AUSTRALIAN ENERGY MARKET COMMISSION

DELIVERING A STRONGER, MORE STABLE POWER SYSTEM

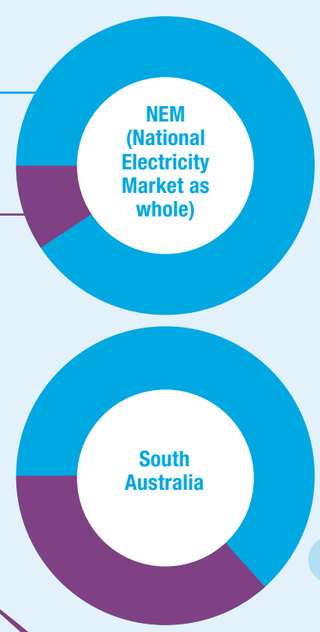
Overview of system security work program September 2017

WHAT'S CHANGING?

The physics of new generation technologies like wind farms and rooftop solar is different. We need a new plan for security.

Synchronous generators like coal, biomass, gas and hydro operate with large spinning turbines that help maintain consistent frequency and voltage; keeping the system stable. They inherently produce inertia – the energy momentum that lets the system ride through sudden disturbances and maintain its operating frequency of around 50 Hertz.

Non-synchronous generators like wind and solar have no or low inertia. Systems with lots of non-synchronous generation are weaker and harder to control. They have less time to recover from sudden equipment failures before frequency collapses and blackouts happen.



WHEN IS A POWER SYSTEM SECURE?

System security is when frequency and voltage are maintained - even when something goes wrong. A secure system resists changes, can be restored to normal levels when something does go wrong, and has emergency schemes in place as a last line of defence.

Security is about the technical performance of the system, which is different to reliability.

Reliability is about having enough investment in generation and demand response capability to meet consumer demand.

WHAT WE HAVE DONE

Making the power system stronger by putting new obligations on generators and networks to maintain system strength

The power system is "strong" when voltage levels are steady even with sudden changes in electricity flows.

We are requiring network businesses to maintain system strength above minimum levels at key locations when shortfalls are identified by AEMO.

And new generators must now pay for any extra equipment or services they need to maintain system strength, before they can connect.

Equipping the system to manage frequency changes by making networks provide enough inertia or fast response power

If there is a disruption, the system needs enough inertia to give it time to recover, or a fast injection of electricity to bring supply and demand back into balance.

We are requiring network businesses to provide minimum levels of inertia. For example, they can install synchronous condensers on their networks or contract with suppliers to provide inertia substitutes like fast frequency response from batteries (where AEMO approves).

Preparing for emergencies by giving AEMO new tools and more data

We have introduced smarter, faster emergency schemes as a 'last line of defence' to help prevent system-wide blackouts.

We've also created a new category of contingency event - the protected event - to allow AEMO to take action to avoid certain low probability, high consequence events.

We are also requiring generators and networks to provide more information to AEMO about how they perform so the system operates more efficiently.

WHAT WE ARE DOING NOW

Keeping the system stable as it continues to transform while minimising costs for consumers

Through our *Frequency control frameworks review* we are looking at how best to integrate distributed energy resources like batteries, new fast frequency control services and demand response to help keep the system secure.

We are considering new ways for the market to deliver more inertia where this provides additional benefits to the system *(Inertia ancillary services market rule change)*.

And we are reviewing technical standards for connecting generators and the process for negotiating the standards *(Generator technical performance standards rule change)*.