Firstgas Group

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Sent via email: info@infracom.govt.nz

Dear Ross

Importance of gas infrastructure in New Zealand's transition to zero carbon

Firstgas Group welcomes the opportunity to comment on the Infrastructure Commission's (the Commission) consultation document *"He Tūāpapa ki te Ora: Infrastructure for a better future"* released in May 2021.

Firstgas Group owns and operates Firstgas and Rockgas, two consumer brands that supply natural gas and LPG to over 165,000 customers, as well as New Zealand's only gas storage facility, Ahuroa. We support the Government's commitment to transition to net zero emissions by 2050 and believe that our existing gas infrastructure and work on zero carbon gases can be an important enabler of this transition. **Attachment 1** provides a full summary of Firstgas Group.

We recommend that the Commission recognises the potential of zero carbon gases. At Firstgas Group we have set the ambitious target to decarbonise our gas network by 2050. The decarbonising of our infrastructure offers supplementary and complimentary solutions to New Zealand's energy transition. The Commission's consultation document should incorporate detail on these zero carbon opportunities into its strategic goals such as principal four[1] and action areas F2, F6 and S3.[2]

Our submission focuses on the role of gas and gas infrastructure in New Zealand's transition to net zero carbon emissions. Our submission covers three areas:

- **The Commission should consider the prospect of a zero carbon gas enabled transition.** We set out the benefits possible from zero carbon gas integration and how we are readying our existing infrastructure to supply green hydrogen.
- **Encouraging the circular economy**. Our case for using this infrastructure strategy to facilitate collaboration on a circular economy, for innovative uses such as harnessing high nutrient waste to produce biogas.
- **The challenges of low carbon energy storage** and how the decarbonisation of our Ahuroa gas storage facility can play a pivotal role in to alleviating dry year capacity issues of the electricity market.

We expand on these points below and would welcome the opportunity to meet with Commission staff to discuss our submission.

[1] Page 14, *Te Waihanga*, Infrastructure-Strategy-Consultation-Document-May-2021.pdf (infracom.govt.nz)
[2] Page 54, *Te Waihanga*, Infrastructure-Strategy-Consultation-Document-May-2021.pdf (infracom.govt.nz)

Our case for a gas enabled energy transition

Firstgas Group consider that zero carbon gases provide an achievable pathway to reducing carbon emission in New Zealand. We are preparing our existing gas infrastructure for the transport of hydrogen and biogas and recommend that this work is reflected in the consultation document sections on addressing climate change.

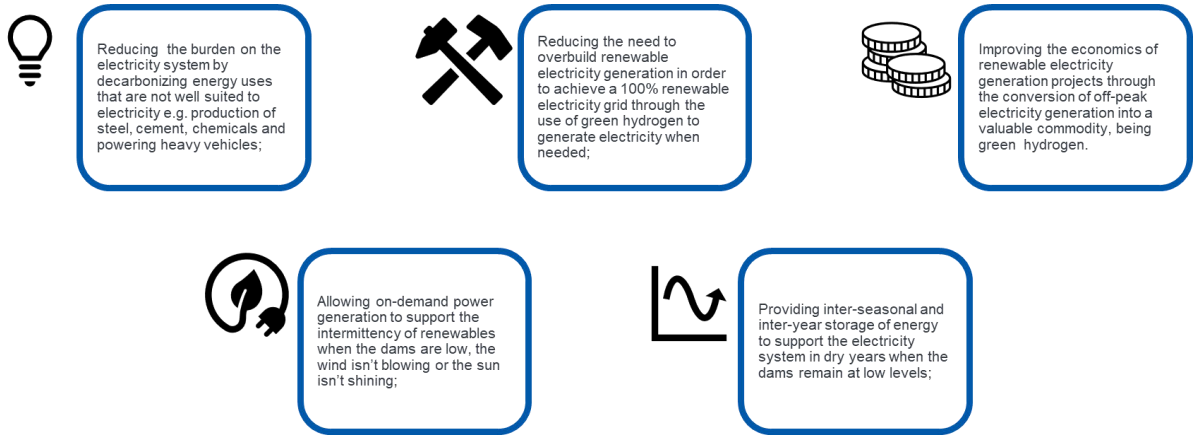
Case for green gas integration

The Firstgas Group Hydrogen Feasibility Study[3] released in March 2021 recommended an integrated energy system, similar to the view held by the European Commission around the Hydrogen Strategy for a Climate-Neutral Europe:

> *"In the integrated energy system of the future hydrogen and biogas will play a role, alongside renewable electrification and a more efficient and circular use of resources. Large-scale deployment of clean hydrogen at a fast pace is key for the European Union (EU) to achieve a higher climate ambition, reducing greenhouse gas emissions by minimum 50% and towards 55% by 2030."*[4]

Efficient deployment of these fuels can maximise New Zealand's existing gas infrastructure and zero carbon gases can often be used in businesses' existing gas plant and appliances. For some energy users, zero carbon gas may be their only pathway to decarbonisation, such as high temperature process heat, refining, and the production of fertilizer and steel.[5] There is huge potential for zero carbon gases to complement our intermittent renewable energy generation in New Zealand.

Figure 1 Benefits of a zero carbon gas system



Internationally, there are similar projects that are further along in development and the lessons from these projects are being fed into our work programme and demonstrate the pathway for green gas in New Zealand. These projects include the HyDeploy trial at Keele University,[6] the Leeds 21[7] trial, H100 Fife[8] and the HyNTS Future Grid[9] in the United Kingdom. Work is also underway by Jemena in Australia to introduce hydrogen to the Sydney gas network within the next year to partially decarbonise their network.[10]

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[3] *Bringing Zero Carbon Gas to Aotearoa: Hydrogen Feasibility Study – Summary Report*, Firstgas Group, 29 March 2021, https://gasischanging.co.nz/our-path-to-zero-carbon-gas/hydrogen-trial-results/

[4] https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

[5] Decarbonising with hydrogen, hydrogen council Hydrogen-Insights-2021.pdf (hydrogencouncil.com)

[6] Hydrogen is vital to tackling climate change - HyDeploy

[7] https://www.northerngasnetworks.co.uk/wp-content/uploads/2017/04/H21-Executive-Summary-Interactive-PDF-July-2016-V2.pdf

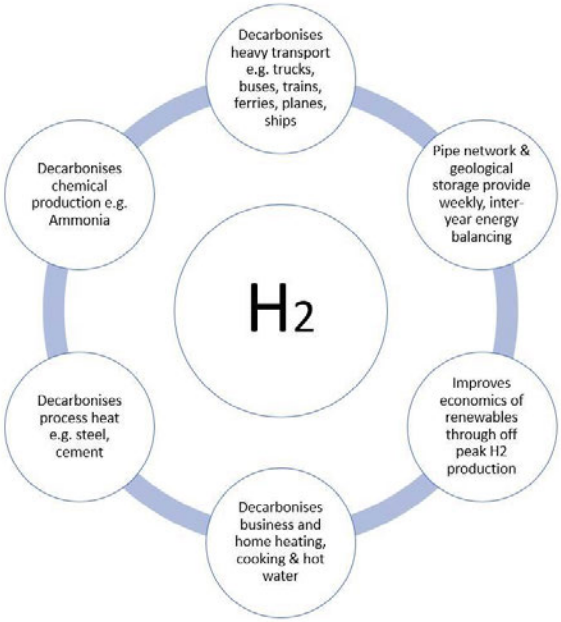
[8] https://www.sgn.co.uk/H100Fife

[9] https://www.nationalgrid.com/uk/gas-transmission/insight-and-innovation/transmission-innovation/futuregrid

[10] Jemena's Western Sydney Green Gas Project - Jemena

We see potential in the Commission's proposed renewable energy zones and the production of green hydrogen. Excess renewable energy can be harnessed to produce green hydrogen, that can provide large scale energy storage and / or energy system balancing. These benefits and other benefits from green hydrogen are illustrated in Figure 2 below.

Figure 2 Green hydrogen's decarbonisation and storage benefits



We are preparing our infrastructure for green hydrogen

The next phase of our green hydrogen work is to begin live trials of hydrogen. Our programme of work will cover three key elements:

- **Confirming network characteristics**: While we know a lot about our gas networks, we do not know everything about the pipelines, equipment and appliances connected to all the gas networks in New Zealand. We need to catalogue all the equipment and pipes on the networks to understand our infrastructures readiness for hydrogen.
- **Building experiences with hydrogen**: The second focus area will build experience dealing with hydrogen on our network. We know from overseas that trials of hydrogen blends on distribution networks can be deployed rapidly. These trials and demonstration projects act to build confidence in hydrogen, build demand for hydrogen and serve as a practical example for regulations and safety assessments. We want to select a distribution network in the North Island that is blend ready (or nearly blend ready) to start building that experience. We intend to start with a small amount of hydrogen (1% by volume) and build to 20% by volume over the trial. We aim to kick design off in Q3 2021.
- **Building the hydrogen value chain**: Through our work we have discovered that storage is critical for leveraging the benefits of hydrogen in our energy system. Different types of storage suit different applications – large scale geological storage can help with inter-seasonal.

We hope to complete a live trial of hydrogen in the next five years, with the goal of beginning transport of blended green hydrogen / biogas / natural gas in our network by 2031.[11]

[11] *Bringing Zero Carbon Gas to Aotearoa: Hydrogen Feasibility Study – Summary Report*, Firstgas Group, 29 March 2021, https://gasischanging.co.nz/our-path-to-zero-carbon-gas/hydrogen-trial-results/

Encouraging the circular economy

We would encourage the Commission to use this consultation document as a tool to encourage cross sector coordination and collaboration around development of the circular economy. This section lays out two potential opportunities we see in New Zealand.

Biogas: Linking the energy and waste sectors

We see many opportunities to utilise high nutrient waste to generate biogenic methane, which is also known as biogas. This is indistinguishable from natural gas. Firstgas is currently investigating the feasibility of injecting biogas into one of our gas distribution networks. We have partnered with Beca, Fonterra, Lion, and the Energy Efficiency and Conservation Authority (EECA) to assess the potential of biogas to provide a possible substitute for natural gas and to understand what a successful biogas industry for New Zealand would look like.[12] We hope to deliver a report and pathway for biogas this year.

Currently, New Zealand produces 3.6 PJ (petajoules) per annum of biogas. It is burnt at site for heating or electricity generation. An initial summary indicates New Zealand could easily produce an additional 14PJs of Biogas per year,[13] which is equivalent to around 10% of New Zealand's total natural gas consumption per year. However, due to the large amount of nutrient dense waste produced every year, we believe the true number of PJs per year could be much higher. Our intention is to supplement our natural gas pipelines with biogas to give greater network security and assist with New Zealand's decarbonisation of energy.

Table 1 Potential for biogas in New Zealand Error Bookmark not defined.

Feedstock source	Existing biogas (PJ/Year)	Additional potential biogas (PJ/Year)
Landfill gas	3	-
Municipal wastewater	0.6	0.3
Industrial waste	-	2
Crop residue	-	1.3
Livestock manure	-	9
Municipal and commercial food waste	-	1.4
Total	**3.6**	**14**

The use of biofuels in the transport sector can facilitate the growth of bioLPG and biogas

Developing zero carbon fuels for the transport sector can be the catalyst for further decarbonisation into the energy sector, by facilitating the growth of two zero carbon gases:

- **BioLPG**: We see bioLPG as the most straight forward way to decarbonise the kiwi barbeque. It is a by-product of biofuel production. Traditionally, bioLPG has a much lower market value compared to biofuel and instead is burnt on site for electricity. We believe there is a large consumer demand, especially as the price of carbon rises.
- **Biogas**: A well-functioning biofuels mandate could facilitate the basis of an emerging biogas market as well. Production of these fuels require similar technology but require the input of different feedstock to produce the respective fuels. We believe having a comprehensive

[12] *Industry leaders collaborate to solve global energy challenges*, First Gas, https://firstgas.co.nz/news/industry-leaders-collaborate-to-solve-global-energy-challenges/

[13] *Biogas Technical Memo*, Attachment 1 of Firstgas Group's submission on the Climate Change Commission's draft advice, March 2021 Firstgas-Group_CCC-submission-March-2020.pdf

biofuels mandate and a robust biogas market provide a platform to which can provide New Zealand with supplementary energy sources.

We encourage the Commission to include commentary in its consultation document about how bioLPG and biogas could be facilitated through a well-considered biofuels policy.

Ahuroa Gas Storage facility: A case study for zero carbon energy storage

We recommend that the Commission incorporate commentary on the Ahuroa gas storage facility into its consultation document and outline the role it can play in providing effective, large scale energy storage.

The Commission states that energy storage is as a key issue that the energy sector needs to address for a successful transition away from high emitting fuels. Energy storage is particularly key to helping alleviate the 'dry year issue' faced in the electricity sector. New Zealand is currently dependent on fossil fuels to cover electricity load when hydroelectric systems are running low and often during peak demand periods. Effective large-scale energy storage options are limited in New Zealand. These options are:

- Hydro storage, predominantly in the South Island
- Firstgas Group owned Ahuroa Gas Storage
- The coal stockpile at the Huntly Power Station.

Ahuroa Gas Storage facility has a similar energy storage capacity to the sum of all South Island hydro storage, making a large-scale effective option. As zero carbon gases become more available, we envisage being able to inject them into Ahuroa. Overtime, this means the energy system will have access to a more diverse and secure large scale stored green energy.

Next steps

Firstgas Group would welcome the opportunity to meet with Commission staff to discuss the role of zero carbon gases and the points we have raised in our submission. Up to date information on our development of zero carbon gases is also available on our website www.gasischanging.co.nz.To arrange this meeting or if you have any questions, please contact me on [redacted] or via email at [redacted]

Yours sincerely

[redacted]

[redacted]
Regulatory and Policy Manager

Attachment 1 About Firstgas Group

Our vision is to lead the delivery of New Zealand's energy in a changing world. Our mission is to safely and reliably deliver energy that's affordable and accessible to Kiwi families and businesses. We're really proud of this and of the important role we play in Kiwis' lives.

Based in New Plymouth, Firstgas Group is an umbrella brand consisting of Rockgas, Firstgas, Flexgas and Gas Services NZ. Firstgas and Rockgas are consumer brands that supply LPG and natural gas to over 165,000 customers through their gas network of over 2,500 kilometres of high-pressure transmission pipeline and 4,800 kilometres of distribution pipeline in the North Island, 36 local LPG suppliers, and over 180 Refill and Save locations across New Zealand.

Flexgas and Gas Services NZ are energy storage, operations and maintenance brands who make sure gas can be delivered safely and continuously. Flexgas operates the Ahuroa gas storage facility in central Taranaki. Gas Services NZ provides operational and maintenance support to all gas infrastructure owners, including the brands within Firstgas Group.[14]

New Zealand's homes have benefited from the choice of energy sources to meet their household needs. Currently there are over 400,000 homes in New Zealand who enjoy natural gas and LPG in their homes. These homes predominantly use gas for cooking, instant hot water, and heating. There are many benefits of having gas in the home. Hot water heating is currently the most energy. affordable way to heat a home and water.[15] Gas boilers heats water so that it is instantly available. It requires no onsite storage in the home.

Firstgas is investigating opportunities for using our assets in ways that help to reduce New Zealand's carbon emissions. Our gas transmission and distribution networks cover much of the North Island and are ideally placed to support the development, transfer, and use of emerging fuels such as hydrogen and/or biogas.

Firstgas rockgas Flexgas gas services nz

[14] For more information about Firstgas Group, visit www.firstgas.co.nz , www.rockgas.co.nz , www.flexgas.co.nz

[15] Cost of heating homes, Home heating costs in 2020 - Consumer NZ