

INFORMATION SHEET

POWER SYSTEM

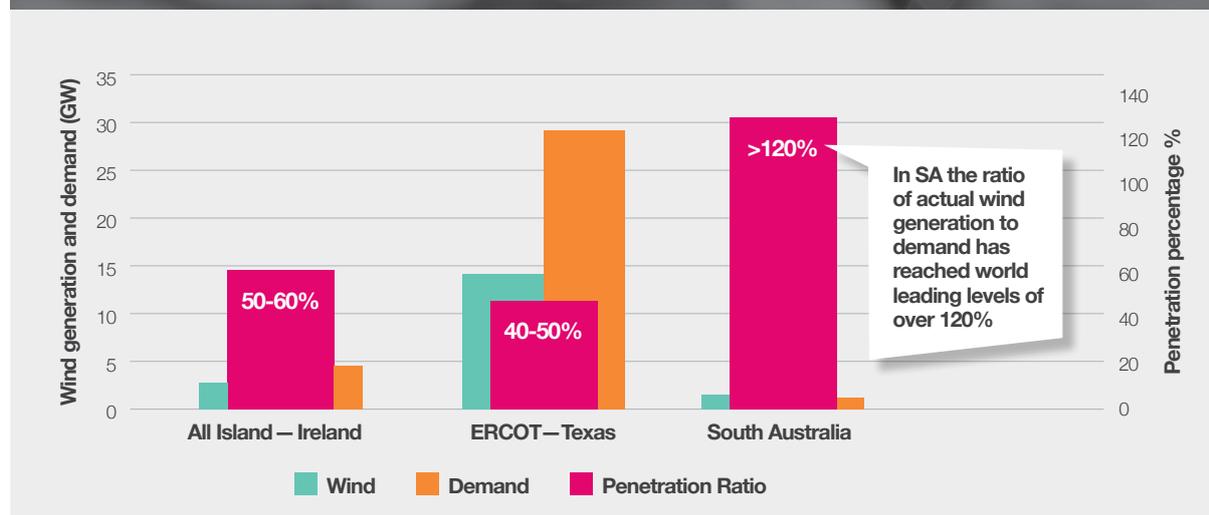
STRENGTH

MAY 2018

We are playing our part to maintain the security of South Australia's power system, while placing downward pressure on energy costs for customers.

South Australia is a world leader in renewable energy generation. As more renewable energy generation such as wind and solar has come online, traditional synchronous generation sources, such as gas-fired units now operate less often. The chart below shows the extent of this trend in South Australia, compared to other power systems with high levels of renewable generation.

Maximum historical penetration of non-synchronous generation in selected power systems



Source: AEMO, South Australian System Strength Assessment, September 2017.

A secure power system needs adequate levels of both system strength and inertia, which to date have been provided by synchronous power generation.

System strength relates to the ability of a power system to manage fluctuations in supply or demand while maintaining stable voltage levels. Inertia relates to the ability of a power system to manage fluctuations in supply or demand while maintaining stable system frequency.

Both are important to ensure secure supply for customers. If there is not enough of these services within the power system, there is an increased risk of system instability and supply interruptions.

Maintaining system strength

On 13 October 2017, the Australian Energy Market Operator (AEMO) declared a gap in system strength in South Australia¹. ElectraNet is required to use its reasonable endeavours to address this gap on an ongoing basis.

To address the gap in the short-term, AEMO has identified various combinations of synchronous generators which must be operating. AEMO currently directs these generators to operate when required under its powers of market direction. However, this is a costly process considering the compensation directed generators are entitled to and associated impacts on the wholesale electricity market. Directing generators is an interim operational solution only, and is unlikely to remain a viable option.

¹AEMO, Second Update to the 2016 National Transmission Network Development Plan for the National Electricity Market, October 2017, available at <http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/National-Transmission-Network-Development-Plan>.

ElectraNet has evaluated the potential options to meet the system strength requirement, including the option of entering into contracts with the relevant generators. This involved a generator tendering process and advice from independent energy market experts.

Our analysis identified that in the interests of customers:

- Contracts with generators would not be economic based on generator costs.
- Installing synchronous condensers on the network is the least cost solution.
- The cost and risks of the current generator direction process requires a fast track alternative solution.
- No other realistic options are available to meet the need in the required timeframe.
- Installing network synchronous condensers is a no regrets measure to meet an immediate need. Any future sources of system strength available will help address wider constraints on the power system.

This solution may also need to address minimum inertia levels, if a need for inertia is determined to exist by AEMO.

What is a synchronous condenser and where will they be installed?

A synchronous condenser operates in a similar way to large electric motors and generators. It contains a synchronous motor whose shaft is not directly connected to anything, but spins freely and is able to adjust technical conditions on the power system. Synchronous condensers are an important source of system strength and other services such as inertia.

Detailed technical studies need to be completed in conjunction with AEMO and manufacturers in the coming weeks to determine the number, size, location and design of the synchronous condensers.

The most likely sites being considered are on the 275kV network at Davenport, Robertstown and an Adelaide metropolitan site yet to be determined. (please refer to the map top right).

Will this benefit South Australian customers?

While helping to maintain a stable power system, installing synchronous condensers will also avoid the need for costly generator direction by AEMO which is expected to result in a net cost saving equivalent to \$3 to \$5 per year on a typical South Australian residential electricity bill.



Next steps

- Develop detailed specification and design of a synchronous condenser solution in consultation with AEMO and manufacturers.
- Approval by AEMO of the technical specifications, performance standards and operational arrangements.
- Competitive sourcing of synchronous condensers and associated equipment direct from the relevant suppliers.
- Obtain land & approvals for the relevant sites.
- Assessment and approval of the required capital and operating expenditure by the Australian Energy Regulator (AER).
- Construction & commissioning by 2020.

AEMO, the AER and the South Australian Government have supported this fast track approach to meet the system strength shortfall. We will continue to work closely with these bodies, customers and wider stakeholders to deliver a solution that is in the best interests of electricity customers.

Contact Us

For more information about our response to address the system strength gap please contact ElectraNet.

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Visit us online electranet.com.au