ESOO, Market Suspension & UFE explained

Mark Stedwell, AEMO

26 October 2022

We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

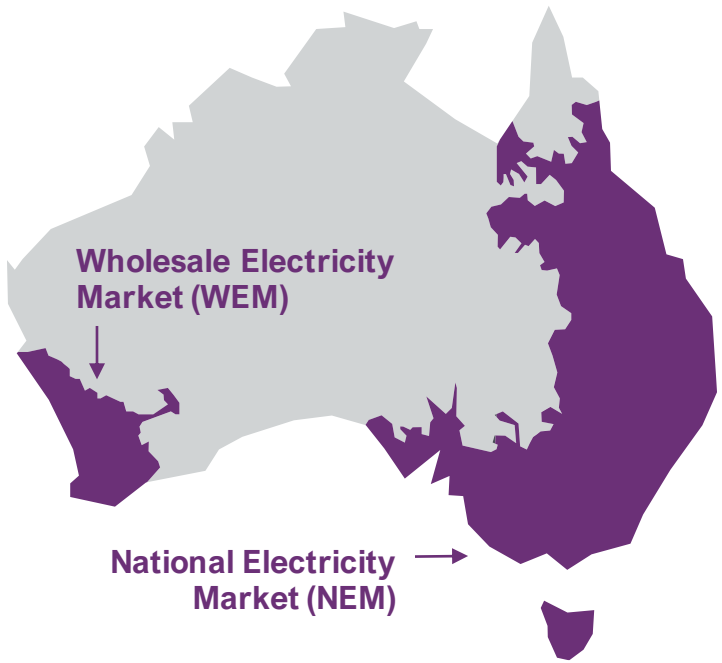
We pay respect to their Elders past, present and emerging.

About AEMO

- We are the independent not-for-profit 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 eastern Australia and Victoria's gas transmission pipeline grid.

AEMO Services is an independent subsidiary of AEMO, established in 2021 to enable the transparent provision of advisory and energy services to National Electricity Market jurisdictions.

Electricity



Gas

Declared Wholesale Gas Market (DWGM)

Short Term Trading Market (STTM)

and

Gas Supply Hub (GSH)

Agenda

1. Electricity Statement of Opportunities (ESOO) 2022 overview
2. Market Suspension Event 15 -24 June 2022
    a) What is market suspension?
    b) Why was the market suspended?
    c) Resumption of the market
    d) Compensation arrangements
3. Unaccounted for Energy (UFE)

Electricity Statement Of Opportunities

ESOO

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Urgent need for investment to support the energy transition

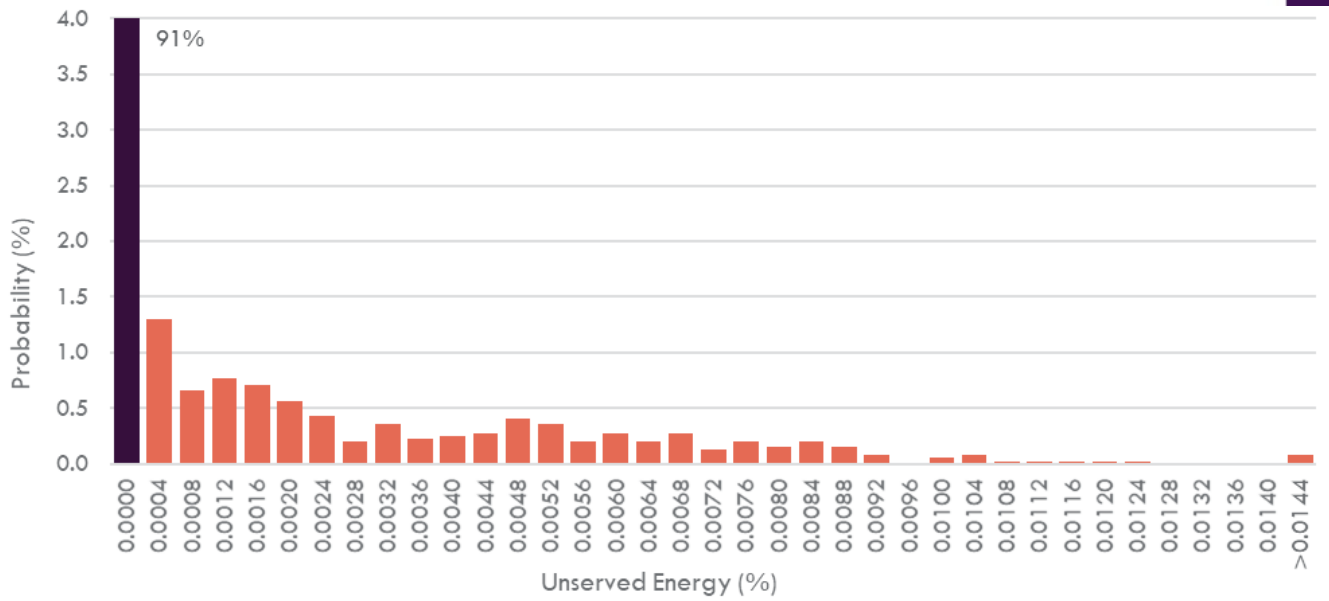
- **Urgent development is needed** of anticipated generation and storage projects, as well as actionable transmission investments, to support the energy transition and maintain reliability amidst a cluster of coal retirements this decade.
- A strong pipeline of announced projects currently exists, however **insufficient capacity response has become committed** to address emerging shortfalls, while programs to increase investments are progressing.
- The coming summer (2022-23) is forecast to remain within the Interim Reliability Measure in all regions, however reliability risks are emerging in many regions across the 10yr horizon due to:
  - Scheduled generator retirements
  - Growing energy consumption and peak demands
  - Project commissioning risks
  - Deteriorating reliability of ageing generators

The IRM is forecast to be met in all NEM regions this summer, however risks to supply remain.

Risks include:

- Prolonged periods of unavailability of generation or transmission, including forced outages, planned maintenance and/or potential mothballing.
- Delays to the commissioning of new renewable generation, dispatchable capacity and/or transmission.
- Extreme temperatures affecting the output from all generation sources.
- The ongoing potential for gas and coal fuel shortfalls, particularly if generators need to operate more frequently to cover prolonged outages of major power stations.

Probability density of forecast USE in South Australia 2022-23, Central scenario



The figure shows a 91% probability that no USE will occur in the coming year, but there is a 9% probability of an incident. It shows a 'long-tail' of possible outcomes that may be infrequent but impactful. For example there is a 1% probability of an outage greater than four hours for 100,000 households.

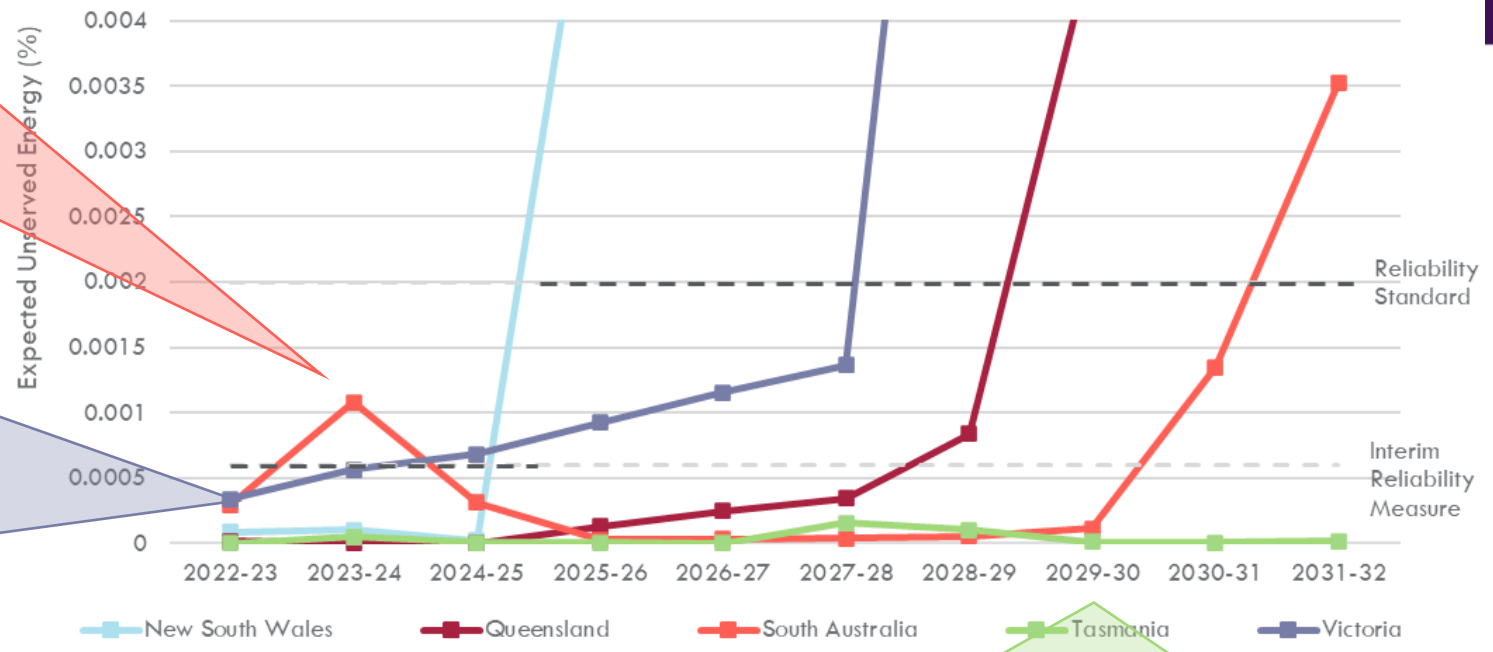
Reliability gaps are forecast in all mainland NEM regions without more committed developments.

Reliability gaps are forecast in South Australia in 2023-24, against the IRM of 0.0006% USE. This gap is emerging due to delayed commissioning of committed generation and transmission developments, including a later release of the first stage of the Project EnergyConnect transmission project, and also expected expansions of industrial loads.

Reliability gaps are forecast in Victoria from 2024-25, against the Interim Reliability Measure of 0.0006% USE. This gap is attributed to forecast expansions of industrial loads, and updated projected outage rates and ratings on the inter-regional transmission flow paths that supply Victoria during times of high demand.

* Since modelling was undertaken, the Mortlake South Wind Farm become committed, and would improve outcomes in Victoria if considered.

Expected unserved energy, 2022-23 to 2031-32, Central outlook



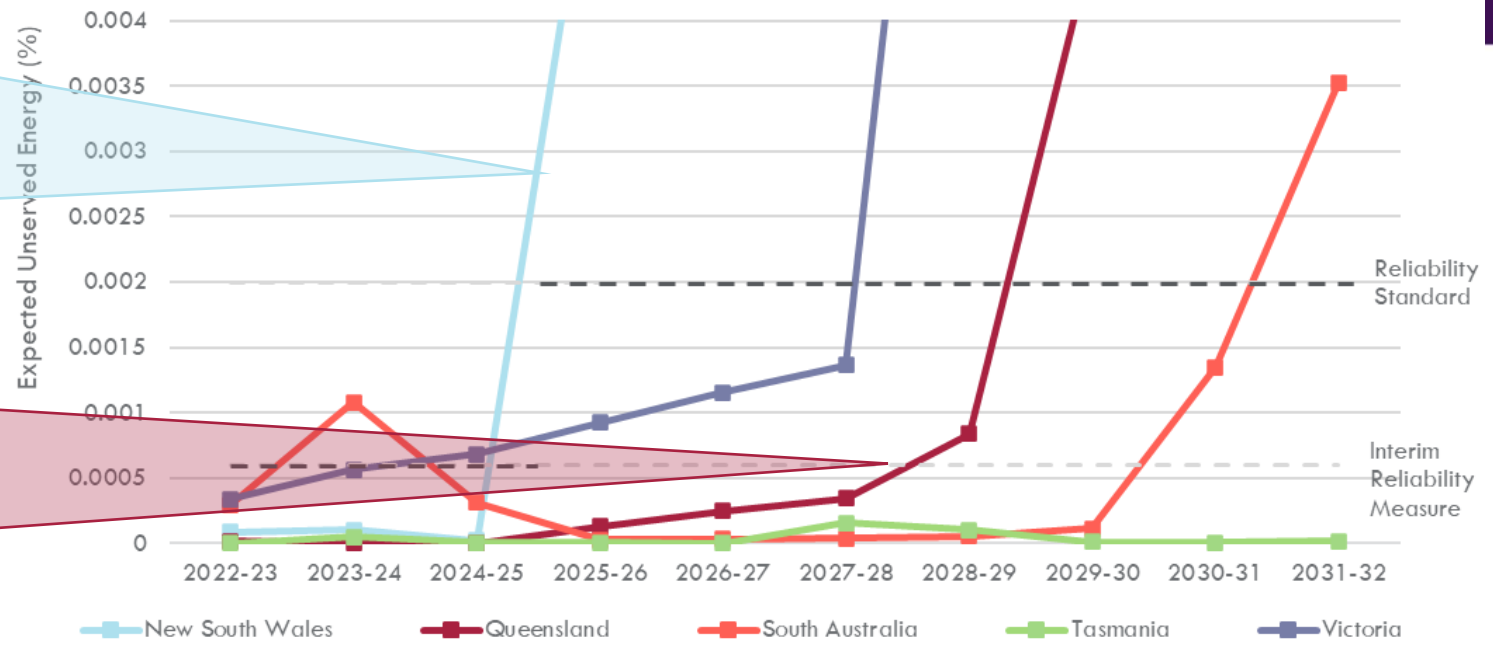
Reliability risks remain with the IRM in **Tasmania** over the ESOO horizon

Reliability gaps are forecast in all mainland NEM regions without more committed developments.

Reliability gaps are forecast in New South Wales from 2025-26, against the reliability standard of 0.002% USE. Consistent with the Update to the 2021 ESOO, this reliability gap is four years earlier than forecast in the 2021 ESOO, following changes in generation including the announced earlier closure of the Eraring Power Station.

Reliability risks in Queensland increase from 2029-30, above the reliability standard of 0.002% USE. Risks arise when Vales Point Power Station in New South Wales is expected to retire (and after the expected closure of Callide B Power Station in Queensland), as expected USE is shared across the two regions.

Expected unserved energy, 2022-23 to 2031-32, Central outlook



Market Suspension

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What is market suspension?

- The spot market in a region is suspended by a declaration by AEMO.
- It is not a suspension of the rules, the market is still dispatched and priced (within alternative rules) and settled normally.
  - If it is not practical to operate central dispatch and pricing, AEMO sets prices using the market suspension pricing schedule.
  - The rules also include compensation when the pricing schedule is applied.

Criteria for suspension

One of three criteria must be met:

1. The power system in a region has collapsed to a black system
2. AEMO has been directed by a jurisdiction to suspend
3. AEMO has determined it has become impossible to operate the spot market in accordance with the rules

Why was the market suspended?

Three factors made the spot market impossible to operate leading to the market suspension on 15 June 2022:

- Large scale withdrawal of capacity (6.5 GW of generation offline)
- Manual dispatch of plant with directions (close to 5 GW on 14 & 15 June)
- Inability to determine prices due to the number of constraints and conflicts

Withdrawal of plant

- When the weekly rolling cumulative price in each region exceeds a threshold, administered price cap of $300/MWh is applied
- Compensation arrangements apply during administered prices
  - From AEMC for direct and opportunity costs exceeding the price cap
  - From AEMO for direct costs of complying with directions exceeding a formula-based compensation calculation
- Low energy reserves from early cold spells, generator availability, gas supplies and coal transport issues
- High levels of uncertainty saw withdrawals of capacity

Inability to determine prices due to over-constrained dispatch

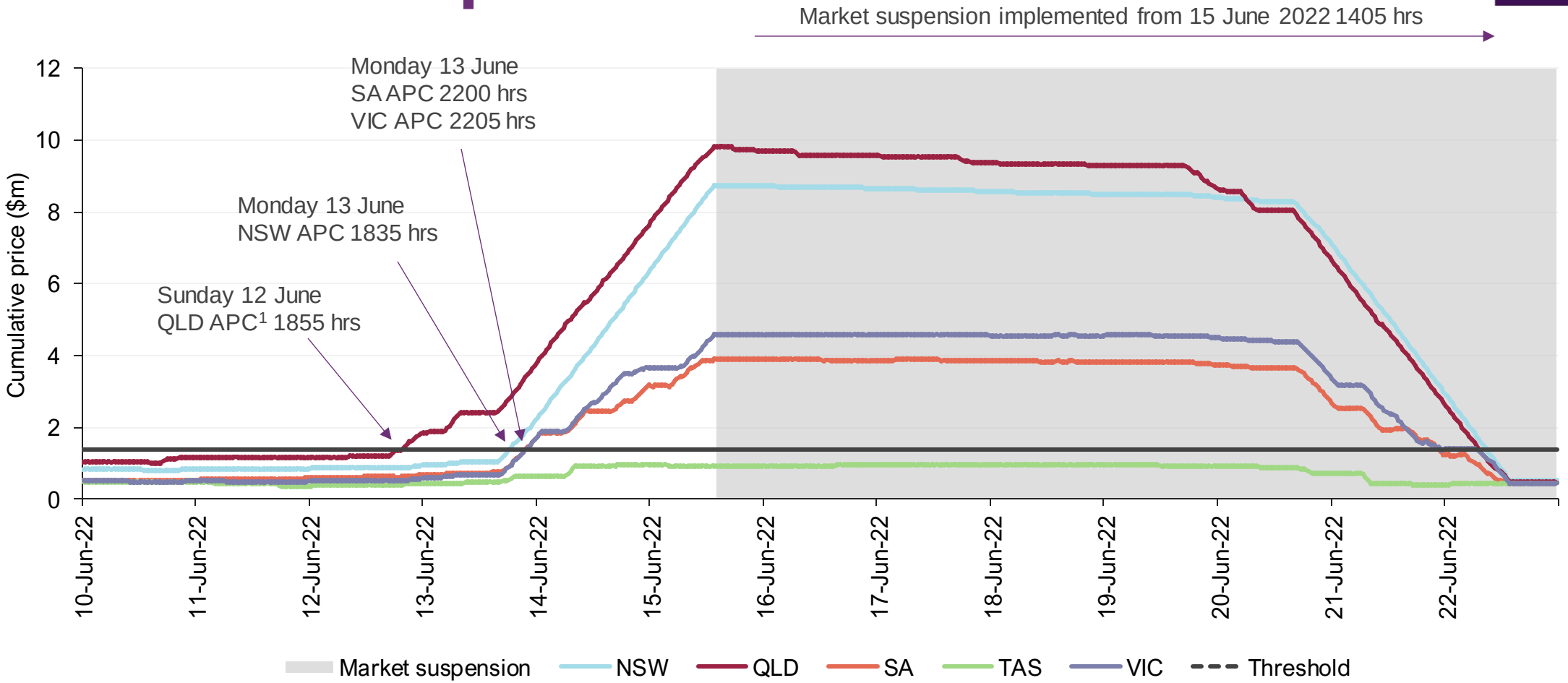
OCD is an example of the issues that AEMO was attempting to manage prior to suspending the spot market.

- The number of conflicting constraints in place resulted in unresolved pricing outcomes ('over-constrained dispatch').
- Normally, AEMO gets up to one or two a year; in the 12 months leading up to this week AEMO had none.
- Number of unresolved OCD intervals that required manual resolution:

Trading Day	OCD Intervals	Hours
13/06/2022	12	1
14/06/2022	49	4
15/06/2022	139	11

This was a key factor from two aspects
- Deciding to suspend the market
- Using the market suspension pricing schedule

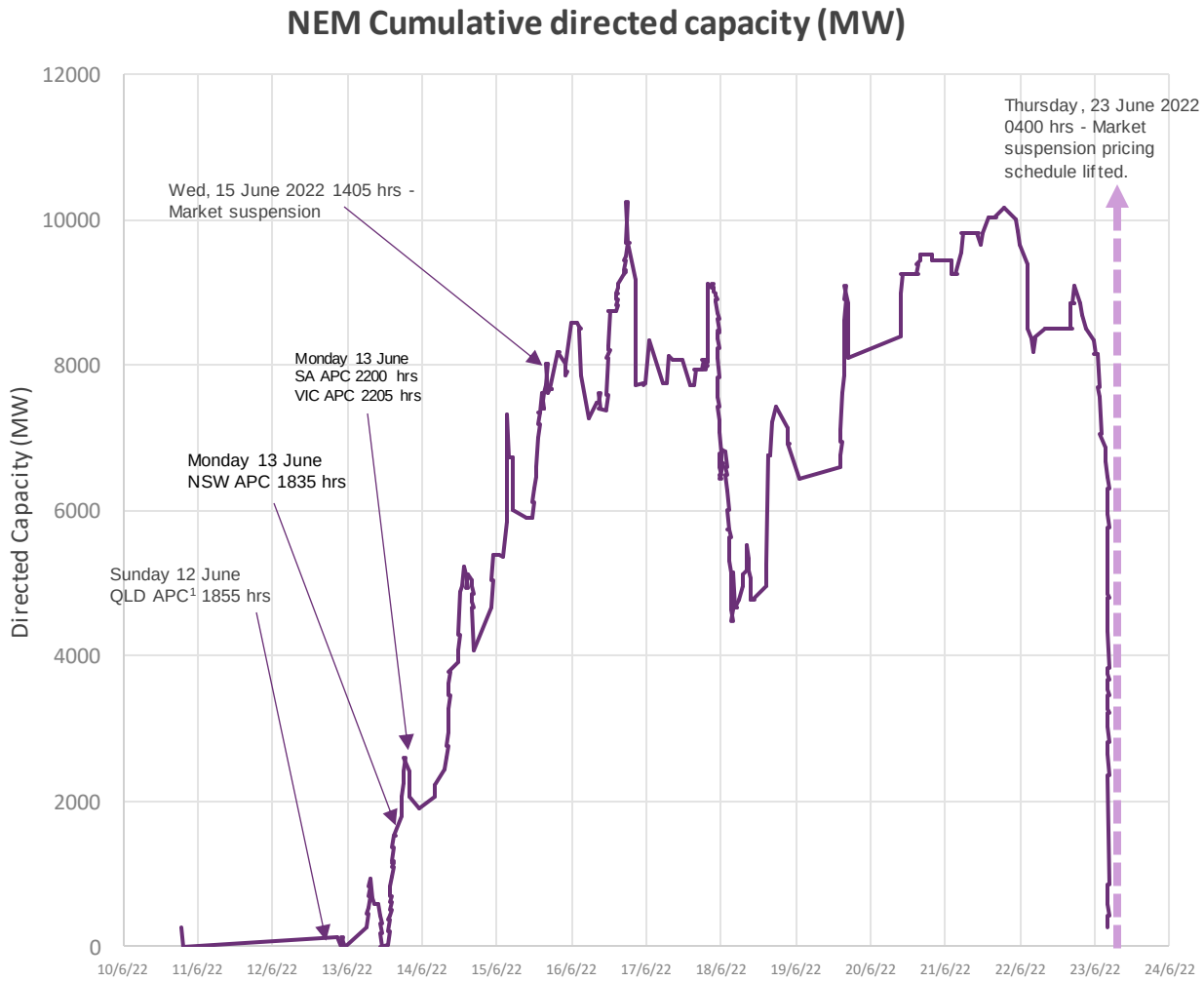
Cumulative prices



Data updated to 22 June 2022

- The cumulative price is calculated as if the administered price cap is not applied to the spot price, so it continued to rise after APC was implemented.
- However, under market suspension - the market suspension pricing schedule is used in the calculation hence the cumulative price plateaued and declined.
- The APC is $300/MWh. During suspension, the APC was not effective because the suspension price was already capped at $300/MWh

Manual dispatch of plant by directing



Date	MW of NEM directed capacity per day*	NEM Number of direction related participant notices per day
10/06/2022	260	2
11/06/2022	0	4
12/06/2022	260	0
13/06/2022	3544	37
14/06/2022	4868	30
15/06/2022	4945	48
16/06/2022	3849	46
17/06/2022	2528	110
18/06/2022	4565	71
19/06/2022	2680	16
20/06/2022	1426	25
21/06/2022	1085	30
22/06/2022	899	26
23/06/2022	0	38 (all notices were cancellations of directions)

* Note MW of NEM directed capacity per day is simply the total of the MW capacity directed each day and is not adjusted for the same unit being directed multiple times in one 24-hour period nor does it account for any cancelled directions in the same period.

Resumption of the market

- Needed assurance that the market would not re-enter suspension soon after lifting it:
  - Relieve severe capacity shortages from plant outages and fuel supplies
  - Reduce cumulative prices with market suspension prices
  - Eased pressure on the market to withdraw capacity
  - Reduce likelihood of needing to direct large amounts of capacity, resolving
  - problems with NEMDE's ability to price the market
- Administered pricing ended on 22 June in SA and 23 June in NSW, VIC and QLD
- Market suspension pricing ended 23 June and marked suspension ended 24 June

Unaccounted for Energy

UFE

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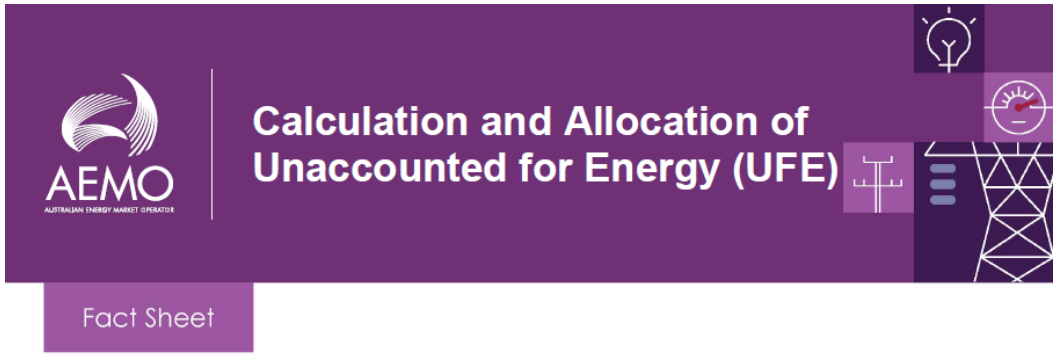
Global settlements

- Global settlements (GS) went live 1 May 2022
- Unaccounted for energy (UFE) is now shared across all retailers from settlement week 2022Wk19 onward
- Issues with data quality have occurred and there have also been some unexpected UFE outcomes, but the implementation is considered successful overall
- 20-Week Revision data is now available for the early weeks of GS, with some trends in UFE behavior emerging
- UFE Trends Report (Google AEMO UFE Trends Report)

https://aemo.com.au/-/media/files/electricity/nem/data/metering/ufe/2022/ufe-report-june-2022.pdf?la=en

GS/UFE fact sheet



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Calculation and Allocation of Unaccounted for Energy (UFE)

Fact Sheet

The National Electricity Amendment (Global Settlements and Market Reconciliation) Rule 2018 requires AEMO to determine the amount of unaccounted for energy (UFE) for each distribution network local area.

This fact sheet provides a high-level overview of how UFE is calculated and can be used as a reference on how to allocate UFE to a market load.

What is UFE?

UFE is the difference between all adjusted metered energy entering a local area, compared to all adjusted metered energy consumed within the local area.

These differences could be caused by energy theft, inaccurate or faulty meters, estimation errors associated with unmetered devices, profiling of reads to the trading interval (5 minute) level or errors in the distribution loss factor (DLF).

- A UFE fact sheet has now been compiled to answer some of the more common questions and consolidate previously provided information
- It includes the main formulas and example calculations for the GS variables, as well as the key data sources
- It will also be available on the AEMO website in the near future

For more information visit

aemo.com.au

ESOO Definitions

Unserved energy (USE) is energy that cannot be supplied to consumers, resulting in involuntary load shedding (loss of customer supply). For example, this may be caused by insufficient levels of generation capacity or demand response.

The **Interim Reliability Measure (IRM)** was introduced to reduce the risk of load shedding across the NEM providing a trigger for the Retailer Reliability Obligation (RRO) of 0.0006% of energy demanded in a region in any year. It applies until 30 June 2025.

The **reliability standard** is a measure of USE in each region of no more than 0.002% of energy demanded in any year. For the purposes of the RRO, it applies after 30 June 2025.

Any **forecast reliability gap** is based on forecast USE in excess of the IRM or reliability standard in a region in a year.

If AEMO reports a forecast reliability gap, this may trigger a reliability instrument request under the **RRO**.