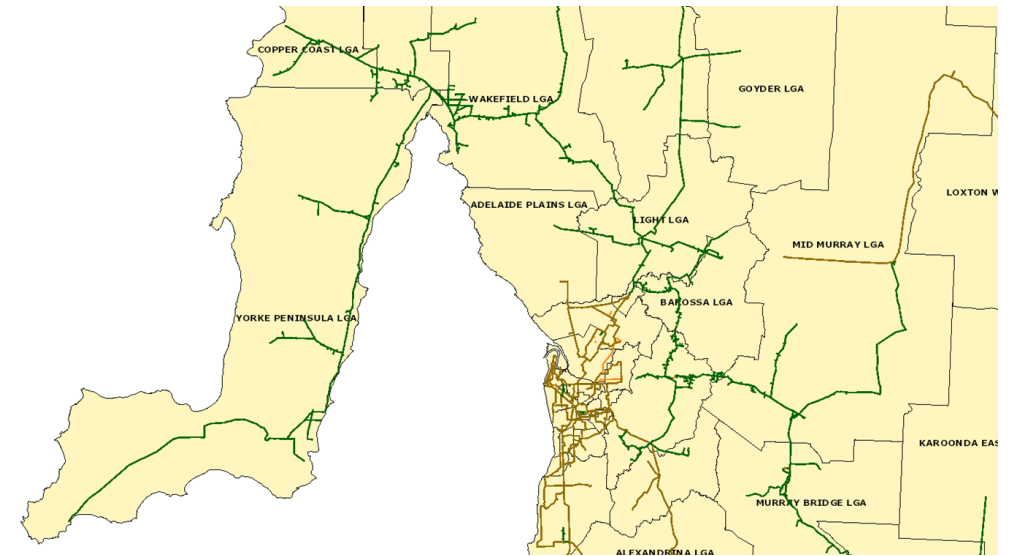
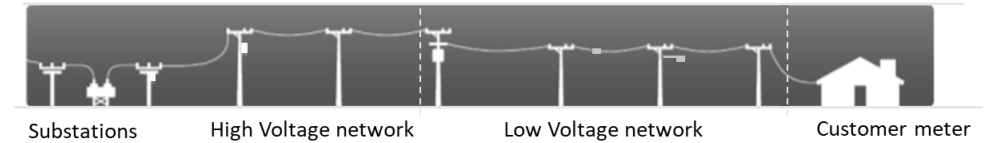
Key points to be added (awaiting DV)

The National Electricity Market (NEM)

- AEMO (the national market operator) is responsible for security of supply across the NEM. This is currently more challenging due to the changing mix of generation in the system.
- In the following situations, relating to security of supply on the National grid, AEMO will direct us to take action:
 1. From time to time AEMO will direct SA Power Networks to implement load shedding (**reducing demand**) if there are major faults or loss of generation on the national grid
 2. Or something new! We have needed to **increase load** to manage system security where we have lost transmission connection with Victoria and have minimum demand (low demand and very high levels of solar generation)

Network configuration

- SA has a network that is significantly radial in nature and 80% of it is above ground
- In the metro area it is more meshed/grid based and we can switch customers around outages to restore power for most more quickly
- In regional areas long single radial lines supply towns and surrounds and a fault upstream will affect all those downstream
- Electrical equipment is vulnerable to climate-related issues – like humans it works less efficiently in heat, it can be damaged by fire, and it is vulnerable to the impact of tree/limb falls and other impacts



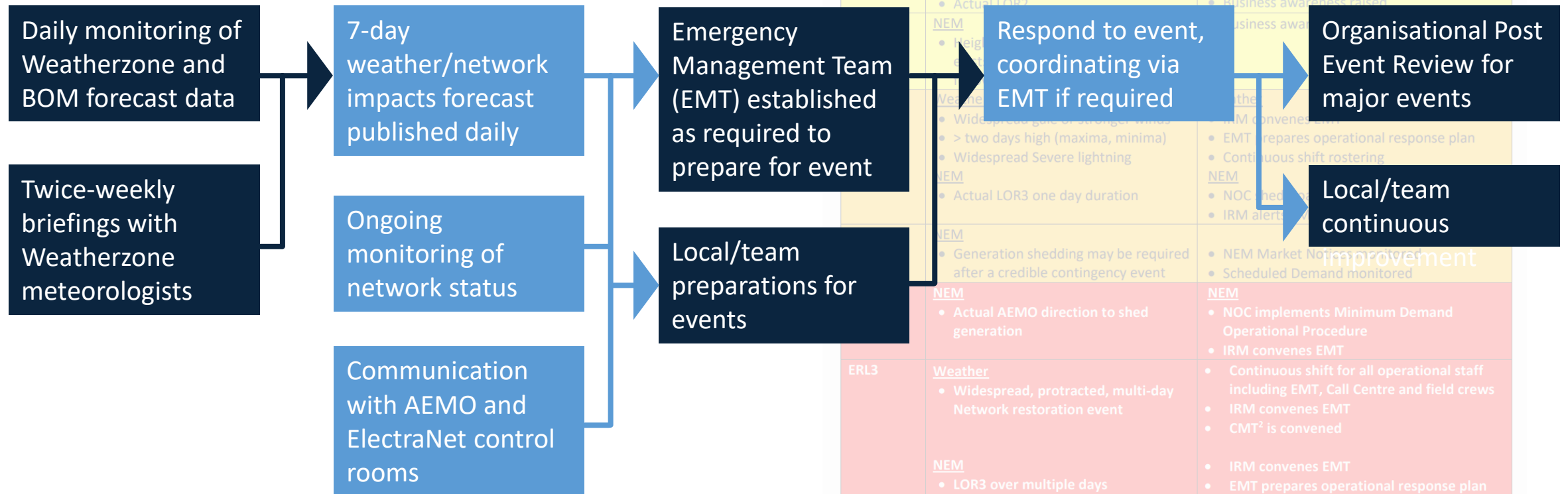
Extreme weather has major impacts on our network

- Extended heatwaves with hot nights result in high levels of energy demand and equipment gets little chance to cool
- Bushfires can cause significant damage and outages
- Lightning strikes impact infrastructure and cause outages
- High winds can bring down trees and tree limbs or propel airborne debris and cause significant damage

We have developed a sophisticated approach to minimising risk, and preparing for summer and extreme weather events

Weather and network impacts monitoring

- This illustrates how we monitor and prepare for events with the potential to cause network outages:
 - FDL (Fire Danger Response Level)
 - ERL (Emergency Response Level)
 - MSD (Minimum State Demand)



Overview of this summer

Weatherzone and CFS advice indicates a longer fire season, although not at the level of 2019/20

Heatwaves expected to be shorter (2-3 days) but with a chance of more extreme peak temperatures

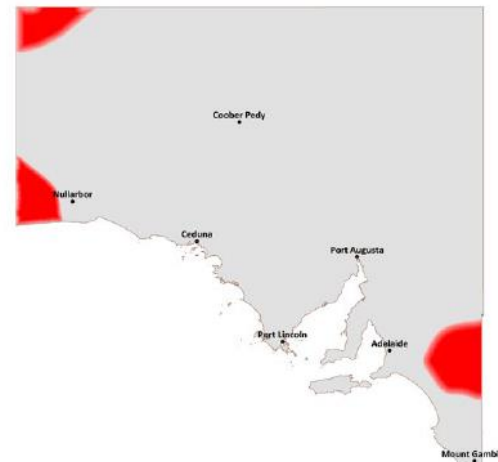
AEMO forecasting increased chance of rotational load shedding

Weather Summary

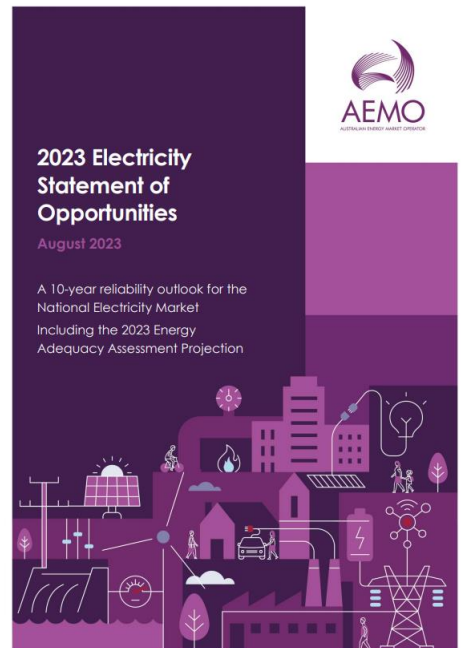
- **Rainfall:** Slightly below average in spring, closer to average in summer
- **Temperatures:** Warmer than average maximums and minimums, esp. in the north
- **Strong Wind events:** More likely, especially during negative SAM
- **Storms:** Normal chance. Higher chance of damaging winds and hail
- **Bushfire risk:** Above average chance this spring and summer, particularly grass/scrub fires.

weatherzone^o
business
a DTN company

South Australia



Increased Risk of Fire

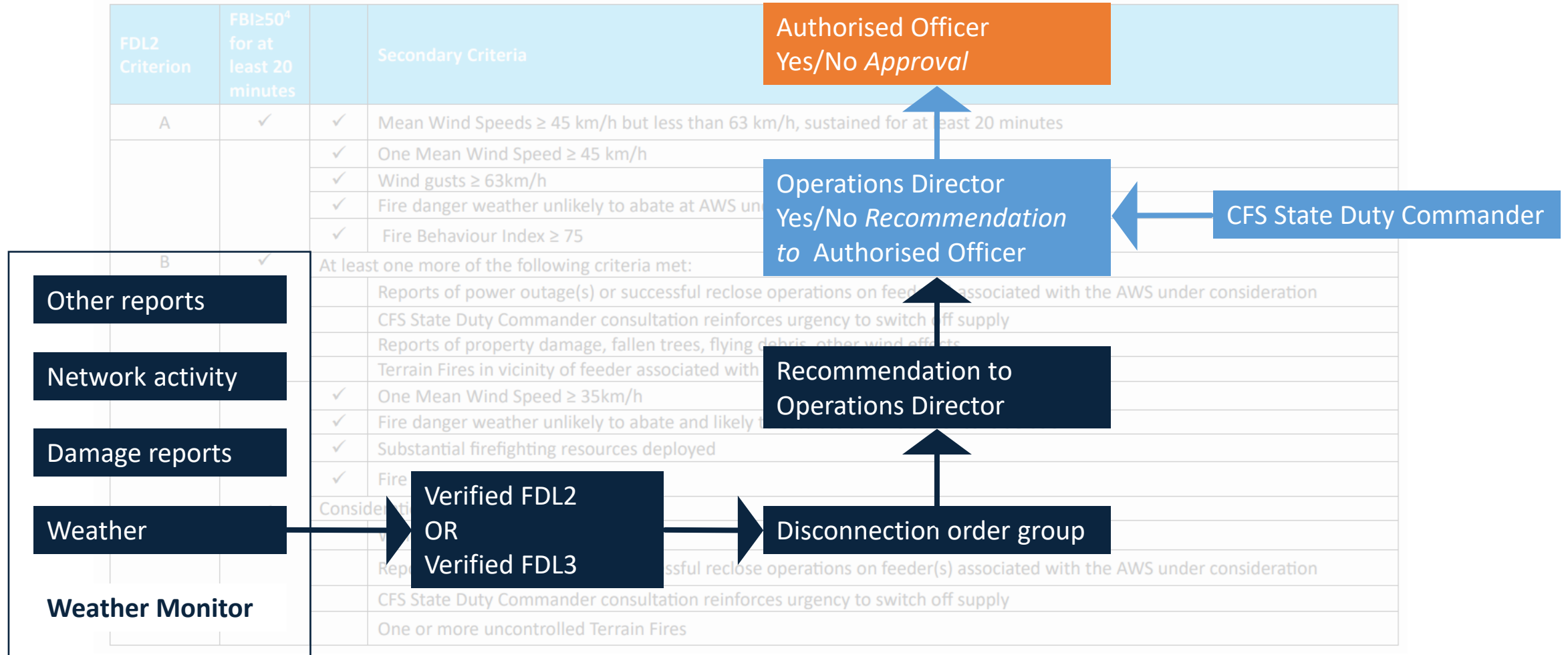


Bushfire Seasonal Prep

- For a variety of reasons, overhead electricity networks are involved in fire starts – we do everything we can to minimise that risk
- Early, external sources of information on long term and short-term impacts, including seasonal briefings from Weatherzone
- Preparation tasks completed prior to season:
 - Asset inspections (incl use of drones / helicopters / ground patrols)
 - Rectifying any identified bushfire and supply-risk defects and ensuring key network projects completed prior to Summer
 - Tree trimming
 - Training operational personnel/emergency management exercises
 - Ensuring emergency spare parts in stock
 - Preparing call centre and social media messaging
 - Writing to Life Support Customers, MP's.

Fire Danger Response – Emergency Disconnection

Disconnection procedure flowchart





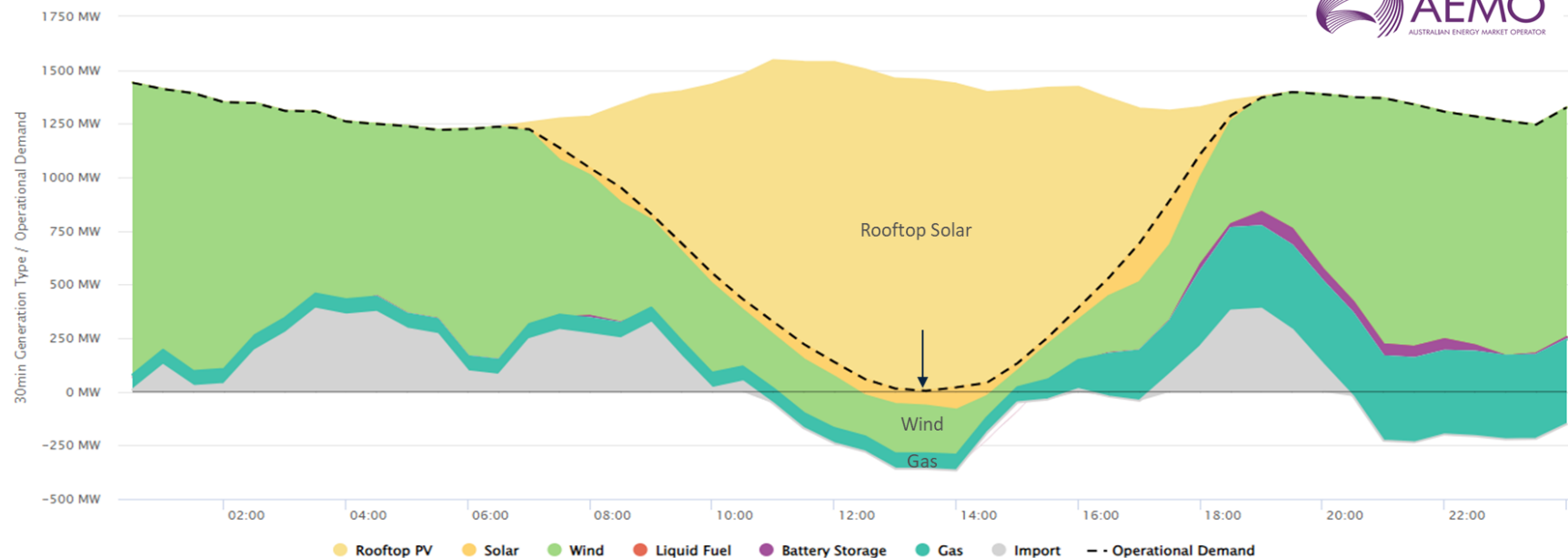
Storm Impact

- Storm damage often requires reconstruction
- We attend wires down first – including use of volunteers from the business
- We prioritise reconnections (emergency and public infrastructure, outages with most customers affected)
- We communicate with affected customers as we get updated information

Minimum State Demand

Increasingly SA is being powered in the middle of the day almost entirely by rooftop solar. These days of high rooftop solar generation and low customer energy demand need to be managed carefully by AEMO

SA Operational Demand and Generation Mix on Sunday 1 October 2023



Emergency action – minimum demand

- If there is the loss of the interconnector to Victoria then SA becomes islanded – creating the potential for a localised or a wide blackout if there is another issue in the State-wide system
- AEMO takes action at State-level with Electranet and large-scale generators and also high load customers are asked to assist to help manage security of supply
- As a last resort AEMO will direct SA Power Networks to increase energy demand (load building) in our network to a specific target by tripping off solar generation by:
 1. Turning off large scale solar and wind farms
 2. Turning off large scale solar systems such as shopping centres and factories
 3. Turn off the exporting of rooftop solar using the regulated Relevant Agent and Dynamic Export functions
 4. Trip off remaining exporting rooftop solar using our Emergency Voltage Management function



Minimising heatwave impact

- As demand for electricity increases during extended heat, there is a risk of
 - A loss of generation upstream in the supply chain (AEMO manages)
 - Electrical overloads in our network (SA Power Networks)
- We design our network to meet customer demand using long-term forecasts
- Risk-based approach to delivering long-term levels of supply security to cater for all network conditions

Load shedding – a rare event

1. **Automated** system that reacts fast to rapid falls in frequency – this is what happened in the State-wide blackout in 2016 in response to a massive shock to the system
2. **Manual** rotational load shedding, where AEMO has a supply/demand issue and directs SA Power Networks to shed a target amount of MW load to stabilise the network.
 - Load shedding is rotated to different customers every 45 minutes according to a list maintained by the OTR (exemptions are made for key facilities)
 - Communication is a challenge as these are fast moving events and AEMO is the lead agency

Communications

- Communication is initiated when forecasts indicate significant ERL or FDL conditions
- We utilise a range of media with channels and messages tailored to expectations regarding the impact of the event (prior, during)
- During an ERL event, we have an automated system to notify customers when supply is lost, and provide estimated restoration times (our SMS system reaches about 85% of customers)
- In major events, we deliver targeted, bespoke messaging to localised groups of customers regarding restoration times
- On a day of potential FDL disconnection, we will SMS zones re likely disconnection until conditions abate
- We communicate directly with major infrastructure providers, Government agencies and other relevant stakeholders



Empowering South Australia