

CURRENT WORK PROGRAM

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The power system continues to evolve toward a more decentralised system, integrating more renewables, batteries and distributed energy resources. This is resulting in a system that is more complex to operate. It is also subject to more frequent extreme events than in the past. A large-scale program of reform is underway to ensure that the power system can continue to operate most effectively in this changing environment.

The work program for the Reliability Panel for 2021/2022 currently is scheduled to include:

- Reviews of:
 - <u>QLD sub-region system restart standard</u> [COMPLETED]
 - Reliability Standard and Settings, for the period FY25-FY28.*
 - <u>System Restart Standard [COMPLETED]</u>
 - Frequency Operating Standard
 - Review of the System Operating Incident Guidelines
- Annual Market Performance Review (AMPR) 2020-21
- Input into rule changes and reforms including ESB post 2025 market design work.

* Note the AEMC has initiated a rule change request from Dr Kerry Schott AO that seeks to align the requirements to design a capacity mechanism with the need to consider the optimal reliability settings required for a transitioning power system. Further information is provided on slide 15.

PURPOSE OF ANNUAL MARKET PERFORMANCE REVIEW MARKET UPDATE

- The Reliability Panel is required to conduct a review of the performance of the market, and provide advice, in terms of:
 - The reliability of the power system.
 - The security of the power system.
 - The safety of the power system.
- The market performance update provides an opportunity for the Panel to communicate key and initial findings for the reporting period. It allows for a more timely communication of information with stakeholders
- This market update covers the period from 1 Jul 2020 to 30 Jun 2021

AMPR MARKET UPDATE 1: KEY THEMES

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1. Reliability	2. Security	3. Focus Areas
Unserved Energy*	Security Events	System Load Trends
Reliability Events and Directions/Instructions	Directions/Instructions	Network Outages and Reliability
Lack of Reserves	Performance Against Frequency Operating Standard	
RERT	System Services (FCAS, NSCAS, SRAS)	
Reliability Price Settings	Network Constraints	
	Market Notices	

* The reliability and security metrics listed are required by the NER and AEMC Terms of Reference for the annual review.





RELIABILITY CORE TOPICS



WHAT IS POWER SYSTEM RELIABILITY?

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- Reliability in the electricity sector means that the power system has enough capacity to meet people's needs.
- That is, the system has sufficient capacity, including generation, demand response and interconnection to produce and transport electricity to meet demand.
- A reliable power system requires the following:
 - Efficient investment, retirement and operational decisions resulting in an adequate supply of capacity to meet demand
 - Sufficient level of reserve or buffer, so demand and supply can be kept in balance in the face of shocks to the system
 - A reliable transmission and distribution network, and
 - The system being in a secure operating state.^{*}
- The Panel plays an important role in recommending the reliability standards and settings that act to deliver a reliable power system in the most efficient way to minimise costs for consumers.
- This section looks at performance of the power system in the context of key reliability metrics, including directions issued by AEMO, use of the Reliability and Emergency Reserve Trader, Market Price Cap and Market Price Events.

* Secure operating state: A state where the power system is in, or will return to, the NER requirement of a satisfactory operating state within 30 minutes.

AMPR UPDATE 1: KEY TRENDS – RELIABILITY

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- AEMO forecasts no breach of the reliability standard (0.002% USE) until 2028/29.
- AEMO forecasts no breach of the interim reliability measure (0.0006% USE).
- Spike in unserved energy (USE) in NSW predicted towards 2030, driven by forecast coal retirements.



- AEMO issued 2 reliability directions in 2020/21, one in NSW on 17 Dec and the other in QLD on 25 May.
- NSW direction caused by low generator and interconnector availability OLD direction caused by low generator availability



- following Callide incident
- Number of Lack of Reserve (LOR) events shows a marked increase from prior years.
- 1 forecast but 0 actual LOR3 conditions in the NEM across the 2020/21 period.
- Significantly more LOR1 conditions in 2020/21 compared to all prior years.



- No long notice RERT contracted.
- RERT was required on two days in 2020/21, less than 2019/20 but the same as 2018/19. Volumes activated were also down
- 2020/21 saw a significant decrease in RERT costs compared to 2019/20
- Similar frequency of market price cap events, but with a shift toward QLD.
- Large increase (+524% on 2019/20) in market price floor events, particularly in QLD and SA
- Cumulative price threshold was breached for FCAS 6 times in June 2021 in QLD. No breaches in energy.



- The 2022 reliability standard and settings review will consider whether the reliability standard and settings remain suitable for the NEM.
- The AEMC is considering a rule change request that seeks to better align the review with capacity mechanism design work.

1. FORECAST UNSERVED ENERGY

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Key points:

- Unserved energy (USE) is a measure of the amount of customer demand that cannot be supplied within a region due to a shortage of generation, demand-side participation or interconnector capacity.
- Forecasts of USE are that it is not expected to exceed the interim reliability measure (0.0006%).
- The reliability standard (0.002% USE) is not expected to be breached until 2028-29 in VIC when Yallourn is scheduled to close.**
- The reliability standard is not expected to be breached until 2029-30 in NSW when Vales Point is scheduled to close, with higher USE forecast in 2030-31 with the expected retirement of some Eraring units.
- QLD, SA and TAS all remain under both reliability measures for the entire forecast horizon.

*Note, the Interim Reliability Measure was put in place to take care of immediate reliability concerns, and it will cease in March 2025.

**Outside of the Central scenario, AEMO analysed a number of other possible events, including the flooding of the Yallourn coal mine. If this occurs, the reliability standard may be breached in VIC in 2021/22

Source: AEMO ESOO Central Scenario

1. ACTUAL UNSERVED ENERGY



Key points:

- Historical unserved energy figures are also reported on.
- No unserved energy was recorded for the 2020/21 period, following a similar result for the 2019/20 period.

* Note, the Interim Reliability Measure was put in place to take care of immediate reliability concerns, and it will cease in March 2025.

NEM INSTALLED GENERATION CAPACITY

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- Large amounts of renewable energy and battery generation capacity continues to be installed in the NEM.
- Compared to 2019/20, 2020/21 saw:
 - 1.0 GW of wind capacity installed
 - 1.3 GW of utility solar capacity installed
 - An increase in coal capacity by 115 MW due to plant upgrades
 - An additional 50 MW gas and other fuel capacity
 - An additional 50 MW battery capacity

2. RELIABILITY EVENTS AND DIRECTIONS/INSTRUCTIONS



- Reliability directions are issued to maintain the power system in a reliable operating state.
- AEMO issued two reliability directions in 2020/21. This is a decrease on the 2019/20, but higher than the two prior years.
 - One was issued in NSW on 17/12/20. This was caused by a combination of outages at 6 coal units and low combined output from wind and solar across the state.
 - One was issued in QLD on 25/05/21. This was required as a result of the reduction of available generation following the incident at Callide Unit C4.
- No reliability events (i.e. actual LOR3 conditions) where supply was interrupted due to shortfall of available capacity reserves occurred in 2020/21.

3. LACK OF RESERVES

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LOR notices by month (All levels)



- AEMO will declare LOR conditions when there is a nonremote possibility of LOR load shedding due to shortfall of available capacity reserves.
- A set of pre-defined conditions must occur for each LOR level to be reached or forecast. The AEMO <u>Reserve Level</u> <u>Declaration Guidelines</u> detail these conditions.
- 53 actual lack of reserve notices were issued in 2020/21, a marked increase of 36 from 2019/20. This was mostly driven by an increase in LOR1 conditions.
- This increase was mostly driven by the 2021 Winter period. A large number of concurrent coal unit outages in NSW and works limiting VIC-NSW and QLD-NSW interconnectors were the main contributing factors.

4. RELIABILITY AND EMERGENCY RESERVE TRADER

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The RERT is a function conferred on AEMO to maintain power system reliability and security. AEMO maintains a panel of RERT providers for short-notice and medium-notice RERT if required.



* AEMO established a panel of short/medium notice providers for up to 1,728 MW of potential reserve capacity across the NEM, which could be contracted when a revenue shortfall arose. Source: AEMO RERT Reporting

4. RELIABILITY AND EMERGENCY RESERVE TRADER

- No long notice RERT was contracted in 2020/21, a decrease on 2019/20.
- Short notice RERT was contracted and dispatched on 2 different occasions in 2020/21.
- 83.6 MWh of RERT was activated in 2020/21, declining from 2,086.5 MWh in 2019/20.
- In 2020/21, 39.3 MWh of RERT was activated in QLD, and 44.3 MWh activated in NSW.
- RERT was activated to address reserve shortfalls due to extreme temperatures, high demand, and environmental factors (storms and bushfires) impacting the transmission network.
 - RERT activated on 17 December 2020 in response to higher than expected demand in NSW due to hot, humid weather, and a trip at Liddell Unit 3¹.
 - RERT also activated on 25 May 2021 following the loss of availability in QLD due to the Callide incident².
- For both activations, the cost per MWh was less than the MPC and well below the average value of customer reliability.
- The Reliability Panel notes that the ESB's Post 2025 advice to ministers recommended the implementation of jurisdictional strategic reserves which could provide the option for a jurisdiction to procure any required reserves beyond the national market reliability standard if they consider this necessary.

5. RELIABILITY PRICE SETTINGS: MARKET PRICE CAP

- The market price cap (MPC) is a reliability setting that sets an upper bound on the maximum possible price to which market participants can be exposed in any dispatch interval. The MPC was \$15,000/MWh in 2020-21.
- MPC events occurred in all states.

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- There was an increase in MPC events in QLD associated with impacts following the Callide incident, and limited NSW-QLD capacity due to transmission works.
- TAS saw a moderate increase in MPC events from 2019-20, but still lower than 2018/19.
- All other states saw decreases in the number of MPC events, including a very significant decrease in VIC.
- The next Reliability Standard and Settings Review (RSS review) will consider whether the reliability standard and settings for the period of 1 July 2024 to 30 June 2028 remain suitable for expected and evolving market conditions.*

*The AEMC is currently considering a <u>rule change request</u> from Dr Kerry Schott AO (former Chair of the ESB) seeking to remove the need for the Panel to review the reliability settings for the 2022 review. It has been submitted as a transitional rule that would not apply to future RSS reviews. The request outlines that the ESB will instead consider a range of scenarios in relation to the capacity mechanism design work underway.



** Chart shows dispatch intervals (5 min).

Source: AEMO DISPATCHPRICE MMS table

5. RELIABILITY PRICE SETTINGS: MARKET PRICE FLOOR

- The market price floor (MPF) is the minimum settlement price. The MPF was -\$1,000/MWh in 2020-21.
- Continuing the trend seen during 2019-20, Queensland and South Australia saw significant increases in MPF events in 2020-21.
- The comparatively high penetration of utility-scale renewables and DER (including rooftop PV) in SA and QLD is driving these trends.
- Works near the QNI interconnector often limited QLD->NSW export capacity, contributing to the number of MPF events in QLD.
- The increase in MPF events reflects developing minimum system load issues present in the NEM. [This issue is explored further in Section 3 of this report]
- The increase in negative prices will likely impact average prices for different technologies, which will in turn influence plant operational and entry and exit decisions. The Panel will continue to monitor the trends and report on issues in the annual report.



* Chart shows dispatch intervals (5 min). Source: AEMO DISPATCHPRICE MMS table

SUMMARY: POWER SYSTEM RELIABILITY

- 2020/21 presented some challenges relating to reliability, as shown by the marked increase in LOR1 notices. Despite this, LOR2 and LOR3 notices did not follow the same increase and there were no instances of reliability driven USE. This indicates a system which is tight but with the reliability frameworks managing these challenges.
- Two reliability directions were made in 20/21, compared to six in 19/20.
- Minimum system load and the associated low-price trends are emerging as an issue, with the increasing frequency of market price floor events in SA and QLD symptomatic of this.
- The Panel considers the challenges presented in 20/21 are important and will consider these and related outcomes in the annual report. The Panel also notes that the reliability matters are core to several market design reforms currently under consideration.





SECURITY CORE TOPICS



WHAT IS POWER SYSTEM SECURITY?

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- Power system security involves maintaining the different elements that make up the power system within allowable equipment ratings and maintaining the system in a stable condition and within defined technical limits. By remaining inside technical limits a secure power system also contributes to power system safety.
- Technical parameters include power flows, voltage and frequency. In practice, the power system is in a secure state if it remains in, or will return within 30 minutes to, its technical parameters following a credible contingency event.
- Such events include:
 - Unplanned transmission line outages, and
 - Unplanned generator outages.
- AEMO is responsible for managing the system to operate power system equipment within designed capabilities and ratings. As part of this role, it is responsible for using regulatory tools to intervene to ensure the power system remains secure.
- This section of the market update considers the security performance of the power systems, considering the above and both historical and forecast outcomes.

AMPR UPDATE 1: KEY TRENDS – SECURITY



- Reviewable operating incident numbers are similar for 2020/21 to 2019/20.
- No events where the power system was not in a secure operating state for more than 30 minutes in 2020/21, down from three in 2019/20.



- Upward trend of power system directions continued in 2020/21, almost exclusively in SA.
- This is due to the system strength shortfall that has been frequently experienced by SA, the synchronous condensers installed in Jul 2021 may change this pattern in future



- Both the mainland and Tasmania had better frequency performance from Sep 2020 onwards.
- This occurred following the implementation of primary frequency response.



- Significant spike in FCAS costs and prices in Q2 2021.
- Slight increase in SRAS costs compared to 2019/20.
- AEMO did not procure any NSCAS in 2020/21 in its capacity as system operator.



• Number of constraint changes in NEMDE for 2020/21 was more than 2019/20 but less than 2018/19.



- Large increase in the number of market notices issued by AEMO in 2020/21.
- Significant drivers of the increase include notices regarding the reclassification of contingencies and the review of prices.

1. SECURITY EVENTS





Power system security events**



**Events when the power system was not in a secure operating state for more than 30 minutes.

- AEMO publishes reports on events considered reviewable under clause 4.8.15 of the NER, and the associated Reliability Panel guidelines.
 - The Panel plans to review these Guidelines in the latter half of the 2021/22 year
- A similar number of operating incidents occurred in 2020/21 relative to 2019/20, staying at a level that is slightly higher than prior years.
- Transmission incidents and busbar related incidents have both increased, while combined generation and transmission incidents have decreased.
- No operating incidents in 2020/21 resulted in the power system not being in a secure operating state for more than 30 minutes, categorized as power system security related.

2. SECURITY: DIRECTIONS/INSTRUCTIONS

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- AEMO may issue directions to participants to maintain or reestablish the power system to a secure operating state.
- A strong upwards trend in security directions continued in 2020/21.
- Most of the security directions issued by AEMO in 2020/21 were in South Australia. Ongoing system strength shortfalls in South Australia contributed to these.
- The commissioning of four synchronous condensers in the ElectraNet network is expected to alleviate the system strength shortfalls going forward. This should reduce the number of units directed, however it may not materially reduce the number of directions.
- Tasmania also saw a small number of power system directions.

3. PERFORMANCE AGAINST THE FREQUENCY OPERATING STANDARD

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Key points:

- The normal operating frequency band (NOFB) is the range within which the power system should be operating under system normal conditions.
- The review period to Sep '20 showed a similar proportion of time spent in the NOFB to previous periods in both the mainland and Tasmania.
- The first tranche of generators to implement primary frequency response following the mandatory primary frequency response rule change occurred in September 2020, with additional units implementing PFR in the following months.
- Mainland's frequency performance showed a marked improvement in the Sep/Oct '20 period and has hovered around 100% of time in the NOFB since.
- Tasmania's frequency performance also improved through the Sep/Oct period, however it hovered at 99.5% for the remainder of the period.

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4. FREQUENCY CONTROL ANCILLARY SERVICES

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AEMO uses ancillary services to manage the power system safely, securely and reliably.



5. FREQUENCY CONTROL ANCILLARY SERVICES

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- FCAS enablement fairly flat from the levels of 2020 Q2, across 2020/21.
 - A small uptick in all contingency raise services between 2020 Q4 and 2021 Q1
 - A small downtick in raise regulation between 2020 Q4 and 2021 Q1
- Moderate changes in prices for all services for 2020 Q3 2021 Q1.
- A notable increase in R6, R60 and RREG services in 2021 Q2. This was driven by multiple factors:
 - Localised QLD FCAS requirements
 - Low coal availability across NSW and QLD
 - High energy price volatility which often flows through into FCAS markets due to co-optimization.
- Due to the increased raise prices, 2021 Q2 saw noticeably increased FCAS costs, compared to the rest of the reporting period which was down on the 2019/20 reporting period.

6. NETWORK SUPPORT AND CONTROL ANCILLARY SERVICES

- Network Support and Control Ancillary Services (NSCAS) are a non-market ancillary service that may be procured by AEMO or Transmission Network Services Providers to maintain power system security and reliability, and to maintain or increase the power transfer capability of the transmission network.
- AEMO will be required to acquire NSCAS only to ensure power system security and reliability if the NSCAS gaps remain unmet after TNSP's attempt to procure services.
- AEMO has issued no NSCAS contracts as the market operator for 2020/21, which was also the case in the 2019/20 reporting period.
- AEMO NSCAS costs as the market operator for 2020/21 were \$0.
- This is distinguished from AEMO procuring NMAS contracts under its position as the Victorian Transmission Network Service Provider.

7. SYSTEM RESTART ANCILLARY SERVICES

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- System restart ancillary services (SRAS) contribute to overall resilience of the power system by enabling recovery following a major blackout.
- SRAS costs increased slightly from 2019/20 due to inflation.
- Increase in costs from 2017/18 to 2018/19 can be attributed to the beginning of a new contracting period, and changes to the system restart standard, notably the requirement for two restart tests per annum.
- Costs are expected to decrease into the 2021/22 period due to a restructuring of SRAS regions and a new set of contracts starting 1 Jul 2021.*

8. NETWORK CONSTRAINTS

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- AEMO uses constraint equations to represent the physical limits of the power system, which are used in the NEMDE optimisation.
- AEMO reported approximately 19,000 constraint equation changes in NEMDE over 2020-21.
- This is between the number of changes seen in the two previous years. The overall trend is increasing, reflecting the increasing complexity of the power system.
- Some of the main drivers for changes to constraint equations are:
 - Changes in power system topography, typically either the addition or removal of plant
 - Evolution of understanding of characteristics of the power system.

9. MARKET NOTICES

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Key points:

- Market notices are issued by AEMO to notify market participants of events that impact on the market.
- The number of market notices issued by AEMO increased significantly in 2020/21.
- The significant drivers of this increase compared to 2019/20 included prices subject to review (+1973) and prices unchanged (+1978), as well as reserve notice (+253).
- An upwards trend in total market notices issued by AEMO has continued.

29

SUMMARY: POWER SYSTEM SECURITY

- 2020/21 continued the trend of increasing complexity around managing power system security.
- The frequency performance of the NEM improved markedly following the implementation roll out of mandatory primary frequency response arrangements.
- Q2 2021 saw higher FCAS prices due to local requirements* in QLD, low coal-fired generation availability and energy price volatility.
- Transmission related security events are trending upward.
- The ongoing challenge and complexity to maintaining power system security is a key focus of the Panel and will be considered in more detail in the final report. The Panel also notes that essential system services is a key area of reform in the market at the moment, and that it intends to review the frequency operating standard in 2021/22.

*FCAS is usually procured globally on the NEM mainland, however transmission constraints on the interconnectors can limit their ability to transfer FCAS services. During limited periods AEMO may require that FCAS is procured locally for particular regions.





FOCUS AREAS

NON-CORE TOPICS



1. WHOLESALE MARKET TRENDS: CHANGING SYSTEM LOAD PROFILES

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- System load refers to the load that semi-scheduled and scheduled generators are dispatched to meet. It is evolving at a rapid pace in the NEM, particularly due to the rapid uptake of distributed energy resources (DER) such as distributed rooftop solar PV and distributed home batteries.
- DER can reduce or change the system load as the load can be met or shifted at the point of consumption, or 'behind the meter'.
- Installed DER continues to trend upward rapidly, though installed distributed battery capacity substantially lags installed distributed PV.
- The daily variability of system load is increasing, with lower load through the middle of the day and higher ramping requirements for the evening peak.
- Similarly, prices are becoming more variable across the day, with lower prices during the day when renewable generation is highest and higher prices in the evening when renewable energy tends to be lower and ramping needs are higher, reflecting the increased value of dispatchable generation.

2. WHOLESALE MARKET TRENDS: DISTRIBUTED ENERGY RESOURCES INSTALLED

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Key points:

- The installed amount of distributed solar PV continues to grow, with 3.2 GW installed in the NEM in FY21, bringing the total installed capacity to 13.9 GW.
- NEM distributed battery capacity is growing rapidly with 43 MW of additional capacity installed so far in 2021.*
- The installed capacity of batteries is growing year-on-year at a similar percentage rate to distributed PV, however it is still much lower in terms of total installed capacity.

Source: AEMO, Clean Energy Regulator small-scale installations

3. AVERAGE DIURNAL SYSTEM LOAD PROFILE BY SEASON



Source: AEMO DISPATCHREGOINSUM MMS table, FY21 data is Jun '20 - May '21 to ensure days seasons are contiguous for seasons

4. AVERAGE DIURNAL SYSTEM LOAD PROFILE BY SEASON



Source: AEMO DISPATCHREGOINSUM MMS table, FY21 data is Jun '20 - May '21 to ensure days seasons are contiguous for seasons

5. AVERAGE DIURNAL SYSTEM LOAD PROFILE BY SEASON





Source: AEMO DISPATCHREGOINSUM MMS table, FY21 data is Jun '20 - May '21 to ensure days seasons are contiguous for seasons

6. WHOLESALE MARKET TRENDS: SYSTEM LOAD PROFILE BY SEASON

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- System load refers to the load that is met by scheduled and semi-scheduled generators, and wholesale demand response.
- System load has evolved substantially over the last 4 years, except for TAS, where the profile is largely unchanged in shape due to the lower uptake of DER (with the exception of some seasonal effects).
- The difference between the morning and evening load peaks and the low point at around 13:00 is increasing substantially in all mainland regions.
- Faster ramping is required from scheduled generators, particularly in the evening when the output of solar PV drops and system load increases.
- COVID-19 and associated lockdowns may have caused some of the load profile changes observed, particularly increased winter system load in NSW and VIC.
- The solar PV 'duck curve' is becoming more pronounced in SA and VIC across the year, and in Winter and Autumn in NSW and QLD.*

7. AVERAGE DIURNAL REGION PRICE PROFILE BY SEASON



Source: AEMO DISPATCHPRICE MMS table, FY21 data is Jun '20 - May '21 to ensure days seasons are contiguous for seasons

8. AVERAGE DIURNAL REGION PRICE PROFILE BY SEASON



Source: AEMO DISPATCHPRICE MMS table, FY21 data is Jun '20 - May '21 to ensure days seasons are contiguous for seasons

9. AVERAGE DIURNAL REGION PRICE PROFILE BY SEASON



10. AVERAGE DIURNAL REGION PROFILE BY SEASON

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- Diurnal price trends by season across the NEM reflect a system that is changing.
- FY21 wholesale energy prices are on average lower across the board when compared to the three previous financial years. This is likely caused by the addition of large amounts of low short run marginal operating cost renewable energy entering the system.
- Prices are becoming more variable across the day, with a close correlation with system load, particularly in QLD, VIC and SA outside of Summer. This indicates that dispatchable generation is being valued more highly by the market when renewable generation is more scarce and ramping needs are higher.
- Autumn 2021 saw notably higher prices than the 3 previous autumns. This was contributed to by a number of factors:
 - Record gas prices
 - Large amounts of outages at scheduled plant
 - Works around interconnectors limiting inter-region transfers

11. WHOLESALE MARKET TRENDS: MINIMUM & MAXIMUM SYSTEM LOAD

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- Noticeable downward trend in minimum system load in all regions besides TAS which has a lower penetration of distributed PV.
- No clear trend in maximum system load which is more influenced by variable trends in weather and other impacts like COVID-19 than predictable ongoing system trends. This is likely to change in the future however, as distributed batteries become more widespread and shift some of peak demand to elsewhere in the day.
- SA minimum system load went negative in Nov '21.
- QLD minimum system load is following a similar pattern of decline to SA, albeit still 3 GW above net zero demand.

12. NETWORK OUTAGES AND RELIABILITY

- As the geographical and technological diversity of the variable renewable energy generators and batteries in the NEM continues to grow, the role of interconnectors in ensuring each state has adequate energy supply will continue to increase
- The analysis here investigates whether there is any relationship between lack of reserve notices and outages on interconnectors and nearby network elements which could affect their transfer capacity
- There is a moderate correlation of works affecting interconnectors and LOR notices (both forecast and actual) in QLD and NSW, however there does not appear to be a significant relationship in the other NEM regions
- It should be noted that any correlation is especially difficult to identify in the Southern states as they experienced relatively few LOR conditions when compared to QLD and NSW

13. NETWORK OUTAGES AND RELIABILITY

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- The Panel will continue to have regard to the key issues highlighted in the update, in particular:
 - Reliability and security matters
 - Overall and decreasing minimum demand
 - Commentary on any further extreme or unusual events, and
 - Power system resilience.
- The annual review will also consider other areas of interest including the performance of short term PASA. It will also provide useful context to other reform work being undertaken by the Reliability Panel, ESB, AEMO, AER and AEMC.

REFORMS UNDERWAY

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There are reforms already underway to address power system security and reliability issues. These include:

- AEMC rule changes, such as:
 - Synchronous services markets and Capacity commitment mechanism for system security and reliability services
 - Operating reserve market and introduction of ramping services
 - Primary frequency response incentive arrangements
 - Updating Short Term PASA
 - Enhancing operational resilience in relation to indistinct events
- Panel reviews, including:
 - expected reviews of the *frequency operating standard* and *reliability standards and settings* and *system operation reports*
- Delivery of ESB Post 2025 recommendations

WHAT WE DO

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The Reliability Panel, which forms part of the AEMC's institutional arrangements, reviews and reports on the safety, security and reliability of the national electricity system.



The Panel is comprised of members who represent a range of participants in the national electricity market, including:



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