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Ministry for the Environment – Manatū Mō Te Taiao
PO Box 10362, Wellington 6143, New Zealand

By email: climateconsultation2021@mfe.govt.nz

Gas NZ Submission on Te Hau Mārohi ki Anamata – Transitioning to a low-emissions and climate resilient future

Tēnā koutou e te rangatira mā o Te Manatū Mō Te Taiao

Gas NZ, representing the LPG Association (LPGA) and the Gas Association of New Zealand (GANZ), is committed to net zero carbon by 2050. Our submission encourages an orderly transition and new opportunities for energy diversity and growth.

With a focus on the issues pertaining to gas and LPG in the transition to a low carbon economy, our primary recommendation is that Government introduce a Renewable Gas Mandate requiring procurement targets and goals for renewable LPG, renewable gas, and hydrogen, through to 2050.

Gas is a fuel in transition and work is well underway to introduce renewable gas and renewable LPG into homes and businesses. The industry has invested in feasibility studies and pilot projects that support the viability of phasing in renewable LPG and gases into existing New Zealand energy networks. With the right policy settings in place, the industry can start to introduce low emissions alternatives by 2025 and scale up significantly by the end of the decade.

There are substantial opportunities for the circular economy in the 'waste' feedstock needed for renewable LPG and gas, while at the same time providing regional prospects for industry, local communities, iwi, and Māori businesses, to be part of a carbon zero future. We are already working with a number of these groups to develop opportunities.

According to the Gas Infrastructure Working Group, gas pipelines supply over 760,000 residential gas consumers (residents not connections). In addition, over 19,000 businesses such as restaurants and hotels use natural gas.

We do not support a ban on new gas connections, which would be detrimental to achieving the Government's renewable energy goals, unnecessarily closing off options for renewable gases like hydrogen. It is essential that pipelines, connections and appliance infrastructure are maintained to support future demand for renewable gas and renewable LPG. Prematurely limiting or closing off these options undermines efforts to develop a renewable gas industry and directly harms energy users in hard to abate sectors that are expected to create significant economic opportunities over the coming years (such as hospitality, horticulture, and food processing).

LPGA and GANZ are committed to working with government, our customers, communities and iwi to ensure an orderly and equitable energy transition. We strongly urge government to involve the gas and LPG industries as it considers the feedback received from the discussion document and the detail of the emissions reduction plan forms.

Our submission is supported by the Bioenergy Association, the Hospitality Association, and the Business New Zealand Energy Council. We are listening we are collaborating and we welcome the opportunity to contribute.

Ngā mihi maioha

A handwritten signature in blue ink, appearing to read "Janet Carson".

Janet Carson

Chief Executive

The LPG Association and the Gas Association of New Zealand

Gas NZ Submission on Te Hau Mārohi ki Anamata – Transitioning to a low-emissions and climate resilient future

1. PURPOSE

The purpose of this submission is to provide feedback on the high-level Te Hau Mārohi discussion paper; to reinforce the criticality of gas and LPG as fuels in transition; and to propose specific steps the government can take to ensure an orderly and equitable transition.

A key option available to decarbonise New Zealand's energy system is to use existing gas infrastructure and networks to transport zero carbon gas. The most promising options for decarbonising gas infrastructure are to incorporate biogas and hydrogen into natural gas systems and to incorporate bio-LPG and biomass derived dimethyl ether (rDME) into LPG systems.

Over the past few years, Gas NZ members (representing the LPGA and GANZ) have been advancing commercial and R&D opportunities for these gases. These opportunities are consistent with the Climate Change Commission's guiding principle of keeping options open – New Zealand will need all possible tools, including zero carbon gas, to achieve net zero by 2050.

This submission addresses the work that industry has done to date to achieve these outcomes and our direction of travel on a journey that will take many years. While this submission concludes with proposals in respect of the Carbon Emissions Reduction Plan, we urge government to involve the gas and LPG industry as it considers the feedback received and it forms the detail of the emissions reduction plan and associated regulations.

2. RENEWABLE LPG

Bio-LPG is similar to biogas in terms of its technical readiness and ability to play a role immediately. Many countries in Europe already have sources of bio-LPG in their energy mix and no changes to consumer appliances are required because bio-LPG is chemically identical to conventional LPG.

In Europe the production of bio-LPG mostly comes from bio-refineries, whereas domestic production of bio-LPG in New Zealand can leverage off the development of a domestic biofuels industry (with bio-LPG forming part of the output product mix).

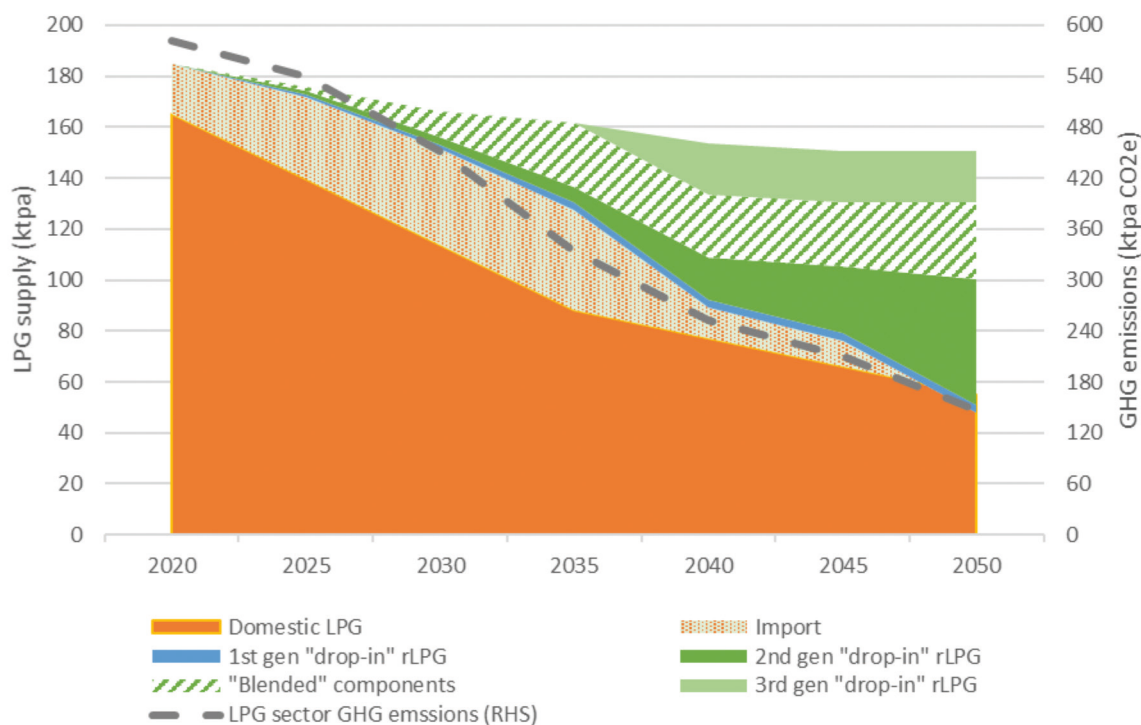
In March this year, the LPGA commissioned Worley to provide a technical view of the pathways to bio-LPG for New Zealand. This report concludes that available pathways could supply around 30% of LPG demand by 2035 – resulting in emissions reductions that are consistent with the Commission's carbon budgets¹.

Since bio-LPG could also be imported, there are existing supply chains to accept fuels and integrate them alongside domestic production if required. This provides additional assurance that supply can be brought to market as needed.

The estimated supply of LPG in the Worley report is shown in the following LPG Market Projection graph– with the green areas provided via renewable LPG (rLPG) pathways. The emissions reductions achieved are significant, lowering emissions from around 600,000 tCO₂ per year today to 300,000 tCO₂ per year in 2035g.

¹ Worley Report: Pathway to 70 / 100% renewable LPG March 2021

LPG market plan – 70% rLPG substitution



Since Worley completed the March 2021 report, industry has focused on identifying the most promising early opportunities for the production of rLPG and rDME.

Renewable LPG is being produced in Europe and increasingly in the USA and other parts of the world as a byproduct of the hydrotreating of vegetable oils for biodiesel. This process is unlikely to be a substantial source of rLPG in New Zealand. Emerging developments and 2nd generation technologies open real opportunities for New Zealand to produce rLPG within the next few years.

Alternatively, there are mature technologies available now for the production of rDME from a variety of feedstocks, including dairy manure and municipal and abattoir waste streams. Pathways via biogas and methanol as well as gasification and syngas to rDME technologies are mature with many technology providers. Production of rDME is gaining significant traction in Europe and the USA. It is the best prospect for making substantial early progress in the decarbonisation of LPG in New Zealand.

The New Zealand LPGA is working closely with the Australian LPG industry and Gas Energy Australia to cooperate on renewable LPG options.

2.1 Using rDME in domestic and commercial gas appliances

There is considerable work being advanced by various jurisdictions on the use of rDME and LPG blends, however current LPG regulations and Appliance safety regulations do not cater for the blending of rDME with LPG.

BSI, a certification body in the UK, is actively working on a testing regime to understand the performance of standard LPG products on a rDME blend and preliminary appliance testing in Japan on a range of appliances has shown normal operation for blends of 20% rDME and higher.

Given the large number of appliances in the market that would need to operate safely and effectively on a rDME blend without modification, testing would need to provide confidence across all existing appliance types.

The LPGA expects to finalise a second report from Worleys which aims to identify the most promising early opportunities for the production of rLPG and rDME by the end of 2021 and will share these findings with government when the report is complete.

There are some regulatory issues to resolve to enable the production of rDME beyond early concept and to make further progress on renewable gas blends. We have been in discussions with the regulator on these matters and understand the GIC is currently exploring, options for regulating renewable LPG, rDME and other renewable gases (such as hydrogen) in the future.

3. RENEWABLE GAS (BIOGAS)

Together with Fonterra, Beca and EECA, Gas Association New Zealand member First Gas released a study into the potential for biogas to displace natural gas in New Zealand and to help to better understand the realistic potential for biogas in New Zealand, given the availability of organic waste feedstocks. The key findings of the work completed by Beca were that:

1. The technology is mature and consists of two main components:
 - Anaerobic digestion to rapidly decompose organic waste to release biogas and produce digestate
 - Processing biogas to biomethane by removing CO₂ and any impurities from the raw biogas.

Biogas already displaces natural gas around the world, particularly in Europe. Denmark has already scaled up its biogas industry and now has 20% of gas supply coming in the form of biogas.

New Zealand has its first utility scale food waste anaerobic digestion plant under construction in Reporoa that will produce biogas and renewable fertiliser from Auckland's municipal food waste, rather than disposing of this waste at landfills. Developed by Ecogas, the Reporoa project is a great example of the circular economy in action.

There are two reasons that biogas projects to displace natural gas have not been economic in New Zealand, both of which are changing:

- The low cost of other waste disposal options. The producers of organic wastes (such as wastewater, dairy process waste, meat process waste, and dairy effluent) have historically been able to dispose waste through lower cost alternatives than anaerobic digestion.
- The low price of natural gas and unknown price premium for renewable gas. New Zealand has historically enjoyed relatively low-priced natural gas. Wholesale gas costs over the past decade have averaged \$7/GJ (in real 2019 prices). However, as the Climate Change Commission notes, natural gas prices will continue to rise in future years as carbon prices rise.

These market changes are having a real impact on the appetite for investment in biogas. In addition to the Reporoa project described earlier, we are aware of several other projects that are at pre-feasibility stages that would significantly increase New Zealand's use of biogas and reduce emissions from the use of natural gas.

4. HYDROGEN PROVIDES A VALUABLE OPTION FOR NEW ZEALAND'S LONG-TERM ENERGY TRANSITION

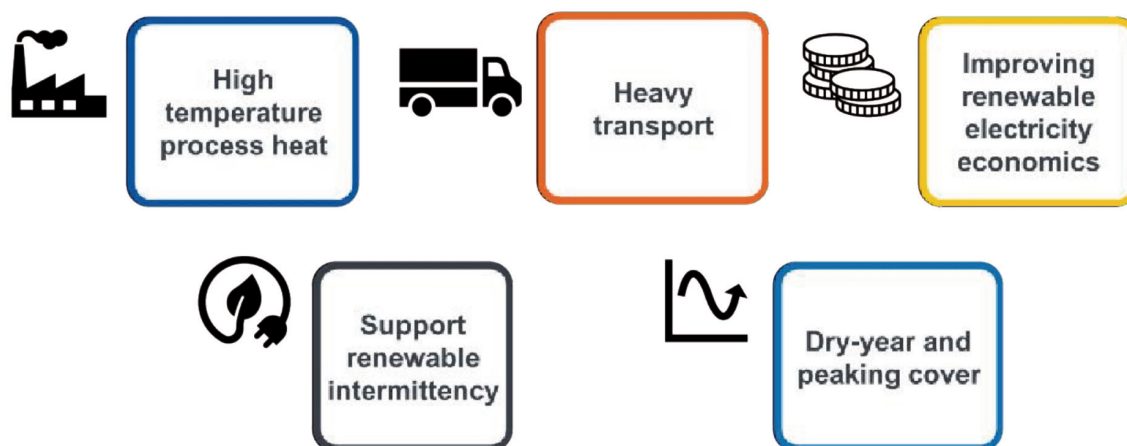
The energy system advantages and international progress on hydrogen mean that of all the future energy sector developments, hydrogen is perhaps the most exciting. This was recently reinforced by Lord Deben (Head of the UK Climate Change Committee) who expressed the view that New Zealand is ideally placed to lead the world on hydrogen deployment.

Gas networks are a critical enabler of the hydrogen economy. Without pipeline infrastructure, hydrogen would need to be transported at much higher cost and would be unable to economically reach the majority of customers.

There is immense international interest in realising the potential of hydrogen in energy systems. Around 30 countries have a national hydrogen strategy in place and \$70 billion of funding has been committed globally to hydrogen projects. This international interest is expected to bring the costs of critical hydrogen equipment (such as electrolyzers) down, while also leading to improvements in the hydrogen production process (for example by improving conversion efficiencies from electricity and water to hydrogen).

While biogas technologies and supply sources are available today, hydrogen is likely to take longer to make an impact on New Zealand's overall emissions profile. However, the real advantages that hydrogen brings for New Zealand are that it is scalable (to the full extent of New Zealand's renewable resources) and that it holds the potential to simultaneously solve several intractable problems facing energy system decarbonisation. The likely sources of hydrogen demand in New Zealand are shown in the figure below.

Sources of hydrogen demand in New Zealand



Significant work has also been completed exploring the future role that gas pipelines play in enabling the hydrogen economy in New Zealand². The key findings from the hydrogen pipeline study include:

- New Zealand's gas transmission and distribution networks are well-configured to deliver future hydrogen supply to meet demand. Network capacities are sufficient to transport hydrogen efficiently, notwithstanding hydrogen's lower energy value when compared with natural gas.
- The pipeline expenditure required to accommodate hydrogen is consistent with normal levels of renewal and replacement costs. Gas distribution networks are predominantly comprised of polyethylene (PE) pipes, which is the preferred material for transporting hydrogen (i.e., new dedicated hydrogen pipelines use PE pipes). While some distribution system equipment (such as valves) will need to be replaced, current pipeline tariffs should be sufficient to fund this expenditure. Required expenditure on the transmission system will depend on the findings of research currently underway into hydrogen embrittlement of high-grade steels (which make up around one third of the transmission system in New Zealand).

² Firstgas Hydrogen Pipeline Study 2020 (Summary Report)

















5. SETTING A RENEWABLE GAS MANDATE

Consistent with the government’s sustainable transport biofuels mandate proposal, we suggest that the best option to reduce emissions from natural gas and LPG is to set a renewable gas mandate (including renewable gas, renewable LPG and hydrogen).

Adopting a similar mandate for gas as has been proposed for transport fuels aligns with government’s response to a similar set of circumstances to address hard to abate emissions, its desire to repurpose existing infrastructure, and challenging economics of low emissions alternatives even with a relatively high carbon price.

At its most basic the mandate could focus on home and businesses heating, water and cooking, and would see escalating quantities required from 2025 to 2050. However, a more ambitious mandate could also include other gas users, for example process heat and possibly even gas for electricity generation.

The following table outlines the advantages and disadvantages of a renewable gas mandate applied to buildings vs setting a date to ban new gas connections.

Set a renewable gas and LPG mandate for a proportion of gas and LPG used in building heating, cooking and hot water to come from renewable (non-fossil fuel) sources.		Set a date by when no new gas connections are permitted.	
	High certainty of CO ₂ reductions		High certainty of CO ₂ reductions
	Risks new building systems having to convert to another fuel if renewable gas is not available		Avoids risk of new buildings installing heating systems that must be replaced within useful life
	Preserves options to decarbonise heat using gas appliances (biogas, hydrogen, bioLPG)		Closes off options to reduce emissions using gas appliances (biogas, hydrogen, bioLPG)
	Provides diversity in energy distribution channels		Decreases energy system resilience (puts all eggs in one electric basket)
	Risks increasing delivered price of gas (only) by requiring supply of less economic alternatives		Risks increasing delivered price of gas and electricity due to network economics
	Preserves value in existing networks and household plumbing systems		Strands existing assets in gas networks and household plumbing systems that can be repurposed
	Preserves public commitment to decarbonisation by enabling consumer choice of appliances		Risks losing public commitment due to the absence of comparable substitutes for gas appliances
	Retains a viable gas industry to service needs of ‘hard to abate’ emissions (electricity, process heat)		Closes off options for a just transition based on new gas-based solutions (biogas, hydrogen, bioLPG)

6. MAINTAIN THE INFRASTRUCTURE TO SUPPORT RENEWABLE GAS, RENEWABLE LPG AND HYDROGEN

There are substantial opportunities outlined in this submission to encourage introducing renewable gas, renewable LPG and hydrogen into networks. We do not support a ban on new gas connections, which would be detrimental to achieving the Government’s renewable energy goals.

It is essential that pipelines, connections and appliance infrastructure are maintained to support future demand for renewable gas and renewable LPG. Prematurely limiting or closing off these options undermines efforts to develop a renewable gas industry and directly harms energy users in hard to abate sectors that are expected to create significant economic opportunities over the coming years (such as hospitality, horticulture, and food processing).

7. PROPOSALS THAT SUPPORT THE OPTION OF ZERO CARBON LPG AND GAS

Acknowledging the potential of renewable LPG and gas, we propose government undertake the following:

- A. Set a renewable gas mandate, namely that a proportion of gas and LPG used in buildings and homes is to come from renewable (non-fossil fuel) source. This mandate should apply from 2025 at a low level, introducing growing renewable fuel supply requirements through to 2050.
- B. Direct the GIC to regulate renewable LPG and renewable gas, oversee a certification scheme, monitor security of supply and report publicly on the emissions profile of the gas and LPG industries.
- C. Do not ban new gas connections; the pipelines, connections and appliance infrastructure must be maintained to support a renewable gas and hydrogen future.
- D. Engage again with the industry, to ensure we have opportunity to input on the detail of these recommendations before the Carbon Emissions Plan is finalised.
- E. Provide for the explicit recognition of the opportunities for renewable LPG and gas in the national energy strategy, with clarity on expected progress and check in dates to assess whether these options are realising their potential.

8. ENERGY QUESTIONS

The following Q and A is part of our submission and outlines Gas NZ’s response to specific questions from the discussion paper.

Energy Strategy
<p>58. In your view, what are the key priorities, challenges and opportunities that an energy strategy must address to enable a successful and equitable transition of the energy system?</p>
<p>Gas as a fuel in transition, not only a transition fuel, and we urge Government to factor the growth of renewable gas and renewable LPG into its plan to meet New Zealand’s pledge for net zero carbon by 2050.</p> <p>We also urge the government to involve the gas and LPG industry as it considers the feedback received from the discussion document and the detail of the carbon emissions plan is formed.</p>

59. What areas require clear signalling to set a pathway for transition?

We recommend the government set a renewable gas mandate (including renewable LPG and hydrogen).

This is consistent with the government’s sustainable transport biofuels mandate proposal. Adopting a similar mandate for gas aligns with government’s response to a similar set of circumstances to address hard to abate emissions, desire to repurpose existing infrastructure, challenging economics of low emissions alternatives even with a relatively high carbon price. Suggestions such as banning new connections, would be detrimental to achieving the Government’s renewable energy goals, including unnecessarily off options like hydrogen. It is essential that pipelines, connections and appliances infrastructure are maintained to support future demand for renewable gas, renewable LPG and hydrogen.

Setting targets

60. What level of ambition would you like to see Government adopt, as we consider the Commission’s proposal for a renewable energy target?

We recommend a renewable gas mandate and seek to work with government to determine goals and targets that would achieve the emission reductions required to meet New Zealand’s carbon budgets.

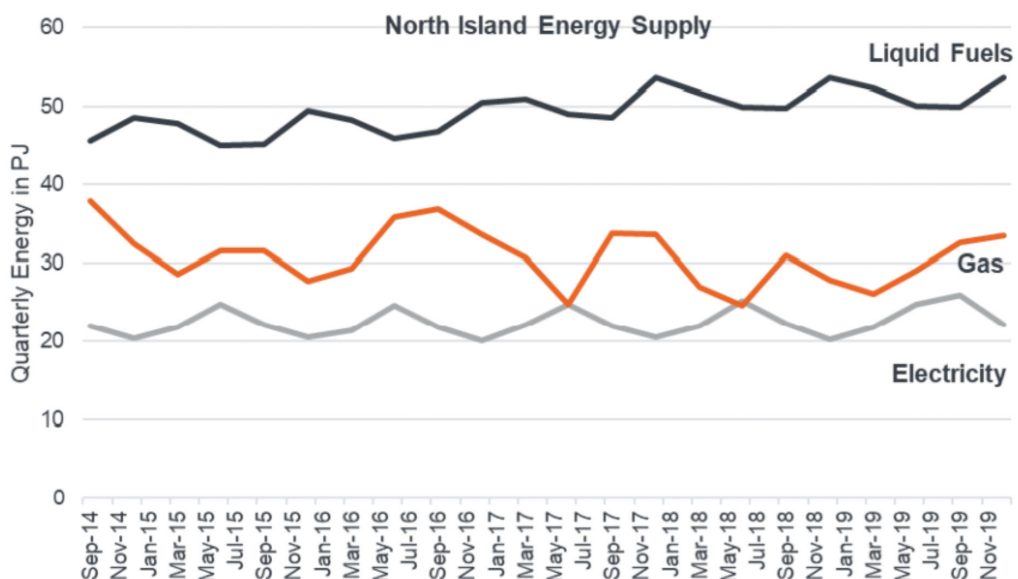
Phasing out fossil gas while maintaining consumer wellbeing and security of supply

61. What are your views on the outcomes, scope, measures to manage distributional impacts, timeframes and approach that should be considered to develop a plan for managing the phase out of fossil gas?

One of the key strengths of the New Zealand energy system today is its diversity of supply sources and distribution channels.

This feature of New Zealand’s energy landscape has proven particularly valuable in responding to natural disasters, where natural gas and LPG have played significant roles in providing energy continuity, such as following both the Canterbury and Kaikoura earthquakes. This is a strength worth preserving.

The graph below shows the amount of energy distributed around the North Island via existing electricity, gas and liquid fuels (petrol and diesel) networks. This highlights the challenge for distribution networks in the transition to lower carbon energy sources.



Converting liquid fuels demand to electricity will represent a 2.5x increase in the energy flowing across electricity networks in the North Island. As the Commission highlights in its draft advice, the electrification of light vehicles is imperative for New Zealand to achieve its emissions reduction plan.

Fortunately, much of this energy demand may be implemented without increasing existing electricity system peaks (effectively flattening the load curve). However, energy demand served by gas pipelines will be more difficult to transfer since gas and electricity have coincident demand peaks (both supply energy on cold, winter mornings and evenings).

Decarbonising the industry sector

Supporting evidence on fleet size and characteristics is welcomed.

Supporting development and use of low-emissions fuels

68. What level of support could or should Government provide for development of low emissions fuels, including bioenergy and hydrogen resources, to support decarbonisation of industrial heat, electricity and transport?

There are some regulatory issues to resolve to enable the production of rDME beyond early concept and to make further progress on renewable gas blends. We have been in discussions with the regulator on these matters and understand the GIC is currently exploring, options for regulating renewable LPG, rDME and other renewable gases (such as hydrogen) in the future.

9. BUILDING SECTION

72. The Building for Climate Change programme proposes capping the total emissions from buildings. The caps are anticipated to reduce demand for fossil fuels over time, while allowing flexibility and time for the possibility of low-emissions alternatives. Subsequently, the Commission recommended the Government set a date to end the expansion of fossil gas pipeline infrastructure (recommendation 20.8a). What are your views on setting a date to end new fossil gas connections in all buildings (for example, by 2025) and for eliminating fossil gas in all buildings (for example, by 2050)? How could Government best support people, communities and businesses to reduce demand for fossil fuels in buildings?

We do not support a ban on new connections, which would be detrimental to achieving the Government's renewable energy goals, including unnecessarily closing off options like hydrogen. We also note that a ban on new connections was not included in the Climate Change Commission's final advice.

Work is well underway to introduce renewable gas and renewable LPG into homes and businesses starting 2025.

The industry has invested in studies and pilots that support the viability of phasing in renewable LPG and gases into the New Zealand network. The policy settings and regulatory environment is critical. With the right policy settings in place, blends can start in the next few years.

We share the Government's view that there are hard to abate activities that cannot be economically electrified due to the high temperatures and scale involved. It is forecast that renewable electricity alone will not achieve the government's proposed energy targets and natural gas and LPG will be needed for some years yet to maintain some high value processing and manufacturing activities that are essential to our economy and to ensure thriving communities through the transition.

There are substantial opportunities for the circular economy in the 'waste' feedstock needed for renewable LPG and gas, while at the same time providing regional prospects for industry, local communities, iwi, and Māori businesses, to be part of a carbon zero future. We are already working with a number of these groups to ensure opportunities are supported and the industry maintain a social licence to operate.

73. The Government is developing options for reducing fossil fuel use in industry, as outlined in the Energy and industry section. What are your views on the best way to address the use of fossil fuels (for example, coal, fossil gas and LPG) in boilers used for space and water heating in commercial buildings?

The industry is already working to adopt existing renewable LPG and renewable gas technologies from overseas into New Zealand.

We consider the best way for addressing the 'phase-out' of fossil fuel in buildings is to squarely focus on the 'phase-in' of renewable fuels by way of setting a renewable gas mandate.

74. Do you believe that the Government's policies and proposed actions to reduce building related emissions will adversely affect any particular people or groups? If so, what actions or policies could help reduce any adverse impacts?

Please see response to question 75 below.

A focus on the phasing-in of renewable gases rather than a ban on new connections for example brings opportunity and choices for customers, iwi and regional communities.

75. How could the Government ensure the needs and aspirations of Māori and iwi are effectively recognised, understood and considered within the Building for Climate Change programme?

There are substantial opportunities for the circular economy in the 'waste' feedstock needed for renewable LPG and gas, while at the same time providing regional prospects for iwi and Māori businesses.

Iwi have repeatedly expressed a desire for devolved funding models and decision-making. A renewable gas mandate provides opportunity for iwi to determine what options are best for them in a low carbon future. A renewable gas mandate simply reduces reliance of fossil gases in line with the carbon emissions budget, without ruling specific fuel sources in or out.

Further, renewable energy opportunities will be dispersed across regional boundaries. This will lead to further opportunities for iwi in their respective rohe (regions) to be involved in developments and to work with others. The Tūaropaki Trust is an example. The trust's diverse business portfolio includes a geothermal power station, hydrogen energy production, engineering and drilling services; all of which meet the challenges of, or respond directly to a new energy future.

The gas and LPG industry consider iwi involvement in the transition critical to a renewable gas and LPG future and is already working with iwi and Māori businesses to ensure inclusion, that opportunities are supported, and the industry maintain a social licence to operate.