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Gas Energy Australia

GEA SUBMISSION

Securing Australia's Cleaner Fuels Industry

The proposed Mandate is generally positive for Low-carbon Liquid Fuels, but risks impeding production of BioLPG – a key regional decarbonization option.

Voluntary BioLPG Recognition within the Mandate would mitigate this risk.

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Executive Summary

GEA welcomes the opportunity to provide a submission to the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW) Securing Australia's Cleaner Fuels Industry consultation (the Consultation).

While generally positive for Low-carbon Liquid Fuel (LCLF), the proposed LCLF Mandate risks impeding BioLPG production. GEA is confident this is not the policy intent and recommends Voluntary BioLPG Recognition to address this unintended consequence.

Industrial, commercial, and residential customers continue to choose to use LPG today – the majority of which are based in regional Australia. It's much more than barbeque bottles alone. Beyond BBQ bottles, LPG reliably fuels mining, industry, regional hospitals, disaster recovery, and off-grid cooking, heating and hot water – and more.

It comes down to cost-effective LPG supply, storage, appliances and a supply chain that can go anywhere – all of which would be largely unchanged for BioLPG. As a result, BioLPG is expected to be cost competitive with electrification for many customers, once available. A partner for electrification allowing consumer choice through the transition.

The LCLF Mandate creates an economic incentive to produce mandated fuels – and an economic disincentive to produce non-mandated fuels. As proposed, LCLF suppliers would need to be paid higher-than-commercial rates or non-mandated fuels to offset revenue otherwise earn through Mandated fuel production.

This in turn risks pausing LPG decarbonisation through BioLPG and Co-processed LPG, just as Australia's first Co-processed LPG is due to come online[1].

Europe offers a cautionary example, where LPG-exclusive mandates have resulted in only 2% of biorefineries producing BioLPG. Not because it isn't commercially viable for decarbonising customers, but as an unintended consequence of policy design.

The Australian Government has an opportunity to learn from Europe's experience and design mandate policy to avoid this consequence of design. A consequence which will impact regional decarbonisation opportunities the most.

The policy as proposed includes a solution – an internal crediting mechanism. Allowing the voluntary supply of BioLPG into the Australian market to generate LCLF Mandate Credits would bridge the value gap without impacting underlying policy intent or design.

The LPG industry is well advanced in developing its own decarbonisation pathway through BioLPG, Co-processed LPG, and other renewable liquid gases. This policy should not impede the sector from pursuing that pathway on a commercial basis.

[1] Viva Energy, 2025, *Viva Energy and Origin Energy to collaborate on bio-LPG in positive step for energy transition*, available at https://www.vivaenergy.com.au/media/news/2025/viva-energy-and-origin-energy-to-collaborate-on-bio-lpg-in-positive-step-for-energy-transition

Introduction

The LPG industry safely and securely supplies 43 PJ per annum of energy to industrial, commercial and residential customers nation-wide, including over 1 million regional Australian households[2]. Gas Energy Australia (GEA) represents Australia's liquid gas supply chains including Liquefied Petroleum Gas (LPG) and Renewable Liquid Gas with members spanning from producers to retailers and everything in between.

Australia's LPG industry supports the net zero transition. As drop-in renewable liquid gases such as BioLPG emerge, consumers will be able to continue using LPG with 99% less Scope 1 emissions[3]. Lower emissions today and net zero tomorrow, LPG is the perfect partner for renewable electricity throughout the transition.

Customers continue to choose LPG today

Australian homes and businesses choose to use LPG today because it is affordable and reliable, both in metropolitan Australia and in regional Australia where other forms of energy supply can be unreliable or unavailable. Much more than barbeque bottles, LPG fuels heating, cooking and hot water in residential and small business settings, as well as serving as a clean-burning bulk liquid fuel for large industrial processes.

Cost-effective LPG supply, storage and appliances, and a nationwide supply chain, are central to this. Continued industrial uptake bears this out, as do gas network transitions in Esperance and across Victoria. Even where all-electric options carried greater subsidies, a substantial proportion of commercial and residential customers still chose LPG – more than half in Victoria.

Decarbonisation & Energy Security Opportunity

As oil refining and gas production decline in Australia, so will LPG supply. BioLPG will cost more to supply than LPG, but biorefineries have the potential to produce enough to meet half of domestic LPG demand. And the lower cost of LPG storage and appliances mean the Total Customer Cost of BioLPG would be competitive with electrification for a range of customers once available – a perfect pair of complimentary decarbonisation options through the transition.

The LPG sector is seizing this opportunity to be part of the energy transition. All major suppliers are investigating renewable liquid gases, and Viva Energy and Origin Energy's announcement indicates the first LCLF Co-processed LPG is due to reach market before the end of the year[1]. The sector knows it will need to engage biorefineries on a commercial basis to secure BioLPG supply, and is actively doing so.

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[2] DCCEEW, 2024, Australian Energy Update 2024, https://www.energy.gov.au/publications/australian-energy-update-2024
Frontier Economics, 2023, *Pathways to Zero Emissions for LPG (plus industry updates to 2026)*, https://www.gasenergyaus.au/get/2016/pathway-zero-emissions-for-lpg-frontier.pdf

[3] Australian Government, 2026, *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, available at https://www.legislation.gov.au/F2008L02309/

The Unintended Consequence

As Europe has shown, a mandate covering some but not all LCLFs creates an economic disincentive to produce the fuels it excludes, including BioLPG. The LPG sector could no longer secure BioLPG at its commercial cost – instead needing to pay a premium that also covers the revenue biorefineries would forgo from mandated fuel markets.

The Australian Government has an opportunity to learn from Europe's experience. Mandate policy should be designed to avoid this same unintended consequence. It need not bring co-produced LCLFs into the mandate but should protect their investment case on a commercial basis rather than impede it.

Recommended Risk Mitigation – Voluntary BioLPG Recognition

Risk mitigation needs to maintain the underlying principles of the proposed policy, while preserving today's status quo for BioLPG. This means ensuring the LPG market can secure BioLPG supply on a commercial basis, rather than facing the added cost hurdle of accounting for forgone mandated fuel revenue.

Introducing Voluntary BioLPG Recognition would achieve this. GEA proposes voluntary BioLPG supply be enabled to generate LCLF Mandate Credits, in the same way voluntary oversupply of mandated LCLFs is proposed to produce credits. This would remove the economic disincentive to invest in BioLPG production capacity without otherwise changing the Mandate's design or policy intent.

Looking Forward

The LPG industry is well advanced in developing its own decarbonisation pathway through BioLPG, Co-processed LPG, and other renewable liquid gases. These won't work for all LPG customers – some will be better off transitioning to electricity. But drop-in BioLPG is shaping up to be the least-cost decarbonisation option for a large proportion of LPG customers, especially in regional Australia and for LPG customers for which electrification isn’t an option.

This policy risks pausing that progress – for the LPG sector, and its mostly regional customers.

GEA strongly recommends the federal government mitigate this BioLPG investment disincentive through mandate design to avoid this unintended consequence. Aside from addressing this risk, GEA supports the Mandate as proposed.

1. The Case for Renewable Liquid Gas in Australia

While small in volume, LPG is a critical energy supply chain for Australia. LPG supplies millions of mostly regional homes and businesses where other forms of energy are not always an option. Supplied by a combination of indigenous supply and imports today, LPG will need to evolve towards increasing volumes of Renewable Liquid Gas supply as Australia moves towards a net zero economy.

Understanding why customers continue to choose LPG today underscores the importance of transitioning toward BioLPG. Customers are choosing LPG today because LPG makes economic sense. LPG offers cheaper energy supply, cheaper appliances, and cheaper energy storage on a per unit energy basis, along with greater reliability, compared to electricity – especially in a regional Australian context.

The transition to BioLPG will remove LPG's energy supply cost advantage, shifting the balance towards electricity. But the lower cost of LPG appliances and storage means BioLPG will remain cost competitive with electrification. Many customers will decarbonise at lower cost via electrification, but a substantial proportion of regional Australian households and businesses would decarbonise for less via BioLPG.

State and Federal policy is starting to move in this direction, with BioLPG and Co-processed LPG emissions factors recognised in legislation, and certificate schemes in development. There is a case for government support to enable BioLPG and other renewable liquid gases as a regional decarbonisation option – and a strong case for avoiding policy that risks putting this regional energy transition on hold.

1.1. Australian LPG Customers

LPG serves millions of residential, commercial, industrial and transport customers across Australia. While transport demand has reduced across the past decade, stationary use across residential, commercial and industrial customers has remained stable.

LPG use is prevalent in metropolitan Australia, however the majority of customers using LPG are located in regional Australia. Here, other forms of energy supply can be unreliable or unavailable, and transportable, clean-burning LPG becomes practical and economic – including in regional healthcare and disaster recovery, where unreliable or absent energy infrastructure both come into play.

Small in volume, this 33.5 PJ per annum of stationary LPG use is dispersed across the entire Australian landscape. This makes regional LPG use hard to electrify – the technology to electrify much of it exists, but the cost-effective availability of firm electricity supply does not.

LPG customers fall into two distinct groups. Residential customers rely on LPG for everyday household energy needs, while commercial and industrial customers span an enormous range of scale and application – from mine sites and hospitals to local businesses – with LPG-fuelled forklifts also underpinning much of Australia's warehousing and logistics supply chains.

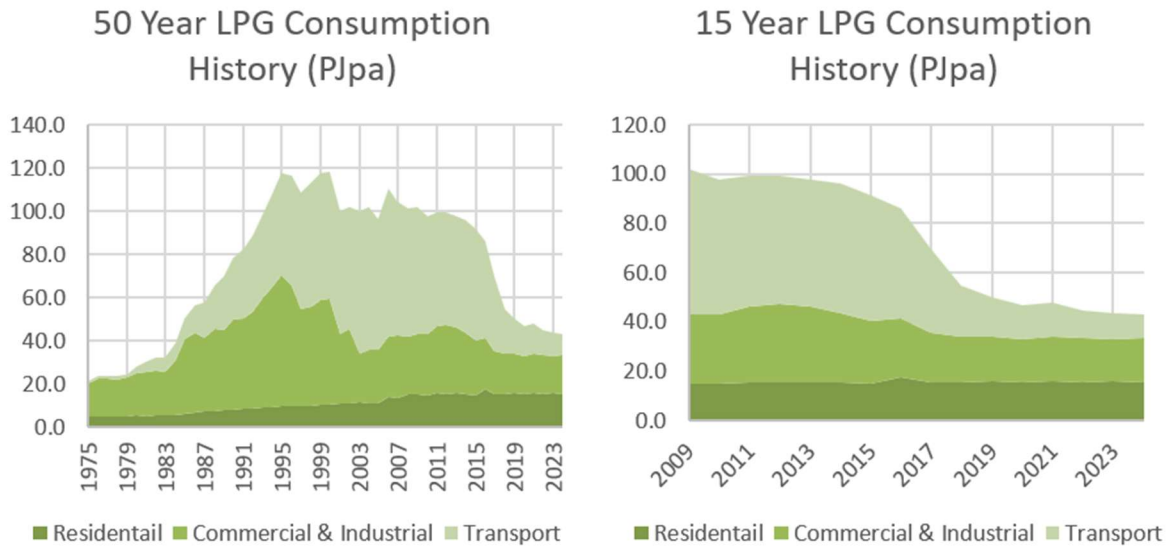

Figure 1: LPG Demand over Time[2]

1.1.1. Residential customers

The most recent LPG industry estimates put the total number of residential customers over 2 million. Nationally and across most states and territories, over 1 million of these residential LPG customers are located outside of capital cities in regional Australia[4].

Residential LPG supply is most often achieved through the installation, swapping or in-situ filling of LPG cylinders installed alongside the home, with some customers supplied by small LPG distribution networks. Cylinder combinations vary from a pair of 45kg Cylinders to larger 210kg cylinders.

Customers will most often use LPG for cooking, hot water and space heating. While most of these appliances have electric alternatives, their LPG alternatives are often the lower cost option when looking at appliance cost and installation alone[11].

For residential customers without access to firm electricity supply from electricity networks, or without access to an electricity connection at all, LPG provides access to reliable energy supply thanks to the high-volume, low-cost energy storage in LPG cylinders. Note that while prevalent, recreational LPG use for non-plumbed barbeques, camping and other recreation sits outside of residential use.

[4] Frontier Economics, 2023, *Pathways to Zero Emissions for LPG* (Plus industry updates to figures), https://www.gasenergyaus.au/get/2016/pathway-zero-emissions-for-lpg-frontier.pdf

Figure 2: Breakdown of Metropolitan and Regional Residential LPG Customers[4]

1.1.2. Commercial and Industrial Business Customers

The most recent LPG industry estimates put the total number of commercial and industrial customers over 160,000. Customers span in scale from as big as Olympic Dam, through to regional hospitals, disaster recovery and agriculture, and to as small as your local bar and grill using LPG in flame grilling – again mostly in regional Australia. The greatest volume is attributed to manufacturing use, however this doesn't necessarily align with the greatest number of customers, or the greatest impact of LPG.

These businesses use a myriad of off-the-shelf and engineered appliances. Their applications spanning those with and without electric alternatives, many of which are exposed to lower appliance costs for their LPG alternative[10]. Many are expected to have an extremely long operating life, with CAPEX spent expected to last decades.

Australia's warehousing and logistics sector also greatly relies upon LPG fuelled forklifts, making LPG supply critical to maintaining Australian supply chains.

Commercial and industrial supply starts with the same 45kg and 210kg cylinders used for household applications. These expand to 210kg cylinder banks and custom designed and installed LPG vessels for larger operations.

LPG vessels are often seen on regional mine sites as well as on farms, hospitals, and tourist resorts and hotels. These vessels are regularly supplied via trucked LPG deliveries, ensuring any customer in any location can access reliable, clean-burning energy supply through LPG.

Table 1: LPG consumption by state and sector[2]

Terajoules (TJ) in Financial year 2023-24

Sector	NSW (& ACT)	VIC	QLD	WA	SA	TAS	NT
Agriculture, forestry and fishing	614	233	471	434	165	88	15
Mining	139						
Manufacturing	5,710	1,309	5,437	492	459	303	13
Electricity, gas, water and waste services		8		18	1		
Construction							
Commercial and services	136	66	202	98	31	24	29
Total LPG	**6,599**	**1,616**	**6,110**	**1,042**	**656**	**415**	**57**

Source: Australian Government, Australian Energy Statistics 2025, Table F1, state and territory sheets.

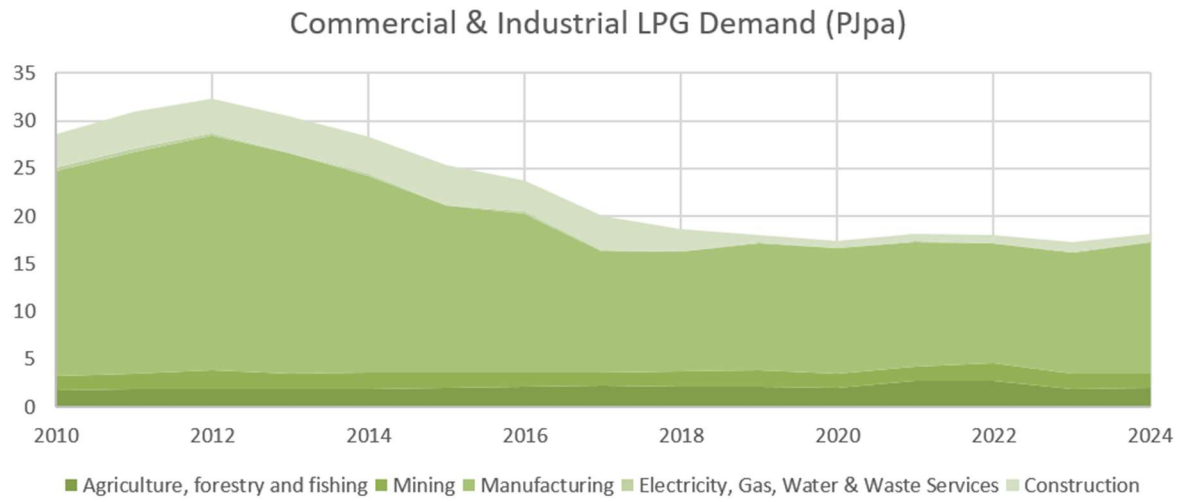

Figure 3: Commercial & Industrial LPG Demand[2]

1.2. Australian LPG Supply

Domestic LPG supply comes predominantly from one of two sources – oil refining to remove lighter propane and butane from heavier liquid fuels; or natural gas processing to remove heavier propane and butane from lighter methane.

Australia's two remaining refineries in Lytton and Geelong both produce LPG. LPG stripped from natural gas produced across the Bass, Ottway, Cooper and Surrat, North-west Shelf and Bonaparte gas basins accounts for the remainder of indigenous LPG production, produced at locations spread around Australia.

Unlike other liquid fuels, Australia is a net exporter of LPG. Of the 148PJ produced in FY24, 129PJ was exported. However, due to reducing propane production and Australia's propane-based LPG quality specification (for Type-A appliances), the country imports a little under half of its total domestic LPG consumption as propane (18PJ in FY2024). At the same time, Australia exports substantial volumes of mostly butane to the global market.

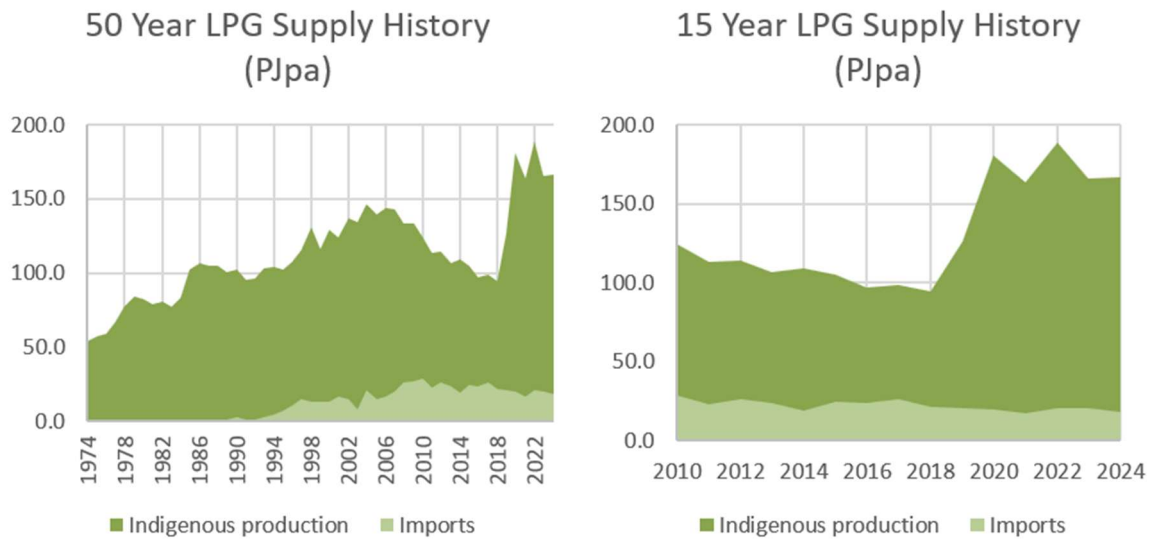

Figure 4: LPG Supply over Time[2]

Australian LPG imports and exports are facilitated by a network of LPG ports. A key piece of this infrastructure is the LPG Storage Cavern at Botany Bay which holds 3.4PJ of LPG storage capacity. Used as part of LPG import infrastructure, the Botany Bay LPG Cavern supports LPG supply across NSW – a state with no indigenous LPG production.

This network of LPG production facilities and ports connects to an interconnected network of LPG depots. Housing large scale LPG storage as well as loading and unloading facilities for trucks and cylinders, Australia's network of LPG depots ensures all Australians have access to affordable, reliable energy supply regardless of location.

Importantly, this entire supply chain is ambivalent to its source of LPG. While it is used to supply conventional LPG to customers today, there are no changes required to enable this same supply chain to deliver drop-in renewable forms of LPG to customers.

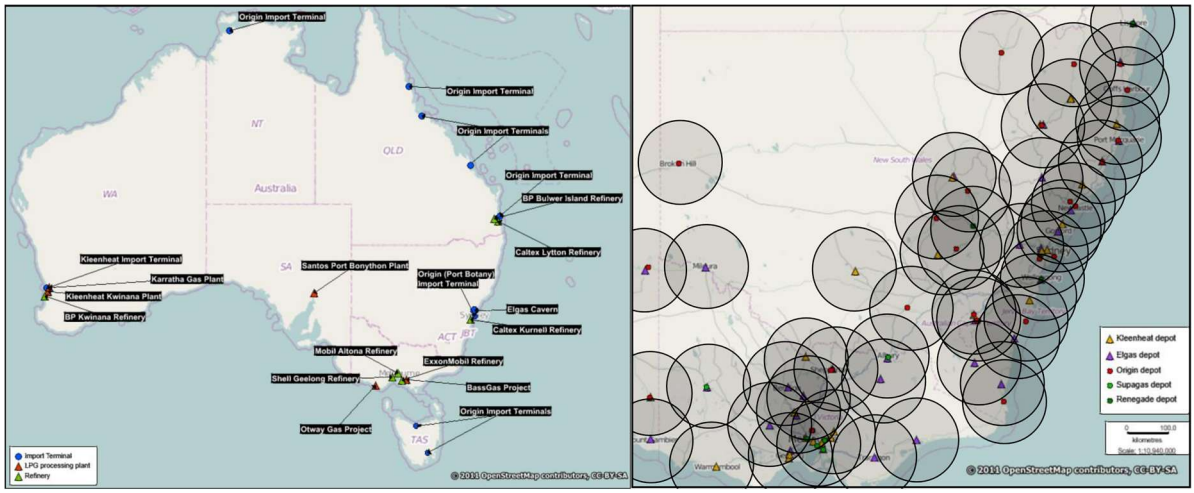

Figure 5: LPG Supply Points across Australia and Depots across Victoria & NSW[5]

[5] ACCC, 2014, *Statement of Issues*, available at https://www.accc.gov.au/system/files/public-registers/documents/MER14%2B6191.pdf

1.3. Customers continue to choose LPG today

Customers have continued to choose LPG in increasing numbers since the 1970's. The reason behind this fact goes beyond simple supply and demand. Rather, a combination of the unique benefits of LPG, its supply chains, its storage characteristics, and its appliances lead to LPG continuing to be chosen by customers.

Many of these benefits can be viewed through the lens of Total Customer Cost[6]. Energy cost is not the only factor driving energy choice – rather, the combined full lifecycle cost of energy supply cost and energy consumption cost, the latter being made up of appliance cost, appliance efficiency, and firming cost.

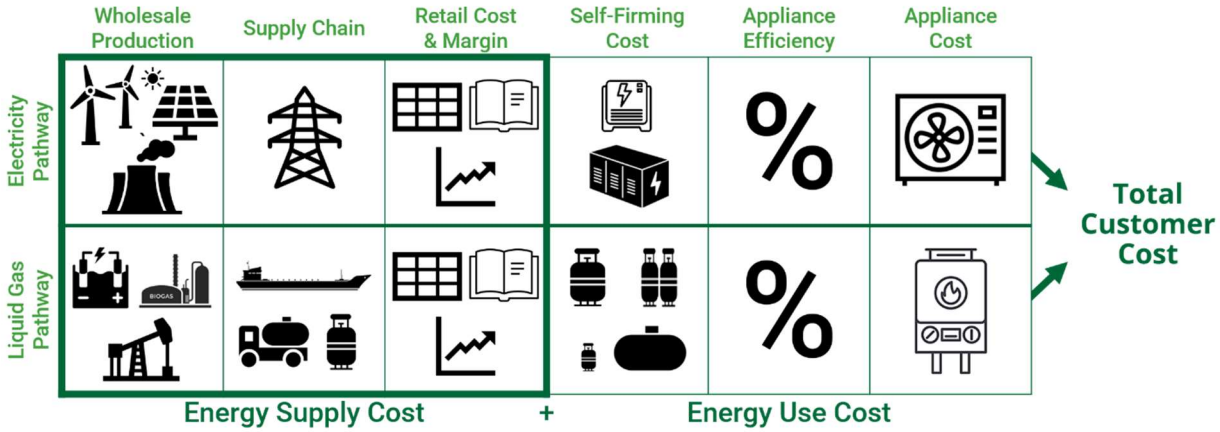

Figure 6: Total Customer Cost Comparison – Electricity vs LPG

Energy Supply Cost

Energy Supply Cost is a combination of Wholesale Production Cost, Supply Chain Cost, and Retail Cost and Margin. While renewable electricity is known to be the lowest cost form of energy production, the electricity supply chain is complex and costly, especially where supplying firming and inertia for a mostly-renewable grid is concerned. On the other hand, LPG is typically priced in Australia based on Saudi Contract Price – moving between $700 - $1000 per tonne LPG wholesale.

With each of these factors combined, retail LPG tends to be cheaper than retail electricity, but not cheaper than rooftop solar. Firmed commercial electricity supply does gain a level of economy of scale, but so does wholesale LPG supply, being closer to Saudi Contract Price plus haulage.

[6] APGA, 2022, *Supply chain analysis methodology for total customer cost*, available at https://apga.org.au/hubfs/Supply%20chain%20analysis%20methodology%20for%20total%20customer%20cost%20-%20Study.pdf

Table 2: Energy Wholesale and Supply Cost[7]

Energy source	c/kWh
Wholesale LPG	5–7
Wholesale NEM electricity	5–14
Retail LPG	19–27
Retail electricity	28–42
Rooftop solar PV	5–10

Self-firming Cost (Energy Storage)

Self-firming is where LPG comes into its own. Self-firming refers to the requirement for a customer to firm its own energy supply. While less of an issue in metropolitan Australia, this is an important factor in regional Australia where electricity can have lower availability and natural gas networks are less prevalent.

The sheer energy storage volume and low upfront cost of LPG cylinders results in a four-orders-of-magnitude difference in LPG and electricity storage cost. While all other cost comparisons are within one order of magnitude from one another, energy storage costs are where LPG stands head and shoulders above electricity as an energy vector.

Table 3: Energy Storage Cost Comparison – LPG and Electricity[8]

Storage option	Nominal storage	Indicative upfront cost	Cost per kWh storage
45 kg LPG cylinder	500 kWh	$130–150	$0.26–0.30/kWh
210 kg LPG cylinder	2,900 kWh	$2,000–2,500	$0.60–0.86/kWh
Home battery ≤14 kWh	13 kWh	$6,500–9,700	$500–746/kWh
Home battery 14–28 kWh	19 kWh	$13,600–15,800	$716–832/kWh
Home battery >28 kWh	42 kWh	$20,000–37,800	$476–900/kWh

Similar comparisons can be made at the commercial and industrial scale, however this information is less publicly available. GEA encourages bilateral engagement with its Members to discuss commercial and industrial LPG storage costs.

[7] A combination of:
- Saudi Contract Price over time – contact Gas Energy Australia for further information
- Average NEM Wholesale Electricity Price
- Collation of published online retail LPG, Electricity and rooftop solar pricing

[8] A combination of:
- LPG Sector information regarding LPG cylinder costs
- Australian Competition & Consumer Commission, 2026, *Inquiry into the National Electricity Market*, available at https://www.accc.gov.au/system/files/inquiry-national-electricity-market-report-june-2026.pdf

Energy Appliance Efficiency

LPG appliances typically have a lower efficiency than electric appliances. While in the same ballpark for cooking appliances, conventional hot water and space heating appliances have a reasonable advantage. Of course, heat pump hot water and heating appliances have a substantial efficiency advantage over LPG appliances of around one order of magnitude.

This means that total energy supplied will be higher on a like for like basis when using LPG, resulting in greater total energy supply cost. This fact when taken by itself risks misleading energy consumers. However, energy consumers – especially regional energy consumers – understand that supply cost is only part of the equation.

Table 4: Indicative Energy Appliance Efficiency Ranges[9]

Appliance	LPG	Conventional electric	Heat-pump electric
Cooking	~40–55%	~70–75%	N/A
Hot water	~75–96%	~95%	~300–500%
Space heating	~80–95%	100%	~300–500%

Similar efficiencies for commercial and industrial appliances have been explored by ACIL Allen, though for natural gas[10]. Since natural gas and LPG appliances are essentially identical aside from burner jets sized for the different fuel, this analysis is a reasonable analogue for LPG appliance efficiency across commercial and industrial consumers.

[9] Frontier Energy, 2019, *Residential Cooktop Performance and Energy Comparison Study*, available at https://buildingdecarb.org/wp-content/uploads/induction_report.pdf
Rewiring Australia, 2025, *The Electrification Tipping Point: The energy, economic, and emissions impacts of electrifying Australia's homes and vehicles*, available at https://storage.googleapis.com/rewiring-aus-pdfs/The%20Electrification%20Tipping%20Point%20-%20Rewiring%20Australia%20-%20March%202025.pdf
Australian Government, 2026, *YourHome — Hot Water Systems*, available at https://www.yourhome.gov.au/energy/hot-water-systems
HECO, 2026, *Heat Pumps Explained — Space Heating & Hot Water Australia*, available at https://www.heco.com.au/home-energy/heat-pumps-explained.html
Australian Government, 2026, *Space Heating Comparison Methodology: Public Consultation*, available at https://consult.dcceew.gov.au/space-heater-comparison-methodology

[10] ACIL Allen, 2024, *Renewable Gas Target (Table 2.3 Comparative efficiencies of gaseous fuels and electrical appliances, by activity)*, available at https://apga.org.au/hubfs/ACIL%20Allen%20Renewable%20Gas%20Target%20Report.pdf

Energy Appliance Cost

LPG appliances are typically cheaper than their electric alternatives. Furthermore, the simpler installation of LPG in a home or business often costs less than electrical installations. This was explored in depth by Frontier Economics during the period in which gas ban policy was being explored in Victoria – noting natural gas appliance and installation costs are reasonably analogous with LPG appliance and installation costs.

This analysis found that across the archetypes explored, installing gas or LPG appliances consistently cost less than installing electric appliances[11]. This was especially true when seeking equivalent amenity in appliance transition. The cost premiums for electrifying covered a wide span, reflecting the range of differences experienced by householders, and that the greatest uncertainty in Total Customer Cost is the appliance cost.

Similar efficiencies for commercial and industrial appliances have been explored by ACIL Allen, though for natural gas[12]. Since natural gas and LPG appliances are essentially identical aside from burner jets sized for the different fuel, this analysis is a reasonable analogue for LPG appliance efficiency across commercial and industrial consumers.

Figure 9: Difference between the total electrical option costs and the total gas option cost by Archetype

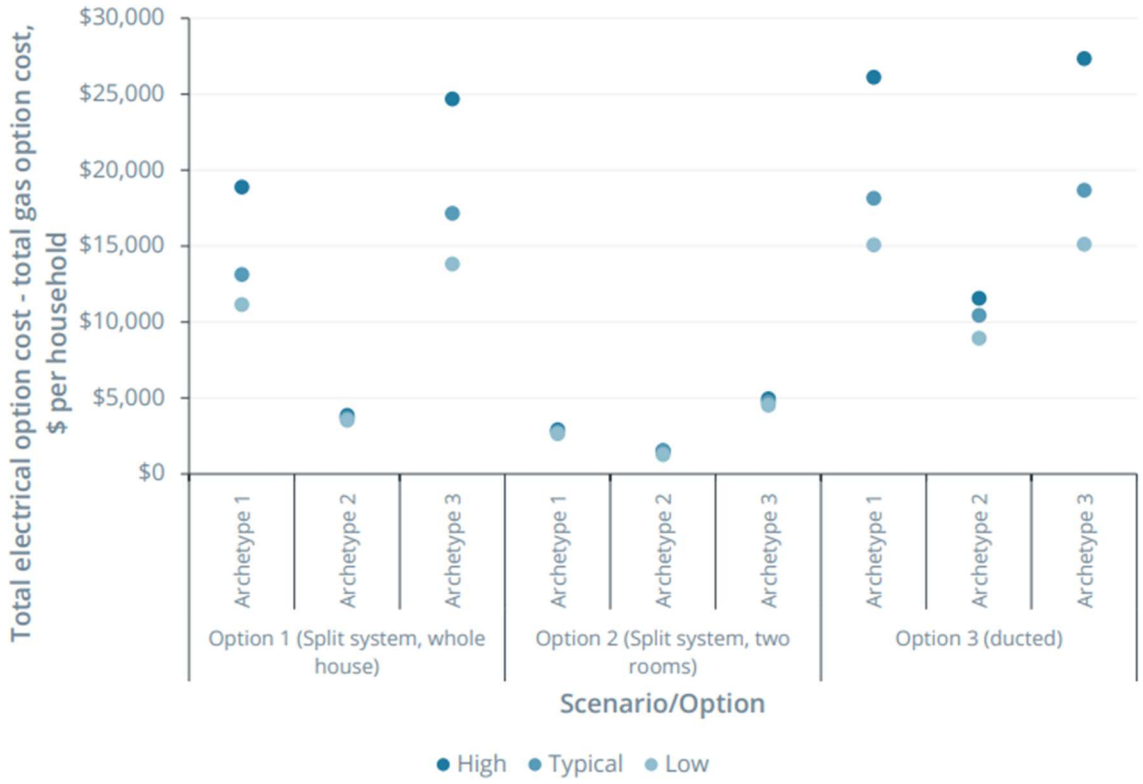

Figure 7: Frontier Economics Appliance Cost Analysis[11]

[11] Frontier Economics, 2022, *Cost of switching from gas to electric appliances in the home*, available at https://gamaa.asn.au/wp-content/uploads/2022/07/Frontier-Economics-Report-GAMAA.pdf

[12] ACIL Allen, 2024, *Renewable Gas Target (Table 2.4 Appliance capital cost and operating life assumptions)*, available at https://apga.org.au/hubfs/ACIL%20Allen%20Renewable%20Gas%20Target%20Report.pdf

Total Customer Cost Conclusion

When piecing each of the Total Customer Cost components together in a simple order of magnitude comparison, we find that LPG produces a lower total customer cost than electricity today. This explains why over 2 million residential customers choose to use LPG – it makes overall economic sense. Understanding which elements of the Total Customer Cost model impact this outcome and which don't is key to understanding customers least cost decarbonisation pathway.

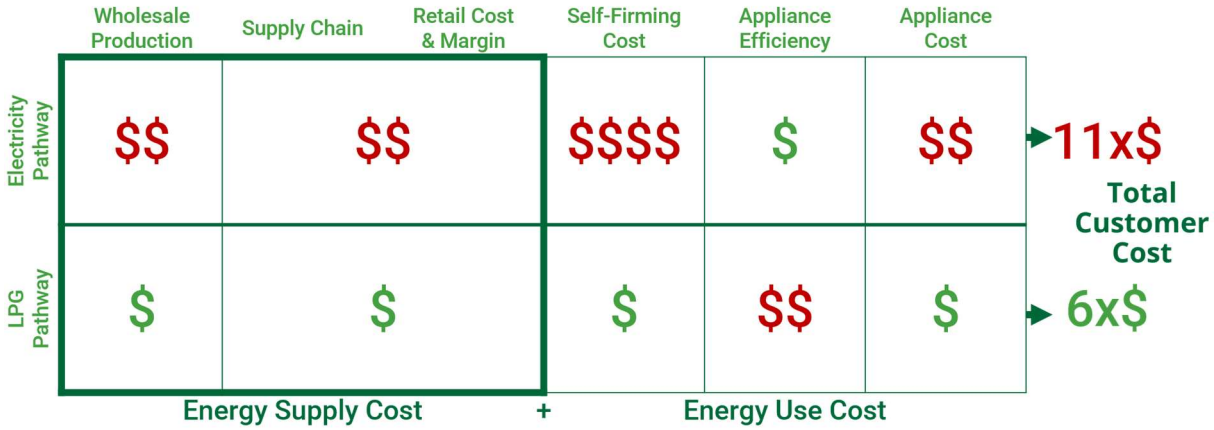

Figure 8: Total Customer Cost Order of Magnitude Comparison

Ultimately, the greatest advantage which LPG has today is the ubiquitous LPG cylinder. One of Australia's lowest cost energy storage options, the cylinder puts LPG well ahead of other forms of energy, especially in regional Australia. When firming is needed, the LPG firming cost is next to zero by comparison to electricity firming, equalising the metropolitan – regional energy divide.

While this comparison has been undertaken for residential LPG customers, the same outcome is able to be anticipated for a range of commercial and industrial applications as well. The ratio of cost for LPG supply, storage, and appliances, and the ratio of appliance efficiencies, hold across most applications as demonstrated through ACIL Allen research referenced above.

1.4. Case Study: Gas Network Customers Choose LPG

Recent years have seen several gas distribution network closures requiring thousands of energy customers to choose between electricity and LPG for their future energy supply. Examples include the Esperance Gas Network closure (completed), the Solstice Energy Gas Network Closures (ongoing), and the Albany Gas Network Closure (new).

Across all three gas network closures, customers have been choosing to use LPG. As detailed below, each closure tells a different story – some of customer choice, some of economic reality. The conclusion is that in absence of policy requiring decarbonisation, LPG is still being chosen by, and the right choice for, a substantial proportion of users.

When the Esperance natural gas network closed, the WA Government committed to fulling funding like-for-like transitions for customers to electricity or LPG. Even with full

funding for higher cost electric appliances, around 25% of residential customers and 62% of business customers elected to transition at least in part to bottled LPG.

This important case where cost wasn't a factor in customer choice demonstrates that economics alone cannot explain customer choice. Once cost does become a factor however, the outcomes move further in favour of LPG.

Solstice Energy chose to close its Compressed Natural Gas supplied distribution network around Victoria[13]. The Victorian Government is supporting customers transition, including greater subsidies to move to electric appliances.

Even with higher electric appliances subsidies, early information indicates that the vast majority of residential and commercial customers are choosing to move to LPG. Importantly however, subsidies did not cover the full cost of electric appliances, nor did they bridge the gap between converting to LPG and electrifying. For more information, the Department is invited to discuss customer transitions bilaterally with those involved.

Table 5: Solstice Energy Transition Customer Electrification Subsidies[13]

Appliance being replaced	Government / VEU discount	Solstice payment	Potential support
Gas hot water → heat pump	up to **$2,030**	**$300–600**	**$3,330–3,630**
Gas room heater → reverse-cycle AC	up to **$1,610**	**$400**	**$3,010**
Gas central heating → ducted reverse-cycle	up to **$5,530**	**$600**	**$7,130**
Gas cooktop → induction	up to **$140**	**$250**	**$1,390**

Lastly, the transition of around 8,000 customers from ATCO's Albany LPG Distribution Network is schedule to commence across the coming year. A recent announcement by the WA Energy Minister indicates that residential customer funding is defined by the cost to transition customers to bottled LPG – indicating that customers choosing to electrify will receive the same amount of funding.

There is a way to go with the Albany transition. The data that emerges will demonstrate customers' willingness to pay more upfront for an appliance even when the electricity bill savings don't fully offset that cost[11].

Across these transitions a trend can be seen. When customers are forced to give up their gas connections, a substantial proportion choose to move to LPG even when fully funded. And when funding drops, this shift becomes stronger – the economics of LPG become more compelling.

[13] Solstice Energy, 2026, *Helping you switch to cheaper energy*, https://nextsteps.solsticeenergy.com.au/

1.5. Renewable Liquid Gas

Renewable Liquid Gas refers to a suite of low-carbon liquid fuels that are either drop-in replacements for LPG or blendable into LPG supply chains. The Renewable Liquid Gas option closest to market is BioLPG produced as a co-product alongside Sustainable Aviation Fuel (SAF) and Renewable Diesel (rDiesel). Similarly, Co-processed LPG can be produced from appropriate feedstocks via existing refineries.

BioLPG can be produced via a range of conventional and less conventional technology pathways. The European Liquid Gas Association collects a suite of options seen in Figure 9 outlining the majority of options available to Australia – noting that Europe endorses the use of some feedstocks which would not be necessary to use in Australia.

Similar to SAF and rDiesel, HVO/HEFA and Alcohol to Fuel production pathways are the most mature. HVO/HEFA produces between 4 – 8% BioLPG within its process, however

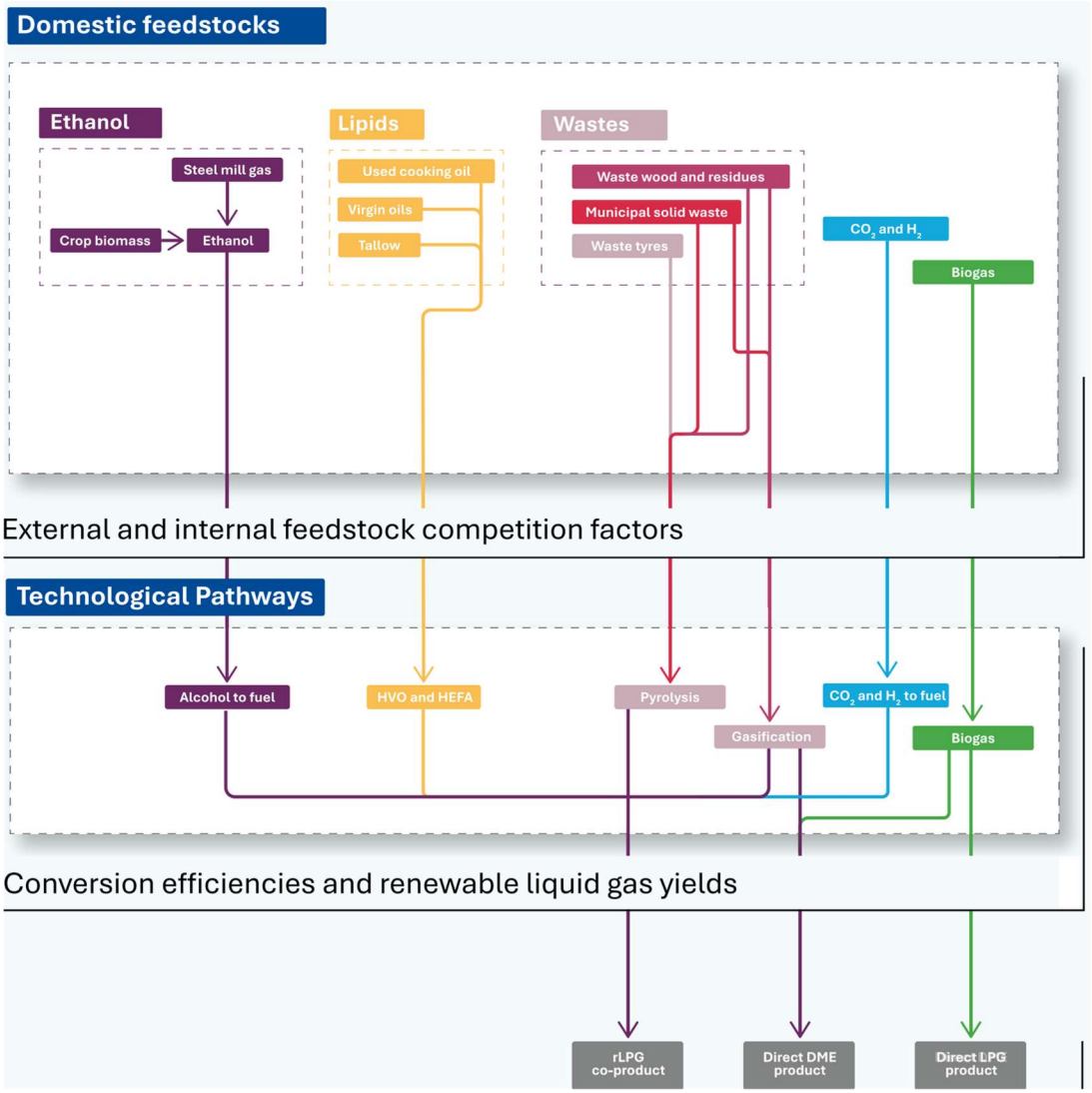

Figure 9: Renewable Liquid Gas Production Pathways[14]

[14] Liquid Gas Europe, 2025, *Outlook for renewable liquid gas in Europe*, available at https://www.liquidgaseurope.eu/wp-content/uploads/2025/03/Outlook_lge_digital.pdf

requires additional CAPEX expenditure of around 5-10%. Some Alcohol to Fuel pathways produce no BioLPG, while others can produce up to 12%. Fischer Tropsh based pathways are less constrained, being able to be reasonably targeted to production outputs by design.

Major LPG suppliers, refiners, and prospective biorefinery proponents have estimated the wholesale cost of these renewable liquid gases. Unfortunately, wholesale cost estimates are yet to be published in the public domain. GEA is working in partnership with WLGA and PERC to address this gap. It should be noted that BioLPG is understood to cost more than LPG, and the Department is encouraged to engage bilaterally with suppliers, refiners, and biorefinery proponents to understand Australian estimates.

1.5.1. Total Customer Cost of Renewable Liquid Gas

Understanding that BioLPG will cost more than LPG is an important part of understanding the future viability of LPG customers decarbonisation. Introducing higher cost renewable liquid gas supply into the Total Customer Cost model introduced in Section 1.3 helps unpack what this may mean for customers.

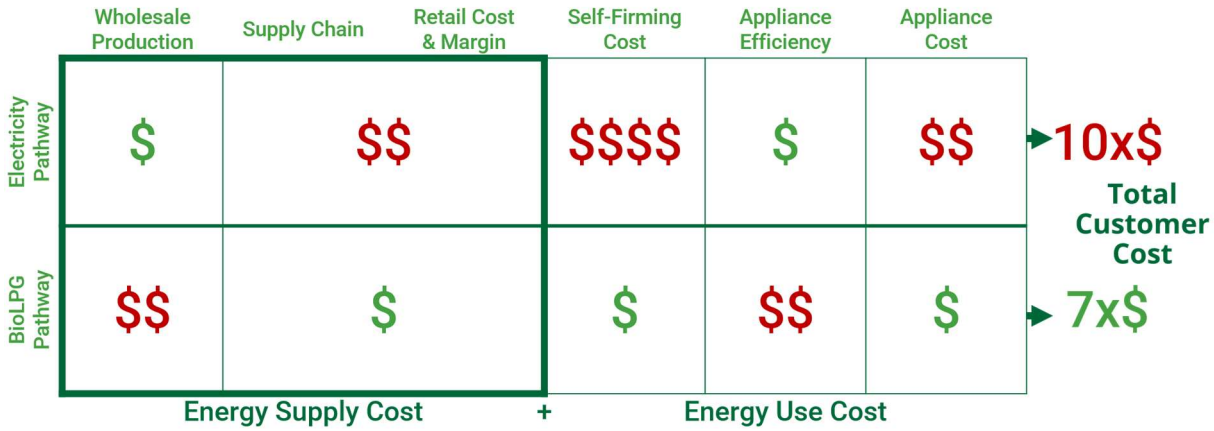

Figure 10: Total Customer Cost Order of Magnitude Comparison with BioLPG

Moving from wholesale LPG cost to anticipated wholesale BioLPG costs does increase the Total Customer Cost of energy for LPG customers. Importantly however, it is anticipated that the Total Customer Cost of transitioning to BioLPG will be cost competitive with electrification as a decarbonisation pathway.

As Australia decarbonises, many customers will find electrification suits their circumstances better than BioLPG. However, a wide range of customers will also find that BioLPG suits their circumstances better as well. This makes BioLPG a perfect partner for electrification through the net zero energy transition.

BioLPG and electrification are broadly comparable on Total Customer Cost, and each offers distinct advantages depending on the customer. Providing both options would allow customers to choose the solution which works best for their unique circumstances, in turn reducing the overall cost and impact of the net zero transition.

1.6. Case Study: Viva & Origin Co-processed LPG MOU

The first Renewable Liquid Gas production is expected within the coming year. In November 2025, Viva Energy and Origin Energy signed a Memorandum of Understanding to develop a proof of concept for BioLPG production at Viva Energy's Geelong refinery based on production from locally sourced renewable feedstocks.[1]

Under the arrangement, Viva Energy would manufacture BioLPG using domestically sourced used cooking oil and other feedstocks, with Origin Energy on-selling the gas to its customers - building on Viva Energy's long history of supplying LPG manufactured at Geelong to Origin Energy for distribution.

The collaboration extends beyond production to the commercial and policy settings needed to bring BioLPG to market. Its scope includes market development, transparent pricing models, and joint advocacy for the carbon accounting frameworks needed to support commercialisation, with the aim of establishing a viable business case that could set the stage for a long-term supply arrangement.

1.7. Existing Renewable Liquid Gas Policy

Like most Low-carbon Liquid Fuels, BioLPG and other Renewable Liquid Gases will have a higher wholesale cost than their fossil fuel alternative. Despite this, they are anticipated be the least cost decarbonized alternative for a broad range of LPG users. Therefore, supportive policy is required to ensure these customers are able to access their least cost decarbonisation option where it is Renewable Liquid Gases.

The pursuit of enabling policy for a renewable fuel has been most successful when following a three-phase approach:

1. **Removing Roadblocks:** addressing any legislation which would prevent a customer from legally being able to use the renewable fuel. i.e. technical and safety legislation or standards which don't consider the renewable fuel.

2. **Enabling Markets:** creating a pathway for a customer's renewable fuel use to count toward national emissions accounting, so the premium paid for a low-carbon product delivers a recognised emissions reduction in return. i.e. tradable renewable fuel certificates recognised under NGER or other reporting legislation.

3. **Driving Markets:** Creating a 'reason' for the production and/or consumption of the fuel beyond customers choosing to pay more for renewable fuels out of their own personal desire or business benefit for fighting climate change. i.e. a demand side mechanism such as consumption targets or supply mandates.

The LPG Sector is currently at the Enabling Markets phase of policy support for Renewable Liquid Gases. Most forms of Renewable Liquid Gas are 100% drop-in capable

with no modification to appliances or supply chain and no technical or safety legislation impeding customer access, requiring little focus on Removing Roadblocks[15].

The majority of Australian LPG sector focus has been on Enabling Markets by connecting green premium paid to emissions reduction value received. The first success in this regard has been the inclusion of BioLPG and Co-processed LPG within NGER Emissions Factors[16]. This is the first step in allowing recognition of BioLPG consumption separate from LPG consumption.

From here, both of Australia's Low-carbon Liquid Fuel certification programs, Guarantee of Origin[17] and GreenPower[18], are actively developing BioLPG and Co-processed LPG certification. In parallel, GEA is actively working with the DCCEEW National Inventory Systems and International Reporting Branch to facilitate a Market-based Method for recognising BioLPG and Co-processed LPG emissions in national emissions accounts by recognising surrender of the above certificates.

The one missing piece is how to recognise BioLPG and Co-processed LPG consumption for LPG customers below the NGER reporting threshold of 50,000 tonnes CO^2e emissions per annum. GEA is working on this across government to understand the appropriate pathway to smaller customer recognition.

Once these steps are achieved, a voluntary market for BioLPG and Co-processed LPG should be enabled in Australia. An LPG consumer wanting or needing to reduce its emissions could then purchase BioLPG or Co-processed LPG, with the correct scope 1 emissions recognised.

1.8. Rationale for government action

LPG already delivers reliable, low-cost energy to millions of Australian customers, and remains their choice even when full subsidies remove electrification's price disadvantage. This advantage is strongest in regional Australia, where linear energy infrastructure is unreliable or absent and LPG's cylinder-based storage remains an order of magnitude cheaper than the battery alternative.

The infrastructure gaps that make electrification impractical for regional LPG customers today won't close by 2050, so these customers will still need a technically and

[15] With the exception of renewable dimethyl ether (rDME) which requires amendments to some standards. A low-impact renewable liquid gas opportunity in Australia, rDME should not delay drop-in renewable liquid gas uptake while rDME technical challenges are explored.
[16] Federal Australian Government, 2026, *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, available at https://www.legislation.gov.au/F2008L02309/latest/text
[17] Clean Energy Regulator, 2026, *Guarantee of Origin proposed cost recovery: new production pathways*, available at https://cer.gov.au/news-and-media/public-consultations/guarantee-origin-proposed-cost-recovery-new-production-pathways
[18] GreenPower, 2025, *LCLF and Biogenic CO2 Certification announcement*, available at https://www.greenpower.gov.au/news-and-events/news/lclf-and-biogenic-co2-certification-announcement

economically viable decarbonisation pathway of their own. Renewable liquid gas – delivered through the same cylinders, storage vessels and depots already serving LPG customers – is that pathway.

BioLPG production is already progressing through the Viva Energy and Origin Energy collaboration, and government policy progress has moved the sector past Removing Roadblocks and into Enabling Markets. Once certification and recognition has enabled a voluntary market, then policy will be needed to drive the market – potentially via a demand-side mechanism to make the business case for renewable liquid gas production stack up.

This consultation's proposed mechanism excludes LPG as a mandated fuel in its initial phase – and it is reasonable that first-phase mandate policy focus on the largest fuel supply chains. As this framework matures however, government should move towards including smaller fuel supply chains such as LPG in time. This will be key to ensuring that all Australian energy consumers are supported in their least-cost decarbonisation pathway.

In the meantime, care will need to be taken to ensure the settings adopted now do not produce unintended consequences for pathways not yet targeted by the core mandate. Protecting smaller supply chains right to voluntarily decarbonise is what will keep that least-cost pathway open for all Australian consumers, not just those covered by the initial mandate.

2. What we have learned: Australian BioLPG Potential & LCLF Policy

BioLPG represents a substantial, credible decarbonisation pathway for Australian LPG customers. But Europe's experience shows this potential can be undermined by mandate design, a risk that also sits within Australia's proposed Mandate.

If enabled, BioLPG co-produced alongside the CEFC's projection of Australian Biorefining potential could be enough to decarbonise half of Australia's current LPG demand. Importantly, the BioLPG will already exist within biorefineries – it only requires a small proportion of additional CAPEX to enable its supply into the LPG market – a cost the LPG sector will be willing to pay on a commercial basis when procuring BioLPG.

Europe's experience shows how this potential can be undermined. Despite BioLPG being an economically viable decarbonisation option for many European LPG customers, fuel-specific mandates have led biorefineries to redirect BioLPG production toward mandated outputs instead, because those outputs carry compliance value that BioLPG doesn't. As a result, only 2% of European biorefineries produce BioLPG[19].

Australia's proposed Mandate creates this same risk. Excluding LPG doesn't just fail to drive BioLPG uptake – it gives Australian biorefineries an incentive to direct BioLPG toward mandated fuel production instead, threatening to pause nearly a decade of sector investment until the Mandate's 2032 review.

Full mandate inclusion may not be the right response, and the LPG sector understands this. But the Australian Government should explore options to neutralise this disincentive so that the LPG sector can pursue BioLPG on its own economics, free of disincentives produced from policy as proposed.

2.1. Australian BioLPG Production Potential

Understanding BioLPG co-production ratios identified in Section 1.5, it is possible to determine the national BioLPG co-production potential. Based on CEFC Accelerated LCLF Scenario (2025), Blunomy analysis indicates that around half of total domestic LPG Demand could theoretically be supplied alongside theorized SAF and rDiesel supply.

This analysis demonstrates that in the event that LPG customers want or need to decarbonise their LPG use, around half of current LPG demand can be supplied BioLPG based on projected SAF and rDiesel co-production alone. If greater volumes are needed, "LPG-on-purpose" technologies leveraging energy crops and hydrogen are able to fill the remaining gap. So long as governments don't impede supply, renewable liquid gases have the potential to be an available option for LPG decarbonisation into the future.

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[19] European Commission, 2018, *A sustainable Bioeconomy for Europe*, available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52018SC0431
WLGA, 2021, *BioLPG The Renewable Future*, available at https://fliphtml5.com/addge/izfc/BioLPG_The_Renewable_Future_2021/

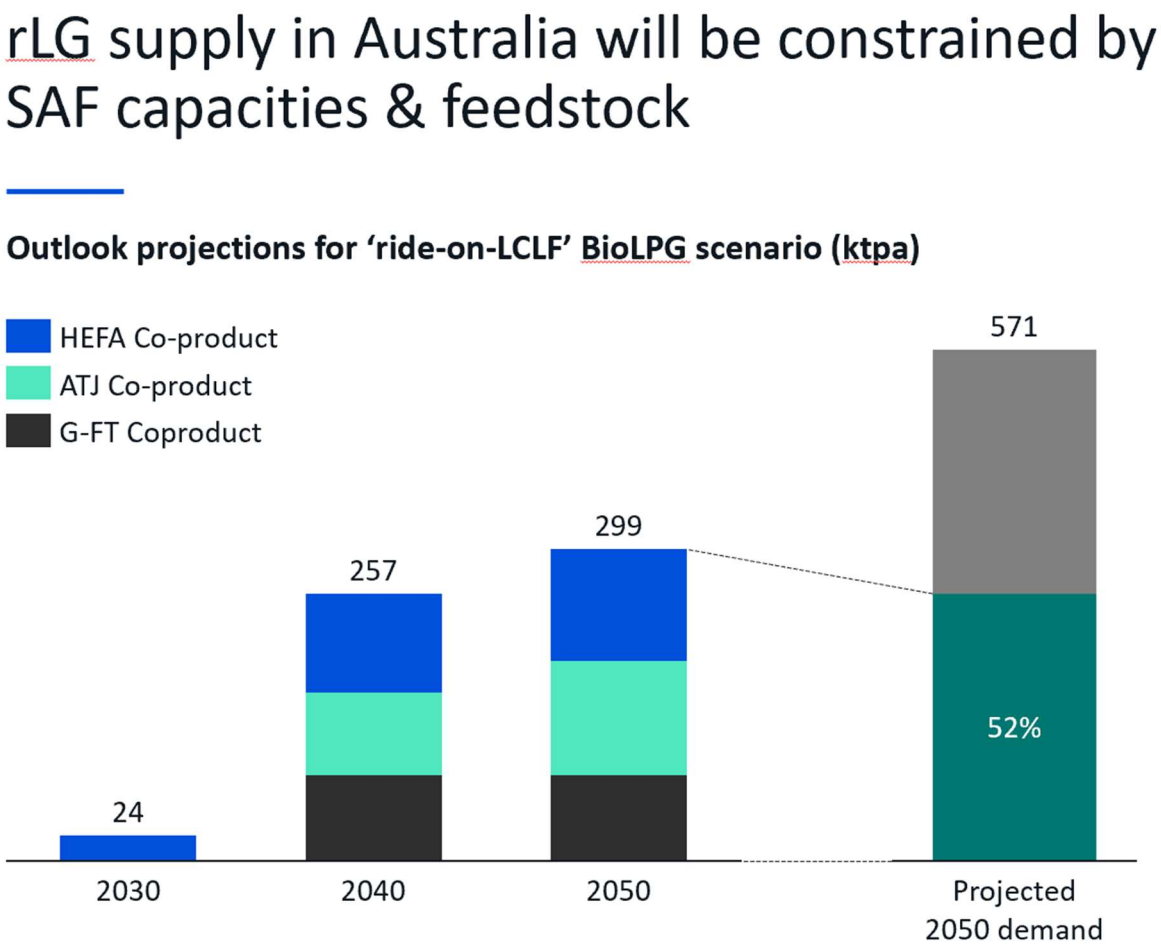

Figure 11: BioLPG Production Potential based on CEFC SAF & rDiesel Potential[20]

2.2. Case Study: European LCLF mandates

Europe provides an important case study of an unintended consequence of fuel-specific mandate policy. While BioLPG is produced in Europe, much of this isn't taken up by market, instead being reprocessed into other LCLFs – despite BioLPG being an economically viable decarbonisation option for many European LPG consumers.

European LCLF policy provides an important example of how fuel-specific policy can unintentionally create an economic disincentive to produce non-mandated LCLFs.

Europe has developed extensive policy support for renewable fuels, particularly rDiesel and SAF. The Renewable Energy Directive establishes binding obligations on fuel suppliers and specific targets for renewable fuels in transport, with the policy framework providing preferential treatment and compliance value to particular categories of renewable fuel.

This policy has successfully stimulated investment in advanced biofuel production. The European Commission's Joint Research Centre reports that consumption of preferential advanced biofuels in the EU rose from around 1 Mtoe in 2019 to over 4 Mtoe in 2023,

[20] Analysis by The Blunomy presented at the GEA 2026 National Forum – available upon request

driven by legislative certainty[21]. However, the economic effect of a fuel mandate extends beyond the fuel which is directly mandated.

Modern biorefineries can produce multiple products from the same feedstock and through the same processing pathway. In the case of HVO and HEFA facilities, BioLPG can be produced alongside the principal renewable diesel and SAF outputs[22]. The EU's own regulatory methodology recognises this characteristic of refinery production, explicitly providing for the allocation of emissions between a fuel and its co-products and treating the refinery as the relevant unit of analysis for fuel production[23].

This creates an important economic consequence. Where policy creates a compliance value for one refinery output but not another, the mandate does not merely incentivise production of the mandated fuel. It changes the relative economic value of the refinery's potential outputs – economically disincentivising non-mandated fuels.

The refinery will therefore rationally seek to maximise the value of its overall production subject to the constraints of its feedstock, process configuration and available markets. Where additional production, processing or allocation towards a mandated fuel generates compliance value, while an alternative co-product does not, the policy creates an economic incentive to favour the mandated output.

This is particularly important for renewable fuels which can be produced as co-products. Where a co-product is not itself covered by the mandate, increasing production of the mandated fuel can carry a greater economic value than separating and marketing the co-product. The mandate can therefore make the non-mandated fuel economically less attractive, even where it is technically viable and could deliver additional emissions reductions.

This is the issue demonstrated by BioLPG in Europe. BioLPG can be produced alongside mandated renewable fuels, but where its use does not generate equivalent compliance value, the refinery has an economic incentive to maximise the value of the mandated output rather than the total decarbonisation value of all available outputs.

The consequence is a broader policy risk. Fuel-specific mandates can distort the economics of integrated biorefineries in favour of mandated fuels and against non-mandated fuels, including co-products which could otherwise contribute to decarbonisation.
The disincentive to produce non-mandated fuels comes from the incentive to produce the mandated fuels. Non-mandate hydrocarbons produced through HVO/HEFA and Alcohol to Fuel processes are able to be converted into a marginal additional volume of

[21] European Union, 2026, *Biofuels and biogas in co-processed fuels*, available at https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/biofuels_en
[22] European Commission, 2018, Biorefineries distribution in the EU, available at https://publications.jrc.ec.europa.eu/repository/handle/JRC113216
[23] WLGA, 2024, Renewable LPG 2024 The Decarbonised Future, available at https://online.fliphtml5.com/addge/rsge/

mandated hydrocarbons, or can be used to marginally reduce the overall carbon intensity of produced fuels. LPG wholesalers need to pay above the commercial cost for BioLPG, also covering the revenue receivable from mandated fuel markets.

The lesson for Australian policymakers is that an LCLF mandate should consider not only which fuels it incentivises, but also which fuels it may economically disincentivise. A mandate directs capital, feedstock and production capacity toward the fuels it covers – and away from those it doesn't. Fuels left outside it don't just miss the incentive, they gain an economic impediment to their underlying investment case, even where they'd otherwise be a viable or lower-cost option for decarbonising customers.

2.3. Unintended consequences of proposed LCLF Mandate

Elements of the unintended consequences seen in EU LCLF policy can be seen in the proposed mandate policy. While the impacts on the mandated fuels are well captured by the consultation paper, the negative impacts on investment in non-mandated fuels is not.

Excluding LPG doesn't only elect to not drive BioLPG uptake – it elects to introduce an economic disincentive for Australian biorefinery developers to deploy the additional CAPEX required to produce BioLPG. This is because BioLPG can be redirected to support production of additional mandated LCLFs.

This sets the LPG sector back in its attempt to enable its LCLF alternative. As it stands, almost a decade of dedicated LPG sector investment in advancing BioLPG for LPG customers will be put on pause until after the proposed 2032 policy review.

Regional Australian LPG customers with no other viable decarbonisation alternative will be left waiting for that pause to lift. These customers already sit outside the electrification options available to metropolitan Australia, as set out earlier in this submission. A mechanism that only recognises BioLPG once the review concludes leaves them with no supported pathway in the meantime.

The lesson for Australian policymakers from the European experience is that an LCLF mandate should consider not only which fuels it incentivises, but also which fuels it may economically disincentivise. A mandate directs capital, feedstock and production capacity toward the fuels it covers. Fuels left outside it don't just miss the incentive – they can lose the underlying investment case altogether, even where they'd otherwise be a viable or lower-cost option for their own customers.

While the solution may not be full mandate inclusion, alternative solutions may be possible. Government should explore options that neutralise this disincentive without folding LPG into the core mandate, so the LPG sector can pursue BioLPG on its economics, rather than with an economic disincentive to decarbonise.

3. Conceptual framework Feedback: Addressing unintended consequences

The Cleaner Fuels Mandate as currently proposed achieves its intended aims for the fuels it is intended to target. However, this comes with an unintended consequence. Proposed mandate design introduces an economic disincentive to BioLPG production – pausing a decade of LPG sector work to decarbonise LPG months before the first Co-produced LPG is about to arrive.

GEA is certain that this is not the intent of this policy. While mandate inclusion may not be the right approach, options to neutralise this economic disincentive need to be explored. Otherwise, LPG customers reliant on BioLPG to decarbonise may be left without an option until the mid-2030s.

The proposed design already offers a pathway. By introducing Voluntary BioLPG Recognition, obligated entities could generate LCLF Mandate Credits for voluntarily supplying BioLPG. This would be supported by the same Guarantee of Origin or GreenPower LCLF Certificates already identified for mandated LCLF recognition.

Importantly, this would not materially change the underlying policy design, nor guarantee LPG customers any particular volume of BioLPG supply. At only a couple of per cent production by volume alongside SAF and rDiesel, BioLPG-based certificates cannot meaningfully alter an obligated entity's obligation, and all other design elements remain intact. The only change this introduces is removing the economic disincentive currently facing BioLPG production.

Aside from introducing Voluntary BioLPG Recognition , GEA supports all other design elements of the proposed policy.

3.1. Voluntary BioLPG Recognition

Voluntary BioLPG Recognition would function alongside the core Mandate. Obligated entities would not be required to supply BioLPG or Co-processed LPG. However, if an entity chooses to supply either into the domestic market, that supply would produce the same credits proposed for entities supplying above their LCLF obligation volume.

An obligated entity could then use LCLF Mandate Credits created from BioLPG supply to reduce its own obligation or sell them to another obligated entity. This breaks the economic disincentive created by the proposed Mandate design. Once BioLPG supply can reduce an obligation, an obligated entity has an equal incentive to bring it to market, rather than a higher incentive to consume it in mandated fuel production.

This would leave the LPG sector needing to compete on an economic basis to secure BioLPG supply – which is exactly where the LPG market sits today. Removing the disincentive doesn't guarantee BioLPG volumes for LPG customers. But it does put

BioLPG production back on a level footing, leaving the sector to secure supply the same way it competes for supply now – on price and value.

3.2. Preservation of underlying policy intent

Voluntary BioLPG Recognition preserves what the Mandate is designed to deliver. Obligated entities retain their full existing obligation and every compliance pathway already proposed. While a small additional LCLF volume would be introduced into the scheme, the proportion is expected to be negligible despite the number of customers it could support.

Scheme integrity is preserved as BioLPG and Co-processed LPG certificates are being developed through the same Guarantee of Origin and GreenPower frameworks already proposed for mandated LCLF. Any credit created this way carries the same verification standard as one from a mandated fuel, with no new certification pathway introduced.

The approach also sits within consultation design principles. Stakeholder consultation found strong support for technology-neutral design, letting multiple fuels compete on their merits. The paper's guiding principles also require regional communities not be disproportionately affected – a principle Voluntary BioLPG Recognition would serve given LPG's customer base sits overwhelmingly in regional Australia.

4. Consultation Questions

Obligation fuels – proposed coverage of diesel, jet fuel and petrol
GEA supports an initial obligation focused on the largest fuel supply chains, and does not propose LPG be added to obligation fuel coverage.

However, this design has an unintended consequence. Because BioLPG is a co-product of mandated fuel production, excluding it from any recognition gives biorefineries an incentive to not produce BioLPG, instead focusing on mandated fuel volumes. GEA recommends this be addressed through a voluntary crediting pathway sitting alongside the mandate, not through mandate inclusion.

(see Sections 1.8 and 2.2–2.3 of GEA's submission.)

Supporting domestic LCLF production – does the framework support domestic production relative to imports
As designed, the framework risks discouraging domestic BioLPG production for the same reason. GEA is confident that this was not an intended outcome of Mandate design. However, through the intersection of mandate exclusion and project economics, biorefineries are economically disincentivised from producing any non-mandated LCLFs.

Biorefineries have a stronger incentive to direct co-produced BioLPG toward producing or reducing CI for mandated fuel volumes than to enable on selling it as BioLPG. This affects the Viva Energy–Origin Energy BioLPG project already underway, and the broader potential GEA has identified, where roughly half of current LPG demand could be met by BioLPG co-produced alongside projected SAF and renewable diesel supply.

Ultimately, this negatively impacts regional Australian LPG consumers which rely upon LPG for energy access, removing a key decarbonisation pathway.

(see Sections 1.6 and 2.1 of GEA's submission.)

Supporting domestic LCLF production – additional measures required
GEA proposes a complimentary measure of Voluntary BioLPG Recognition. This would be a mechanism allowing obligated entities to generate tradeable credits from voluntary BioLPG or Co-processed LPG supply, without BioLPG becoming an obligation fuel or being assigned any mandated volume. This removes the disincentive identified above while leaving the mandate's design and obligated entities' compliance requirements unchanged.

(see Section 3.1 of GEA's submission.)

Credit eligible activities – whether any additional LCLF should be recognised as eligible fuels
GEA recommends BioLPG and Co-processed LPG be recognised as fuels capable of generating credits under a voluntary pathway, not as mandated LCLF added to the core obligation. Both are already progressing through Australia's Guarantee of Origin and

GreenPower certification frameworks. First Australian production is expected within the next year through the Viva Energy–Origin Energy collaboration. The certification basis already exists to support voluntary credit generation without new obligation-fuel status.

(see Sections 1.5–1.6 and 3.1 of GEA's submission.)

Credit market – use of a credit market

GEA supports a credit market as a key aspect of the scheme. GEA extends its interest in credit markets to allowing voluntary suppliers, including BioLPG producers, to sell credits to obligated entities – participating in the credit market without being brought inside the mandate itself. This can help avoid the unintended consequence of creating an economic disincentive for biorefineries to produce non-mandated fuels (see Sections 3.1–3.2 of GEA's submission.)

Carbon-intensity and certification requirements – recognition of existing certification schemes

GEA supports Guarantee of Origin and GreenPower as the certification basis for LCLF generally, and notes BioLPG and Co-processed LPG certification is already being developed through these same schemes – meaning voluntary BioLPG credits would use existing verification rather than a new pathway. (see Sections 1.7 and 3.2 of GEA's submission.)