

Australia's energy markets are in transition

Australian energy markets are experiencing a time of significant change, driven by the transition to lower carbon emissions, rapidly evolving technologies and changing customer needs.

South Australia has reached significant levels of renewable energy penetration through large scale wind generation developments and rooftop solar photovoltaic (PV) installation. Around 45 per cent of South Australia's power generation now comes from renewable energy resources.

Successfully integrating this changing supply mix, while maintaining affordability, reliability and security of supply for customers is a key priority for the energy sector.

Electricity transmission networks have a key role to play in supporting the efficient development of energy markets during this transition, as highlighted recently by the Council of Australian Governments (COAG) Energy Council¹.

Additional interconnection between National Electricity Market (NEM) regions can result in greater competition between generation sources, thereby delivering lower overall energy prices for customers, in addition to facilitating an increase in renewable generation and addressing security of supply concerns associated with energy market transition.

Non-network options can also provide benefits to the market to help with energy market transition. These options could include demand response, generation options, battery storage and other solutions.

Exploring options to facilitate energy market transition

ElectraNet, in consultation with other transmission network service providers (TNSPs), has commenced an economic cost benefit assessment to explore options that can help to facilitate South Australia's energy transition. The Regulatory Investment Test for Transmission (RIT-T)² will be applied to this assessment.

The identified need for this RIT-T is driven by allowing greater competition between generators in different regions ...

A number of South Australian generators have permanently, or partially, withdrawn from the market in the recent past, including the Northern Power Station (NPS) which closed in May 2016.

The closure of these generators has resulted in sharply increasing spot and futures prices in South Australia that have not been replicated in the eastern states. For example, South Australian electricity base futures prices are around \$100/MWh for the next three years, while prices in New South Wales and Victoria range from \$55 to \$65/ MWh over that same time horizon³.

A new interconnector or non-network alternatives would put downward pressure on energy prices in South Australia. Specifically, new interconnector options would enable demand in South Australia to be met through using surplus low cost generating capacity that currently exists elsewhere in the NEM. This will lower the overall costs of electricity supply across the market as a whole.

The reduction in electricity prices in South Australia can also be expected to lead to further benefits to customers through the value they derive from increased electricity use.

¹ COAG Energy Council, *Communique*, August 2016

² The RIT-T is the regulatory cost benefit test administered by the Australian Energy Regulator (AER)

³ ASX Energy website, available at: <https://www.asxenergy.com.au/>, accessed 19 October 2016

... as well as improving security of electricity supply in South Australia...

While new, low carbon emission generation technologies contribute significantly to Australia meeting carbon emission and renewable energy targets, they generally do not provide the same system services as those delivered by traditional coal or gas-fired generators. Consequently, the change in the generation mix is changing the nature and level of services required to maintain security of supply.

Security of supply concerns arise in particular in relation to the operation of the South Australian network during non-credible 'separation events'. The loss of the existing Heywood Interconnector between South Australia and Victoria has the effect of 'islanding' the operation of the electricity network in South Australia from the rest of the NEM – this is referred to as a 'separation event.' Historically, separation events have occurred on average once every four years.

During a separation event, it is important that the electricity system in South Australia remains secure. This includes maintaining a Rate of Change of Frequency (RoCoF) within certain bounds, in order to avoid widespread supply disruptions. The retirement of conventional generation, which previously provided services to assist with managing frequency, means that new ways of managing the system security are needed.

To address security of supply concerns, the South Australian Government has enacted a new requirement that requires RoCoF to be limited within 3 Hz/s for the coincident loss of both circuits of the Heywood Interconnector, when the system is in a secure operating state as defined in the National Electricity Rules (NER). ElectraNet has consequently provided limit information to the Australian Energy Market Operator (AEMO) to assist in limiting flows on the Heywood Interconnector when necessary to achieve this RoCoF standard.

Against this background, the options considered in this RIT-T may provide system security benefits to consumers and producers of electricity through:

- allowing the RoCoF standard to be met without constraining flows over the Heywood Interconnector;
- further reducing the risk and/or consequences of supply disruption following a separation or other event, through reducing RoCoF below the mandated standard;
- managing the challenges of declining system strength (fault levels)⁴; and/or
- allowing greater sharing of ancillary services across regions, resulting in an overall lower cost of providing system stability.

... and facilitating the transition to lower carbon emissions and the adoption of new technologies

Australia has in-place a number of carbon emission and renewable energy targets. Meeting these commitments, will lead to the replacement of emissions intensive generators with lower emission alternatives. New technologies, including distributed generation and energy storage, can be expected to assist with this transition.

South Australia has abundant and high quality renewable energy resources that exceed its combined minimum demand and export capability. Greater interconnection would allow renewable energy from South Australia to assist the nation to meet carbon emission and renewable energy targets at lowest long-run cost.

⁴ System strength (fault levels) declines where the quantity of synchronous generators operating declines and the quantity of power electronic convertor-connected generation such as wind and solar increases. This can lead to increased risk of protection systems not operating as designed and therefore an increased risk to system security, public safety and plant and equipment.

Greater interconnection between South Australia and the rest of the NEM would also enable renewable energy resources in Queensland, New South Wales, or Victoria to be unlocked by developing transmission corridors through weakly or otherwise unconnected renewable regions, thereby, contributing further to the overall market transition.

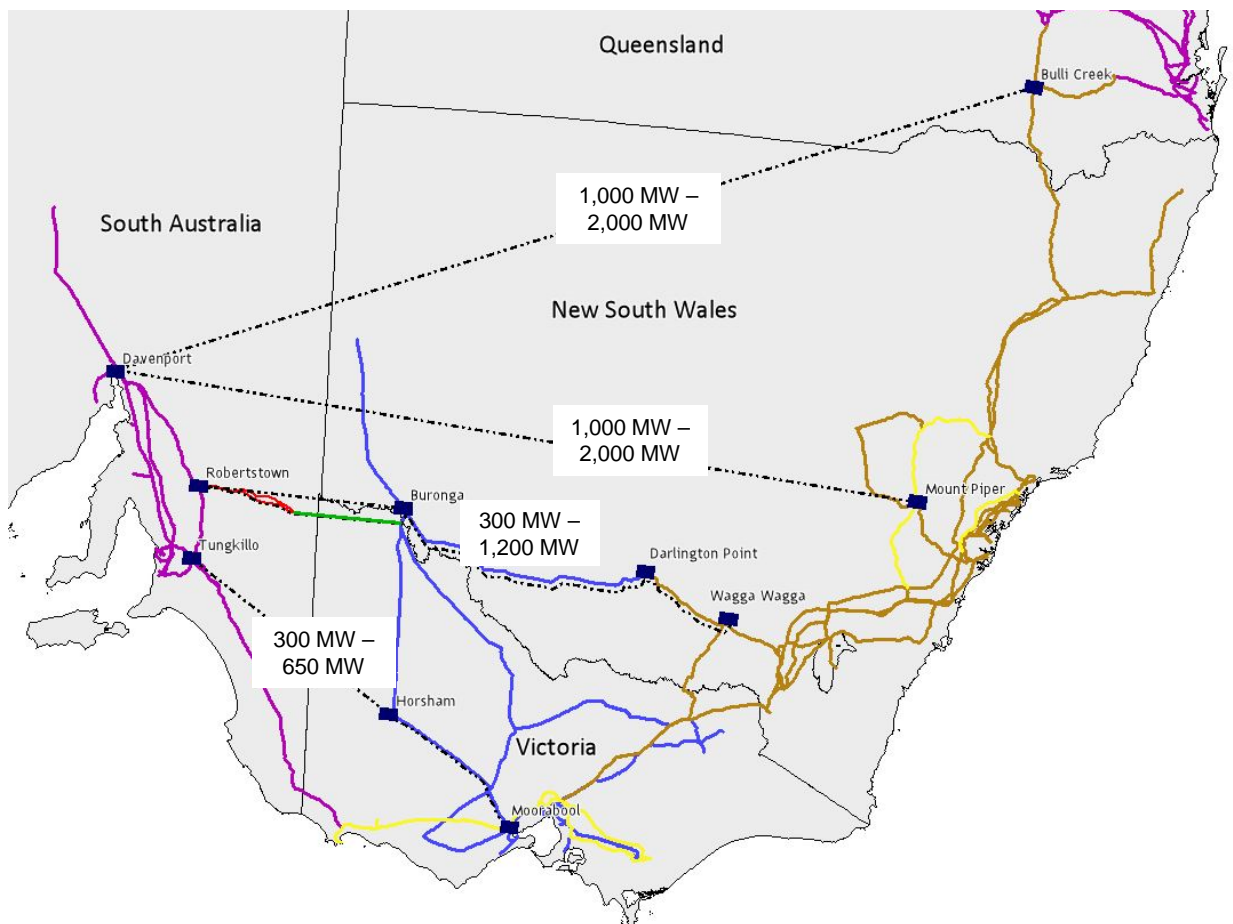
Four interconnector options proposed to be assessed

ElectraNet has identified four credible network options, all of which involve constructing a new interconnector between South Australia and a neighbouring state. The four interconnectors under consideration are

- Central SA to Victoria Interconnector (nominally Tungkillio to Horsham, and beyond)
- Mid North SA to NSW (nominally Robertstown to Buronga, and beyond)
- Northern SA to NSW interconnector (nominally Davenport to Mt Piper)
- Northern SA to Queensland interconnector (nominally Davenport to Bulli Creek)

The map below shows the four routes that are being investigated, along with an indicative range of interconnector capacity (both ways).

Figure 1 Four new interconnector options are proposed to be investigated as part of this RIT-T (line corridors are indicative only)



None of the network options being investigated were considered in AEMO’s 2015 National Transmission Network Development Plan (NTNDP). However, AEMO’s 2016 NTNDP is expected to include high level consideration of additional interconnection options in the NEM, including from South Australia to neighbouring states.

Non-network options will also be evaluated

Non-network options can also provide benefits to the market and help with energy market transition, particularly in relation to system security.

Non-network options could provide inertia, fast frequency response and/or voltage response capabilities to increase interconnector capacity and so that supply disruptions could either be avoided or substantially reduced.

Technological advances with respect to controllable demand and storage mean that there may be a broader range of potential non-network options than previously was the case.

ElectraNet is interested to hear from non-network proponents

ElectraNet is interested to hear from potential proponents of non-network options. The information that non-network proponents need to provide is set out in section 4 of this report.

ElectraNet will use the information provided in submissions to further develop non-network options for inclusion in the next stage of the RIT-T assessment process.

Next steps

ElectraNet welcomes written submissions from registered electricity market participants and interested parties on the PSCR, which is available for download from www.electranet.com.au.

ElectraNet welcomes written submissions on this PSCR. Submissions are due on or before Monday 6 February 2017. Submissions are particularly sought on the investment options presented and from proponents of potential non-network options.

Submissions should be emailed to consultation@electranet.com.au.

Submissions will be published on the ElectraNet website. If you do not want your submission to be made publicly available, please clearly specify this at the time of lodging your submission.

ElectraNet will publish a separate consultation report on the economic modelling to be undertaken to assess the credible options. The Economic Modelling Assumptions report will be published before the end of 2016. This report will provide details of the modelling approach and assumptions that ElectraNet intends to adopt in the economic assessment, including the future scenarios against which credible options will be assessed.

A Project Assessment Draft Report (PADR), including a full quantitative assessment of the costs and benefits of each of the options being considered, is expected to be published mid-2017.