Submission

Transport and Infrastructure Net Zero Consultation Roadmap

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Introduction

This submission to the Transport and Infrastructure Net Zero Consultation Roadmap is made on behalf of members of **Gas Energy Australia (GEA)**.

GEA is the national peak body representing the downstream gas fuels industry - producers, refiners, fuel marketers, equipment manufacturers, gas transporters and retailers of LP Gas (LPG) and associated renewable gases, including low-carbon liquid-fuels (LCLF)[1].

GEA strongly supports the pathway to net-zero, and notes that the LP Gas sector will transition to net zero over the same timeframe as set for electrification and, going further, is forecast to transition to actual zero emissions from the mid-2030s.

GEA would be happy to discuss or expand upon any part of this submission in more detail.

Our interest in the Transport and Infrastructure Net Zero Consultation Roadmap

1. LPG is delivered to over 2 million Australian households and around 130,000 businesses nationally, almost exclusively by road. Our members provide safe, efficient and transportable energy to regional, domestic and industrial Australian consumers who require alternative options to the electricity grid – due either to restricted access to infrastructure, or for specialised energy needs.
2. LPG is also an existing, lower-emission and efficient maritime transport-shipping fuel alternative to diesel. Three recently commissioned LPG fuelled vessels in the Australian maritime fleet[2], demonstrate greater engine efficiency coupled with measurably fewer emissions than the diesel equivalent (95% reduction in sulphur dioxide, 20% reduction in nitrogen oxide, 99% reduction in particulate emissions). Ultimately, such vessels could be operating with net-zero emissions by the mid-2030s without any modification, fuelled by:
    a. Net zero bioLPG will be available in Australia from as early as 2025-26. It is sourced from plant waste or a by-product of sustainable aviation fuel production using the hydrotreated vegetable oil (HVO) process.
    b. The advent of renewable synthetic LPG (rLPG), made from green hydrogen and CO2 taken from the atmosphere, is an actual zero gas. That is, the only CO2 expelled when it is burned is what was used to make it. It has zero impact on the environment and requires no offsets. It is forecast that rLPG will be available in Australia from the mid-2030s.

[1] *Pathway to zero emissions for LPG (2023); Frontier Economics*

[2] Origin Energy, LPG powered fleet, 2022. https://www.originenergy.com.au/business/lpg/customer-stories/lpg-powered-ships-lpg-case-study

Consultation response

SECTION 3.2 ROAD – HEAVY VEHICLES

Q9. Do you agree with the proposed net zero pathway for heavy road vehicles? 9.1. Please add details to your response.

GEA fundamentally agrees with the principles of the net zero pathway – but urge that access to customers, productivity and increasing vehicle mass to be balanced in consideration, while striving to achieve net zero emissions targets.

We recognize emission reductions previously achieved through implementation of Euro V standards, which have been supported by the transport sector through fleet replacement and adaptation.

To facilitate sustainable productivity levels, future transport infrastructure access, capacity and resilience needs to reflect the inevitable increase vehicle mass & technological advances.

Q10. The proposed pathway for heavy road vehicles relies on a mix of battery electric, hydrogen fuel cell and low carbon liquid fuels.

Rank from 1 to 3 the order in which these should be prioritised for emissions reduction. 10.1. Please add details to your response. Why did you rank them in that order?

GEA notes that the transition to net-zero for transportation requires multiple fuel sources to meet a range of needs. We also wish to acknowledge the clear *interconnectedness* of static (home, business, commercial) energy requirements, with transport fuel requirements and the critical role of liquified compressed gases - including compressed hydrogen and renewable LPG - as readily *transportable* energy alternatives to diesel and electricity. Put simply - we need to be able to facilitate that energy delivery via roadways.

In terms of vehicle fuels which will facilitate our transport fleets to deliver those energy products:

1. **Biodiesel** is a direct and suitable fuel alternative for current diesel vehicles, and requires minimal equipment or business adaptation for use, and thus is the currently preferred alternative fuel.

   However, it is not currently accessible in sufficient and reliable volumes, or at an economically viable price to be considered a sustainable fuel alternative. Government support to develop this fuel option could be greater.

2. The Roadmap acknowledges that **electrification** is not the optimum solution for heavy vehicle and long-haul transportation. Our sector does see it as a potential option of local short-haul transport.

However, it is clear that battery electric infrastructure for heavy transport is currently underdeveloped. Recent industry experience of battery electric technology is that charging stations are required at transport loading and unloading sites to manage range and fuel access (the status quo is that many of these sites have diesel refuelling facilities). Notably - electric charging stations, and electrically propelled vehicles with lithium-ion batteries in conjunction with carriage of flammable gases may under some conditions present a significant, or unacceptable hazard (either at site, or in transit).

3. **Hydrogen** fuel technology forms a part of current product development for our member businesses and is forecast to become a suitable long-haul option.

   However, hydrogen supply infrastructure and commercially feasible transport technology is not readily available, so time-line projections within this consultation are optimistic, based on current projections and understanding of the transportation technology in development.

11. What role should low carbon liquid fuels play in heavy vehicle decarbonisation?

GEA fundamentally agrees with the principles of the net zero pathway but notes the absence of some LCLF technologies in consideration.

BioLPG, rLPG and rDME are existing renewable LCLF technologies, and sustainable 'drop-in' diesel fuel alternatives well suited to marine and heavy vehicle applications, as described in more detail in the following sections.

GEA ask that these LCLFs be considered accordingly within the Roadmap.

12. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce heavy vehicle emissions?
12.1. How would these actions address the identified challenges and opportunities to reduce heavy vehicle emissions?

- To quote the consultation document*, "The high upfront cost of switching to low and zero emission heavy vehicles, together with the potential impact heavier vehicles would have on our road pavements, will remain challenging…"*
- Our members have concerns regarding the balancing of emissions, access and infrastructure, and in particular how that relates to safety and productivity.
- These concerns will eventually relate to transport authorities, regulators, infrastructure management and other stakeholders.
- Sustainable productivity is an underlying driver for the Roadmap, and the consultation document describes the context in which vehicle mass limits and productivity are related:

- *Battery electric trucks are significantly limited in range (by comparison to current fleet vehicles), as well as necessitating significant reduction in payloads. Low carbon liquid fuels (including liquid gas fuels) will be required for larger payloads and distances.*
- *There are current regulatory barriers in terms of vehicle properties and mass limits which further constrain vehicles with drive mechanisms which increased mass- i.e. increased tare mass for vehicles using non-traditional drives.*

- LP Gas delivery vehicles, for bulk or cylinder gas delivery are specialised vehicles, customised specifically to carry Class 2.1 Dangerous Goods in particular volumes, in accordance with all the requirements of national and state legislation and regulation.

GEA request that close consideration be given to the following:

1. **Sustainably fuelled, low-emission vehicles are heavier. As a result, payloads currently suffer a corresponding decrease where vehicle mass limits apply.** A decreased vehicle payload is counter-productive to the core objectives of the Roadmap – of increased safety and productivity, and reduced greenhouse gas (GHG) emissions. Decreasing payload means more trips to deliver the same amount – reducing productivity, and increasing time on the road and the relative exposure to various forms of risk.

   We note that *there are a number of ways in which additional payload can be facilitated* by changes to regulation relative to specific vehicle parameters.

   Following is a simplified Case Study to demonstrate the level of impact.

Case Study #1 – local delivery trucks

Company "A" has 50 purpose-built rigid, 2-axel LP Gas delivery trucks for delivering gas to residential homes and small businesses in an Australian capital city, and nearby towns.

Each truck has a 15.5 tonne Gross Vehicle Mass (GVM), limited by regulation, which allows them to drive on all publicly accessible roads to reach their customers. Each truck can carry a 5-tonne payload.

If the truck vehicle mass is increased by 1 tonne, through the addition of a battery/electric drive or other emission reduction technology – then the payload must correspondingly decrease to meet the maximum mass allowed on the access the roads where customers are situated. That means a 5-tonne payload, becomes 4 tonne payload.

A truck carrying 5 tonnes of gas, travelling 250km per day, can deliver 125 tonnes of gas per month (in 25 delivery runs). That's 6250 km travelled per month, per truck.

A truck carrying 4 tonnes per trip needs to carry out 32 (31.25) trips to deliver the same amount of gas - around an extra 1563km per truck, per month., or an extra 18,756km per year.

For a fleet of 50 trucks, a 1 tonne payload difference per truck will mean over 937, 800km <u>extra</u> travelled per year.

(This is a deliberately simplified this example. Notably - battery/electric drives for trucks of this type currently have an additional tare mass nearer to 2 tonnes.)

2. Therefore, infrastructure needs to be funded, designed and maintained to manage increased vehicle mass to facilitate efficient heavy vehicle transportation; or delivery access, public safety and industry productivity will be directly and detrimentally affected.

   GEA suggest that costs of change to reduce GHG emissions - a change we support – must be fairly distributed between adaptation of both the transportation sector and infrastructure asset owners and managers. There is an obligation on government to facilitate essential services and economic activity by providing suitable and reliable transportation infrastructure access.

3. Comparisons are fairly made between the operating emissions of new and existing vehicle technologies when considering a replacement fleet; however, prior to ever being used there is also a high energy requirement and resulting embodied carbon footprint in the production and manufacturing of new vehicles – some calculations put that initial production energy around 20% or more of the operational carbon footprint (variable based on the vehicle type and application).

   Replacement of existing operational vehicles with new vehicles has an embodied carbon cost of production which must be considered, equivalent to 2-10 years of (existing) vehicle operational emissions. Therefore, replacing vehicles ahead of the optimal operational lifetime will likely result in an overall increase in net GHG emissions.

SECTION 3.4 MARITIME

17. Do you agree with the proposed net zero pathway for maritime? 17.1. Please add details to your response.

GEA fundamentally agrees with the principles of the net zero pathway, but note the absence of some LCLF technologies in consideration.

These technologies are described below and detailed in the following section ''A note on low-carbon liquid fuels''

18. The Australian Government is engaging in consultation as part of the development of the Maritime Emissions Reduction National Action Plan and those consultations will also inform the final Roadmap and Action Plan. 18.1. What additional actions by governments, communities, industry and other stakeholders need to be taken now and in the future to reduce maritime emissions? 18.2. How would these actions address the identified challenges and opportunities to reduce maritime emissions?

- Australia's most recent bulk-shipping fleet purchases include three vessels designed to run on conventional LPG. These vessels emit almost zero particulate matter (PM) emissions, and significantly lower carbon, NOx and SOx emissions, than diesel fuelled vessels
- LPG is a non-toxic vapour when depressurised and it *is not a greenhouse gas* (GHG)– which means in the event of a fuel spill, LPG vaporises and dissipates, presenting *no environmental risk unlike liquid diesel fuels*. It is significantly safer for the marine environment than any liquid fuel – and it is available today in sufficient volumes.
- BioLPG is net-zero emissions, and molecularly identical to conventional LPG. It is a 'drop-in' replacement for LPG. BioLPG can be readily produced from biomass, and as a by-product of biogas, renewable diesel, and sustainable aviation fuel production.
- Renewable LPG (rLPG) is a derivative of green-hydrogen, and an actual-zero emissions renewable fuel.
- Dimethyl ether (DME) is another internationally used fuel supplement, liquid hydrocarbon and biofuel, and it can be produced from the same biomass or hydrogen sources as bioLPG or rLPG. When mixed in appropriate proportions rDME is another 'drop-in' LPG fuel-alternative.

A note on low-carbon liquid fuels

As noted above there are renewable, sustainably produced forms of LPG and DME, which are recognised 'drop-in' fuel technologies, alternatives to diesel and natural gas which are viable not only for transportation but for a range of household, commercial and industrial uses.

Critically – these low-carbon gas fuel technologies are interrelated with the production of other sustainable fuels. LPG was a valued by-product of petroleum and natural gas refining – but it can also be produced through the production facilities for renewable/bio diesel, sustainable aviation fuel, and green hydrogen. As a complimentary, but different fuel type, renewable liquified fuel gases enhance the economic case and facilitate investment for the production of other sustainable fuels. To use the analogy of dairy production – milk, cream and butter all rely on a single source, but at the dairy they are separated and distinguished for different uses through a process of refinement – same source, same dairy, but different products for different needs. Producing a range of diverse products for a range of customer makes the *dairy* more sustainable.

BioLPG:

- Derived from waste biomass.
- Produced as a byproduct of biodiesel and/or SAF production using the HVO process.
- Molecularly identical to LPG – it is propane gas.
- A simple 'drop in' replacement for LPG. 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. transport, farming) reduce their emissions.

Renewable LPG (rLPG):

- Synthetically produced from green hydrogen and atmospheric CO_2
- Molecularly identical to LPG – it is propane gas.
- A simple 'drop in' replacement for LPG. Same storage, transport infrastructure and appliances. No change. No additional capital costs.
- Is an *actual zero* emissions, the only CO_2 expended in its use is what was captured in its creation.

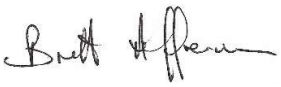
Renewable dimethyl ether (rDME):

- Derived from methanol (generally from waste biomass)
- Chemically similar to LPG (propane and butane).
- Can be blended with LPG, bioLPG and/or rLPG with no change to appliances.
- Derived from gasification and catalytic synthesis or electrolysis (i.e. green H2) and catalytic synthesis.
- As described above, it is net zero, but can be actual zero as related sectors (i.e. transport) reduce their emissions.

GEA ask that these LCLFs be considered accordingly within the scope of fuel alternatives considered by the Roadmap.

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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