



26 October 2015

RenewablesSA
Department of State Development
GPO Box 320
Level 4, 11 Waymouth St
Adelaide, South Australia 5000

Lodged (by email): DSDRenewablesSA@sa.gov.au

South Australia's Climate Change Strategy – consultation papers

The Energy Supply Association of Australia (esaa) welcomes the opportunity to make a submission to the South Australian Government on its Climate Change Strategy.

The esaa is the peak industry body for the stationary energy sector in Australia and represents the policy positions of the Chief Executives of 37 electricity and downstream natural gas businesses. These businesses own and operate some \$120 billion in assets, employ more than 59,000 people and contribute \$24.1 billion directly to the nation's Gross Domestic Product.

Given there are overlapping themes across the multiple consultation papers, we are making a single submission on the areas relevant to our members, focussing on the strategy's implications for the gas and electricity industries (including new sources of demand such as electric vehicles).

Renewable energy in South Australia

Renewable energy has an important role to play in South Australia's energy future. South Australia is already a leader in renewable energy levels with 39 per centⁱ of its total generation supplied by wind and solar while it sits amongst the highest ranked states in the world on capacity of wind and solar per capitaⁱⁱ. The market continues to be oversupplied with generation capacity. Attempting to add more generation to a market that is not providing underlying signals for investment is fraught with risk. While policies can induce investment, they create risks either for the investor, if their ongoing returns can be affected by closure or amendment of the policy, or for the taxpayers if the investors' returns are locked in by a binding contract.

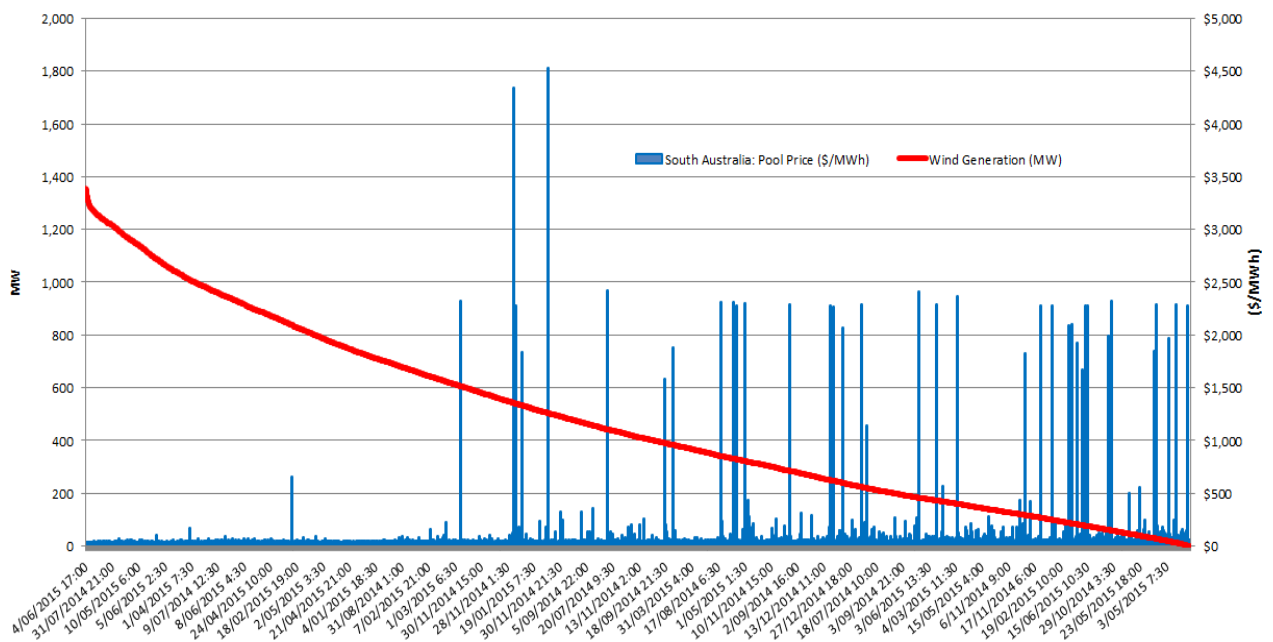
The changing market - rising wholesale and contract prices

The increased penetration of renewable technologies in South Australia has had a number of effects: it has reduced the carbon intensity of the state's electricity system; it has increased volatility in wholesale prices and increased the state's reliance on the interconnector to Victoria.

As wind generation has increased in South Australia, at times of high wind, wholesale prices in South Australia have been low, reflecting the abundance of

supply at zero marginal cost. When the wind is not blowing, thermal generation increases to meet demand. Depending on the level of demand, the wholesale price has increased a little or a lot, depending on the availability of different generators, constraints on the interconnector and the intensity of demand. Figure 1 illustrates the impact of wind generation and spot prices during 2014-15.

Figure 1 – 2014-15 half-hourly South Australian Wind generation and spot pricesⁱⁱⁱ



With the market experiencing volatility and an expectation it will continue to increase with more base load generation exiting the market, base future contract prices^{iv} are increasing.

A number of existing South Australian thermal plants are undergoing a terminal decline. Alinta Energy has brought forward the closure date of its Flinders operations (the Northern and Playford B power stations at Port Augusta along with the Leigh Creek coal mine), which will not operate beyond March 2016^v.

South Australia also has a lot of rooftop solar panels. The market operator (AEMO) has forecast that in under a decade there could be occasions when PV output is sufficient to meet the state's minimum demand. Similarly there will likely be times when wind can meet demand. This would make it very difficult for gas plant to run as baseload, which in turn may inhibit its ability to offer baseload hedges. The intermittency of wind and solar means they are not well placed to offer hedge products either. Accordingly, South Australia's market in the future may well be characterised by prices oscillating between zero, when there are sufficient renewables available to meet demand, and very high levels, when there is no wind. It will be harder for energy retailers and large users to manage this volatility if there is no-one to hedge with. It is this sort of challenge that has been rarely considered in the development of renewable energy policies. South Australia can no longer afford to ignore these and so such considerations must be integrated into any future renewables policy.

The esaa has commissioned Deloitte to examine the impact of increasing levels of intermittent renewable generation (wind and solar) in South Australia. Deloitte's report is expected to be released in the coming weeks and we will make it available to the South Australian government.

Renewable energy target

We recommend that any formal target, such as the proposed 50 per cent renewables target be subject to modelling, to test the implications, before making any commitment. The same principle applies to other mooted targets such as the investment target and the proposal for a carbon neutral Adelaide. We recognise the potential for such targets to provide motivation and a basis for measuring progress, but given they are essentially arbitrary the risks of adverse consequences need careful consideration.

The South Australian Government will look to support the potential for a broader roll-out of solar and efficiency projects without government subsidy through new models, including a new financial and legal model for community ownership of solar and efficiency projects. In the esaa's view, any new models implemented by the South Australian Government should not be at any cost to consumers or to the industry.

It should be noted that customers who want to pay more for electricity in return for more renewable energy investment can already do so using a voluntary scheme called GreenPower.

National approaches are more efficient for the sector

National approaches are inherently more efficient than a variety of state based approaches to reducing greenhouse gas emissions from the stationary energy sector and/or deploying low or zero emissions technologies. State-based schemes are likely to distort investment incentives between different regions of the NEM resulting in sub-optimal outcomes economy wide. Importantly, South Australia's electricity system will be increasingly reliant on interconnection with Victoria. The South Australian government has no influence over the emission intensity of Victorian imports.

Energy Jobs

The South Australia Strategy Paper, like many renewable energy reports, spruiks the prospect of renewable energy investment creating jobs. To some extent this may be true, but there is a wider range of issues at play which will determine whether renewable energy development will be a long-term, net provider of employment.

Renewable energy deployment programs often create jobs, particularly during construction phases. While this may be true in some areas, any scheme that involves a cost to government budgets or consumers, or creates wealth transfers within the economy, also has the potential to result in job losses. In addition, renewable energy schemes involving public subsidies may have some crowding out effect of private spending, which will reduce jobs elsewhere in the economy.

The energy system is undergoing a transition. As part of this transition, employment patterns are changing. This will mean jobs are lost as legacy assets close and

efficiencies are required throughout the supply chain. Meanwhile others will be created building and operating new assets and delivering new customer services. Governments will always have an interest in overall employment levels and minimising the impact of the dislocation entailed in this transition. This is best achieved by supporting affected workers in retraining, job searching and potentially relocation. Where governments are looking to steer the transition through schemes such as renewable energy development, claims of job creation are at best uncertain.

Removing barriers to investment in planning

The Government does have a role to play in removing barriers to investment in planning requirements. In this respect, the South Australian Government's reform to wind planning laws at pastoral Crown land is welcomed by the esaa. The Association rejects the imposition of arbitrary setback distances for any technology without supporting evidence. Applying these rules to wind turbines exclusively could make investment difficult.

Government intervention in the stationary energy market

Several of the case studies in the Low Carbon Investment Plan for South Australia Strategy Paper have the implication of government intervention in stationary energy markets. Investing in renewable energy would significantly undermine investment signals in the NEM, particularly where the subsidisation is not tied to the wholesale price in some way. It will also put upward pressure on retail electricity prices over the long term as the costs of subsidies and increased volatility in wholesale electricity prices are passed on to consumers. The esaa believes that the South Australia Government should consider approaches that can return Australia's wholesale electricity markets to a sustainable supply-demand balance that will support the required level of investment.

The development of a new climate change strategy for South Australia requires the development of an integrated strategy that considers the interaction of different policy areas, overlap of costs, benefits, challenges, risks and opportunities and their impact on the community over the long term. Given the state of the market, the level of decarbonisation required and the timescales over which the reform is required there should be appropriately designed regulatory mechanisms, drawing upon international experience which may provide the most effective outcome that balances the needs of a range of stakeholders.

For long-term transformation to be effective, the esaa considers that energy market design and climate change policies need to be integrated to allow energy affordability, reliability and environmental sustainability to be pursued jointly by market participants over time. It is esaa's view that there is considerable merit in South Australia supporting and working closely with the Australian Energy Market Commission (AEMC), the Australian Energy Market Operator (AEMO), academics, industry representatives and other technical experts to investigate whether any regulatory responses may be required to address market changes.

Gas has a role to play

The Association is a fuel and technology neutral organisation. As such we do not believe it is appropriate to implement policies and regulations that favour one or a group of technologies over others. In assessing responses to climate change, the South Australian Government should not forget that gas can play a valuable role in delivering least cost energy supply. Additionally there are gas appliances that are more efficient than their electricity equivalent and so may be lower emissions overall. It is best to avoid taking the shortcut that purely more renewables is the best solution to a particular public policy issue.

Biogas has a role to play in supplementing natural gas supply in the future

Biogas may have a role to play in Australia's future energy mix and it is encouraging to see that the South Australian Government is giving consideration to bio-energy as part of the Strategy Plan.

Rising wholesale gas prices coupled with a potential reduction in domestic demand over the medium term may pose some challenges from an asset utilisation perspective, the ramifications of which would extend to all gas users. Biogas/bio-methane is relevant in this context given its potential to supplement grid supply.

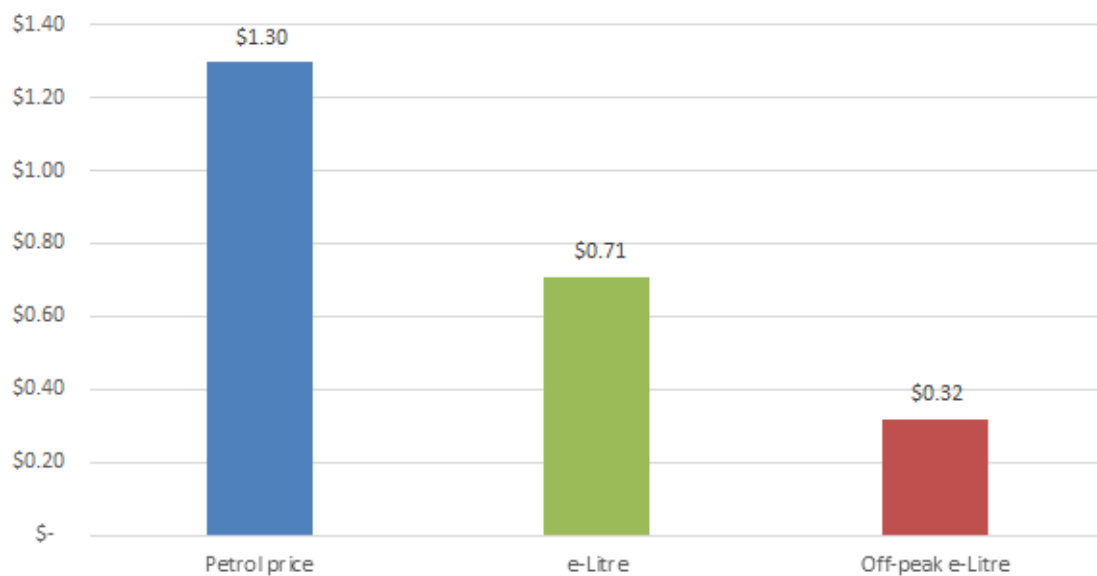
Biogas/bio-methane is relevant in this context given its potential to supplement grid supply. But establishing small-scale distribution level connections in a network that was designed to receive bulk supply from large transmission lines brings with it a range of operational challenges. Further, given the composition of the potential input fuel may differ from grid-supplied natural gas, steps will need to be taken to ensure the relevant gas quality standards are being met.

To assist with identifying the potential for bio-methane injection in Australia, the Association has provided a high-level summary of the relevant policy and technical considerations for bio-methane development (please see Attachment A).

Electric Vehicles

The esaa welcomes the South Australian Government's proposal to offer a package of initiatives which could accelerate the take up of EVs. Figure 2 shows that EVs can save consumers money as well as reduce emissions (depending on the source of electricity).

Figure 2: South Australian Petrol vs e-Litre^{vi}



The esaa's 'Review of Alternative Fuel Vehicle Policy Targets and Settings for Australia'^{vii} discussion paper identified a range of policy enablers that have been successful in stimulating demand for EVs in a number of international markets:

- Skills training to enable the workforce to support the design, development and diffusion of technologies
- Research & Development (R&D) programs which aim to achieve AFV technology breakthroughs
- Incentives for manufacturers to increase the supply and reduce production costs of AFV technology
- Standards which drive down the allowed emission intensity of vehicles, indirectly supporting AFVs
- Tax incentives such as Goods and Services Tax (GST) breaks, Motor vehicle duty or stamp duty fee discounts, Annual registration fee discounts and Company car tax breaks
- Direct vehicle subsidies
- Charging infrastructure incentives
- Vehicle lane and parking privileges
- Indirect vehicle subsidies

As has been seen in the market for solar PV, the wrong combination of policies can result in unforeseen consequences and uneconomic outcomes. Careful consideration is required to determine which, if any, policy enablers are appropriate in the Australian context.

Conclusion

South Australians want a reliable, affordable and sustainable electricity system. The strategy plan can form part of this transition. It is important that any actions taken by the South Australia Government as part of the strategy plan do so in a way that minimises distortions to the market and encourages efficient investment in the sector.

Any questions about our submission should be addressed to Panos Priftakis, by email to panos.priftakis@esaa.com.au or by telephone on (03) 9205 3115.

Yours sincerely



Kieran Donoghue
General Manger, Policy

Summary of bio-methane developments and the relevant policy and technical considerations

Biogas is not suitable for grid-injection – upgrading to bio-methane is required

Biogas is the gaseous product of anaerobic digestion, a biological process in which microorganisms break down biodegradable material in the absence of oxygen. The chemical composition of biogas typically includes 50-75 per cent methane, 25-50 per cent carbon dioxide and trace amounts of other particulates and contaminants (incl. oxygen, nitrogen and hydrogen sulphide).

The methane content of biogas is the usable portion of the gas and determines its calorific value. Biogas can be combusted to provide electricity and heat. In addition, biogas can be upgraded to bio-methane (typically with a methane content of above 96 per cent) by removing water, carbon dioxide, hydrogen sulphide, and other trace elements.

Bio-methane is comparable to conventional natural gas and can be injected into the pipeline grid to provide heat and power to homes and businesses or used as a transportation fuel in compressed or liquefied form. But as noted below, additional steps may be required to ensure bio-methane meets the appropriate specifications for grid-injection.

The economics of grid-injected bio-methane will be largely governed by exogenous factors

The bio-methane upgrading process essentially delivers a more refined and higher energy content product (relative to its earlier forms). This gives bio-methane important functionality, since it can be used as an input fuel for high-efficiency gas-fired electricity generation plant and for heating and power in homes and businesses. But this functionality comes at a cost and the extent to which grid-injected bio-methane is considered economic will largely be dependent on a range of exogenous factors. This includes pricing relativities between bio-methane and natural gas, as well as competing uses for the less-refined biogas, biomass, and other waste materials (see Table 1).

Table 1: Competing uses for waste, biomass, biogas and bio-methane

	Competing uses
Waste gases	<ul style="list-style-type: none"> ▪ Biofuels (e.g. bioethanol and biodiesel) ▪ Conversion to biogas
Biomass	<ul style="list-style-type: none"> ▪ Food ▪ Biofuels (e.g. bioethanol and biodiesel) ▪ On-site electricity generation ▪ Combined heat and power (CHP) ▪ Conversion to biogas
Biogas	<ul style="list-style-type: none"> ▪ Conversion to bio-methane ▪ On-site electricity generation ▪ CHP
Bio-methane	<ul style="list-style-type: none"> ▪ Grid-injection

There is a clear overlap in competing end-uses, with biomass and biogas capable of being used for electricity generation and CHP purposes. While grid-injected bio-methane could also fulfil these roles, the cost of processing and transmission (if required) may potentially outweigh any economic advantage delivered through the higher energy content. In this respect, the niche opportunity for grid-injected bio-methane is likely to be supplementing home and business energy use. Table 2 below provides a brief qualitative assessment of the strengths, weaknesses, opportunities and threats (SWOT analysis) of grid-injected bio-methane.

Table 2: SWOT analysis of grid-injected bio-methane

	Positive	Negative
Internal	<p>Strengths</p> <ul style="list-style-type: none"> ▪ Large potential resource base of biomass, municipal waste and sewage. ▪ Small spatial footprint. ▪ Avoided transmission costs (typically valued at around \$1-2/GJ). ▪ Small amounts of residues and wastes. ▪ Carbon negative (or at least neutral). 	<p>Weakness</p> <ul style="list-style-type: none"> ▪ High technical effort. ▪ Comprehensive gas upgrading process which can impact overall costs and plant availability. ▪ Establishing a pipeline connection agreement and meeting connection facility requirements. ▪ Cost of feedstock and transportation. ▪ Sustainable supply of feedstock (i.e. securing reliable long-term supply).
External	<p>Opportunities</p> <ul style="list-style-type: none"> ▪ Waste biomass resource is not in conflict with food production. ▪ Future price on emissions should improve economics relative to natural gas. ▪ Rising natural gas prices. 	<p>Threats</p> <ul style="list-style-type: none"> ▪ Competition for agricultural land (i.e. biomass production vs food production). ▪ Competing uses for less-refined input fuels (e.g. on-site electricity generation, CHP and liquid biofuels). ▪ Competing uses for bio-methane (i.e. grid-injection vs transportation fuels). ▪ Cost of bio-methane production relative to natural gas.

Australia has significant resource potential but costs are likely prohibitive at this stage

The biogas industry is in its infancy in Australia. For the stationary energy sector, biogas is principally associated with onsite electricity generation. As of 30 June 2014, there was approximately 226 MW of installed electricity generation capacity fuelled by landfill gas and sewage gas. The Clean Energy Finance Corporation also recently committed to providing up to \$90 million in funding for several biogas projects in Australia.

As part of a 2012 CSIRO study on renewable energy supply, electricity generation opportunities and storage for the National Electricity Market (NEM), the CSIRO considered the estimated annual production potential and cost of biogas at 2030. According to the report, annual biogas potential at 2030 is in the order of 256,169 TJ, with production costs in the \$11-13/GJ range.

The obvious limitation with the costings provided is that they do not appear to incorporate the cost of upgrading biogas to bio-methane for grid injection, which will likely vary depending upon facility requirements and the individual pipeline connection agreement established. Other factors that will influence cost competitiveness with conventional gas sources include:

- Avoided transmission costs: CSIRO estimated the costs of a typical gas transmission access tariff at approximately \$0.0015/GJ/km.
- Emissions abatement: If greenhouse gas emissions get valued in the future then biogas/bio-methane could potentially benefit from delivering abatement (e.g. where fugitive emissions are avoided). Alternatively, where biomass conversion is regarded as more or less emissions neutral relative to natural gas, this may provide an indirect incentive for bio-methane development.

While the focus on biogas for on-site electricity generation is clear, sites like the Woodlawn 6 MW bioreactor facility highlight the potential for grid-supplied bio-methane. As a way of storing the renewable energy extracted from municipal solid waste (MSW) at the facility, the resultant biogas could be upgraded to bio-methane and compressed into the gas transmission network for domestic consumption. While there are some technical barriers that would need to be overcome, access to bulk supplies of biomass provides important efficiencies of scale.

There are no clear regulatory barriers to grid connection

The gas distribution access policy and related codes are generally consistent across all of the major networks. Under these arrangements, gas distribution network service providers (DNSPs) are permitted to charge a connection fee for the associated infrastructure costs. This charge will generally incorporate:

- the cost of installing and maintaining the connection facilities dedicated to the customer; and
- where the connection fails to pass the net economic benefits test, a contribution to the reinforcement of the shared distribution system equivalent to the deficit resulting from the application of the economic feasibility test. To the extent net economic benefits are positive, the additional investment is incorporated in the DNSP's asset base and costs are recovered across all users.

These issues were considered in the UK as part of the Energy Market Issues for Bio-methane (EMIB) Project. UK DNSPs base their connections policy on a deep connections approach, with those connecting to the network asked to meet the full cost of all the work necessary to support that connection, both at the connection point itself and within the network to the extent investment is necessary to meet the requirements specified by the connecting party.

In the context of bio-methane entry, this would involve the connecting party meeting the costs associated with developing the entry facility. In terms of deeper, within network investment, the only potential cost foreseen is when there is insufficient downstream demand to accommodate the planned flow into the distribution network. In this case, it may be possible for the planned flow to be accepted following

investment in the network, such as compression, to support a change in flow patterns – with gas being moved upstream.

The EMIB discussions accepted that, currently, it would be appropriate for any such investment to be funded by those benefiting from the change and therefore a deep connections policy remains appropriate and is not an undue barrier to entry at this stage.

Meeting gas specifications at the point of entry is a critical requirement

Although bio-methane contains largely methane and has properties similar to those of natural gas, additional steps are required before it can be injected into the network, even after the upgrading process has taken place. Relevant considerations for grid-injection relate primarily to ensuring bio-methane meets the required pipeline specifications and parameters, as noted below.

- Pressure control – compression may be required for entry into the network.
- Enrichment – bio-methane has a lower calorific value (CV) than the required gas system CV and enrichment/blending may be required.
- Odorant injection – odourisation is necessary to comply with safety standards.
- Flow management – necessary to adjust bio-methane flow rates based on system requirements.
- Gas analysis – to determine whether the bio-methane is meeting key parameters, including: CV, oxygen, water and hydrogen sulphide content.
- Telemetry – to monitor bio-methane flow rates, gas quality, temperature/pressure and for closure of a remotely operated valve (ROV) if required

Establishing minimum standards for connection could facilitate competitive services and reduce compliance costs

In the UK, it was recognised that establishing a single national set of standards would remove uncertainty and hence a potential barrier to entry. It would also support the development of competitive infrastructure provisions since different providers could develop competing products to deliver the common specification. Cost reductions may also be delivered as a result of requirements being replicated at all sites.

ⁱ esaa Electricity Gas Australia and Global-roam NEM Review program

ⁱⁱ esaa, “Renewable Energy in Australia: How do we really compare?”, September 2015

ⁱⁱⁱ NEM Review, global-roam.com

^{iv} Base future prices are used in this report. One megawatt of electrical energy per hour based on a base load profile. Where the base load profile is defined as the National Electricity Market (NEM) base load period from 00:00 hours Monday to 24:00 hours Sunday over the duration of the week.

^v Alinta Energy media release, 7 October 2015, “[Flinders Operations Update](#)”. >>

^{vi} Source: Australian Institute of Petroleum, energy made easy website and several automotive companies

^{vii} Energeia, “Review of Alternative Fuel Vehicle Policy Targets and Settings for Australia”, July 2015