Submission

Electricity and Energy Sector Plan: Discussion Paper

Submitted: 26 April 2024

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Table of Contents

Introduction

Gas Energy Australia (GEA) welcomes the opportunity to provide a submission to the Electricity and Energy Sector Plan consultation.

GEA is encouraged by our discussions with the Australian Government – at both ministerial and departmental levels – noting that LPG is different and can play a positive role via its renewable alternatives in residential, commercial, industrial (including agriculture) and recreational settings in Australia's emissions reductions targets while ensuring reliable, secure and affordable energy supply.

Net zero bioLPG will be available in Australia from as soon as 2025-26. As a by-product of biodiesel and sustainable aviation fuel production using the hydrotreated vegetable oil process, the first three plants slated for operation in 2025-26 have the capacity to initially displace 11% of conventional LPG demand almost immediately, seeing up to 160,000 tonnes of CO2-e abated per year.

The exponential growth of this sector has the potential to replace all conventional LPG. Indeed, as the CSIRO's Sustainable Aviation Fuel Roadmap (released August 2023) makes clear, from 2025 Australia will have sufficient feedstock to produce 5 billion litres of SAF every year from approximately 15 biorefineries with LPG as a by-product. This would abate up to 1.5 million tonnes of CO2-e each year.

However, the advent of renewable synthetic LPG (rLPG), derived from green Hydrogen and CO2 from the atmosphere, is an actual zero emitting gas. The only CO2 expelled when it is burned is what was captured when it was made – meaning it has a zero impact on the environment and, as such, requires no offsets. It is expected rLPG will be available in Australia from the mid-2030s.

Based on current domestic demand, replacing all conventional LPG with synthetic actual zero rLPG by 2050 would reduce CO2-e emissions by up to 1.94 million tonnes every year.

GEA is fully supportive of the Net Zero Plan objectives.

The key opportunities for these renewable gases to assist in decarbonising include:

- Transitioning to replace conventional LPG use with net zero bioLPG, sourced as a by-product from domestic biodiesel and sustainable aviation fuel production, from 2025-26.
- Transitioning to phase-in renewable, actual zero synthetic LPG by the mid-2030s.
- Replacing all conventional LPG use with bioLPG and rLPG by 2045.
- Throughout this transition, replacing many uses of natural gas, including residential, commercial and industrial (including agriculture) with renewable and actual zero synthetic LPG.
- Replacing many uses of diesel, especially in regional and/or agricultural settings, with renewable and actual zero synthetic LPG.
    - Importantly, this includes maritime fuels, where LPG's transition to bioLPG and rLPG is seeing increasing uptake as a fuel, both overseas and in Australia. Australia's most recent ship purchases include three vessels that run on LPG. In displacing diesel, emissions are reduced by 20% immediately (100% when rLPG is used), is safer for the marine environment in event of

shipping incidents and presents a sovereign benefit by delivering domestic fuel security.

The policy framework to enable this transition is critical.

1. Governments should move to give the industry confidence to invest in these new technologies, and

2. To ensure Australia is ready to reap the benefits of the transition as soon as bioLPG becomes available from 2025-26.

About GEA

GEA is the national peak body representing the downstream gas fuels industry, encompassing Liquefied Petroleum Gas (LPG) and associated gases – including a raft of new renewable gases such as bioLPG, synthetic renewable LPG (rLPG) and renewable Dimethyl Ether (rDME). The industry comprises major companies, medium and small businesses across the gas fuels supply chain including producers, refiners, fuel marketers, equipment manufacturers, gas transporters, consultants and service providers.

Having engaged directly with the Australian Government Department of Industry, Science and Resources, Department Climate Change and Energy, Department of Infrastructure, Transport, Regional Development, Communications and the Arts, relevant Ministers and Shadow Ministers, as well as state and territory governments, GEA has provided seminal research undertaken by Frontier Economics on LPG's path to zero emissions.

LPG supply can begin this transition as soon as 2025-26, offering governments, industries and household consumers another important string in their bow to deliver on 2030 targets and beyond. We see these developments as complementary to government objectives in shifting to renewable energy, while offering customers diversity in choosing the zero energy sources that suit their needs.

Importantly, we have made it clear to all governments – and do so again here – that the LPG sector is not seeking any government funding. That is, we require no subsidies, seed or project funding or the like to facilitate the transition.

We simply seek a level playing field. That is, recognition and inclusion of bioLPG, rLPG and rDME technologies in the array of government considerations, programs and mechanisms so homeowners and businesses can choose the path to zero best for them.

Examples for LPG to Achieve Net Zero & Actual Zero Emissions

BioLPG:

- Derived from plant and vegetable waste.
- Derived as a by-product from biodiesel and/or Sustainable Aviation Fuel production using the Hydrotreated Vegetable Oil process.
- Identical to LPG. A simple 'drop in' replacement.
- Same storage, transport infrastructure and appliances. No change. No additional capital costs.
- Net zero as an 80% renewable gas.
- Potential to be actual zero as related sectors (i.e. farming and transport) reduce their emissions.

rLPG:

- Synthetically produced from green hydrogen and CO2 taken from the atmosphere.
- Identical to LPG. A simple 'drop in' replacement.
- Same storage, transport infrastructure and appliances. No change. No additional capital costs.
- Is an actual zero gas – that is, the only CO2 expended in its use is what was captured in its creation. No offsets are required.

rDME:

- Derived from methanol.
- Chemically similar to LPG (propane and butane).
- Can be blended with rLPG up to 20% with no change to appliances.
- It can fully replace LPG, however, would require minor changes to existing appliances.
- Derived from gasification and catalytic synthesis or electrolysis (i.e. green H2) and catalytic synthesis.
- It is net zero, but can be actual zero as related sectors (i.e. transport) reduce their emissions.

Today, more the 2,026,000 Australian homes – some 18.5% of all dwellings - rely on LPG for their daily indoor cooking, hot water and heating needs. That is distinct from outdoor recreational uses or, indeed, its many commercial, industrial and farming uses.

Consultation Key Considerations

1: Mobilising investment. Accelerating renewable energy capacity will require significant investment from both government and industry at a time of international competition for green finance.

With over 2,026,000 Australian homes already using LPG every day, they can be net zero over the same timeframe as the electricity grid, without the hefty price tag. Gas Energy Australia and its members is not seeking government funding for its transition to bioLPG and, ultimately, rLPG. Rather than seeking subsidies, seed funding, or project funding from governmental bodies, the industry is determined to finance this transition autonomously. Our primary objective is to establish a fair and equitable marketplace where bioLPG, rLPG and rDME technologies are duly recognised and incorporated into government policies and considerations.

The overarching aim of the industry is to ensure that the unique potential of LPG as a pathway to decarbonisation is acknowledged within policy frameworks, all without leaning on government investment. This stance underscores the industry's commitment to self-funding initiatives and driving the shift towards sustainable energy sources. By championing this approach, Gas Energy Australia is demonstrating its dedication to propelling the energy sector towards a greener future through independent means.

Importantly, what the sector is looking for is a market signal from government to trigger its investment in stand-alone facilities in Australia to produce biogases. The investment in these new plants is significant, so industry needs reassurance that the resultant biogases are recognised, accredited and tradeable as renewable gas/energy.

2: Enabling electrification. Electrification is a key tool for reducing energy-related emissions and reducing costs, but it will require substantial expansion of Australia's electricity networks.

Gas Energy Australia's strategic approach underscores the pivotal role of LPG as complementary to government objectives and electrification, presenting a solution that not only alleviates pressure on the grid but also facilitates decarbonisation over the same period as electricity expansion. Importantly, net zero bioLPG and actual zero rLPG provide consumers – households and businesses – with the ability to choose the clean energy best suited to them. While electrification stands out as a crucial tool for curbing energy-related emissions and reducing costs, the significant expansion of Australia's technology-agnostic approach is crucial to support this transition effectively.

LPG supply can begin this transition as soon as 2025-26, offering governments another important string in their bow to deliver on 2030 targets and beyond. We see these developments as complementary to government objectives in shifting to renewable energy, while offering customers diversity in choosing the zero energy sources that suit their settings. This dual approach of promoting electrification alongside the adoption of BioLPG and, ultimately, rLPG, not only aligns with government objectives but also presents a comprehensive pathway to sustainable energy utilisation.

The trajectory set by the LPG sector envisions a future where all conventional LPG supply in Australia will be replaced by 2045. This transition is projected to significantly reduce CO2 emissions, providing a viable solution to the challenges associated with grid pressure and decarbonisation. By embracing renewable LPG, the industry demonstrates its commitment to advancing Australia's sustainable energy future in parallel with electrification efforts, thereby, contributing to a more resilient and environmentally friendly energy landscape with minimum upheaval for customers who can be net zero without the exorbitant costs of switching to electrical appliances.

3: Growing alternative low carbon fuels. Low-carbon fuels will need to be developed for industries that are difficult to electrify, while fuel security challenges are managed.

Gas Energy Australia's strategy recognises the significance of LPG in supporting industries that are challenging to electrify, ensuring a reliable energy source for sectors such as tomato growers, regional hospitals, hospitality businesses with commercial kitchens, agriculture and maritime. These industries rely on LPG for various applications where electrification may not be feasible due to specific operational requirements or infrastructure limitations.

- For example, tomato growers utilise LPG for greenhouse cultivation, providing essential heat for optimal plant growth. LPG offers a sustainable solution for these agricultural operations, enabling them to continue benefiting from LPG while reducing their carbon footprint.

- Regional hospitals often rely on LPG for heating purposes, particularly in areas where access to alternative energy sources may be limited. By continuing to utilise LPG, these hospitals can maintain a reliable heating system while contributing to decarbonisation efforts.

- Hospitality businesses and commercial kitchens depend on LPG for cooking and heating applications, where the high energy density and precise temperature control of LPG are essential. Using LPG ensures a sustainable energy source for these establishments, supporting their operations while reducing emissions.

- In the agriculture sector, LPG is commonly used for various applications, including heating, drying, and processing. By using LPG, agricultural operations can continue to benefit from the versatility and reliability of LPG while aligning with sustainability goals and reducing their environmental impact.

In each of these settings, LPG is a mainstay and need not change to electrification to achieve net zero.

LPG as a Substitute

Displacing Natural Gas

Thus far in this submission we have covered the ability for bioLPG and rLPG to replace existing uses of LPG to complement the shift to electrification. This is a simple one-for-one replacement, requiring no additional capital costs for residential, commercial, industrial or recreational consumers.

But what of LPG (and bioLPG and/or rLPG) replacing natural gas? Replacing natural gas with LPG is also relatively straight-forward and inexpensive. For example, cooktops are really simple. Assuming pipes are compatible, which they typically are, it's a case of changing jets and rubbers. This represents an incidental change.

For converting natural gas heaters and hot water systems to LPG, again, it's typically not much more complex. But that can depend on the equipment in use:

- Converting jets is required.
- Converting the regulator is required.
- Each conversion is unique. Some may take 5 minutes… some a few hours. It depends on compatibility.
- Compatibility depends on the manufacturer of the heater/hot water system. If they have not allowed for LPG conversions, then there is the possibility of a new system being required. It's a case-by-case situation.
- As the Frontier Economics modelling shows, even if a full replacement is required it costs half as much as converting to electrical appliances (based on appliance and installation costs). Additionally, it saves homeowners potentially tens of thousands of dollars on upgrading to Phase 3 wiring.

As the Queensland Government Department of Natural Resources and Mine's Fact Sheet Safely converting Natural Gas installations and appliances to LPG (January 2014) makes clear:

"Q: Can most natural gas appliances be converted to LPG?

"A. Yes: Most natural gas appliances can be converted but this work must be done by a licensed gasfitter. The gasfitter is responsible for making sure the appliance is suitable, including ensuring the appliance is certified for use on LPG. Some gas appliances are not designed or certified for use on LPG and cannot be converted to LPG."

Further, the Grattan Institute's Getting Off Gas report (June 2023) states:

"Ending the widespread use of natural gas in pipelines need not mean an end to the great Australian barbeque. Most outdoor cooking is powered by LPG, which has the advantage of being portable. Continuing to use LPG for barbeques will have minimal impact on Australia's carbon emissions. Using a barbeque for three hours emits 13.4kg of greenhouse gases. To generate a million tonnes annually would require every household in Australia to hold eight barbeques every year. LPG could continue to be used in barbeques until a non-fossil substitute such as hydrogen or synthetic bioLPG is developed. Governments should support LPG companies to develop these substitutes. Where natural gas from pipelines is used, it should be possible for equipment suppliers to develop and sell conversion kits to change these items to burn LPG."

We are already seeing this in practise. In both Victoria and the ACT where government's are banning new natural gas connections in greenfield residential sites, these bans do not apply to LPG. Indeed, in the ACT we have been advised of new LPG in-home installations at a rate of six per week.

Displacing Diesel

The advent of bioLPG, rLPG and rDME enhances the desirability of consumer-led choice.

These renewable gases have the capacity to replace diesel, especially where there is no other viable option, especially in rural/regional settings. LPG produces 45% less CO2 and 99% less NOx pollutants than diesel.

For many stationary engine applications where a diesel tank of fuel is required, LPG is a flexible and efficient energy source. Unlike diesel, LPG does not deteriorate in tanks and does not require water to be drained from the bottom of tanks over time.

Replacing diesel with bioLPG or rLPG has numerous benefits:

- Suitable for fixed diesel installations and vehicles.
- The rate of substitution is typically 30-35% and depends on engine size and application.
- A diesel substitution kit is fitted to the engine without the need to make any modifications.
- The kit can be easily removed and installed on another engine.
- Diesel Substitution Control Units ensure the optimum substitution rate.
- Engine monitoring and data logging systems continuously check engine performance and fuel consumption.

In the context of this submission, this demonstrates that electrification is not the only means of achieving net zero and that, indeed, in these settings its is preferrable, practical and cheaper to switch to LPG.

Decarbonising Other Sectors

In addition to LPG's ability to displace natural gas use in homes and general businesses applications, the advent of bioLPG, rLPG and rDME mean LPG can go a long way to helping Australian manufacturing to decarbonise.

Plastics Recycling

Pyrolysis involves heating plastic in an oxygen-free environment, causing the materials to break down to create new liquid or gas fuels (namely bioLPG) in the process. According to the Australian Government Department of Climate Change, Energy, Environment and Water, one million tonnes of Australia's annual plastic consumption is single-use plastic – 84% is sent to landfill and only 13% is recycled.

Converting plastic waste into bioLPG provides a valuable source of green energy, while addressing the mounting challenges of plastic waste management. It represents a clear win-win for government, the environment and renewable energy generation.

Electricity Generation

Natural gas-fired electricity generation in Australia provides $5.591 billion in economic activity and supports 12,289 Australian jobs. Importantly, as intermittent generating renewables (solar and wind) are more relied on as coal exists the market, gas will become increasingly relied upon to fill the inevitable downtime gaps.

BioLPG and, ultimately, rLPG stand to play an important role in decarbonising this much-needed back-up facility.

Chemical Industry

As a feedstock (or ingredient) in modern Australian manufacturing, gas – predominantly natural gas – generates $7.538 billion in economic activity and supports 36,674 Australian jobs.

Gas is a vital and irreplaceable feedstock in the making of many things we need for everyday life, including plastics, fertilisers, pharmaceuticals, rubber, propellants, refrigeration, adhesives, cosmetics… to list just a few.

There is an opportunity for bioLPG and rLPG to replace natural gas in these processes, thereby, dramatically reducing the carbon footprint of manufacturing while avoiding the negative impacts of an electrification-only approach. These renewable alternatives can reduce reliance on traditional fossil fuels, supporting more sustainable production methods.

Construction

Through high temperature manufacturing, gas contributes $5.792 billion in economic activity and supports 29,372 Australian jobs. Gas – predominantly natural gas – is essential in generating industrial heat for manufacturing, including steel, glass, bricks, ceramics, cement... to list a few. In these processes it is irreplaceable given electricity, regardless of how it is produced, cannot generate the 1,300 degree Celsius temperatures required.

The advent of bioLPG and rLPG can see these processes, including cement kilns and curing processes, replace natural gas to contribute to sustainable building practices across a plethora of industries and applications. The versatile applications of bioLPG and rLPG make them pivotal components in transitioning various sectors toward cleaner energy alternatives, fostering a more sustainable and a low carbon future.

Again, this represents an important fillip to government plans to electrify, with LPG an important partner in delivering net zero while maintaining our national economic and manufacturing base.

Overall, the adoption of LPG presents a viable solution for industries that are challenging to electrify, ensuring a reliable and low-carbon energy source for applications in multiple sectors. By supporting these industries with LPG, Gas Energy Australia aims to facilitate a smooth transition towards cleaner energy alternatives while addressing fuel security challenges and promoting sustainability.

4: Building Australia's clean energy workforce. Australia will need a large skilled workforce to deliver these system-wide changes and we are already facing a shortage of the technical and professional skills required.

It is important to note that the LPG industry can seamlessly continue its current operations as bioLPG is chemically identical to conventional LPG, allowing for a one-for-one replacement without requiring significant infrastructure changes. By investing in research and development of these technologies and promoting knowledge sharing among stakeholders, Gas Energy Australia members can play a pivotal role in equipping the workforce with the expertise needed to drive the successful adoption of bioLPG and renewable LPG, contributing to more sustainable and low-carbon industries.

To effectively prepare a skilled workforce for the integration of bioLPG and rLPG in the decarbonised LPG sector, collaboration between GEA, government, industry and educational institutions, is essential. Specialised training programs should be developed to educate LPG professionals on the production, handling, and utilisation of these sustainable fuel sources, emphasising skills in environmental compliance, maintenance, and supply chain management specific to bioLPG and rLPG applications.

This is a relatively easy undertaking as the technologies, infrastructure, transport, switch and use of bioLPG and rLPG is identical to conventional LPG, which has a long-standing record in residential, commercial, industrial (including farming) and recreational uses.

5: Maximising outcomes for people and businesses. Households and businesses will play a critical role in the energy transformation and need support to engage effectively. Careful policy design and consideration of social licence issues is necessary to ensure an equitable transition.

LPG is poised to expand its role beyond its current uses, serving over 2 million Australian households for in-home cooking, heating, and hot water, along with providing energy solutions for approximately 130,000 commercial and industrial businesses. As a renewable, flexible, and dependable energy source, its potential for growth is substantial.

Consumer choice and affordability for households and businesses are paramount considerations in the energy transformation process, particularly when transitioning from traditional LPG to BioLPG. Empowering consumers with a range of energy options and ensuring that renewable alternatives like BioLPG are cost-effective and competitive with traditional fuels are essential for driving widespread adoption of cleaner energy sources.

GEA's emphasis on consumer choice highlights the importance of offering individuals and businesses the freedom to select energy solutions that align with their values and sustainability goals. By providing a variety of options, including BioLPG as a renewable alternative to traditional energy sources, consumers can make informed decisions that best suit their needs and preferences.

Affordability plays a crucial role in the transition to BioLPG, as ensuring that renewable energy sources are accessible and cost-effective is key to encouraging broad acceptance. By making BioLPG affordable and competitive with traditional fuels like LPG, more consumers and businesses can easily switch to cleaner energy options without financial constraints. This affordability factor not only benefits consumers but also accelerates the overall shift towards sustainable energy practices.

Moreover, households have the opportunity to stay on gas while decarbonising over the same period as electricity. This option allows consumers to continue using gas, as a reliable and familiar energy source while reducing their carbon footprint. By providing households with the choice to decarbonise gradually with BioLPG, the energy sector supports a smooth transition to cleaner energy solutions without compromising comfort or convenience.

<u>Case Study: NSW Homes</u>

Some 532,000 NSW homes use LPG for in-home use (cooking, heating and hot water). The modelling below assumes a 50% premium in the wholesale cost for rLPG.

Here the Frontier Economics modelling looks at the relative cost and emissions profiles comparing those replacing their LPG appliances with high-efficiency electrical appliances or cheaper, less efficient electrical appliances.

Switching to High-Efficiency Electric Appliances: Considering energy bills and appliance costs, continuing to use LPG appliances remains lower cost for the representative household, in Dubbo NSW, until the 2040s, when using LPG appliances and using electrical appliances are very similar in cost.

This scenario shows total emissions are only marginally lower if using high-efficiency electrical appliances.

- Result: The household would incur $11,871 in upfront costs, save $649.36 on annual bills and reduce emissions by a mere 284 kg per year (or 5.4kg per week, less than the volume of typical BBQ cylinder).

This means, if homeowners are prepared to pay for all high-efficiency electrical appliances in their home, it would take more than 14 years to get a return on investment, for a very small reduction in their CO2 output.

Given switching to these electrical appliances only abates 2.84 tonnes of C02 over a 10-year period, the price of carbon abatement is $707.81 per tonne, which is 20-times higher than the average price per tonne of buying Australian carbon credit units at $36.75.

Again, it makes for very expensive and inefficient carbon abatement.

Switching to Cheaper, Less Efficient Electric Appliances: Faced with these costs, people might think if they opt for cheaper, though less efficient appliances, they're still doing the right thing. Right? But they'd be wrong. Emissions are actually lower if the sticks with LPG appliances.

- Result: The household would incur $6,520 in upfront costs, save $347.41 on annual bills, while actually increasing their emissions by a substantial 640 kg per year.

In this scenario, emissions from LPG appliances are significantly lower, which means switching to electrical appliances actually increases emissions.

Again, this scenario dispels the notion that electricity is, by default, cheaper and lower emitting than LPG.

The timeline covers the coming decade. However, with the emergence of actual zero emissions technologies for rLPG users replacing conventional LPG by the mid-2030s, gas can be lower emitting than electricity. That is, not requiring offsets.

The cost of switching to electrical appliances does not include the costs of likely power supply upgrades (from Phase 1 to Phase 3 wiring), which, depending on appliances can take total outlays up to $42,000 per premise. This was previously modelled by Frontier Economics *Cost of switching from gas to electric appliances in the home*, released in 2022.

An ACT family recently contacted GEA advising that when their ducted gas heater died, they sourced an electrical replacement and were quoted $20,000 to make the switch. They opted to simply replace it with a new ducted gas heater.

By prioritising consumer choice and affordability in the transition to BioLPG, the energy sector can empower individuals and businesses to make environmentally conscious decisions while also promoting economic feasibility. Offering a seamless and cost-effective switch to BioLPG as a renewable and sustainable alternative to traditional LPG enhances consumer engagement and drives the adoption of cleaner energy sources, ultimately contributing to a greener and more sustainable future for all stakeholders involved.

Conclusion

Gas Energy Australia (GEA) is dedicated to driving Australia's energy transformation by promoting sustainable fuel alternatives and advocating for industry autonomy in funding.

We recognise the complementary role of BioLPG alongside electrification efforts, envisioning a future where renewable LPG replaces conventional supply, significantly reducing emissions. GEA emphasises the importance of supporting industries with challenging electrification, preparing a skilled workforce, and prioritising consumer choice and affordability.

Through collaboration and innovation, GEA aims to create a greener and more resilient energy landscape for Australia.

For More Information

Should you require more information, have questions or wish to discuss any elements arising from this submission, please contact:

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