

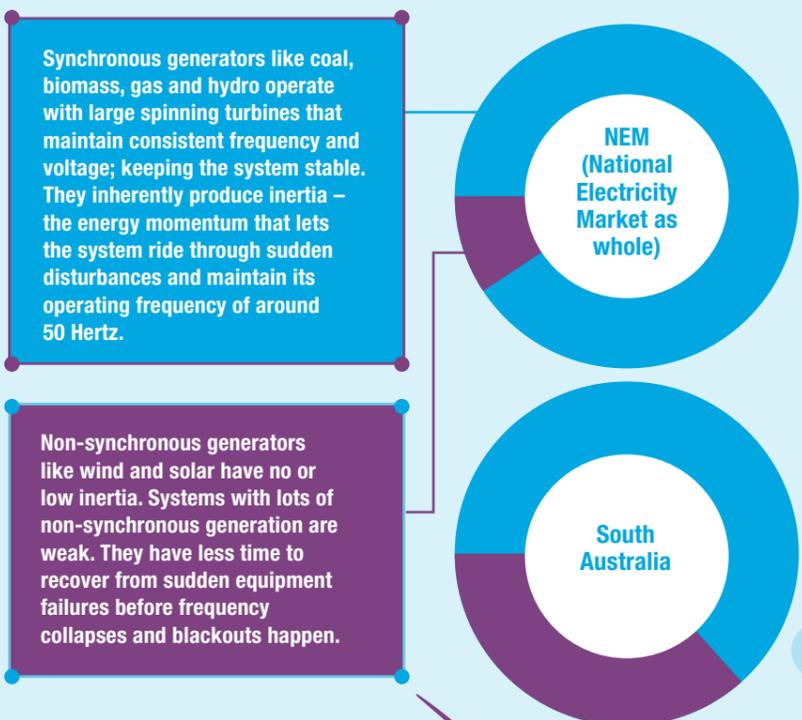
# AUSTRALIAN ENERGY MARKET COMMISSION

## DELIVERING A MORE STABLE POWER SYSTEM

System security market frameworks review final report 27 June 2017

### WHAT'S THE PROBLEM?

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 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 weak. They have less time to recover from sudden equipment failures before frequency collapses and blackouts happen.

### WHEN IS A POWER SYSTEM SECURE?

When frequency and voltage are maintained – even when something goes wrong. Security's different to reliability. That's more about investment to make sure there's enough infrastructure to produce and transport power to meet demand.

#### A Frequency control

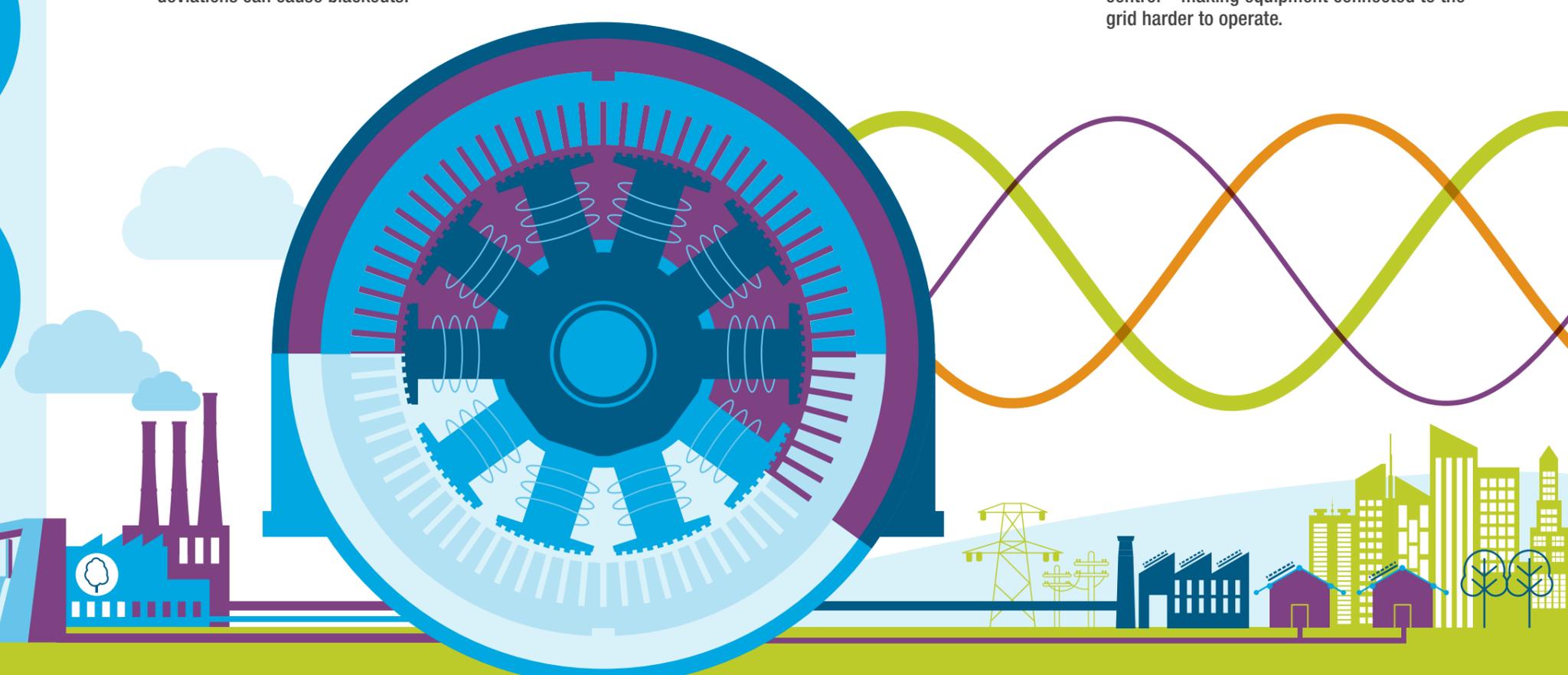
Supply and demand needs to be balanced at all times. If not, uncontrolled frequency deviations can cause blackouts.

#### B Extreme power system conditions

As frequency becomes more volatile we need faster emergency protections to stop widespread blackouts.

#### C System strength

Systems with high levels of non-synchronous generation are weaker so voltage is harder to control – making equipment connected to the grid harder to operate.



### WHAT ARE WE DOING?

Our system security review was initiated in July 2016. Rule changes on aspects of system security have been considered concurrently.

#### A Frequency control

We need new approaches to keeping frequency in the secure operating band. So transmission businesses will be required to provide new minimum levels of inertia determined by AEMO or equivalent alternative services like fast response batteries. The new arrangements will be finalised on 19 September 2017. Draft arrangements were published today for consultation: *Managing the rate of change of power system frequency draft determination 27 June 2017*

The review recommends a new market-sourcing mechanism for inertia services. Draft arrangements will be published for consultation on 7 November 2017: *Inertia ancillary service market draft determination (underway)*

We recommend that all new generators need to be capable of injecting power quickly when needed. We expect this new obligation to be detailed in a request for new rules due from AEMO in July 2017

We'll start the next stage of the system security reform program next month when we initiate the frequency control frameworks review. It will consider AEMO's expert advice on the causes and impacts of deteriorating frequency control performance. This review will examine options for new fast frequency response services like batteries to inject power rapidly. And assess whether frequency control arrangements are fit for purpose including as solar PV continues to expand.

#### B Extreme power system conditions

We need smarter emergency frequency control schemes to strengthen our 'last line of defence' to help prevent system-wide blackouts. That's why the AEMC has already made new rules to protect the power system. The rules introduced a clear framework to regularly conduct forward-looking reviews of new frequency risks and implement the most efficient ways to manage them: *Emergency frequency control schemes final determination 30 March 2017*

#### C System strength

Network businesses will have to meet new minimum levels for system strength for generators connected to their networks. The new arrangements will be finalised on 19 September 2017. Draft arrangements were published today: *Managing power system fault levels draft determination 27 June 2017*

Connecting electrical plant will have to be able to operate to specific system strength levels. These will be detailed in a request for new rules expected from AEMO in July 2017 on revising generator performance standards.