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Department of Environment,
Land, Water and Planning
GPO Box 4356 Melbourne VIC 3001

Submitted via consultation hub

GEA RESPONSE TO THE VICTORIAN GAS SUBSTITUTION ROADMAP

Gas Energy Australia (GEA) welcomes the opportunity to respond to the Department of the Environment, Land, Water and Planning's (DELWP) Victorian Gas Substitution Roadmap (VGSR).

By way of background, GEA is the national peak body which represents the bulk of the downstream gas fuels industry which covers Liquefied Petroleum Gas (LPG), Liquefied Natural Gas (LNG) and Compressed Natural Gas (CNG). The industry comprises major companies and small to medium businesses in the gas fuels supply chain: refiners, fuel marketers, equipment manufacturers, LPG vehicle converters, consultants and other providers of services to the industry.

While outside the current scope of the VGSR, GEA members are committed to contributing to Victorian and national efforts to combat climate change. We acknowledge that this will require our industry to decarbonise gas fuels. Gas fuels such as LPG and natural gas currently play a significant role in Victoria's energy mix. Victorian households and businesses use LPG and natural gas more than any other state for applications such as space heating, especially in agriculture and horticulture, in manufacturing processes, and for cooking and water heating in homes and businesses[1].

In developing the VGSR, GEA urges the Victorian Government to consider energy affordability, safety, security and reliability for all users into the future as well as GHG emissions reductions. In addition, the VGSR needs to take into account the pathway the gas industry is currently on to transition to decarbonised, including renewable, gases.

The utilisation of bottled gas fuels infrastructure can contribute to the above outcomes in the short term through fuel switching for power generation (from diesel to gas fuels) and transport applications. In the medium-term, blending with renewable gas fuels and in the long-term use of fully decarbonised, including renewable gas fuels.

[1] *Reliable and clean gas for Australian homes, Energy Networks Australia, July 2021* *https://www.energynetworks.com.au/resources/fact-sheets/reliable-and-clean-gas-for-australian-homes-2/*

Other benefits to retaining the use of gas and gas infrastructure include maintaining energy security and affordability for remote and regional areas, not having to massively expand the electricity network and decarbonisation of hard to decarbonise applications such as heavy transport.

With this in mind, GEA offers the following recommendations in response to the VGSR, the rationale for which are discussed below.

- **Gas fuels should be treated as within the scope of the VGSR.**
- **The VGSR should recognise the value of gas fuels and the benefits they deliver in terms of maintaining affordability, reliability and energy security as well as reducing emissions.**
- **The VGSR should adopt a technology neutral approach that recognises there are multiple pathways to decarbonising the economy (eg, not just electrification) and the gas industry (eg, not just hydrogen).**
- **Government funding to support decarbonisation should be available for all decarbonisation pathways.**

Reducing emissions now

At present, the continued use of gas fuels and fuel switching is the way that gas fuels make their strongest contribution to reducing Victoria's emissions, particularly in homes and businesses, transport, back-up and off grid applications.

Our current value to Victoria

Bottled and tank gas is available everywhere all the time. With its availability and diverse applications, in the transport and stationary energy sectors, the industry is equipped to contribute to a safe and sustainable energy solution, wherever the need arises.

As alternative energy sources, LPG, LNG and CNG are playing an important role in shaping Australia's future energy policy and lowering our carbon footprint. Gas fuels are a significant contributor to the Australian economy both in exports and providing access to an easily transported and safe low carbon energy source for Australians everywhere.

With over 1000 uses, including as a fuel for water and home heating, cooking, lighting, machinery, power generation, automotive fuel and for manufacturing and construction, bottled gases are extremely versatile. While most people are aware of the automotive uses, LPG, LNG and CNG can be used widely and readily for a range of other stationary energy and industrial uses. Contributing $3.5 billion to the national economy, Australian LPG, LNG and CNG support over 2,700 direct jobs, with over 500 located in Victoria. The bottled gas industry has also invested more than $4.3 billion in facilities, trucks and cylinders.

The Aussie BBQ

The BBQ is as iconic as they come. With over 60% of Victorian households owning a BBQ, the BBQ has become synonymous with the Australian way of life. The decarbonisation pathway set out below demonstrates how the Australian portable gas indusrty is changing to ensure that consumers can continue to use their BBQ out to 2050 and beyond.

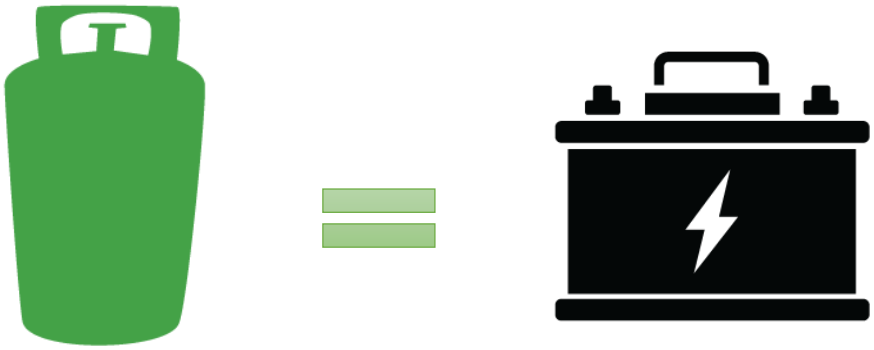
Bottled and tank gas infrastructure

GEA members have over $4.3 billion invested in delivering LPG across Australia and are continuing to invest to improve reliability, safety and portability. The gas fuels industry has also invested in the training, development of safety standards and provides a livelihood for many Victorian families through the support of employees and contractors. This amounts to thousands of man hours dedicated to improving the safety of the indusrty and consumer experience. GEA considers that the VGSR must acknowledge these vast investments and development of the indusrty and support the industry to transition to a net zero and renewable future while maintaining jobs and reliability for Victoria.

Portable gas infrastructure also provides massive decentralised energy storage. In addition to bottled gases, commercial and businesses customers which consume large quantities of LPG use bulk storage tanks which come in various sizes for different applications. Bullet tanks can be used for commercial industrial and agricultural applications.

The existing LPG storage capacity represents 3 billion kilowatt hours and can store the same amount of energy as 300 million Powerwall batteries. This storage infrastructure comprising bottles, tanks, trucks and reticulated networks is already in place and has been designed to meet stringent Australian standards. Taking account of how this gas storage capacity can be used for net zero and renewable energy storage is critical in evaluating the best pathway for Victoria to achieve net zero emissions.

Australia's LPG storage capacity = 300 million Powerwall batterie



The gas fuels distribution network has an important role to play in the medium term transition phase to a net zero emission future, and that same infrastructure and supply chain can store and transport many of the potential renewable energies of the future including renewable biogas, renewable dimethyl ether (rDME), renewable ammonia and renewable hydrogen.

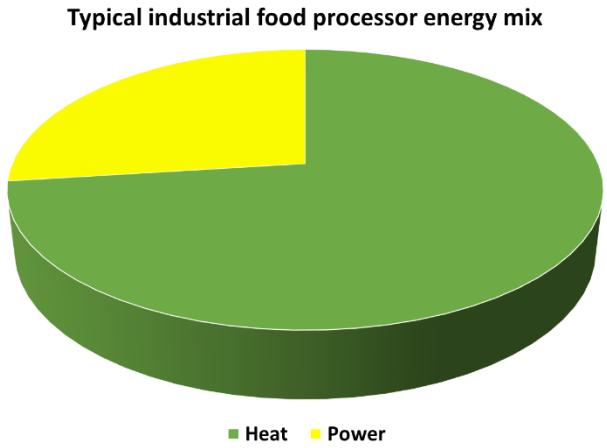
In the future, energy systems are likely to be more decentralised, particularly for remote and regional areas. Portable fuels that can be delivered via virtual pipelines to back up "off-grid" and "edge of grid" areas will be essential for maintaining reliability for these communities. It

is in these types of scenarios, the portability, scale and reach of the existing bottled network has a role to play alongside the pathways being explored for the existing pipeline network.

Decarbonisation of industrial applications

Gas is generally used to generate heat and as an industrial feedstock. These uses can be significantly harder to decarbonise due to the high heating requirements. Higher temperatures can be achieved from electrification by concentrating solar thermal or with electrical technologies such as electrical resistance heating. However, very high temperatures (>1,300°C) associated with industrial processes requiring a heavy thermal heating load including processing chemical feedstock will still require a gaseous fuel source.

In addition, when different sectors' total energy consumption of gas and electricity is compared, it shows that some sectors are heavily weighted towards gas use rather than power (that is, they use more heat than power). The above factors make it difficult for these sectors to simply "fuel switch" to decarbonise. It's critical that the VGSR takes into account the different energy needs of sectors and facilitates a just transition through incentives to utilise renewable and net zero gas fuels..

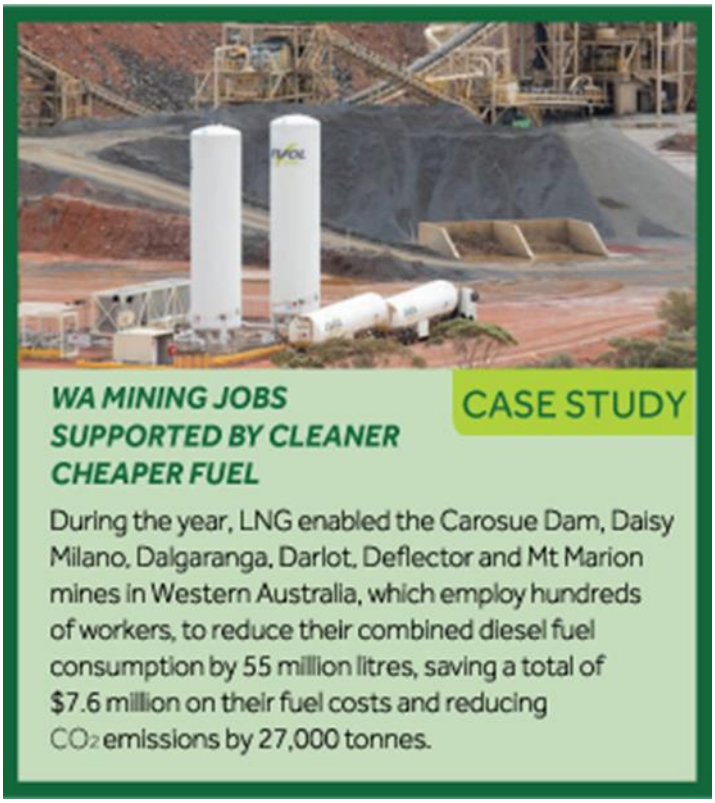


Reticulated LPG networks

In Victoria, there are around 1000 LPG households and businesses connected to reticulated LPG networks. Usually, located in regional areas these networks service communities that do not have access to the natural gas pipeline network. These include Echuca, Falls Creek, Phillip Island and parts of Melbourne metro. These networks could be used to assess the implications for gas quality, safety, reliability and capacity when seeking to decarbonise gas supply through blending of different gases.

Regional and remote areas

When considering the pathway to reach and meet climate and net zero emissions targets as part of the VGSR, it is important to consider the impact on regional and remote areas which are heavily reliant on Single Wire Earth Return (SWER) lines for electricity. In addition to the general issue of the increasing electrification of stationary energy and transport placing extra load on an electricity network already under pressure from increasing reliance on intermittent renewable energy, there are specific issues in regional areas. In particular, there needs to be further exploration of the impacts of increased electrical load from electrification in edge of grid areas where around 28,000 km of SWER power lines exist in Victoria[2].



The gas decarbonisation pathway set out below demonstrates how retaining the use of gas infrastructure can help regional and remote areas decarbonise with minimal cost and consumer intervention. GEA considers that there are strong economic, fuel security, environmental and health benefits to be gained from removing barriers to the use of gas fuels as an alternative fuel to diesel for off-grid power generation.

Much of the electricity for rural and remote applications comes from generators running on imported diesel as a back-up to intermittent renewable sources. Off-grid generators and industrial users can all use LPG and natural gas fuels with current technology, and they are able to provide reliable power generation which backs up that provided by renewable energy sources. Case studies show that gas and solar hybrid generators for off-grid generation, provide a lower emitting and more cost-effective solution than more common solar diesel hybrids.

[2] *https://www.energy.vic.gov.au/safety-and-emergencies/powerline-bushfire-safety-program/reports-and-consultation-papers/swer-workshop-appendix-c*

The advantages of virtual pipelines

In a country as vast as Australia, service delivery and the provision of everyday necessities such as water, electricity and telecommunications can be very expensive and logistically difficult to provide. A virtual pipeline is a cheaper and faster alternative to fixed energy infrastructure and is the supply and transportation of gas by truck, instead of a physical pipeline infrastructure network. Virtual pipelines don't require much permanent infrastructure and can change their route or destination immediately, based on community and business needs. In areas where there are no gas networks, or when there's an issue with infrastructure, virtual pipelines can provide communities with a cleaner, cheaper source of secure and accessible energy, while bringing consumers on the decarbonisation journey.

As Victoria moves to a net zero future, massive investment would be required to upgrade the electricity network if the State was to follow policy driven electrification. Renewable gases that can utilise current virtual pipelines and infrastructure can help to reduce pressure on the electricity system and instead of transitioning to electricity, the bottled gas market would transition to renewable gases.

Heavy transport

With transport accounting for around 22 percent of total emissions in Victoria , there is significant scope for this sector to contribute more to the Victorian Government's objectives to reduce emissions and improve affordability. Gas powered transport solutions utilise proven low emission technologies currently available and offer a number of advantages for operators. These environmental and cost savings can be realised now and well into the medium term through the increased use of fossil based gas fuels such as LNG, LPG and CNG. In the longer term, as gas undergoes its own decarbonisation journey, renewable gases such as biogas and hydrogen, that utilise existing transport infrastructure, offer the prospect of affordable, reliable net zero emissions energy for vehicles.

Substituting gas for diesel would enable heavy vehicles, especially those covering long distances, to decarbonise and reduce harmful emissions, providing significant environmental and health benefits which could be realised today. Low emission fuels such as LPG and natural gas have the ability to reduce emission cost effectively through the use of innovative technologies for heavy vehicles. One example is the heavy-duty dual fuel (HDDF) system which substitutes LPG for diesel. Sixteen Volvo HDDF prime movers operated by national freight and logistics company Rivet Energy have been fitted with modified engines which substitute LPG for diesel by up to 23 per cent. These HDDF trucks operate across Victoria, NSW, SA and Queensland and deliver LPG on bulk and multi-drop delivery runs to businesses every day of the year. On average per year, each vehicle saves around 7 per cent in fuel costs and reduces emissions by almost 8 tonnes, which is equivalent to taking four cars off the road.

Backing up renewables

Gas fuels are also being used as back-up fuel for electricity generators, including hybrid renewable energy systems in remote locations. As the supply of renewable energy (wind and solar) is inherently intermittent ie the sun does not always shine and the wind does not always blow, it is critical that these systems are backed up with reliable energy sources.

Western Water has built an organic food waste facility at Melton Recycled Water Plant to generate biogas for renewable energy use on site. LPG is used as a backup fuel at the site to increase the energy content of the biogas so it can be used to generate renewable energy without the need to flare. When the volume of biogas produced is low, the facility can also use the back-up LPG to generate the full capacity of the turbines to participate in the wholesale market when there is a good pricing signal.

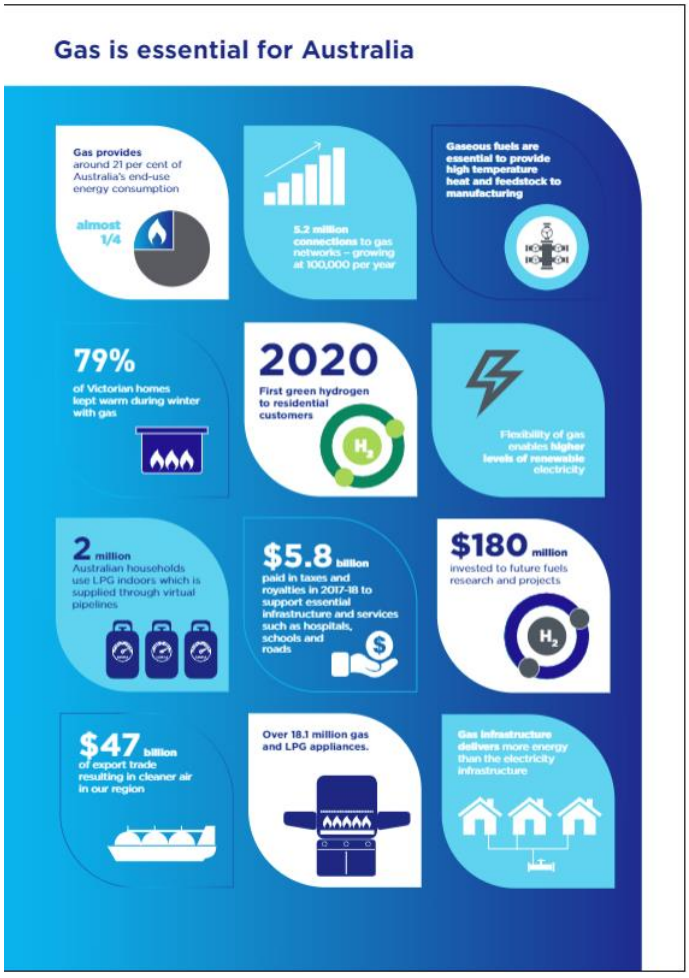
Carbon offsets

In the short term, gas providers can offer gas with carbon offsets. For example, GEA member Origin Energy's Green LPG is certified carbon neutral by Climate Active, a government-backed program that helps organisations play an active part in protecting the climate. For every tonne of emissions generated from LPG usage, Origin will secure one tonne of emissions reduction.

Transitioning to net zero emissions

Gas Vision 2050

The Australian gas industry is moving towards net zero GHG emissions. The use of hydrogen, biogas and synthetic gases is helping Australia meet its climate and emission targets while helping to maintain energy affordability, safety, security and reliability for all users. The pathway towards reaching net zero will involve offsets and the use of fuel switching in the short term, blending in the medium term and the full use of renewable and synthetic gases in the long term.



During 2020, Australian gas associations, GEA, the Australian Pipelines and Gas Association, the Australian Petroleum Production and Exploration Association, Energy Networks Australia, the Gas Appliance Manufacturers of Australia and the Australian Gas Indusrty Trust, developed the Gas Vision 2050: Delivering a Clean Energy Future Report (Gas Vision 2050). Gas Vision 2050 outlines Australia's journey to a cleaner energy future by

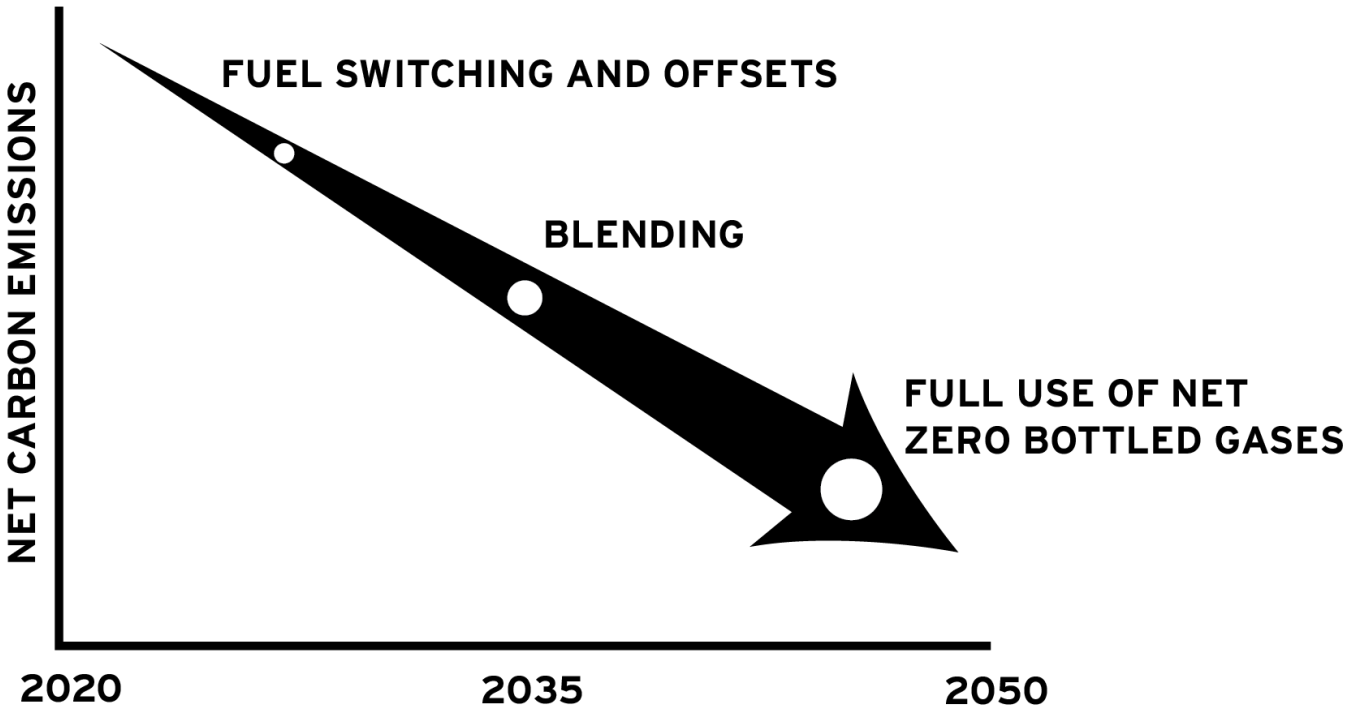
highlighting the pivotal role gas and gas infrastructure can play in Australia's low carbon energy future.

The report outlines a roadmap to decarbonising the gas sector to help meet Australia's GHG emissions reduction commitments over the coming decades and documents innovative research and strong progress being made in advancing transformational technologies. The major conclusion of the report is that net zero emissions can be reached through the use of renewable and synthetic gases and retaining gas infrastructure, at half the cost of electrification. The report also details the transformational technologies and projects that will decarbonise the gas sector and help Australia meet its GHG emissions reduction commitments.

Gas Vision 2050 can be accessed at http://www.cleanercheaperfuels.com/

Bottled and tank gas's decarbonisation pathway

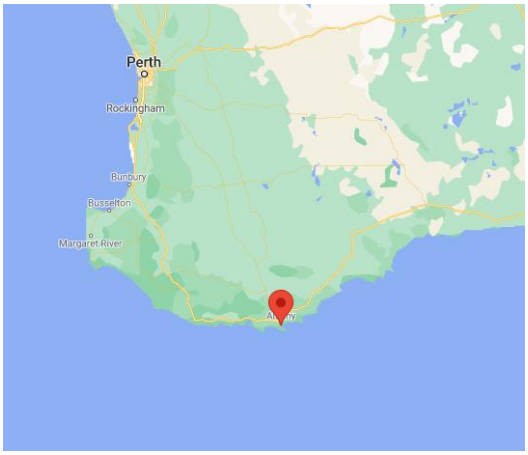
As gas undergoes its own decarbonisation journey, low emission fuels such as LPG and natural gas have the ability to maintain reliability of supply and reduce emissions cost effectively while renewable gases such as biogas, rDME, renewable hydrogen and renewable ammonia become more readily available in the future.



The bottled gas transition

In the medium-term, gas providers will begin offering blended gas products. Gas blending helps to reduce the emissions associated with gas use by blending biomethane, renewable DME and hydrogen into gas tanks and pipeline systems as part of a long-term effort to reduce the greenhouse gas (GHG) emission intensity of producing and consuming gas.

There are already a number of companies currently providing blended gas products.



- ATCO has entered into an agreement with the Great Southern Development Commission to undertake a feasibility study into opportunities for renewable natural gas (RNG) in Albany. This 100% Renewable Gas Project will assess the viability of injecting RNG into the Albany LPG network, providing a low emission energy source for the people of Albany. The RNG will then be transported by road to Albany and injected into ATCO's Albany reticulated LPG network.

- The Hyp SA project, run by Australian Gas Infrastructure Group, is blending about 5% green hydrogen into its gas distribution network going to more than 700 homes in a suburb of Adelaide in South Australia, the state using the highest proportion of renewable energy for power.

- Also, Jemena is currently working to develop Australia's first biomethane-to-gas project which will see thousands of Sydney homes and businesses using renewable green gas for cooking, heating and hot water. Jemena in conjunction with Sydney Water will generate biomethane at the Malabar Wastewater Treatment Plant, in South Sydney. This gas will be injected into Jemena's New South Wales gas distribution network and represents a significant opportunity for industry development in Australia, particularly in regional areas where agricultural feedstocks are plentiful.

Jemena's Malabar Wastewater Treatment Plant

- ABEL Energy is developing the Bell Bay Powerfuels Project to produce green hydrogen and methanol, with support from the Tasmanian Government. Some of the 70,000 tonnes/yr of renewable methanol output will be converted to DME gas for blending into LPG cylinders, with the ultimate aim of supplying 100% renewable LPG bottles to homes and industry. ABEL Energy is proposing to build similar projects around Australia, all based on local inputs of water for hydrogen, air for CO2, and renewable electricity for energy.

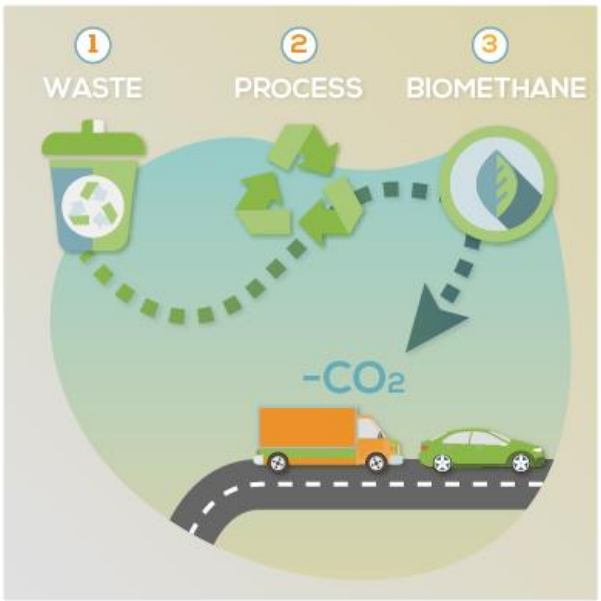
Delivering a net zero emissions future

The bottled and tank gas future

In the long-term, renewable gases such as biogas, renewable DME and hydrogen will become more readily available. With the same chemical composition as fossil based portable gases, net zero and renewable gases such as biomethane or biopropane are able to utilise Australia's vast network of portable gas infrastructure. The continuing use of this infrastructure can contribute to reduced costs for consumers when transitioning to renewable and net zero gases enable the continuing use of existing gas infrastructure and worker training, safety standards etc.

Biomethane

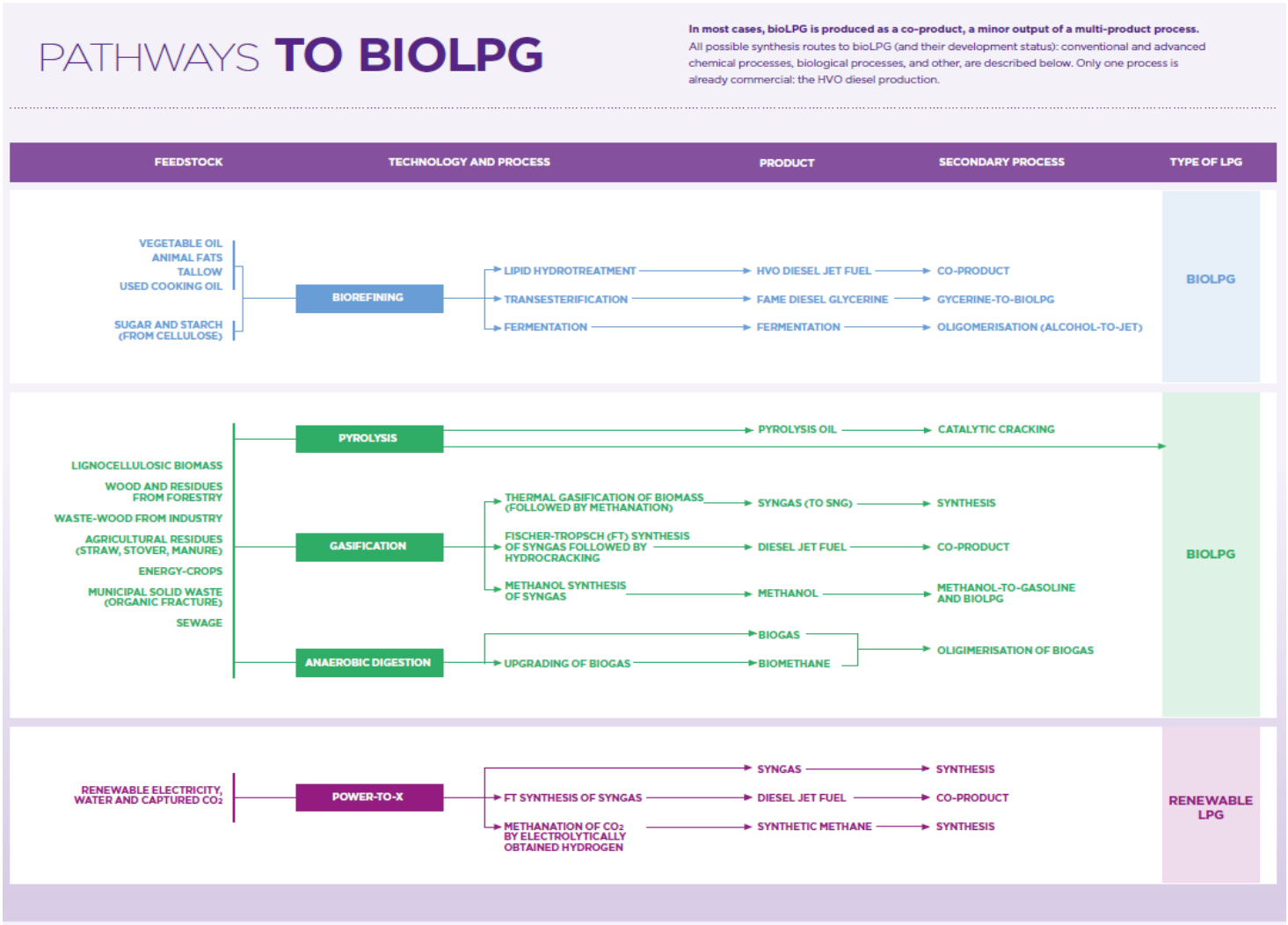
The production of biomethane, which is the same as natural gas, is a well-established process using currently available commercial technologies. The increased use of net zero emission gas fuels such as biogas and hydrogen would ensure that major infrastructure investments such as Victoria's vast network of actual pipelines and virtual pipelines can keep supplying energy to Victorian households and businesses.



Biomethane can also be compressed and liquified to produce bioCNG and bioLNG which have the same chemical properties as conventional CNG and LNG. Applications which utilise CNG and LNG can also seek to transition to the use of biologically sourced gas and significantly reduce their emissions.

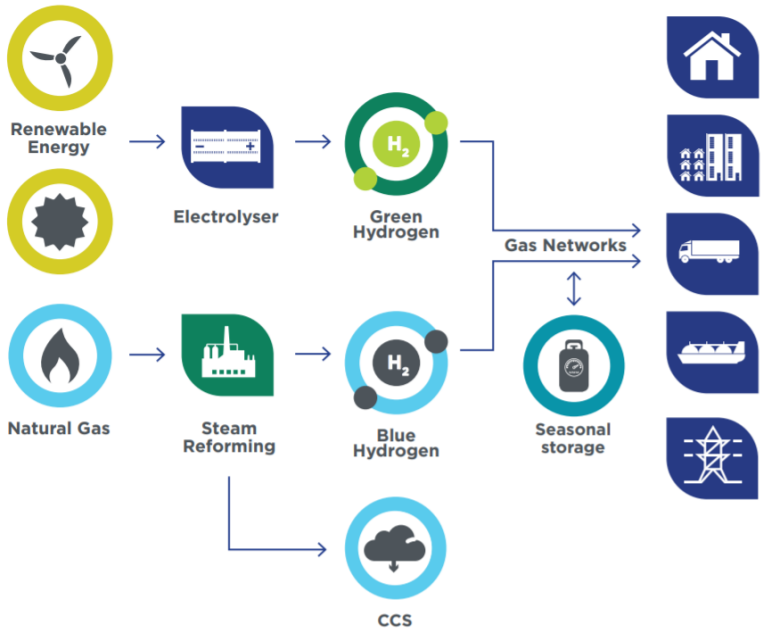
BioLPG

Fossil fuel LPG is an extremely versatile fuel which has a variety of applications in the heating, transport and industrial sectors. LPG consists of mostly propane and/or butane, which are typically produced as a by-product of crude oil refining or natural gas processing. Because biopropane (or bioLPG) is chemically identical to fossil propane, it can be used as a drop-in fuel in the same applications. The use of bioLPG is steadily growing internationally. Companies such as SHV Energy, based in the Netherlands offer customers the ability to switch from traditional energy sources to LPG, LNG or bioLPG. As the supply of bioLPG increases to meet demand and move towards renewable energy, bioLPG users are able to reduce their carbon footprint while continuing to utilise current gas infrastructure. A recent Liquid Gas Europe report details the available pathways for the production of bioLPG – see summary table below[3].



[3] *BioLPG A renewable pathway towards 2050, Liquid Gas Europe* https://www.j-lpgas.gr.jp/data/greenlpg_presen_BIO_20210226.pdf

Renewable hydrogen



Like natural gas, hydrogen is a gas that burns in air to provide heat. This heat can be used in many applications like gas such as space heating. Hydrogen can also be reacted in a fuel-cell to produce both low-grade heat and electricity where the electricity can be used to power the grid or in vehicles. Hydrogen is also a feedstock that can be used by industry. The combustion of hydrogen produces no greenhouse gas emissions. Hydrogen will be an essential energy source for a net zero future and as such, it is important that the VGSR considers all pathways to hydrogen production.

Renewable DME

Renewable DME (rDME) is DME gas made either from renewable liquid methanol, or directly from green hydrogen and biogenic CO2. Traditionally used as a safe and benign propellant for cosmetics and pharmaceuticals, DME can also easily be made renewably, and unlike hydrogen or methane, is an energy-dense liquid at low pressure like conventional LPG. For these reasons, LPG companies around the world are turning to DME as a flammable cylinder gas which can initially be blended with propane, but ultimately also sold as a 100% renewable propane alternative for customers wanting green bottled gas.

Renewable Ammonia

Ammonia is a versatile and easily transportable fuel which can be created to be 100 per cent carbon free and renewable. There are several projects under development around Australia looking into these processes. Renewable ammonia is also able to utilised in the existing LPG infrastructure including bottles and the distribution network. Ammonia powered engines and fuel cells are being commercialised now. Ammonia could also be used to power vehicles, while utilising the existing Autogas network which would minimise infrastructure costs significantly.

Recommendations

In conclusion, GEA offers the following recommendations in response to the VGSR.

- **Gas fuels should be treated as within the scope of the VGSR.**
- **The VGSR should recognise the value of gas fuels and the benefits they deliver in terms of maintaining affordability, reliability and energy security as well as reducing emissions.**
- **The VGSR should adopt a technology neutral approach that recognises there are multiple pathways to decarbonising the economy (eg, not just electrification) and the gas industry (eg, not just hydrogen).**
- **Government funding to support decarbonisation should be available for all decarbonisation pathways.**

GEA would welcome the opportunity to discuss these issues in greater detail. If you have any questions regarding this submission, please do not hesitate to contact GEA's Policy Adviser Melissa Dimovski at mdimovski@gasenergyaustralia.asn.au.

For your consideration

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