RELIABILITY PANEL AEMC

MEDIA RELEASE

POWER SYSTEM TRANSFORMATION ACCELERATING BUT UNDER PRESSURE

Annual market performance review 2017/18

Australia's energy sector is cleaner and greener but the speed of structural change is putting growing pressure on power system security and reliability, according to major reports issued today by the Australian Energy Market Commission (AEMC)

The annual market performance review (AMPR) conducted by the AEMC's expert Reliability Panel and the AEMC's investigation into intervention mechanisms and system strength show problems experienced by South Australia may start to emerge in other parts of the country.

The power system's transformation is continuing to accelerate. Consumers are driving strong growth in rooftop PV; there is significant new entry of variable renewable generation, mainly intermittent large-scale wind and solar generation; and the exit of ageing coal generators ahead.

AEMC Chief Executive, Mrs Anne Pearson, said today's reports detailed all the security implications attached to rapid change in the power system's generation mix.

"They also point the way ahead – so we can address challenges and capture the opportunities of the renewable revolution while driving costs down for consumers.

"In the face of unprecedented change we see the power system still meeting consumer's needs but only because the system operator, AEMO, is using built-in safety-nets on a daily basis to keep the lights on," Mrs Pearson said.

"These emergency, expensive 'stop-gap' measures are not meant to be used all the time.

"AEMO and transmission companies are finding it harder to manage the system in the face of fast-moving renewables penetration as consumers adopt rooftop solar in greater numbers and state, territory and federal governments all pursue their separate environmental policies.

"The Reliability Panel report shows we are starting to see falling system strength at the fringes of the grid in north Queensland, south-west NSW, north-west Victoria and continuing weakness in South Australia.

"There are great opportunities in the renewable revolution. Some emerging stability problems could be solved by managing distributed energy resources in ways that help the power system operate securely within its technical limits.

"It's important to fully understand implications of this change so precise solutions can be targeted to problems; and so the new rules requiring network businesses to add security to the grid when AEMO calls system shortfalls are complied with," she said.

The AMPR has found a range of pressure points on the system including:

- upcoming retirement of thermal coal power stations across the eastern seaboard; and the general ageing of the thermal coal generation fleet;
- deterioration of system strength, particularly in north Queensland, south-west NSW, north-west Victoria and South Australia;
- network issues in Victoria which have been exacerbated by the decommissioning of the Hazelwood power station;
- rising levels of electricity lost in transmission (marginal loss factors) due to increased generator connection in remote parts of the network; and
- impacts of accelerating take-up of solar PV on the grid.

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The report says there were 101 directions for synchronous generators (like gas) to turn on to keep the system stable, compared with only eight in 2016/17.

High rates of growth in solar rooftop PV will see this type of local generation reach an estimated 25GW by 2035/36 or 45% penetration in a market the same size as today's - posing significant grid management challenges.

"We are optimistic the network can adjust to the rapid pace of transition.

"But emerging pressures are clear and real," Mrs Pearson said.

"In the meantime to keep the power system stable in South Australia day to day interventions by AEMO have been necessary to keep the power system operating. The report says there were 101 directions for synchronous generators (like gas) to turn on to keep the system stable, compared with only eight in 2016/17.

In 2017/18 the system operator issued 100 directions to keep the system stable in South Australia.

The need for AEMO to direct a Victorian generator to maintain adequate system strength there in November 2018 highlights the possibility of low system strength challenges in other national electricity market regions in the near to mid-term.

There are new rules in place to deal with these developments.

"Two years ago in 2017 the AEMC made new rules to make networks provide the minimum level of system strength determined by AEMO. Networks can do this by adopting any available technology capable of fixing the local problem," Mrs Pearson said.

"After AEMO declared a problem in South Australia that state's network provider organized to install synchronous condensers which are due to be commissioned in 2020," Mrs Pearson said. When that happens the need for very frequent directions to maintain system strength in South Australia will hopefully come to an end. It is a timing and technology issue. First AEMO declares a shortfall, then networks decide the best local solutions for them and start putting them in place."

The AEMC has started an investigation into system strength and intervention mechanisms in the national electricity market to check-in on how the new framework is working in the context of accelerating changes in the generation mix. Along with the AMPR report we have today released a consultation paper on system strength and intervention mechanisms which asks stakeholders for submissions on how the new process is working.

"While interventions are part of the system's safety net they come with costs attached," Mrs Pearson said.

"The challenge is to protect consumers while meeting the physical needs of the system as state, territory and federal governments act on climate change."

Fact sheets on the AMPR and intervention mechanisms consultation paper are attached.

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BACKGROUND

Who are the market bodies?

AEMC (Australian Energy Market Commission) is the rule maker, market developer and expert adviser to governments. It protects consumers and achieves the right trade-off between cost, reliability and security.

AEMO (Australian Energy Market Operator) is the electricity and gas systems and market operator. It works with industry to keep the lights on.

AER Australian Energy Regulator is the economic regulator and is in charge of rules compliance. It policies the system and monitors the market.

Who is the Energy Security Board?

The Energy Security Board was established by the COAG Energy Council to coordinate implementation of recommendations from the independent review into the future security of the national electricity market (the Finkel review).

Fact Sheet – Key findings

Annual Market Performance Review 4 April 2019

We need new ways to manage the power system when new technologies connect to the grid in large numbers

About the Review

This review is an annual report legally required to be produced by the AEMC's Reliability Panel which includes representatives from consumer groups, generators, network businesses, retailers and the Australian Energy Market Operator (AEMO). Learn more about the Reliability Panel on our website at: https://www.aemc.gov.au/about-us/reliability-panel.

Increasing number of market interventions

The 2017/18 period saw an increasing number of market interventions to maintain reliability and security. Reliability is all about investment – making sure there is enough long-term capacity so there's enough electricity available when consumers need it.

Security is about the technical performance of the power system. A system is secure when frequency and voltage are maintained within set limits. Frequency varies whenever electricity supply does not exactly match consumer demand and uncontrolled changes in frequency can cause blackouts.

As the generation mix changes we need new ways to manage the power system when new technologies connect to the grid in large numbers. Systems with lots of non-synchronous generation are weaker and harder to control.

In Victoria, there were occasions when AEMO had to manually switch off high voltage transmission lines to maintain voltages at stable levels and deliver secure supply.

Reliability on track but needed backup for the first time

The reliability of the market's electricity supply continued to be maintained in 2017/18 but this was in part due to activation of the reliability and emergency reserve trader (RERT) mechanism for the first time in the history of the national electricity market.

The RERT is an emergency mechanism that's used when the power system is under extreme pressure. It allows AEMO to intervene and buy electricity reserves not otherwise available in the market. The AEMC is currently consulting on new rules to make the RERT a stronger part of the market safety net.

The RERT was activated twice last year to keep the system in a reliable operating state. The AMPR finds these interventions came at a considerable cost. Prior to 2017/18, the RERT had only been procured three times and never activated. The activation of the RERT last financial year cost consumers $51.99m to protect supplies.

Grid stability degrading

New challenges are emerging in relation to system strength and maintaining stable voltages on parts of the power system that are vitally important to security and reliability of supply.

Frequency control

There have been more issues meeting the requirements of the Frequency Operating Standards (FOS). While frequency control remained within the required operating standard 99% per cent of the time in the mainland during 2017/18, there were 50 events where the system frequency took longer than allowed to return to the normal operating frequency band following a disturbance. In Tasmania, frequency performance did not meet FOS requirements for normal operation, with system frequency outside the normal band for more than 99% of the time for 11 months in 2017/18. There were also 295 events where frequency took longer than allowed in the FOS to be returned to the normal band.

System strength

New challenges are emerging in relation to system strength in some parts of the national electricity market. In addition to the South Australian experience, system strength is also declining in north Queensland, south-west New South Wales, and north-west Victoria.

System strength interventions come at a significant cost to consumers

In 2017/18, the number and length of security directions increased significantly. Most of the directions that occurred in 2017/18 were to ensure adequate system strength for the secure operation of the South Australian power system. These system strength interventions come at a significant cost to consumers, with an estimated compensation cost of $34m to generators per annum which ultimately has an impact on consumer prices.

Voltage control

Following rising penetration of variable, intermittent power generation and the retirement of traditional synchronous generators in the national electricity market, maintaining transmission voltage control systems within operational limits has become more challenging, particularly during periods where levels of minimum demand have been decreasing. Controlling voltage to within specific limits is essential to protecting system security.

To manage this issue, AEMO has often had to, in effect, shut down parts of the transmission system to lower system voltages, but this has the consequences of reducing the available pathways for energy to flow from generation to consumers.

The extent of this manual switching is increasing. In November 2018, AEMO had to de-energise three separate 500kV lines in Victoria for the first time in the history of the national electricity market. These actions again come at a cost to consumers, impacting on the transmission of electricity between regions, and making the network more vulnerable to external shocks.

Fact Sheet – security investigation open for public consultation

Intervention mechanisms and system strength in the national electricity market – AEMC consultation paper 4 April 2019

About the consultation paper

This investigation into intervention mechanisms and system strength was called for by the Commission in the final report of its reliability frameworks review (July2018). Work has been underway on options relating to development of the interventions safety net in the national electricity market and today we are releasing a consultation paper for public consultation with submissions due 16 May 2019. The investigation is being combined with consideration of two rule requests submitted by AEMO which seek to amend both the interventions and related compensation frameworks.

Interventions built into the market to provide security safety-net

The interventions framework has been in place since the start of the national electricity market. Interventions are ‘last resort’ mechanisms and designed to operate that way. They are applied when market responses are not adequate for maintaining supply to meet the reliability standard and they can also be used to support system security. Intervention mechanisms include:

- Reliability and emergency reserve trader (RERT): It’s an emergency mechanism that’s used when the power system is under extreme pressure. It allows AEMO to intervene and buy electricity reserves not otherwise available in the market.
- Directions: AEMO issues directions to synchronous generators like gas and diesel units to operate when necessary to maintain sufficient levels of system strength and secure electricity supply. These directions are mandatory and generators are compelled to comply.
- Instructions: Generally involve AEMO requiring network service providers or large energy users to temporarily disconnect its load or reduce demand if there is a risk to the secure or reliable operation of the power system.

The Commission considers it necessary to review the interventions framework in light of the growing number of directions that are being issued by AEMO to maintain minimum levels of system strength in South Australia

Checking in on the AEMC's 2017 security rules

Declining system strength is emerging in energy systems all around the world as changing technology and consumer choices combined with government policies to encourage the take-up of renewables drives big changes in the generation mix.

Recognising this in 2017, the Commission made new rules to improve system strength and inertia conditions by placing obligations on network businesses to remedy system strength shortfalls identified by AEMO. This system strength and interventions review is checking in on that reform package to see if they are still fit for purpose given the speed of change underway. As AMPR has noted, increasingly AEMO is issuing directions to maintain system strength.

Purpose of this investigation

The Commission considers it necessary to review the interventions framework in light of the growing number of directions that are being issued by AEMO to maintain minimum levels of system strength in South Australia. The use of directions in South Australia has important implications for wholesale prices, both in South Australia and across the NEM. This affects market signals to investors and the energy costs faced by consumers.

The Commission also wants to consult on how well the existing frameworks accommodate emerging system strength related issues particularly in relation to short-term shortfalls.

The application of established frameworks should mean there is no need for AEMO to maintain system strength by intervening in the market's operation.

We intend to explore whether adjustments could be made to existing frameworks to improve their usefulness as we face the possibility of growing system instability across the national electricity market.

We want to avoid the need for increasing use of directions as well as the intervention pricing mechanisms which are used when interventions are triggered, and which can have unintended impacts on wholesale prices and investment signals.

Ends