

STRONGER FUTURE FOR RENEWABLES IN NATIONAL GRID

Investigation into system strength frameworks in the national electricity market

Final report 15 October 2020

As the energy sector decarbonises we are working intensively with stakeholders to design long-term solutions to keep the power system working well.

Three years ago we put measures in place to keep the lights on as weather-driven generation connected to the grid at accelerating speed and old, thermal generators started to close. Today we release proposals for a new evolved framework that backs up the changing generation mix well into the future – providing the voltage stability required to keep power flowing to consumers.

This work is consistent with the Energy Security Board's market development initiative on essential system services in Australia's post 2025 electricity market.

Why we need system strength services

- 1 Synchronous generators like coal, biomass, gas and hydro operate with large spinning turbines that help maintain consistent frequency and voltage which keeps the system stable. They create their own voltage waveform as a by-product of energy production.
- 2 Non-synchronous generators like wind and solar connect to the grid using inverters which do not create their own voltage waveform. Systems with lots of these generators are weaker and harder to control. So as we shift to new technologies that don't have system strength embedded in their way of operating, we need a new approach.

The new-look system strength framework

- 3 System strength is all about keeping the voltage waveform stable. Today's proposals are a turning point for power system security. We are making it simpler, faster and more predictable for renewables to connect to the grid and keep supply as secure as possible.
 - New planning standard
 - New technical standards
 - System strength zones created
 - Generators must arrange their own system strength outside those zones
 - Generators and consumers will share the cost of keeping the system stable.

How system strength is delivered

There are a range of options to make the power system stronger. Options are increasing as technology innovates.

Non network solutions – contract direct with generators that can supply strength or utilising new technologies like grid forming inverters and techniques such as the collective retuning of existing generators' control responses.

Network solutions – building new network assets like synchronous condensers

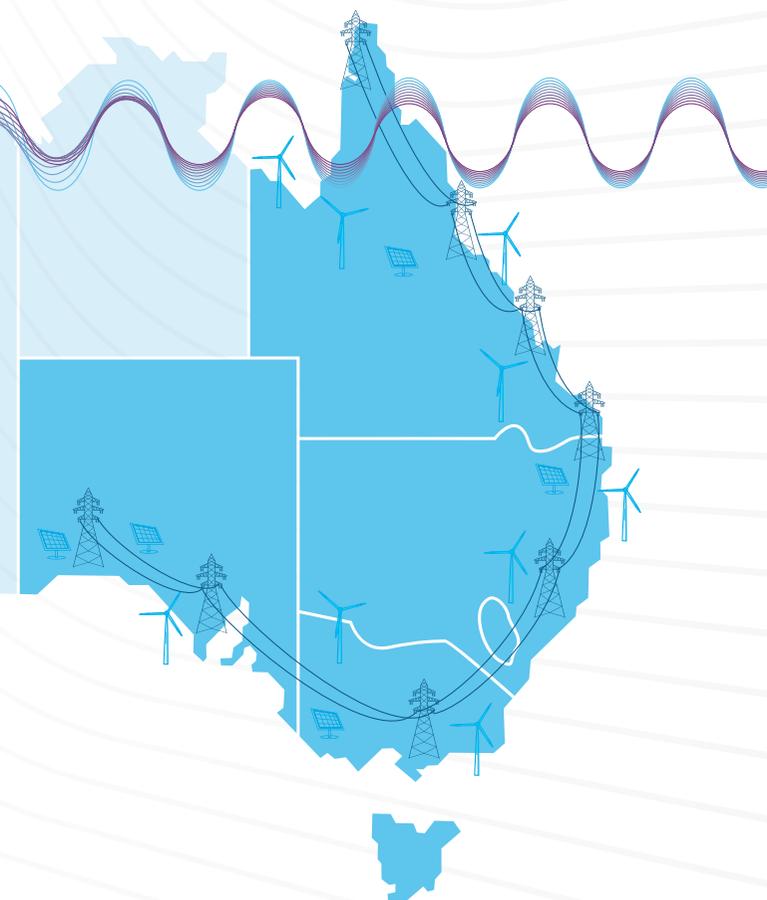
Number of AEMO directions and duration, 2015-20



*Incomplete year; data current at 5 March 2020.

Note: values above each column represent number of directions issued.

This chart shows how since 2015, AEMO has been intervening in the market. It used to not intervene very much at all, only in emergencies. It is now intervening up to 230 times a year and rising. The important thing is these interventions are almost 100% concerned with system security. They are not concerned with any shortage of capacity.

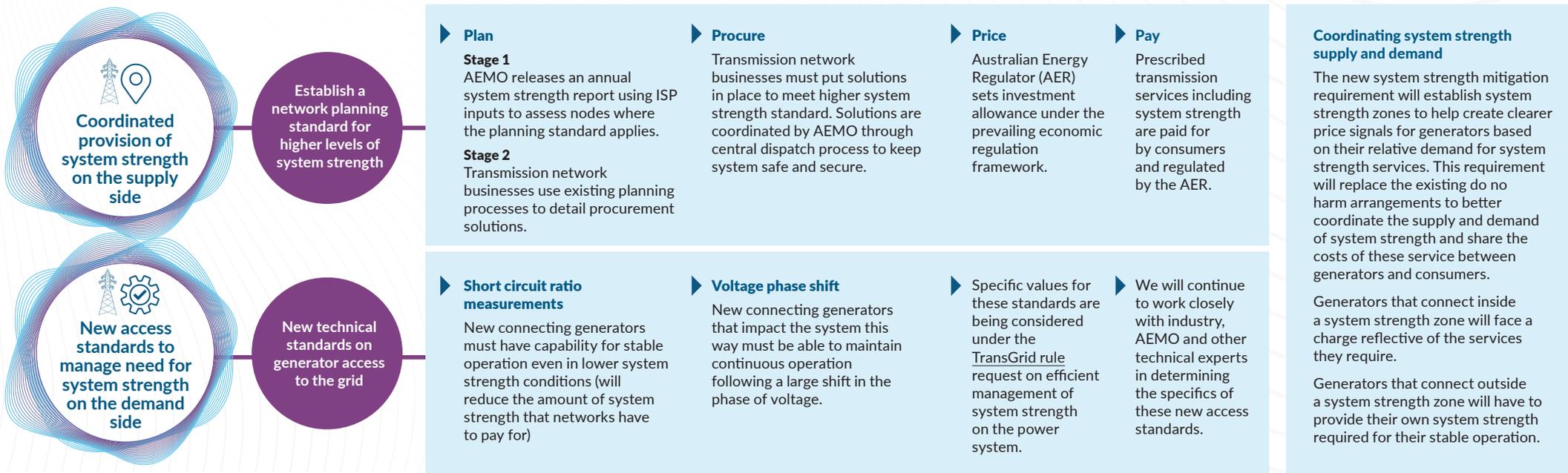


AT A GLANCE: EVOLVING THE SYSTEM STRENGTH FRAMEWORK

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A coordinated approach



Australia is at the cutting edge of managing power systems with high levels of renewables.

