Submission No 149

SUSTAINABILITY OF ENERGY SUPPLY AND RESOURCES IN NSW

Organisation: Energy Networks Australia

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Alex Greenwich, MP
Chair
Committee of Environment and Planning
6 Macquarie St
Sydney NSW 2000

Energy Networks Australia submission to Sustainability of energy supply and resources in NSW

Dear Mr Greenwich,

Energy Networks Australia welcomes the opportunity to provide this submission in response to the 'Inquiry into Sustainability of Energy Supply and Resources in NSW.

Energy Networks Australia is the national industry body representing businesses operating Australia's electricity transmission and distribution and gas distribution networks, with members providing more than 16 million electricity and gas connections to almost every home and business across Australia.

There are four main areas Energy Networks Australia has identified that will improve the economic opportunities of renewable energy and support sustainable regional development:

1. A reliable and efficient transmission network to connect renewable generation.
2. Optimisation of distributed energy resources (solar, wind and storage).
3. Development of a hydrogen sector.
4. Stand-alone power systems.

A reliable and efficient transmission network to connect renewable generation

The electricity sector has the opportunity to contribute to decarbonisation through renewable electricity generation. Increased levels of utility scale renewables, including solar and wind, have been supported by the Renewable Energy Target and Large-Scale Generation Certificates. Many utility-scale renewable generation facilities have been developed in areas where existing transmission infrastructure was not designed to carry a large amount of load.

In North-Western Victoria many utility-grade renewable projects are being constrained due to the capacity of existing transmission infrastructure. South-Western New South Wales is starting to encounter this problem. Connecting generation to the main demand centres will require new transmission infrastructure to be designed, approved and constructed. The EnergyConnect project proposed by ElectraNet and TransGrid will support additional connections of utility-grade renewables by establishing a transmission link between South-Australia and New South Wales[1].

The Integrated System Plan (ISP) is the integrated plan for strategic transmission infrastructure across the National Electricity Market (NEM). Emissions policies, renewable energy subsidies, renewable energy hubs and demand centres all play an important role and have a critical impact on modelling and the results of a co-optimised plan. All state and federal government policies that impact the NEM, such as

[1] https://www.transgrid.com.au/what-we-do/projects/current-projects/SANSWInterconnector

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various trajectories of renewables, should be documented by COAG and formally provided to AEMO for use in the ISP assumptions and modelling.

The ISP should cover a range of trajectories and identify the cost to consumers for high levels of renewable energy deployment that require energy storage and transmission assets to ensure reliability. At some point the increasing cost of these items may require a trade-off between energy prices and emissions.

The Committee of Environment and Planning should be cognisant of the national planning approach when undertaking its inquiry. Establishing more renewable generation and meeting renewables targets cannot be considered in isolation to the ability to maintain a stable power system. Transmission is a key enabler for moving to a lower emissions economy and appropriate investment signals and financeability should be maintained. Long term, stable policy is required to ensure that there is both efficient generation and transmission investment for the benefit of consumers.

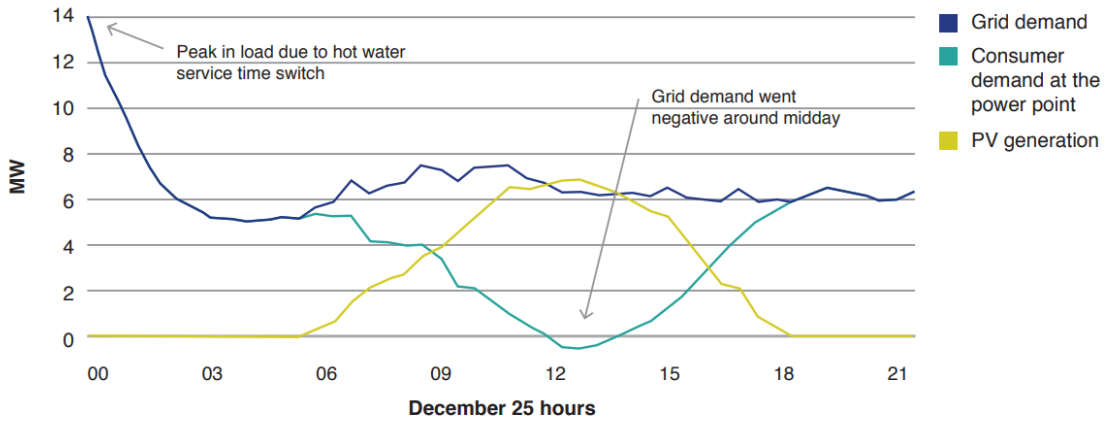
Optimisation of Distributed Energy Resources

Australia now has more rooftop solar installed per capita than anywhere else in the world. The electricity system faces growing challenges as more of these systems are installed on homes and businesses. However, this also creates opportunities. The following capabilities will be required to realise the benefits of these opportunities:

- Enabling distribution networks to have better visibility of where these resources are installed and how they can behave;
- Defining network constraints so customers can be advised on how they can export and/or import their electricity to the grid;
- Establishing community standards to communicate/manage these constraints.

Higher levels of rooftop solar will change the dynamics of demand on the grid with lower demand in the middle of the day and potential energy imports into the grid from these distributed resources. This occurrence is set to become the new normal as more rooftop solar is rolled out.

Figure 1 – Illustration of grid demand due to PV generation[2]



In considering opportunities for renewable energy it is important to consider the network management issues and constraints identified in the AEMO & Energy Networks Australia Open Energy Networks project. Promotion of renewable energy without consideration of the impact it may have on the grid can lead to the network becoming unstable, resulting in potential outages to local communities. Ensuring the power system maintains system security and reliability may require network upgrades which can increase power bills.

Development of a hydrogen industry

Our gas distribution businesses manage over five million connections to Australian households and businesses. The gas supplied through these networks provides 44 per cent of the annual energy consumption in Australia's homes. The consumption of gas is not uniform throughout the year with a seasonal peak in winter where gas consumption is approximately three times the amount used in summer.

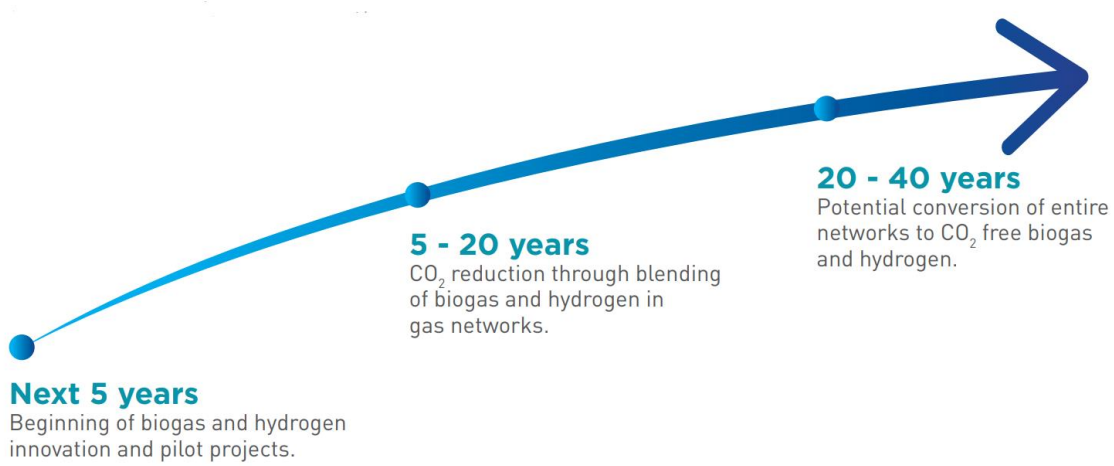
To date, the focus of decarbonisation has been on the electricity sector. Over the long-term, gas networks will have their own decarbonisation journey. New fuels, such as biogas and hydrogen, have the potential to become mainstream and complementary energy solutions that will use existing energy infrastructure.

The gas industry has developed a strategic plan – Gas Vision 2050 – with the aim to decarbonise gas in line with Australia's long-term decarbonisation targets. The decarbonisation pathway involves the use of hydrogen, biogas and carbon capture and storage.

The pathway, illustrated below, involves testing and developing renewable gas technology through applied research and pilot projects out to 2022. Our network businesses are currently progressing four trials around the country with two already operational, and the other two expected to be operational by mid-2020's.

[2] Energy Networks Australia and Australian Energy Market Operator, *Open Energy Networks – Interim Report: Required Capabilities and recommended Action*, July 2019

Figure 2 - Pathway to decarbonise gas networks[3]



This will be followed by blending renewable gas into networks at larger scale. The National Hydrogen Strategy is considering an injection target of 10 per cent by 2030. Beyond the mid-2030's, large scale conversion of gas networks can be carried out to achieve 100 per cent renewable gas by mid-century.

The overall energy consumption challenge

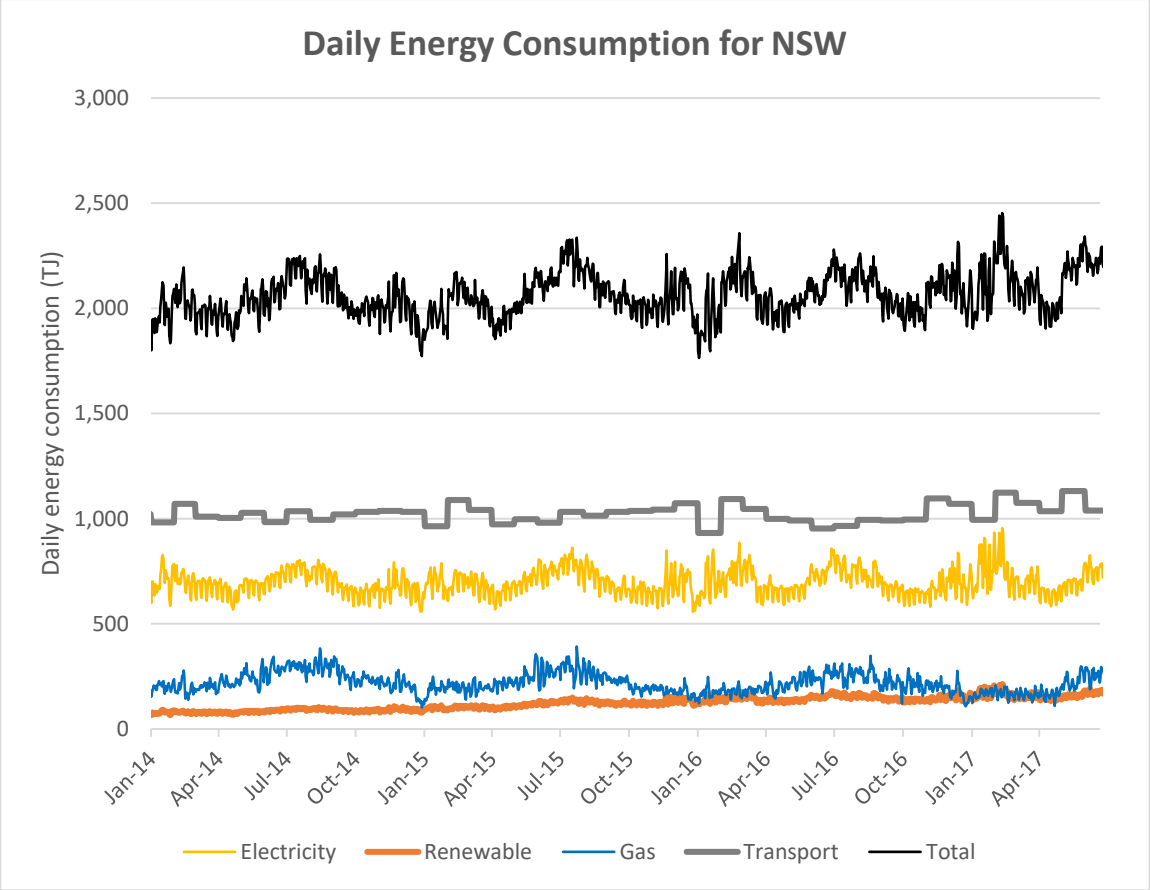
Australia's focus to date has been on decarbonising the electricity sector through measures such as the Commonwealth's and state based renewable energy targets and feed-in tariffs. In many ways, these policies have also incentivised electrification while not addressing emissions from other sectors.

Figure 3 illustrates NSW's energy consumption. The main features are:

- Daily electricity consumption is around 700 TJ, peaking in both winter and summer. Renewable electricity generation is a subset of this, reported at 24 per cent[3] for 2017.
- Daily gas consumption is seasonal, ranging from around 170 TJ per day in summer up to 250 TJ per day in winter. This seasonal load is largely a reflection of the utility of gas to provide space heating and hot water to homes and businesses during colder winter months.
- Daily consumption for transport is around 1,000 TJ. This is fairly uniform throughout the year.

[3] Energy Networks Australia, *Decarbonising Australia's gas networks*, December 2017

Figure 3 - NSW Energy consumption[4]



The overall energy consumption – and the decarbonisation challenge - for NSW is shown by the thick black line. Decarbonising transport is likely to involve a large-scale transition to battery or fuel cell electric vehicles supported by biofuels in certain instances (e.g. aviation). This will place major upward demand on the electricity networks requiring investment in new electricity generation, transmission and distribution infrastructure.

Promoting the electrification of gas appliances in homes can place even higher upward demand on the electricity networks. Due to its seasonal demand this can result major upward pressure on peak demand of the electricity network during winter periods.

To support decarbonisation of both the electricity and gas system, hydrogen produced using electrolysis can create synergies between the electricity and gas system. Electrolysis can be used to convert 'excess' renewable energy (i.e. electricity not required to meet instantaneous day time demand) into renewable hydrogen gas, which can be stored in the existing gas distribution system. The hydrogen can then be used to power industry, domestic consumption, transport and can also be exported.

Australia has the resources and skills to build an economically sustainable domestic and export hydrogen industry which can help meet agreed emissions targets and address concerns around energy security.

[4] Energy Networks Australia analysis

More recently, Australia has been losing its competitive advantage on cheap energy production[5]. Pursuing initiatives which enhance Australia's skills and abilities in hydrogen production will both improve the local energy market and Australia's capability to become a player in the global hydrogen market.

Energy Networks Australia recommends that the inquiry consider the overall energy consumption challenge when assessing options for sustainable economic development of regional communities. Specifically, long-term planning should be undertaken when considering policy options to decarbonise the energy sector so that appropriate policies have a long-term focus and result in least-cost solutions for energy consumers.

Hydrogen's role in decarbonisation

The role of gas networks should not be overlooked when planning for the future. Gas is used by industry as a feedstock and also as a means to provide heat. In homes and businesses, the role of gas is mainly to provide space heating, hot water and cooking services. Gas and other transport fuels provide around 64 per cent of the energy to NSW's economy while electricity provides 36 per cent. The same metrics are 80 and 20 per cent respectively for Australia's economy.

Decarbonising gas consumption could be achieved through electrification. However, in certain circumstances this can further increase demands on the electricity networks and require even more investment to meet this demand (over and above the increased demand for transport). In some States and Territories, the seasonal consumption of gas, peaking in winter, would result in a major investment of electricity infrastructure to meet this peak demand. This extra infrastructure to meet the heating peak would only be used for a small part of the year leading to inefficient investment in infrastructure.

A more practical and cheaper alternative is to decarbonise the gas network and to continue using existing gas distribution infrastructure in tandem with the electricity system to deliver combined benefits. Many reports have indicated this is a lower cost option, with analysis by the Australian Gas Infrastructure Group and Deloitte Access Economics showing that the decarbonisation of gas networks in Victoria could be achieved at 40 per cent less cost than the electrification of the gas system load.

Other international studies have also shown that the cost of full electrification is higher than the cost of decarbonising gas networks[6]. For example:

- A 2016 study by KPMG for the UK found that converting gas networks to hydrogen would have an incremental cost of between £4,500 to £5,000 per household up to 2050, while electrification would cost between £12,000 and £14,000[7].
- In a 2018 report for the American Gas Association, the average cost of US greenhouse gas emissions reductions through policy-driven residential electrification would range between US$572 and US$802 per metric ton of CO_2 reduced, which is significantly higher than renewable gas which was less than US$100 per metric ton.

The critical feature of these studies are that they account for overall systems costs resulting from the extra investment required for electrification, which is a factor some simpler analyses ignore.

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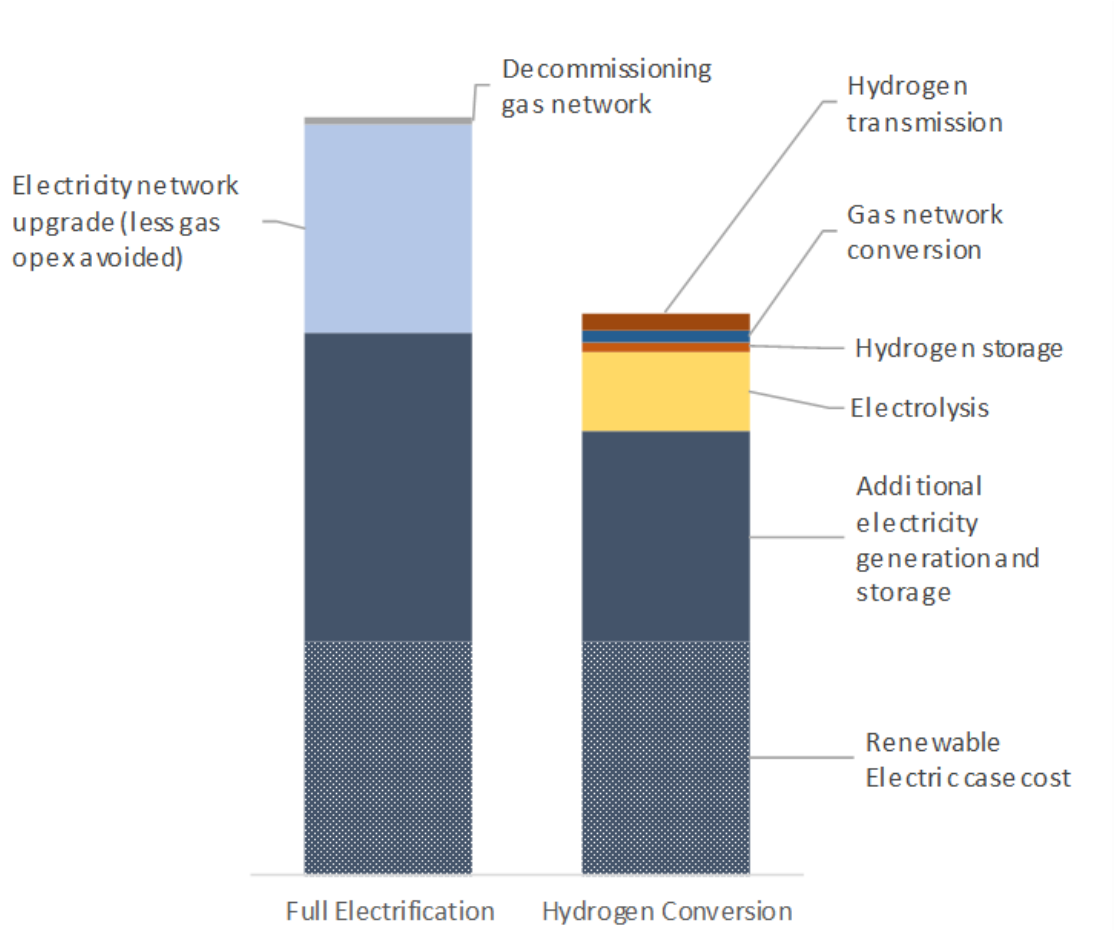
[5] Infrastructure Australia (2019), *An Assessment of Australia's Future Infrastructure Needs*, p. 511.
[6] https://www.energynetworks.com.au/news/energy-insider/electrify-gas-should-we-or-shouldnt-we
[7] KPMG (2016), *2050 Energy Scenarios – the UK gas networks role in a 2050 whole energy system*

Figure 4 - Relative cost comparison of decarbonisation pathways for Victoria[8]



Energy Networks Australia recommends that the inquiry consider the potential opportunities presented by hydrogen in the built environment when assessing the sustainability of energy supply and resources in NSW.

Cost-reflective network tariffs

Electricity pricing is critical to achieving both efficiency and fairness in the transformation of the electricity sector in Australia. The future resilience of the energy system is also supported through the implementation of a fairer system of prices – one which provides fair rewards for customers and cost recovery for networks.

As technology becomes cheaper, smarter and more prevalent, customers will take a lead role in shaping Australia's electricity future. Customers, rather than traditional utilities, are likely to determine more than a quarter of all system investment decisions between now and 2050[9].

[8] https://www.energynetworks.com.au/news/energy-insider/hydrogen-powered-future-tops-full-electrification
[9] Energy Networks Australia, CSIRO (2017), *Electricity Network Transformation Roadmap: Final Report*, p. 39.

An efficient adoption and integration of distributed energy resources through appropriate pricing and incentives should deliver significant savings in future network investments. This will include networks avoiding or reducing costs in addressing constraints due to inefficient import or export of energy, while at the same time delivering significant additional value to customers via their ability to participate in other markets.

A fairer system of prices can only be achieved in a reasonable timeframe with changes to tariff assignment policy. Existing Australian tariff assignment policy predisposes retailers to continue to assign customers to legacy tariffs unless the customer makes a conscious decision to adopt a different retail product which includes a cost reflective network tariff.

Over $16bn in network savings can be achieved by 2050 through improving existing tariffs, including by introducing new network tariffs and retail pricing options and establishing frameworks for networks to buy grid services from customers with distributed energy resources[10].

Rural and regional consumers are likely to benefit greatly from sharing distributed energy resources given these communities often consist of smaller numbers of customers and more community-focussed. Tariff reform to enable fair sharing of electricity is essential for community energy projects to be successful.

Stand-alone power systems.

A stand-alone power system (SAPS) is an electricity supply arrangement that is not physically connected to the national grid. A typical set-up for a SAPS is an array of solar panels, a large battery and a backup diesel generator. SAPS encompass both individual power systems which relate only to a single customer and microgrids which supply electricity to multiple customers.

SAPS are likely to be most beneficial in rural areas of the country where it is expensive to deploy and maintain long expanses of poles and wires. A SAPS can be a cheaper and more reliable option to provide electricity to rural customers.

There is clear evidence of significant potential benefits to customers associated with the deployment of lower cost SAPS solutions. Over the next 10 years, SAPS could represent the lowest cost to serve technology for over 2000 NSW electricity customers. The benefits are estimated to be over $120 million over the next 20 years[11].

Currently, the national energy laws and rules only apply to the interconnected electricity grid on the east coast of Australia that underpins the NEM. Where there are SAPS not connected to this grid, generally in remote areas, these are subject to regulation by states and territories at the jurisdictional level.

Some Australian states – due to a significant history of SAPs deployments in regional and remote communities - have relatively well-developed supporting legislation and regulatory frameworks. New South Wales is not one of those states. New South Wales customers supplied by a SAPS are not currently covered by consumer protections comparable to those applying to grid-connected customers.

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[10] Energy Networks Australia, CSIRO (2017), *Electricity Network Transformation Roadmap: Final Report*, p. 40.
[11] Essential Energy submission on the issues paper – Review of the regulatory frameworks for standalone power systems, p. 2. available from https://www.aemc.gov.au/sites/default/files/2018-10/essential%20energy%20-%2020181015.PDF

The Australian Energy Market Commission review of the regulatory frameworks for SAPS is nearing completion. It is likely that responsibility for many aspects of a regulatory framework will fall on jurisdictions such as the NSW Government. Once this review has been completed, Energy Networks Australia recommends that any required changes to NSW SAPS legislation are prioritised to ensure that all NSW electricity consumers have adequate protections.

We welcome the ongoing opportunity to be involved in the Inquiry into sustainability of energy supply and resources in NSW and its associated policy proposals. If you have any other queries, please contact Chris Gilbert at [redacted] or [redacted]

Yours sincerely,

[redacted]

Andrew Dillon,

CEO