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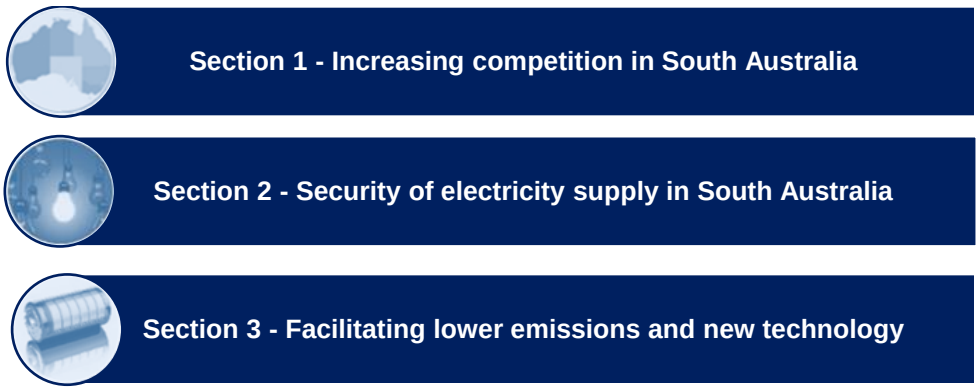
Regulatory Investment Test for new interconnection between South Australia and another region

The Australian Energy Council (the Energy Council) welcomes the opportunity to make a submission to ElectraNet's *Project Specification Consultation Report* (PSCR) and *Market Modelling Approach and Assumptions Report.*

The Australian Energy Council is the industry body representing 21 electricity and downstream natural gas businesses operating in the competitive wholesale and retail energy markets. These businesses collectively generate the overwhelming majority of electricity in Australia and sell gas and electricity to over 10 million homes and businesses.

In the energy transformation it is almost certain that new infrastructure will be needed, but we will not know what to build until we know how it fits into a new and comprehensive national energy strategy. Energy and climate policy uncertainty has led to difficulty in making investment decisions because of the risk to estimating with accuracy the benefits of the investment. If business is expected to build the clean, smart energy system of the future, then it will need governments to reduce risk and uncertainty, not add to it, as is currently happening through lack of clear climate and energy policy direction.

This submission is divided into three sections which align with the classification of estimated benefits outlined by ElectraNet in the PSCR.



We await with interest the development of the modelling to support the process. Given the high levels of uncertainty, it is important that multiple scenarios are considered – ideally a probabilistic and risk adjusted method such as monte carlo simulation would be a useful component of the modeling. We are also interested to understand the trade-offs between the different benefit categories. On the face of it, the main impact of the interconnector appears to be to reduce prices in South Australia due to imports from Victoria or New South Wales. Given those regions have higher carbon intensity than South Australia, it may lead to *higher* emissions than otherwise.

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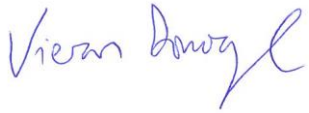
Any questions about our submission should be addressed to Emma Richardson, Policy Adviser by email to emma.richardson@energycouncil.com.au or by telephone on (03) 9205 3103.

Yours sincerely,



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Section 1 – Increase competition in generation

The interconnector options may not make a substantive impact in reducing the current contract price differentials observed between South Australia and the other eastern states, because an interconnector will not reduce volatility of local intermittent supply. An interconnector may reduce wholesale prices in South Australia as ElectraNet outlines, but this benefit should be carefully weighed against the cost of increasing the monopoly network assets in the NEM, ultimately paid for by consumers.

The interconnector options may not make a substantive impact in reducing the current contract price differentials. The dynamics of the market with the introduction of an interconnector are both positive and negative. By increasing the share of intermittent generation, which is able to bid below the full cost of production because of large-scale generation credits and government payments[i], an interconnector worsens the business case for firm generation in South Australia, further exacerbating the scarcity of firm supply. Conversely, greater export of renewable energy at times of high wind and solar generation will help to mitigate price troughs in South Australia, reducing the distortion to the wholesale market price. Forward price curves, mothballing and closure of existing South Australian generation (notwithstanding the price signals being provided in forward prices) highlight the risks facing generation assets in the NEM more broadly and greater interconnection may not solve this challenge.

Contract prices in South Australia are high because of scarcity of firm supply and price volatility, and an additional interconnector may not mitigate this scarcity or volatility. As ElectraNet notes in the PSCR that firm generators have withdrawn from South Australia;

> "*The substantial investment in new wind and rooftop solar photovoltaic (PV) generation in South Australia has been a contributing factor to this withdrawal*."p15

Intermittent generation cannot provide long term contracts or guaranteed levels of supply. Most of the energy that is used to meet a consumer's demand is contracted on a long term basis, and forward contract prices are a good indicator of underlying expectations about supply and demand. The modelling outcomes to assess a new interconnector will be based on average spot prices, but if contract prices increase (due to greater volatility and scarcity of firm supply), South Australia's customers may not actually see the supposed benefits of lower prices.

The subsidies provided to some generation distorts incentives in the market and does not lead to strictly improved outcomes with trade between regions. Increased trade between regions allows generators with a comparative advantage in production to increase their supply and in the long run, to increase investment in expanding supply. However, generation with subsidies is able to suppress prices below the true cost of supply and maintain this advantage in the long term. In the supply of electricity this is resulting in permanently lower revenue, below the value of the service to customers, and a price signal to exit the market despite the value it provides a key times when intermittent resources are unavailable.

Current State and Federal policy settings are driving the investment in intermittent generation over the long term. The location and type of generation will determine which regions should be connected to yield greatest benefit to consumers. The market provides important information to investors about when and where generation is most valuable and South Australia is showing signs that the region needs firm generation (Figure 1 below). It is essential to preserve this feedback between consumers and generators to ensure investment in the sector is not undermined in the long term.

An announcement of an additional SA interconnector will act as a disincentive to invest in further synchronous generation. An additional interconnector will act in a similar fashion to the introduction of a significant baseload generator which will reduce the long term payback that generators seek to recoup their capital expenditure. Any benefits of an additional interconnector should assess the short term volatility that is likely to occur in the years between approval and finalized construction. Experiences with the Heywood interconnector upgrade

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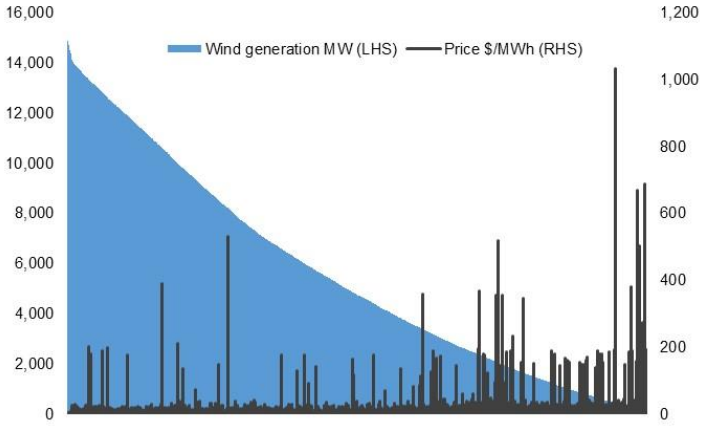
demonstrate the importance of considering the likelihood of market price cap events[ii] and increased requirements for ancillary services[iii] through the construction phase.

Figure 1: South Australia's wind generation by trading interval and price, 2016



Source: NEM Review, 2017

The large-scale uptake of distributed generation may reduce the amount of energy transported on transmission infrastructure. This is a risk to the efficient use of network infrastructure over the long term and underutilizing the asset would be an inefficient outcome paid for by consumers.

The largest risk is that we construct a large, expensive, asset that becomes underutilized and is paid for through higher electricity prices for decades. It is only a few years since the New South Wales and Queensland governments required their state-owned electricity networks to build duplicate assets as a response to blackouts in Sydney and Brisbane, leading to investigations into gold-plating from consumers paying for these assets. Collectively, we seem to already be forgetting the lessons of that episode.

Connecting regions yields the greatest benefits when those regions are complementary in load profile and generation mix[iv]. For example, if peak demand does not occur at the same time of day or season, then surplus supply from the low demand region can be exported to the high demand region when needed. In Europe, Denmark deals with a large share of intermittent renewable generation by exporting excess energy to neighboring Germany, Norway and Sweden. These neighboring regions have relatively high shares of dispatchable hydro, gas and coal generation which then supply Denmark when wind generation is low. Comparatively, Victoria and South Australia receive similar wind resources (due to prevailing winds) and experience coincident heat waves which give rise to peak demand occurring across both states. In early February 2017, we have seen record levels of demand across four regions (SA/VIC/NSW/QLD) occur simultaneously. This has led to increased wholesale spot prices in all regions and represents the risk to greater interconnection to regions that are similar in load profile or generation mix.

Alternative models

To mitigate the risk to consumers created by the uncertainty over benefits and costs of long lived infrastructure assets, market driven solutions should be thoroughly examined. Market driven solutions to supporting system security in South Australia are preferable to regulated asset solutions because they are lower cost and the risk to consumers of an incorrect decision is lower. The scarcity of firm generation in South Australia is not a result of a lack of competition, it is a direct result of the strong renewable resources in the state combined with renewable policies which suppress wholesale prices below the true cost of long run supply. Over time, policy solutions will be required to address this unintended outcome.

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Section 2 - Security of electricity supply in South Australia

ElectraNet identifies that a reduction in conventional synchronous generation affects system security, and this would be the expected result of greater competition with lower cost generation from other regions. ElectraNet has identified the tradeoff between supporting system security in the South Australian region and greater competition from least cost generators in other regions, which diminishes the business case for synchronous generation or storage in South Australia. The challenges facing the network as greater amounts of non-synchronous, intermittent generation are deployed are mitigated by the remaining conventional synchronous generators in the system. The closure of conventional generation and reduced availability for dispatch of others, means that there are now fewer resources available within South Australia to provide the required inertia to limit RoCoF, provide system restart services and provide system strength and mitigate the risk of extreme events. Given the significant change in generation mix that occurred in 2016 the future estimates of benefits attributable to changes in reliability should take into account key changes that have occurred, such as the retirement of Northern Power station.

The likely outcome of greater competition from low-cost interstate generators is a reduction in local firm generation in South Australia. In the long run, this means that as conventional generation retires, the state would be completely reliant on the interconnectors themselves for security and reliability of supply. Centralising the supply of energy as well as system security services to a small number of key infrastructure assets presents its own risks in the case of extreme events. AEMO is pursuing this line of enquiry to understand what the requirements would be for the South Australian region to operate as an island, with high shares of wind and solar PV generation. Some of the solutions to this challenge (including non-network solutions) may be relatively low cost and low risk relative to the creation of a regulated network asset.

Any new interconnector with a new single or double circuit transmission line into South Australia would provide additional diversity of supply, although this could be limited by upstream or downstream network limitations. The Heywood interconnector upgrade was estimated to provide 650MW of additional capacity to the South Australian region, but to meet system security obligations AEMO has constrained down the connection to mitigate the risk of frequency deviations. AEMO created constraints to limit Heywood Interconnector transfers in both directions, in order to limit the rate of change of frequency to below 3 Hz per second for the non-credible co-incident trip of both circuits of the Heywood interconnector[v]. Prior to this, AEMO also constrained the interconnector to a nominal 600MW, below the 650MW the cost benefit assessment was based on[vi]. These constraints are essential to maintain power system security and are not costless, having already been attributed to high price events in South Australia[vii]. Any modelling of an additional interconnection to South Australia should take into account the secure operation of the network, including constraints and the impact of constraints on wholesale price outcomes.

Wind generation in Australia's Southern states such as South Australia and Victoria is moderately to strongly correlated (Figure 2). This means that during times of low demand and high wind output, electricity will be unable to flow into South Australia from Victoria. While this will result in low cost energy supply during that day of low demand, the price outcome will be well below the long run cost of supply, and erode the business case for efficient investment.

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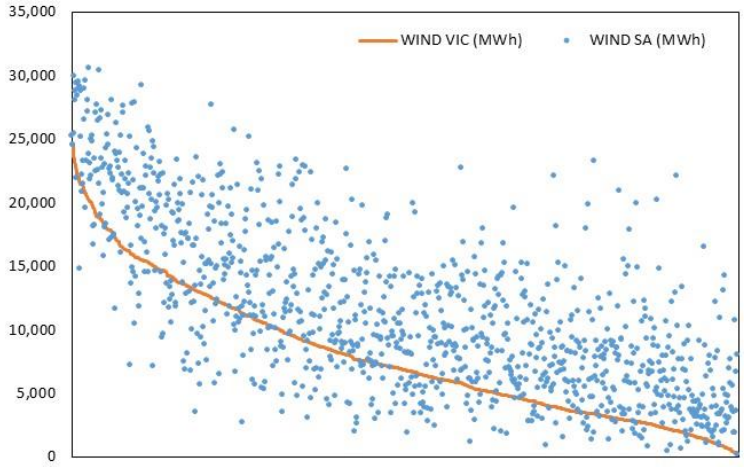
Figure 2: Victoria and South Australia's wind generation is correlated (daily wind generation in Victoria and South Australia from 2013 to 2016, MWh)



Source: NEM Review, 2016.

Operation of large high voltage power systems such as South Australia at low fault levels can result in the conditions of the power system being unstable. Voltage control and system strength is a key priority area for AEMO in maintaining system security in South Australia. Fault levels are provided at the local power system level, and in remote parts of a region are not materially assisted by interconnection[viii]. To mitigate this risk to system security AEMO has imposed a requirement for a minimum of two sufficiently large synchronous generators is required to be on-line at all times. An additional interconnector which exposes existing generators to greater competition from interstate coal generation further diminishes the business case to maintain those local generators in the region. In this way, rising competition has a direct impact on the ability of the market operator to maintain system security under weak system conditions. This trade-off between rising competition through greater interconnection and increasing system security in the South Australian region should incorporated into the modelling of options to understand the whole-of-system cost.

The value that consumers place on reliable energy supply is a key determinant of the benefits of network and non-network solutions. In 2016, the AEMC and Reliability Panel undertook an extensive review into the System Restart Standard including the customer value of reliability by region[ix]. The purpose of this exercise was to determine the value consumers in each region place on timely restart of the network after a major disruption- a system black event. ElectraNet does not consider that the application of AEMO's standard VCR estimates, without modification, would be adequate, since they do not capture the full impact of widespread and prolonged outages that might arise following a separation event. We find that the VCR set out in the Final Determination of the Review of the System Restart Standard are appropriate and have undergone a transparent and rigorous review process through the AEMC's Reliability Panel.

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Figure 3: Values for unserved energy: VCR, GSP and MPC

Outage Duration	Queensland ($/kWh)	New South Wales ($/kWh)	Victoria ($/kWh)	South Australia ($/kWh)	Tasmania ($/kWh)
0-1 hours	50.53	47.76	47.57	46.56	34.18
1-3 hours	41.63	40.60	40.47	40.22	31.14
3-6 hours	28.26	27.37	25.96	27.70	21.37
6-12 hours	17.62	17.97	17.00	17.89	13.53
Gross State Product[85]	5.82	7.21	7.02	7.08	2.46
Market Price Cap[86]	14.00				

Source: AEMC, 2016, Review of the System Restart Standard Final Determination, p53

Alternative models

In September 2016 ACIL Allen was commissioned by the Energy Council to explore a range of possible solutions to improve power quality in South Australia[x]. Attachment 1 provides a summary of ACIL Allen's findings. Some proposed interconnector options could be effective in addressing a range of technical issues in South Australia, but they are either relatively expensive or have long lead times, or both. A combination of lower cost options to procure incremental inertia, frequency and voltage control and additional dispatchable capacity could collectively provide a quicker outcome.

Market driven solutions to energy consumer needs are preferable to regulated asset solutions because they are lower cost and the risk to consumers of an incorrect decision is lower. Some of the service models being investigated include:

- Increasing available information about the need for inertia or the RoCoF levels in regions.
- An inertia services model (the AEMC is currently investigating this option[xi]).
- Adequately valuing ancillary services to reflect the rising scarcity of providers of these services.
- Requirements for RoCoF limits.
- Expanded use of Network Support and Control Ancillary Service (NSCAS) and other ancillary services such as fast frequency control ancillary services.
- Smart distributed generation which is visible to AEMO or the network operator.

To maintain system frequency within the current limits, AEMO could purchase more system inertia (as proposed in a rule change to the AEMC[xii]), and a new fast frequency control service. If alternative support services were not developed or feasible then a RoCoF limit may be appropriate. At this early stage of understanding RoCoF in the NEM, it is essential to consider and balance the relative costs and benefits of all options.

For example, some generators provide voltage control, inertia, fault levels and system strength by installing and running synchronous condensers or running generators in a 'synchronous condenser mode'. This provides the direct benefit to the generator of improving system operating conditions. However, any other generator in the area and energy users also benefit from the stronger system. Currently, there is no mechanism for financial recovery of these services provided by the generator. In this case, the generator who invests in providing improved system security cannot exclude others from benefitting from the service (non-rival in consumption), and all those connected to the network benefit from the service at the same time (the service is non-excludable). In this case, the service that enhances system security cannot be efficiently provided by a competitive market. Under the AEMC's system security market frameworks review, these services could be

procured by the operator or network, to increase investment and continue current voluntary practices, thereby placing a financial incentive to provide this service on the market as a whole.

It is possible that there may be scope to reduce transmission assets that create sub-optimal constraints on energy flow. Some benefit of the Heywood interconnector upgrade was the result of removing limits on the network at Tailem Bend. The decommission of the transmission lines between Snuggery and Keith and Keith and Tailem Bend decoupled the 132 and 275 kV flow paths and allowed the frequently binding constraints to be removed, maximizing energy flow around these pieces of infrastructure. ElectraNet could consider the removal of weak links that can restrict flow where an alternative arrangement may be optimal.

AEMO currently has the ability within the NER to procure a suite of security enhancing services. In particular NSCAS procurement could allow AEMO to create contracts for equipment or generation that provides inertia in South Australia. The ability to procure Voltage Control Ancillary Services also allow AEMO or a network business to procure synchronous condensers which have been identified to assist security in the South Australia region these are also used in Tasmania in areas of high wind generation to assist with weak systems. The existing NSCAS mechanism provides a framework for these services to be procured by either AEMO or network businesses, however the NSCAS quantity procurement methodology is backward looking and does not allow for future impacts or current operations. Prior to establishing a new regulated interconnector, regulatory requirements or markets for services, an examination should be undertaken of the appropriateness of existing measures to meet security challenges which is occurring under concurrent processes.

Section 3 - Facilitating lower emissions and new technology

The basis for this goal is unclear, because it consists of two distinct components that are not necessarily correlated.

Australia has in place internationally ratified national emissions reductions goals for both 2020 and 2030. However, it is not clear *how* emissions reductions should be valued in the RIT-T assessment. The optimal approach to emissions reduction in the electricity sector is highly uncertain due to policy change in this area. It is not clear how a long lived asset such as an interconnector will interact with emissions reduction policy. National emissions reduction policy is under review in 2017. An asset financed via a guaranteed regulated rate of return levied on consumers creates a significant risk to consumers when an emissions reduction mechanism is undetermined.

The goal of facilitating new technology does not seem a relevant consideration in a RIT-T. The NEM rules are deliberately and appropriately technology neutral. The role of the free market is to allow consumers to drive innovation and adoption of new technologies. Exposing market participants, product developers and investors in new technology to the demands of consumers brings new technologies to market and then down the cost curve. Increasing the uptake of new technology is not a role for a regulated transmission business.

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[i] Such as the ACT Renewable Energy Target scheme which provides contract for difference payments to generators or low cost of borrowing capacity provided by the Clean Energy Finance Corporation.
[ii] Australian Energy Regulator, 2016, *Prices above $5000/MWh - 7 July 2016 (SA)*, https://www.aer.gov.au/wholesale-markets/market-performance/prices-above-5000-mwh-7-july-2016-sa
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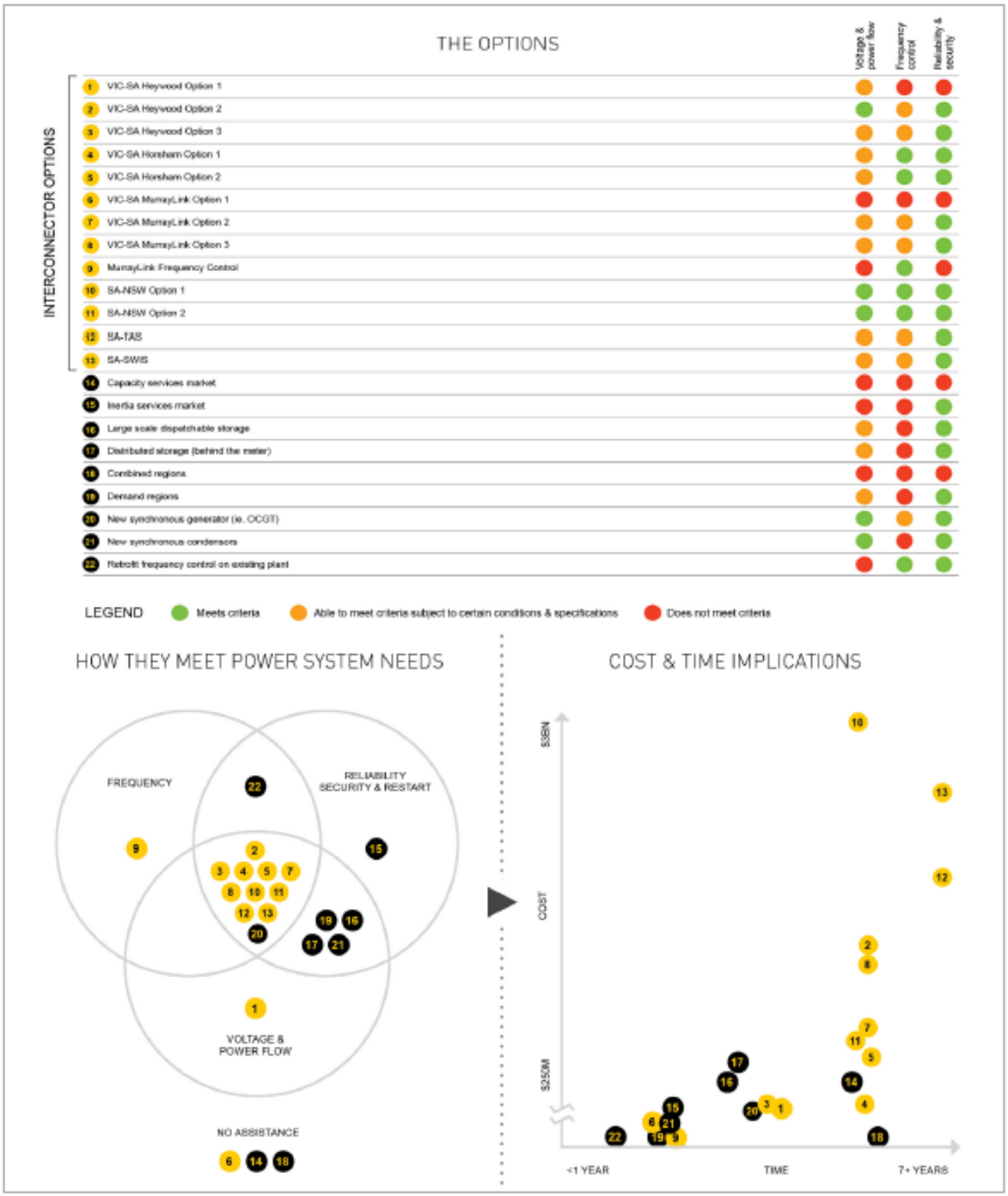
Attachment 1: ACIL Allen, 2016 options for South Australia's energy challenges



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