22 July 2019

Kylie White
Deputy Secretary Environment and Climate Change
Climate Change Team
Department of Environment, Land, Water and Planning
8 Nicholson St, East Melbourne VIC 3002

Via email: Climate Change (DELWP) <Climate.Change@delwp.vic.gov.au>

Energy Networks Australia's submission to the Interim Emissions Reduction Targets for Victoria (2021 – 2030)

Dear Ms White

Energy Networks Australia welcomes the opportunity to provide this submission in response to the Interim Emissions Reduction Targets for Victoria (20121 – 2030) Report (Interim Report).

Energy Networks Australia is the national industry body representing businesses operating Australia's electricity transmission and distribution and gas distribution networks, with 21 member companies providing more than 16 million electricity and gas connections to almost every home and business across Australia.

Our gas distribution businesses manage over two million connections to Victorian households and businesses. The gas supplied through these networks provides 69 per cent of the annual energy consumption in Victorian homes. This is much higher than the Australian average, at 44 per cent.

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.

Gas Vision 2050 outlines industry's journey to decarbonise the use of natural gas in homes, businesses and industry. Since the launch of the document in March 2017, many hydrogen related activities have commenced in Victorian and around the country. Energy Networks Australia believes that the opportunities represented by renewable gases (such as hydrogen and bio-methane) are not adequately recognised in the Interim Report and should be considered by the Department in developing its policy position on developing appropriate climate targets for Victoria.

Emission Reduction Targets

Energy Networks Australia supports a coordinated national approach to emission reduction targets. We are supportive of the Commonwealth Government's approach to the *Paris Agreement on Climate Change* including a 2030 target and a longer-term target to achieve net-zero emissions in the second half of the century.

The proposed targets of 45 to 60 per cent reduction by 2030 in the Interim Report appear ambitious. Figure 6.1 of the Interim Report indicates Victoria's historic

emissions and notes an increase in emission to 2005 and then a slight decrease mainly as a result of land use change and the closure of Hazelwood power station. Decreasing emissions by 45 to 60 per cent in a decade for Victoria will either mean replacing all its power generation with renewable generation or addressing emissions from other sectors as well.

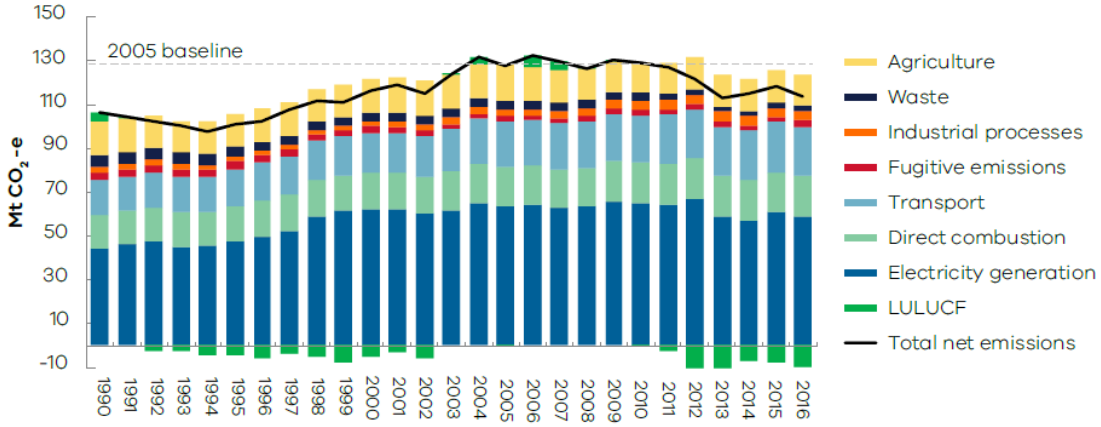

Figure 1: Victoria's historic emissions (Source: Interim Report, Figure 6.1).

Historical evidence for the time taken for energy supply and energy end use technologies to reach widespread deployment range from 20 to 70 years[1]. Major conversions of the energy system require planning for generation, transmission and distribution, as well as amendments to legislative and regulatory processes which take time. Energy Networks Australia accepts the science of climate change and that the targets identified in the Interim Report align with the requirements of global emissions reductions to limit global warming by between 1.5 and 2.0°C. Nevertheless, given the above arguments, a target of 45 to 60 per cent reduction by 2030 appears unrealistic. Moreover, adopting ambitious targets like this may lead to short term policy decisions to reach those targets and not consider long term economy wide implications.

In order to decarbonise the energy system, the Department should consider all potential technologies and not hinder the development of new technologies that can reduce greenhouse gas emissions across the economy.

Hydrogen as a clean fuel alternative for electricity supply and for heat in buildings

The Interim Report refers to the role of hydrogen as a means to decarbonise the transport sector. Hydrogen also creates opportunities to decarbonise the electricity and heat sectors, which are not adequately recognised in the Interim Report.

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

[1] The Institution of Engineering and Technology (2019), *Transitioning to hydrogen*, pg40.

not addressing emissions from other sectors. As noted in the Interim Report and the 2016 Climate Change Authority reports[2], more work is required to reduce emissions from the other sectors.

Figure 2 illustrates Victoria's energy consumption. The main features are:

- Daily electricity consumption is around 500 TJ, peaking in winter. Renewable electricity generation is a subset of this, reported at 20.6 per cent[3] for 2018.
- Daily gas consumption is seasonal, ranging from around 300 TJ per day in summer up to 1,200 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 between 800 and 1,000 TJ. This is fairly uniform throughout the year.

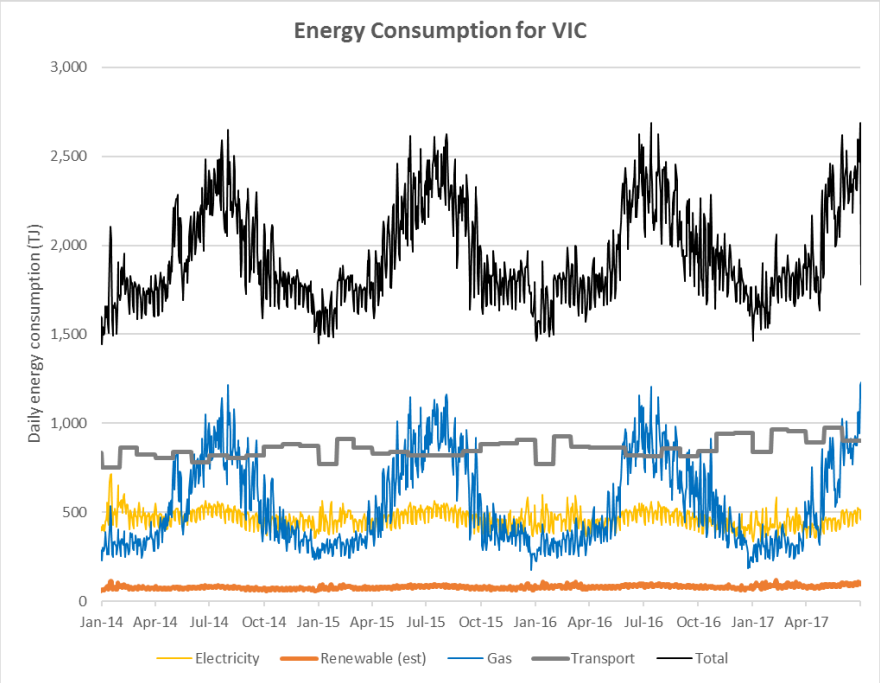

Figure 2: Victorian Energy Consumption (source: Energy Networks Australia analysis)

The overall energy consumption – and the decarbonisation challenge - for Victoria is shown by the thick black line. Decarbonising transport will highly likely involve a large-scale conversion 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.

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[2] Climate Change Authority (2016), *Towards a Climate Policy Toolkit: Special Review on Australia's Climate Goals and Policies.*
[3] Clean Energy Council (2019), *Clean Energy Australia Report 2019*, pg 10.

Hydrogen's role in heating

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.

Decarbonising the gas consumption could be achieved through electrification. However, this would further increase the demand on the electricity networks and require even more investment to meet this demand (over and above the increased demand for transport). 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 and to continue using existing gas distribution infrastructure. 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 the gas networks in Victoria could be achieved at 40 per cent less cost than the electrification of the gas load.

Other international studies[4] have also shown that the cost of electrification is higher than the cost of decarbonising gas networks. For example:

- A 2016 study by KPMG[5] 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.
- 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 outcomes from these studies are different from those by pro-electrification lobbyists, such as Renew or ASBEC[6], as they account for overall systems costs resulting from the extra investment required for electrification, which organisations like Renew and ASBEC ignore.

Energy Networks Australia recommends that the Department consider the potential opportunities presented by hydrogen in the built environment when developing its emissions targets and associated policies.

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[4] https://www.energynetworks.com.au/news/energy-insider/electrify-gas-should-we-or-shouldnt-we

[5] KPMG (2016), *2050 Energy Scenarios – the UK gas networks role in a 2050 whole energy system*

[6] The Australian Sustainable Built Environment Council

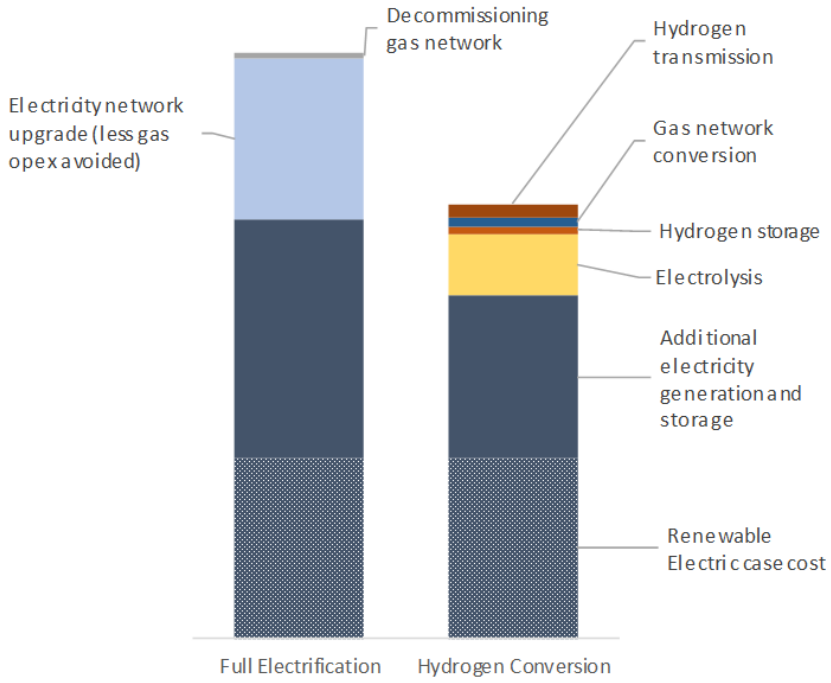

Figure 3: Relative cost comparison of decarbonisation pathways for Victoria (source: AGIG and Deloitte Access Economics Analysis[7])

Hydrogen's role in electricity

Hydrogen creates significant opportunities in the electricity sector that appear not to have been included in the Interim Report. As the production of hydrogen from electrolysis increases, individual electrolysers can be considered as a Distributed Energy Load that could be switched on and off to manage demand and provide stability to the electricity grid, very much like batteries. This is because electrolysers have the ability to quickly ramp up and down also allowing them to absorb excess renewable generation at times. This creates additional revenue opportunities for renewable generators.

While hydrogen can be stored to provide inter-seasonal heating load, some of this hydrogen could also be used to generate electricity (either through turbines or fuel cells) at times when generation levels are low, for example through prolonged periods of cloud cover and/or low wind activity. In this role, hydrogen can support the electricity grid similar to the role natural gas plays today.

Energy Networks Australia recommends that the Department considers to potential opportunities presented by hydrogen in the electricity supply sector when developing its emissions targets and associated policies.

[7] https://www.energynetworks.com.au/news/energy-insider/hydrogen-powered-future-tops-full-electrification

Victoria's role in Gas Vision 2050

Australia's gas industry has commenced its journey to decarbonise gas in Australia. New fuels, such as biogas and hydrogen, have the potential to become mainstream and complementary energy solutions that will use existing energy infrastructure.

Biogas, for instance, can make use of landfill or agricultural and forestry waste to produce a net-zero emissions fuel. Once treated, this can be injected into gas networks to complement fossil fuel natural gas.

Hydrogen can be produced from natural gas, from coal gasification or through electrolysis using off-peak renewables. Producing hydrogen from renewable energy does not produce greenhouse gas emissions and is one way of decarbonising the networks. Hydrogen can then be used to complement natural gas in the gas network, providing reserve energy in the same way battery technology does, in a carbon-neutral, secure and cost-effective manner, while also providing inter-seasonal renewable energy storage.

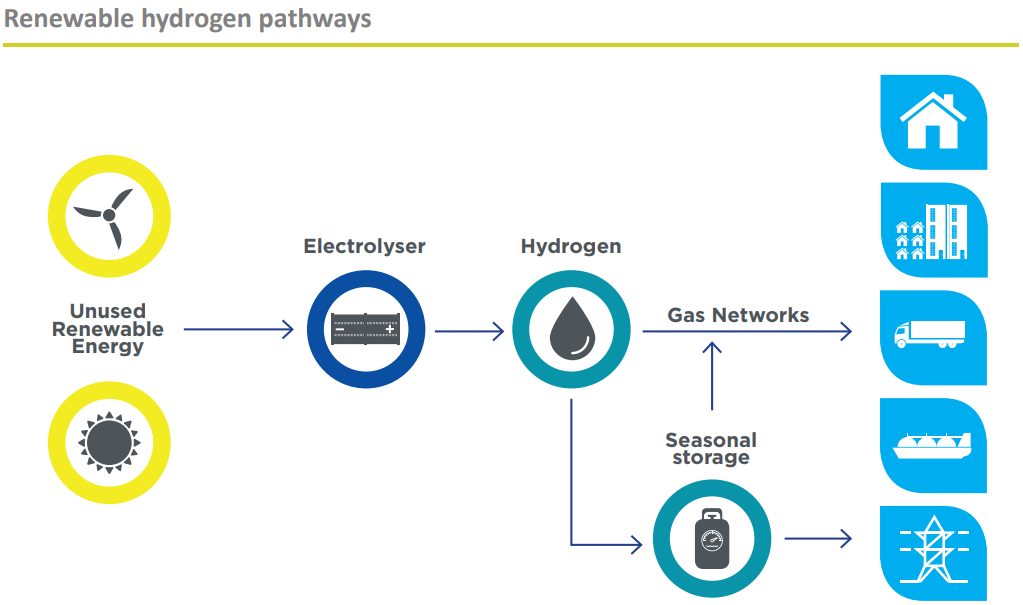

Figure 4: Renewable hydrogen pathways (Source: Energy Networks Australia).

Some key activities since the launch of Gas Vision 2050 include:

- COAG EC agreeing to develop a National Hydrogen Strategy. The strategy is planned to be finalised by the end of the year with a range of issues papers released on 1 July 2019.
- The development of a National Hydrogen Roadmap, led by CSIRO in August 2018.
- The Hydrogen Energy Supply Chain project in the Latrobe Valley. This pilot project will gasify brown coal to produce hydrogen which will be liquefied for export to Japan. This is a precursor to a potentially very large hydrogen production and export project using Victoria's natural resources.

- Future Fuels CRC is a $92 million cooperative research centre to develop new hydrogen technologies and to decarbonise gas networks. It has an office in Melbourne with research nodes at the University of Melbourne, RMIT and Deakin University.
- Toyota Australia will build a hydrogen centre, including a refuelling centre at the company's former site of car manufacturing at Altona in Melbourne's west. Toyota has also partnered with Victorian regional councils in trial of hydrogen fuel-cell vehicles.
- Energy Networks Australia members are leading pilot projects to produce hydrogen and perform trial injections into parts of the gas network which are expected to begin blending hydrogen in portions of the gas network in 2020.

Many of these activities involve Victorian government agencies, industry or research institutions. The Interim Report appears not to recognise the broader opportunities presented by renewable gases, such as hydrogen, beyond its role in transport.

Sectoral targets

We understand that the Department will develop sectoral targets based on the overall targets agreed for the State, and that the Department will consult on these targets. Below are some high-level issues to consider.

Gas networks

Australia's focus on decarbonisation has been on the electricity sector through the role of renewable electricity generation and the government policies to set targets for renewable energy (electricity) and associated feed-in tariffs. Combined with specific grant funding programs, this has led to a growth of renewable generation in Australia to roughly 20 per cent of the total electricity produced.

However, electricity only provides 20 per cent of the energy to the economy, with gas and transport fuels providing the other 80 per cent.

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.

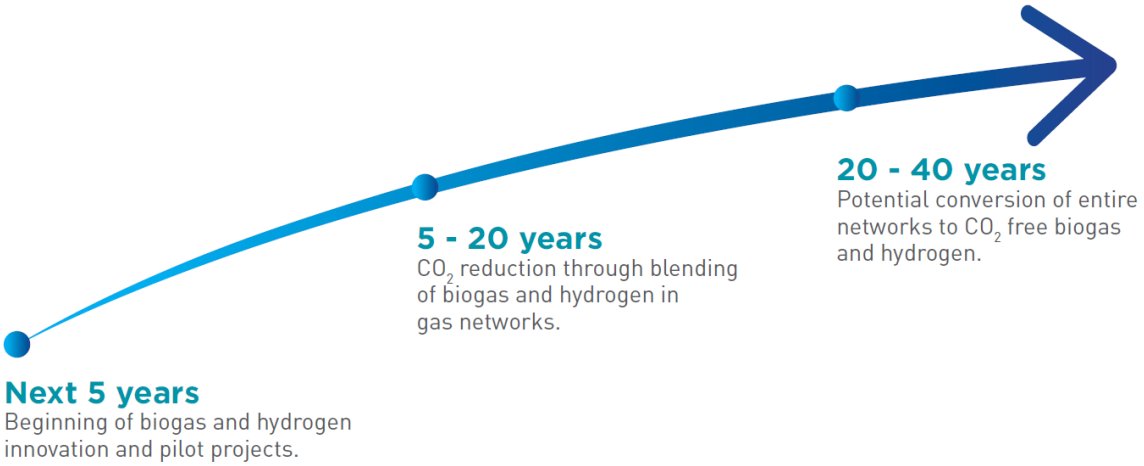

Figure 5: Pathway to decarbonise gas networks (Source: Energy Networks Australia, 2017).

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.

Setting sectoral targets for gas networks should encourage the near-term innovation and should align with other government policy such as the National Hydrogen Strategy that are currently under development.

Connecting utility scale renewables

Electricity represented an opportunity for early decarbonisation through renewable electricity generation. Increased levels of utility scale renewable including solar and wind in Western Victoria can assist to meet Victoria's electricity demand as the current aged generation fleet retires. Connecting that generation to the main demand centres will require new transmission infrastructure to be designed, approved and constructed.

The Integrated System Plan (ISP) is the integrated plan for strategic transmission infrastructure across the National Electricity Market (NEM). Emissions policies and renewable energy subsidies, renewable energy hubs and demand centres 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 various trajectories of renewables should be documented by COAG and formally provided to AEMO for use in the ISP assumptions and modelling.

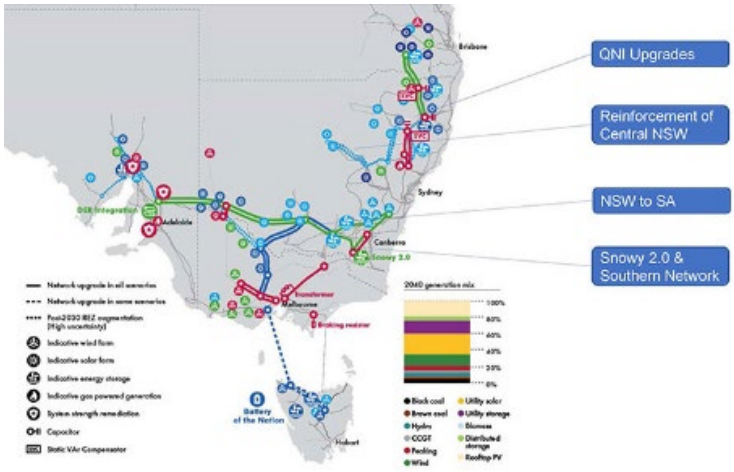

Figure 6: Major Transmission Projects (Source: TransGrid website[8])

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 Department should be cognisant of the national planning approach when developing its sectoral targets for electricity. Meeting renewable targets cannot be considered in isolation to the ability to maintain a power stable system. Long term, stable national policy is required to ensure that there is both efficient generation and transmission investment for the benefit of consumers. Transmission is a key enabler for moving to a lower emissions economy, long term stable policy is needed to ensure that investment signals and financeability can be maintained.

Balancing household PV

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

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

Higher levels of rooftop solar will change the dynamics of the demand on the grid with lower demand in the middle of the day, and potential energy imports into the grid from these distributed resources.

[8] https://www.transgrid.com.au/what-we-do/projects/current-projects/Snowy%202.0/Pages/default.aspx

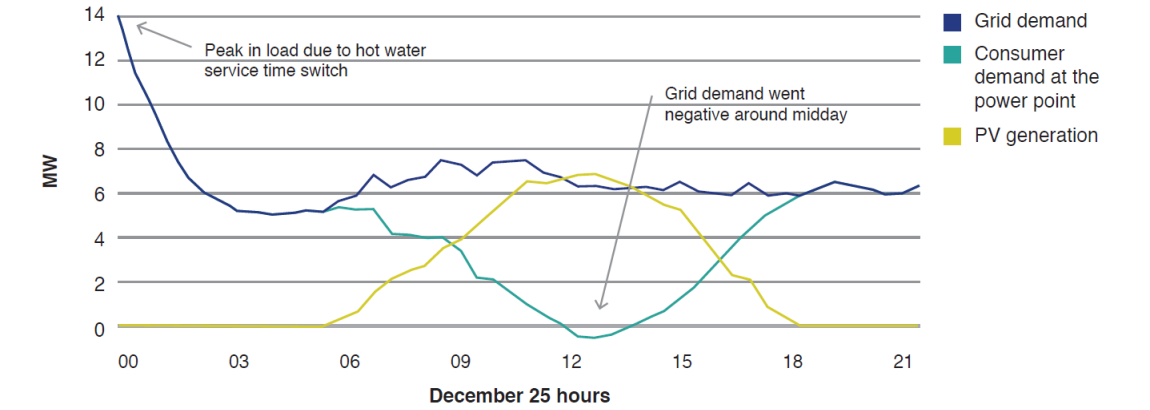

Figure 7: Illustration of grid demand due to PV generation (Source: Open Energy Networks – Interim Report: Required Capabilities and recommended Action, July 2019)

In setting sectoral targets for households, the Department should consider the network management issues and constraints identified in the AEMO & Energy Networks Australia Open Energy Networks project.

Recommendations

Energy Networks Australia recommends:

1. that the Victorian Government continues to support renewable gas (especially hydrogen) related research, development and demonstration activity in the state and more broadly across the nation;
2. that the Department considers the potential opportunities presented by hydrogen in the electricity supply, the built environment and industrial sectors when developing its sectoral emissions targets and associated policies; and
3. that the Department considers network (gas, electricity distribution and electricity transmission) issues in developing sectoral emission,

We welcome the ongoing opportunity to be involved in the development of the Victoria's climate change targets and associated policies. If you have any other queries, please contact Dr Dennis R Van Puyvelde, Head of Gas on dvanpuyvelde@energynetworks.com.au or 02 6272 1548.

Yours sincerely,

Andrew Dillon

CEO