



## Efficient management of system strength on the power system

**The Commission has made a final rule to evolve the existing system strength framework, including the 'do no harm' obligation. It will provide system strength investment that is coordinated with new connections, resulting in lower cost energy for consumers.**

System strength is the measure of a power system's ability to maintain a stable voltage waveform and is critical to a secure power system. Historically, it has been supplied by synchronous generators, such as coal, gas and hydro. However, as these generators leave the market or operate less frequently due to the transition underway, the supply of system strength has reduced. IBR, such as wind, solar and batteries, demand system strength, with this increasing as more of them enter the market. This decline in supply and increase in demand for system strength in recent years has meant that we need to rethink the way the service is provided in the NEM.

The existing system strength frameworks were introduced by the Commission in 2017.<sup>1</sup> In practice, these frameworks have been reactive and slow to provide the necessary levels of system strength. This has resulted in deficiencies in this essential service which can create problems in the power system, including wholesale market interventions and the constraint of inverter based resources (IBR). The outcomes of these has been AEMO intervening and displacing IBR by directing typically more expensive thermal generation, leading to increased costs for consumers.

### The Commission's final rule lowers costs for consumers

The AEMC has made a more preferable final rule (final rule) in response to TransGrid's rule change request. It builds upon the Commission's draft rule with some minor amendments in response to stakeholder feedback.

The evolved framework will address the need for a more forward-looking, coordinated solution for the supply and demand of system strength in the NEM. It does this through a three-pronged approach:

- **Supply side:** A new transmission standard for system strength to provide system strength when and where it is needed. A subset of Transmission Network Service Providers (TNSPs), known as system strength service provider (SSS Provider), must meet the two components of the standard as set by AEMO forecasts. These components consist of the minimum level of system strength required for power system security, and the additional level of the service required for a stable voltage waveform to host projected levels of IBR.
- **Demand side:** New access standards for relevant generators, loads and market network service providers. These ensure that connecting parties efficiently demand system strength by using high quality plant.
- **Coordination:** A charging mechanism so parties who use system strength services pay for them. This charge varies by location in the network and the amount of system strength the connecting plant will consume, sending a price signal to connecting parties. The price signal will ensure that connections are coordinated with SSS Provider's system strength investments. Connecting parties have the choice of paying the charge or opting out providing their own system strength to remediate their own impact.

### Commencement of the rule as soon as practical

The final rule sets out clear and practical transitional arrangements to support implementation that reflect the Commission's desire to implement the evolved framework as soon as practical. These include the:

<sup>1</sup> For more information on the existing framework, see <https://www.aemc.gov.au/rule-changes/managing-power-system-fault-levels>

- Supply side arrangements commencing on 1 December 2022, from which time SSS Providers must begin planning to provide the efficient level of system strength by 2 December 2025 at the latest.
- Demand side and coordination arrangements commencing on 15 March 2023, from which time a new connecting party may opt to pay the system strength charge rather than having to self-remediate.

### **Benefits of the final rule focus on efficient power system transition to renewables**

The final rule change enables the rapid integration of inverter based renewables and batteries into the power system, supporting its transition towards a low carbon future.

The central procurement of system strength services by TNSPs leverages considerable economies of scope and scale, which will contribute to greater coordination and more efficient outcomes. This forward-looking approach also ensures system strength is available when and where it is needed, facilitating the connection of IBR and reducing the need for market-distorting interventions.

The final rule also minimises demand for system strength. It does this through new access standards that set the maximum amount of system strength that can be used by utility scale IBR generators (such as solar and wind farms and batteries), market network service providers and certain loads (such as hydrogen electrolyers). The system strength charge also helps by sending a price signal that encourages connecting parties to locate efficiently and to minimise their demand for system strength services. The introduction of the charge also provides greater choice for connecting parties and contributes to a more streamlined connection process.

Looking to the future, the Commission expects technology to evolve the way system strength services are supplied and demanded in the power system, for example through the use of grid-forming, advanced inverters. The evolved framework is technology neutral and is deliberately designed to provide incentives for this evolution to occur. It is also designed to adapt to changing demand for system strength services, where AEMO has the ability to reflect the changing demand for system strength it is forecasts that underpin the System Strength Standard. For instance, if in the future demand for system strength services fall, the framework would result in less system strength being centrally procured.

### **Context and rule change request**

TransGrid lodged a rule change request on 27 April 2020 to amend the National Electricity Rules. It recognised system strength was an urgent issue to address due to:

- Difficulties in coordinating solutions in a timely manner through the 'do no harm' and minimum fault level frameworks, which was creating inefficiencies.
- The additional time and cost for connections due to the system strength impact modelling and remediation requirements of the 'do no harm' obligation.
- The increased risk of costly interventions in the NEM to maintain security.

At a high level, TransGrid proposed to remove the 'do no harm' obligation as well as to change the minimum system strength framework into a system strength specific planning transmission network standard for SSS Providers.

### **Interaction with the ESB's Post 2025 market design work and AEMC's synchronous services rule changes**

The final rule is an example of the work underway that is transforming the way that system security is procured and charged for in the NEM. The final rule consists of a deliberate set of design choices that seek to meet the challenges of the NEM's world-leading uptake of renewables and batteries. It is an example of the way the Commission is designing frameworks that practically support the power system deliver efficient outcomes through the transition and beyond.

It forms part of the AEMC's system security program of rule changes for designing how the power system can continue to operate securely and efficiently during and after the transition to renewables and batteries. These rule changes dovetail with the Energy Security Board's Post 2025 redesign of the NEM. A key aspect of this work considered how

to best provide four essential services needed to keep the lights on: system strength, frequency control, inertia and operating reserves.

This rule change is also inter-related with the AEMC's synchronous services workstream.<sup>2</sup> The Commission released a joint directions paper for these rule changes on 9 September 2021 setting out the core issues involved.<sup>3</sup> Draft determinations for these rule changes are currently scheduled for December 2021.

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<sup>2</sup> This workstream is made up of the *Capacity commitment mechanism for system security and reliability services* rule change request submitted by Delta and the *Synchronous services market* rule change request from Hydro Tasmania

<sup>3</sup> See: <https://www.aemc.gov.au/sites/default/files/2021-09/ERC0306%20%26%20ERC0290%20Directions%20paper%20-%209%20September%202021.pdf>