



Emergency frequency control

Commencement of consultation

The AEMC has commenced consultation on two rule change requests designed to deliver effective emergency frequency control schemes. These schemes are the last line of defence to maintain a secure power system.

Maintaining a secure system

Emergency frequency control schemes protect the power system following a major disturbance, such as the loss of a large generator. These schemes shed load and generation in a controlled and coordinated manner in order to prevent major blackouts. They are essential to maintaining a secure and reliable supply of electricity for consumers.

The NEM is going through a period of change as new generation technologies like wind and solar become a critical part of our power system. As this occurs, it is timely to consider whether emergency frequency control schemes need to evolve to reflect a changed market.

These rule changes are related to the broader system security work being undertaken by the AEMC through the System Security Market Frameworks review. A separate consultation paper has been prepared for that review and is available on the AEMC's website.

Key issues and solutions proposed

The South Australian Minister for Mineral Resources and Energy has proposed two rule changes related to emergency frequency control schemes. These rule changes address potential issues that could impact the effectiveness of these schemes, including:

- The increase in speed of frequency change following a major disturbance;
- Increased penetration of distributed energy resources, such as solar PV; and
- A lack of explicit guidance for schemes to address over-frequency events.

To address these issues, the South Australian Minister proposed two rule changes that included several matters for the AEMC to address, including:

- Clarification in the rules regarding the roles and responsibilities of parties;
- The introduction of a new classification of special non-credible events, to allow AEMO to plan emergency frequency control schemes more effectively; and
- The introduction of an explicit rules mechanism for an over frequency generation shedding scheme, to manage over-frequency events.

Background to the rule change requests

Managing frequency in the NEM

The frequency of the power system reflects the balance of supply and demand. The frequency can change by events that disturb this balance, such as a large generator tripping, or separation of a region from the rest of the power system. Normally, the Australian Energy market Operator, (AEMO) manages these frequency changes through small increases or decreases in output from generators.

Occasionally major, unpredictable disturbances to the supply demand balance can cause sudden changes to frequency. If this disturbance is not controlled, it can potentially result in significant disruptions to supply.

State governments, AEMO and networks have therefore established emergency frequency control schemes, called under frequency load shedding schemes, to protect against these events. These schemes interrupt supply in a controlled manner to restore the frequency. While this interrupts supply for some consumers, it prevents a more significant power system failure that could lead to prolonged blackouts.

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A changing power system

These schemes have worked well in the past. However, as the Australian electricity industry goes through a fundamental transformation, it is necessary to reconsider their effectiveness.

The last decade has seen a rapid rise in the penetration of new generation technologies, such as wind farms and rooftop solar. In the past, these technologies accounted for only a small fraction of total electricity supply. Now they are a critical part of the power system.

Older, conventional, spinning generators (such as coal, gas and hydro) typically resist rapid changes in the frequency, as they are synchronised to system frequency. Currently, newer, non-conventional electricity generators, such as wind and solar PV, are not synchronised and are limited in their ability to dampen frequency changes. As more of these newer generation types connect to the power system, the frequency may change more rapidly following a disturbance.

Increases in the potential speed of frequency change may impact on the effectiveness of existing under frequency load shedding schemes, as these schemes have been designed around historic speeds; as this speed increases, they may not be capable to arrest frequency changes.

The effectiveness of these schemes may also be impacted by increased penetration of distributed energy technologies like rooftop PV. These technologies can reduce the amount of power consumers take from the grid and therefore the amount of load that can be shed to stop a sudden frequency change. Under certain conditions, they can also result in significant changes in power flow on the grid, creating a risk that activation of existing under frequency load shedding schemes could actually worsen a frequency change.

General considerations of system security

The consideration of the frameworks for emergency frequency control reflects a broader package of work being progressed by the AEMC through the System Security Market Frameworks review. This review will draw upon work being undertaken by AEMO on key technical issues and solutions. It will identify the changes to market and regulatory frameworks that will be required to deliver the technical solutions identified by AEMO.

As there are a number of potential interactions between the matters being considered by AEMO and the AEMC in this broader system security work package, the AEMC will closely monitor the two projects as they progress and consider any interactions as they arise.

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