AUSTRALIAN ENERGY COUNCIL

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State-wide Electricity Blackout and Subsequent Power Outages

The Australian Energy Council (the Energy Council) welcomes the opportunity to make a second submission to the South Australian Legislative Council Select Committee (the Committee) on the State-wide Electricity Blackout and Subsequent Power Outages.

The 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.

We provided a submission to the Committee on 10 February 2017, and will not reiterate the information provided then. This submission provides additional information to address the extended terms of reference, released by the Committee in March 2017.

Power outages subsequent to 28 September 2016 including on 27 and 28 December 2016 and 8 February 2017

The conclusion to be drawn is that it is not the *market* as such that has led us to the current generation mix problem – the continuing growth of wind farms in the state is driven instead by renewables support policies such as the national Renewable Energy Target and the ACT's contract for difference program. We would observe that neither of these policies are SA state government policies.

The outages in some areas in South Australia on 27th and 28th December 2016 were reportedly due to storm damage to the distribution network[i]. These outages are not indicative of a market or policy problem that needs addressing. The network businesses with direct involvement with these outages are the most appropriate parties to comment on the events.

8 February 2017

On 8 February 2017 the Australian Energy Market Operator (AEMO) gave directions to shed energy load in South Australia which caused some areas of the state to lose power. AEMO gave direction to restore load 27 minutes later[ii]. Load shedding occurred because record power demand during heatwave conditions outstripped the available supply. AEMO directed load shedding of 100MW but the actual load shedding by the local network operator was approximately 300MW. The additional load shed was an unfortunate error by the local network operator.

Power networks such as the National Electricity Market (NEM) must remain in balance at all times, with supply perfectly matching demand. When an imbalance occurs, AEMO can keep the power flowing and the lights on by bringing supply and demand back into balance. On 8 February 2017, all available generators were producing around their maximum capacity so AEMO required load shedding on some areas to balance supply and demand and ensure security of supply to the State.

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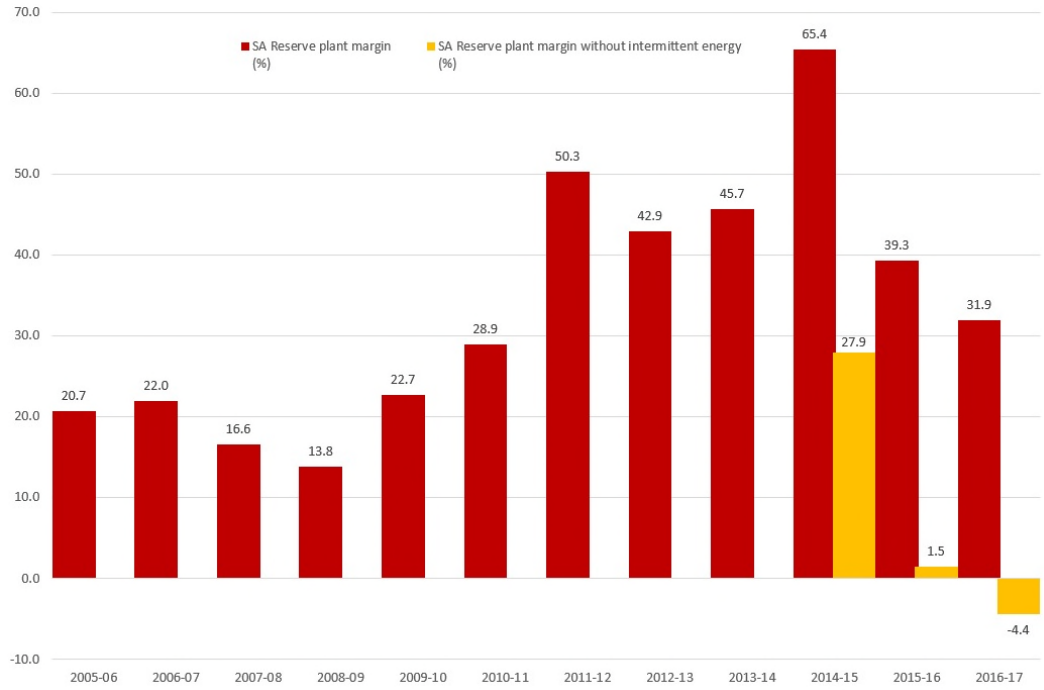
The energy system is built efficiently to meet demand on the day that it is highest throughout the year. In South Australia energy demand reaches a peak in summer, during hot conditions. This means that through the year during times of average energy demand there is spare capacity in the power system. On those days of high energy demand the amount of spare energy capacity decreases. The National Electricity Rules require the power system to meet a reliability standard to ensure that there is sufficient energy and adequate energy in reserve to meet demand at most times during the year. Currently, the reliability standard sets the maximum level of unserved energy at 0.002 per cent of the annual energy consumption in South Australia[iii].

In 2015-16, South Australia's reserve energy appeared ample to meet peak energy demand, but once variable wind and solar generation is removed the margin is no longer apparent, at just 1.5 per cent of average peak demand. Figure 1 shows that in 2016-17, reserve energy available for South Australia to meet peak energy demand is in deficit by 4.4 per cent, meaning the connection with Victoria and remaining dispatchable generators (gas and liquid fuel generators) are essential to maintain energy supply.

Figure 1: South Australia's Reserve Plant Margin from 2005-06 to 2016-17



Source: NEM Review, 2017 data and Australian Energy Council calculations.

South Australia is now completely reliant on interconnection with Victoria and the remaining gas and liquid fuel generators in the state to maintain reliable power during peak demand. And when demand is high, there is a high likelihood that these existing assets will not be sufficient to meet the state's energy needs. This kind of reserve shortfall would normally trigger investment in new generation capacity capable of meeting the shortfall, but policy uncertainty and interventions in the energy market are preventing investment.

AEMO's day ahead forecasts of energy demand are used by generators to prepare for the next day's production and bid into the market. AEMO forecasts underestimated the actual energy demand on the 8th of February and throughout the day, forecasts were revised up, but not with sufficient time to bring on more generation than was already available. Figure 2 shows the black line, which was the day ahead forecast and the red line which was the actual load on the day. The lines in between the forecast and actual are the revised forecasts which occurred throughout the day. Errors in the temperature forecasts led to errors in the demand forecast.

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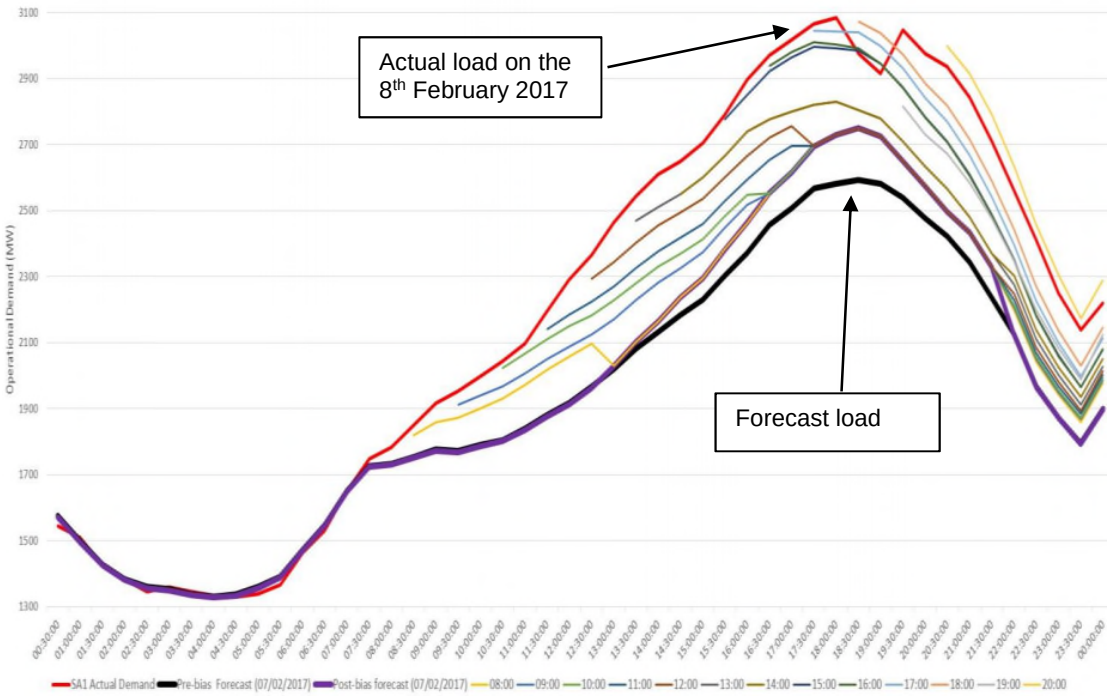
Figure 2: South Australia operational demand, forecast and actual, 8 February



Source: AEMO, 2017a.

High demand events occur on a small number of days each year, which is not sufficient to commercially operate a large dispatchable power plant or to underpin investment in new plant. Hot conditions cause generators to anticipate high demand and prepare to generate at capacity to meet that demand. On the 8th of February Pelican Point power station remained unavailable because it has been mothballed since 2015 due to a lack of commercial conditions in the State to run the plant. The high cost of domestic gas to fuel the plant, consistent suppression of wholesale prices through the year due to high amounts of intermitted generation (wind and solar) and underestimation of actual demand meant there was no basis to make Pelican Point available.

This event highlights the need to reform the market and look at the way renewables are integrated into the power system and progress reform of the gas market. Intermittent generation in competitive energy markets increases the peaks and troughs of price movements, eroding the business case for baseload generation to operate. The energy system is built to withstand the loss of some generators due to outages or the high peaks in demand which can arise unexpectedly in summer. South Australia's generation mix is now heavily reliant on wind and solar generation which cannot be depended on to increase or decrease production as needed. The events of 2016 and early 2017 highlight the risks to the South Australian energy supply during this period of structural adjustment away from traditional generation and toward greater reliance on wind and solar.

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The role of power companies, state and national regulators and the State and Commonwealth Governments in the National Electricity Markets

COAG Energy Council

Cooperation between Commonwealth, state and territory governments.

Responsibility and policy leadership for Australian gas and electricity markets.

Promotion of energy efficiency and energy productivity in Australia.

Australian electricity, gas and petroleum product energy security.

Australian Energy Market Commission

Oversees the rules for Australian electricity and gas markets.

Makes and amends the National Electricity Rules, National Gas Rules and National Energy Retail Rules.

Provides market development advice to governments.

Australian Energy Regulator

Regulates energy markets and networks under national energy market legislation and rules.

Monitors wholesale electricity and gas markets to ensure energy businesses comply with the legislation and rules, and taking enforcement action where necessary.

Australian Energy Market Operator

Responsible for operating Australia's gas and electricity markets and power systems including the National Electricity Market.

Provides planning, forecasting and power systems information and security advice.

Power generators and retailers

Provide gas, electricity, solar PV, smart metering and related products and services across Australia.

Contract for the long term, reliable supply of electricity and gas to customers.

Invest in technology and innovation to meet customers' needs in a transforming market.

Provide ancillary services which support energy security.

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Reforms that would improve electricity reliability and affordability in South Australia whilst reducing carbon emissions

The objectives of reliability, affordability and lower emissions are tradeoffs and there is no silver bullet solution that will solve all three objectives. The objectives of reliability and affordability are formalised in the National Electricity Objective against which all energy market rules must be weighed. The technologies available to reduce emissions from the energy sector will result in higher cost energy than otherwise would occur, and finding the most cost effective way to reduce emissions is the role for the COAG Energy Council. We support South Australia working with its jurisdictional colleagues through the COAG Energy Council to find a pathway to integrate intermittent renewables to the grid while providing secure and reliable power to underpin our living standards.

In 2016, ACIL Allen Consulting assessed the wide variety of options available to South Australia to improve power system reliability and security[iv]. Infrastructure such as interconnectors and power storage can provide strong benefits provided they are designed to meet specific objectives. The time taken to plan and develop these projects can be a drawback. Some options have a significant positive impact on power system security and could be implemented relatively quickly at an efficient cost. Appendix 1 summarises the options to improve power system security and reliability against the objectives of cost, time to implement and effectiveness.

Whichever emissions reduction policy is chosen, it must be credible and durable to provide investment certainty. A decade of repeated state and federal government interference with an extremely complex system has resulted in our electricity system not working reliably or efficiently. Good policy has succumbed to bad politics on energy. A developer assessing the value of a project considers the costs and the revenue over the life of the project, with energy assets having long lives of 20 years or more. The revenue available to renewable developers is determined by the wholesale market price and the price of large-scale green certificates (LGCs). The current outlook for wholesale market prices and LGCs is both high and uncertain due to policy risk and changes in electricity demand in most states of Australia.

In January 2017, AEMO released its third report into the state-wide blackout in South Australia[v]. AEMO clearly identified the need for greater system strength and inertia in South Australia to maintain energy security. Services such as inertia have historically been a positive externality of synchronous machines in the network (such as hydro, gas and coal fired generators) and was not rewarded by the market. Providers of inertia cannot exclude those who have not paid for inertia from consuming it because inertia is diffused throughout the network. To better control frequency in South Australia's grid, higher amounts of inertia can be provided through a competitive services. Creating incentives to provide inertia will also assist to integrate intermittent renewable generation with the grid, providing energy security and helping to decarbonise the energy system.

AEMO has also clearly identified the need to increase system strength for voltage control and better ride through capability in parts of the South Australian grid. As well as increasing energy security system strength assists intermittent generators such as wind to achieve more efficient production and integration with the grid. Unlike inertia, system strength is a local characteristic of the power system and solutions to increase system strength need to be provided at the local level. Technologies that improve system strength are conventional, well established technologies that can be deployed readily once a price signal for their value is created. For example, Hydro Tasmania installed synchronous condensers in a remote part of the network to improve the performance in wind farms and the security of supply in that region[vi]. The Energy Council is working with the Australian Energy Market Commission (AEMC) to achieve the competitive provision of services which improve system strength.

Short term solutions to direct generators to act as a counter weight to non-synchronous generation are an immediate solution to power system security, but in the long term we need smart solutions which address the underlying cause of the imbalances. The shortage of synchronous generation in South Australia is causing a high rate of change of frequency and weak system strength, reducing the network operators' ability to maintain power system security. AEMO now requires two synchronous generators to be operating in South Australia at all times[vii]. While this is an effective short term solution, in the long term the most efficient means of providing system security services are likely to be delivered by competitive markets.

Gas is an essential part of the energy transition and removing regulatory impediments to the expansion of domestic gas supply from conventional sources can relieve tight east coast gas conditions. Tight domestic gas

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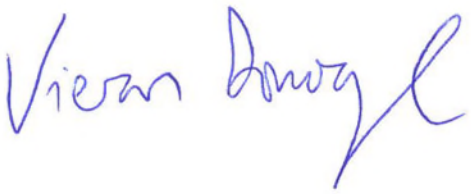
markets aggravate already marginal operating conditions for remaining firm gas generators in South Australia, which are acting as a counterweight to intermittent generation. Prioritising the recommendations for east coast gas market reform arising from the 2016 Australian Competition and Consumer Commission and AEMC reviews will also assist in achieving efficient supply of gas in the long run. We support the COAG Energy Council's vision for the gas market and the close collaboration with industry to reform gas markets.

Any questions about our submission should be addressed to me by email to kieran.donoghue@energycouncil.com.au or by telephone on (03) 9205 3116.

Yours sincerely,



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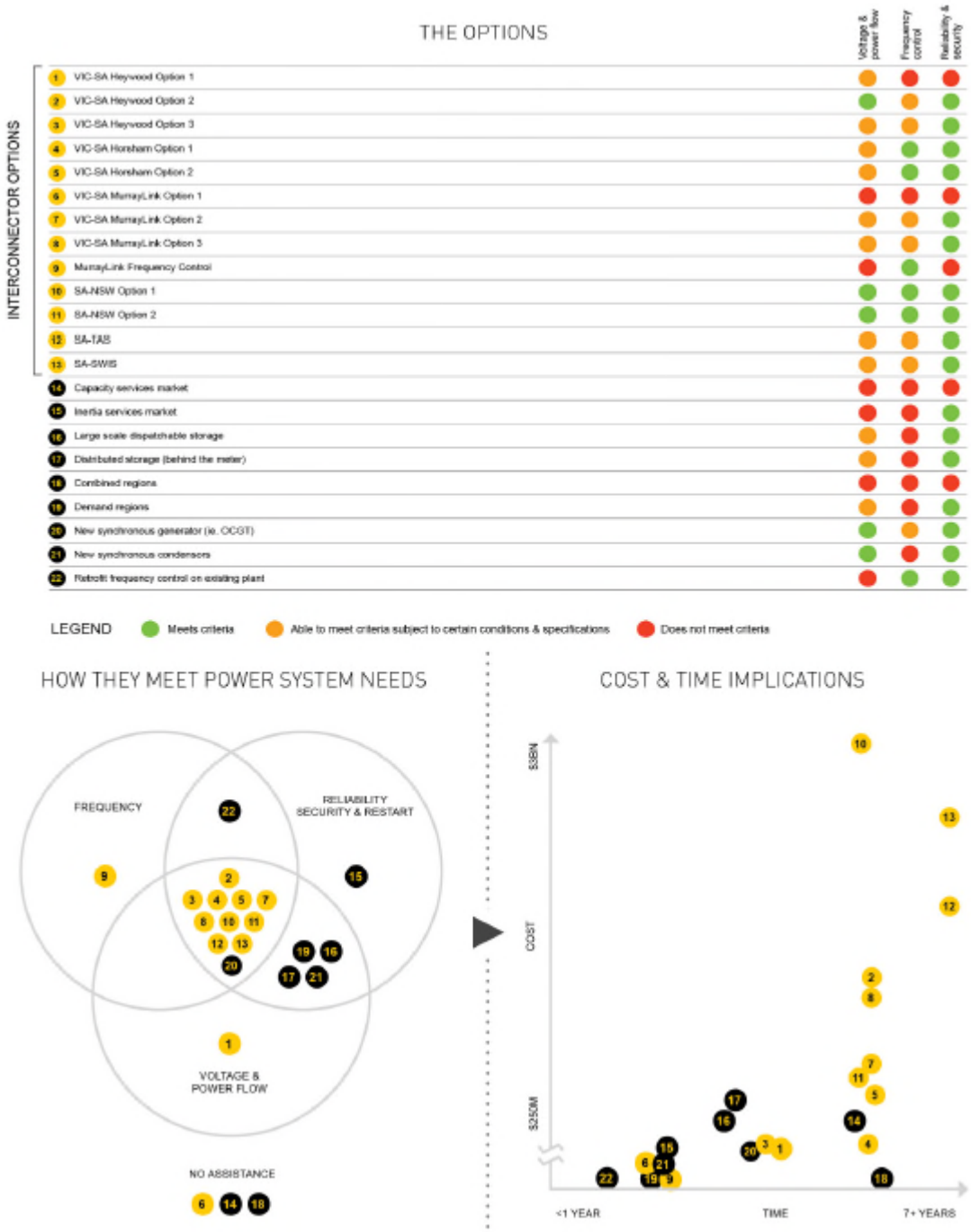
Appendix 1:

Solutions to high renewable integration in South Australia, ACIL Allen 2016



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[i] SA Power Networks, 2016, *Power outage update*, media release 4pm 28/12/2016, http://www.sapowernetworks.com.au/public/download.jsp?id=59893

[ii] AEMO, 2017a, *System event report South Australia 8 February 2017,* https://www.aemo.com.au/-/media/Files/Electricity/NEM/Market_Notices_and_Events/Power_System_Incident_Reports/2017/System-Event-Report-South-Australia-8-February-2017.pdf

[iii] AEMC, 2016, *Reliability Standard and Settings Review 2014*, http://www.aemc.gov.au/Markets-Reviews-Advice/Reliability-Standard-and-Settings-Review-2014#

[iv] ACIL Allen Consulting, 2016, *South Australia's technical challenges and solutions,* https://www.energycouncil.com.au/media/6468/160902-acil-allen-integration-of-renewables-in-south-australia-final-report.pdf

[v] AEMO, 2017b, *Black system South Australia 28 September 2016: Third preliminary event report*, https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Reports/Integrated-Third-Report-SA-Black-System-28-September-2016.pdf

[vi] Hydro Tasmania, 2016, *Managing a high penetration of renewables– a Tasmanian case study*, https://www.aemo.com.au/Media-Centre/~/-/media/B47810C12E25473CB81968D5D4218F78.ashx

[vii] AEMO, 2017c, *Electricity industry conference,* https://www.aemo.com.au/-/media/Files/Media_Centre/2016/SA-System-Strength.pdf

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