Paris Session 2022

Sources of System Strength

AU C5 Electricity Markets and Regulation

PS1 – Q8, Inverter based resources (IBRs) utilizing the grid following (grid supporting) technology need a certain level of system strength to maintain stable operation and, per se, do not sufficiently contribute to system strength, on their own, without inherent transmission systems strength being provided. Whose responsibility should it be to provide enough system strength services to ensure stable operations– transmission service provider or the generators? If the latter, then how does the generator provide this and how are costs recovered? Does making the generator responsible for system strength requirements create an entry barrier for renewable generators?

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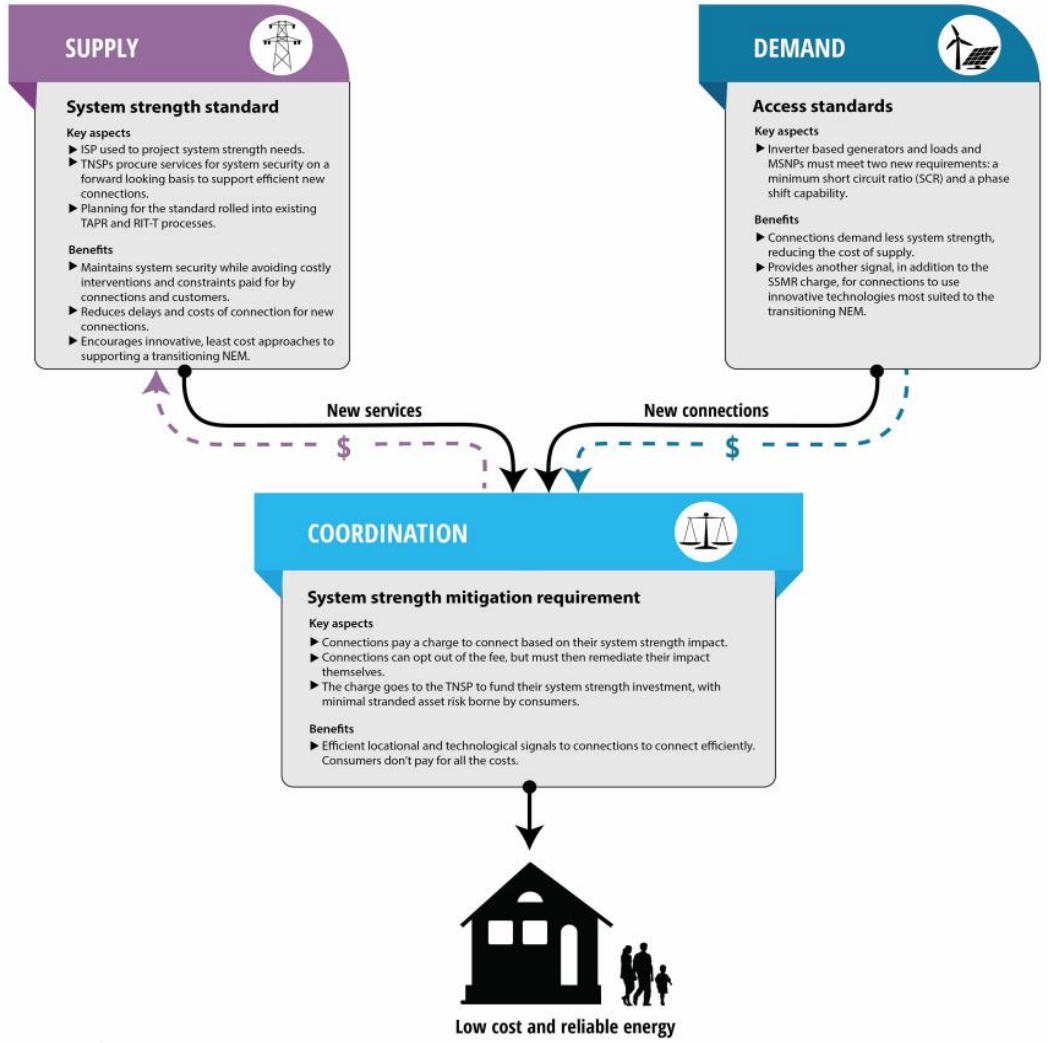
National Electricity Amendment (Efficient Management of System Strength on the Power System) Rule 2021



- Transmission Network Service providers (TNSPs) must plan to provide the suitable system strength to support inverter-based resources (IBR) connections.
- Generators, loads and market network service providers must demand system strength.
- Generators and large loads choose between paying for using the system strength services provided by TNSPs or to build their own system strength.

Source: [ERC0300: System strength final determination - 21 Oct 2021 (aemc.gov.au)]

Challenges

There are some practical issues that can be faced by NSPs and generators, such as:

• If actual connections of IBR plants do not progress as per the planning forecast, there can be either shortage of the system strength or it can result in stranded assets.

• It is not practically possible for the NSP to plan for every IBR plant that may connect to the network under an open access regime. Therefore, not all the plants would have the option to pay for the system strength service planned by NSP, especially the plants that plan to connect to distribution network.

• Under the new regulatory framework, all IBR plants are either expected to pay for the system strength service or self-remediate if the general system strength impact caused by the IBR plant is above the threshold. If the threshold is not set appropriately, this may force small plants connecting to the distribution network to self-remediate based on reduced available fault level (AFL).

Opportunities

- Kiamal Solar Farm (north-west Victoria) has installed a 190 MVAr Synchronous Condenser, designed by Siemens and claimed to be the largest synchronous condenser installed and in operations in Australia.

- Nevertheless, without the development of grid supporting inverters that can contribute to system strength (e.g. Siemens) when there is an obligation on a developer to put in place technology such as synchronous condensers, this reduces the commercial viability of the projects and hence becomes a barrier to development of renewables.

- Despite the recent NER rule change, it might be worth to develop further discussion about pros and cons of establishing a specific system strength market.

- Finally, it would be interesting to know how other jurisdictions are dealing with system strength issues arising from the replacement of synchronous generators with inverter based VRE.