Submission on the *Gas Transitions Plan Issues Paper*

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Responses to questions

Chapter 2: Transitioning our gas sector

How can New Zealand transition to a smaller gas market over time?

1 A reduction of gas use in NZ going forward is predicated by financial and policy decisions already made. Gas based methanol manufacture will decline/cease once existing reserves and supply contracts have been exhausted, because future fossil and renewable gas alternatives in NZ will simply be too expensive compared fossil gas resources available overseas. Existing methanol manufacturing capacity in NZ could of course be converted to supplying the growing international demand for green methanol based on gasified woody biomass, but this would also remove methanol demand from the gas sector. Industrial natural gas demand will decline moderately due to ongoing energy efficiency gains and some technology switching to solid biomass, etc. Gas demand from the electricity sector will continue to decline, yet not disappear, as existing gas generation assets are retired as they reach the end of their useful service life, and proposals for new gas generation assets fail to be executed (e.g. Otorohanga 360MW).

While uncertainties remain (e.g. future GHG emission price, electricity market reform, etc.) strategic plans for gas in NZ over a decade-plus-horizon should be based on managing a residual gas demand and gas market with an overall size of 50 to 70 PJ/y.

2 **What is needed to ensure fossil gas availability over the transition period?**

New Zealand is committed to net zero GHG emissions by 2050. As a fossil fuel, availability of natural gas cannot assist transitioning to a Paris agreement compliant GHG future. The focus therefore needs to be on ensuring the availability on renewable, zero GHG emission alternatives to natural gas – both as a drop-in substitute, as well as a systemic substitute for end use applications.

3 **What factors do you see driving decisions to invest or wind down fossil gas production?**

Does the Government have a role in enabling continued investment in the gas sector to meet energy security needs? If yes, what do you see this role being?

4 First and foremost, government intervention is required to assist the fast and bold adoption and network integration of renewable gas alternatives, particularly bio-methane. This requires targeted measures, such as a fixed price, variable volume green gas mandate with long contract time frames, simplified network connection procedures, technically reasonable changes to natural gas quality standards, etc.

Secondly, operation and maintenance of the gas transmission and distribution network needs to be recalibrated to the reduced market volume of 50 – 70PJ/y following a no regrets policy.

Behind the electricity network, the gas network is the second most important energy supply and conveyance system, that also offers substantial options for energy storage. Regulatory hurdles for the closure of all, or parts, of the network need be high, to retain options for the adoption of future renewable technologies, energy storage and energy sector integration.

	Does the Government have a role in supporting vulnerable residential consumers as network fossil gas use declines? If yes, what do you see this role being?
5	In the residential sector, the most important role for the Government needs to be the promotion of energy efficiency measures, through improved building standards (including renovations), insulation incentive schemes, building WoF, progressive energy pricing structures, consumer education, etc. Reduced residential energy consumption is the best preparation for vulnerable, and all other, customers against electricity or gas price spikes, service interruptions and lowers the investment requirements for technology exchange if a switch away from gas is in-deed required.
	Fossil gas and electricity
	What role do you see for gas in the electricity generation market going forward?
6	Use of natural gas for electricity generation in New Zealand, both for base load and peak load, is optional. Fundamentally gas (both fossil and renewable) is too valuable a resource to be used in electricity generation, compared to other applications, e.g. in industry. New Zealand has sufficient generation resources (e.g. 1,900MW consented but not build wind generation), and balancing capacity in existing hydro schemes (including a cheap pumped hydro option on the Tekapo canal) to not require gas generation for baseload or renewables back-up or peak electricity supply. However, with an irrational spot market pricing system rewarding all generators for expensive thermal generation setting the price, it is hard to see a full removal of gas from electricity generation without electricity market reform.
	What would need to be in place to allow gas to play this role in the electricity market?
7	Gas shouldn't and needn't have to play any role in electricity generation going forward, and electricity market reform is the way to achieve this. In October 2023 the Council of the European Union has agreed on an electricity market reform (https://www.consilium.europa.eu/en/policies/electricity-market-reform/#:~:text=The%20reform%20of%20the%20electricity,steep%20increase%20in%20electricity%20prices.) to limit the price inflating effects of expensive gas generation in a spot market similar to New Zealand's. However, the EU reform appears as way too complex and not sufficiently targeted. Simple steps like a change to "pay as bid" pricing and a single buyer market structure could achieve better outcomes, faster, cheaper and with less bureaucratic effort.
8	**Do you think gas can play a role in providing security of supply and/or price stability in the electricity market? Why / Why not?**

As outlined above gas use for electricity generation is already optional.

However, there is a potential gas related security of electricity supply issue around potentially large winter peak electricity demand increases (see EnergyWatch 86, https://www.energywatch.org.nz/recent.html).
A first principal analysis indicates that switching all current residential gas demand to electricity might increase total national electricity demand by only 7% but could potentially increase national winter electricity peak demand by ~ 41% (up to 3,000MW additional winter evening peak load).
More analysis of this potential issue is required, to determine how costly (additional peak electricity), technically viable, and economically and environmentally sensible a transition of most household gas demand to electricity might be, or if alternative options, e.g. the use of renewable bio-methane in a residential context, may be required on an on-going basis to maintain electricity network supply security during winter peak demand conditions without outsized network peak capacity investment requirements.

Do you see alternative technology options offering credible options to replace gas in electricity generation over time? Why / Why not?

9 See above, substitution of gas for electricity generation is not a technical question but a question of market reform.

1 If you believe additional investment in fossil gas infrastructure is needed, how do you think this should be funded?

All additional investment should be in renewable, not fossil gas infrastructure.

Chapter 3: Key issues and opportunities

Renewable gases and emissions reduction technologies

On a scale of one to five, how important do you think biogas is for reducing emissions from fossil gas? Why did you give it this rating?

11 5 – Biogas is the key pillar for supplying the 50 – 70 PJ/y residual NZ gas demand from renewable resources. Bio-methane refined from biogas is:

- Fully compatible with pipeline infrastructure and gas use equipment (other than hydrogen)
- Cheaper to supply than other renewable gas alternatives (e.g. hydrogen, syn-gas based alternatives). Figure 5 on page 30 of the issues paper is conceptually correct, however the scaling of the X-axis is factor 5 to 10 too small, while the scaling of the Y-axis is factor 2 to 3 too large.
- Available in relevant quantities (50 – 70 PJ/y over a 2-to-3-decade development horizon).

- Key biogas resources are available in regions with existing, dense gas pipeline infrastructure (Waikato, Bay of Plenty, Taranaki, etc.)

Biogas production is a technically and financially viable land use option for rural communities confronted with a phase out of traditional livestock farming:

- NZ currently has 168,000ha farmed peatlands releasing 5-25tCO2/ha/y soil CO2 that need to be rewetted to preserve the peat. Some of the peat lands needs to be rewilded, but representing 10% of all dairy land in the Waikato, some alternative peat land use options need to be adopted. Biogas energy with native peat plants like raupo, harakeke and sour grasses, is one of the few good options for using this land without destroying it further. A minimum of 50-75,000ha of currently farmed peat land needs such paludiculture (wet agriculture) solutions before 2050.
- NZ is currently looking for use options for up to 200,000ha of productive riparian buffers on intensive dairy farms, to capture nutrients before they enter waterways. Biogas substrate production could be a good solution for some of this land.
- NZ has over 100,000ha of land where traditional farming has to change because of nutrient caps/urine spot problem (Rotorua/Taupo catchments, red zones in Canterbury), invasive species (alligator weed in Northland), drought (Hawkes Bay, Wairarapa) or flood protection zones. Environmental and financial goals could be met simultaneously if some of this land would be used for biogas production.

Do you see biogas being used as a substitute for fossil gas? If so, how?

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Biogas is the key pillar for supplying the 50 – 70 PJ/y residual NZ gas demand from renewable resources. The majority of bio-methane, originating from moderate scale biogas plants, will be upgraded to pipeline standard and injected into the existing natural gas network. This requires simplified network access and a long-term stable market regime, based on e.g. a fixed price, variable volume green gas mandate. Up to 15 PJ/y of biogas might be supplied from relatively large biogas plants directly to industrial users like dairy factories. Smaller, farm scale biogas set-ups replacing gas energy “behind the meter” will play a smaller role in NZ, but will still be important for lowering farm GHG emissions and improving farm waste management.

On a scale of one to five, how important do you think hydrogen is for reducing emissions from fossil gas use? Why do you think this?

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1 – For the foreseeable future hydrogen will remain too expensive to be considered as a natural gas substitute. Green electrolysis hydrogen could only become part of the gas supply once all gas-based electricity generation has ceased, as it wouldn’t make sense to simultaneously produce hydrogen from electricity, while burning hydrogen to generate electricity. Blending hydrogen into the natural gas supply is fraught with problems. Even if pipeline materials and installations can cope with up to 20% hydrogen blending, almost all installed gas metering and monitoring equipment is certified to a maximum hydrogen concentration of only 2% or 5%. Short of exchanging all gas meters on the network, higher hydrogen blending rates open all customer billings to dispute, particularly if hydrogen blending rates vary.

	If hydrogen is at all considered for incorporation with the natural gas network, it would be better to co-ferment hydrogen with excess biogenic CO2 to green methane at biogas plants and add it to the system as a true drop-in methane fuel.
	Do you see hydrogen being used as a substitute for fossil gas? If so, how and when?
14	Only to a very limited extent for specialist applications, for example the production of hydrogen peroxide.
	What else can be done to accelerate the replacement of fossil gas with low-emissions alternative gases?
15	Introduce a fixed price, variable volume green gas mandate with long contract time frames, administered by the gas network operator. Physical green gas volumes and financial gains and losses are to be first balanced via the current line pack reconciliation mechanisms. Subsequently green gas volumes and financial gains and losses are passed on proportionally to all gas users as a discount or surcharges for greening and maintain New Zealand's gas network infrastructure, at no cost to the Government.
	On a scale of one to five how important is a renewable gas trading to supporting the uptake of renewable gases? Why have you given it this rating?
16	0 - Renewable gases are not held back because of technical problems or absolute cost of production. Green gas production is up-front capital intensive and structured at much smaller increments then the current gas industry. Key success factors are therefore, simple pipeline and market access, and long-term supply contracts at fixed prices. Green gas trading, particular spot price trading, cannot overcome these barriers, whereas a fixed price, variable volume green gas mandate, CfD standing offers with long contract terms, long-term take guarantees, etc. all do.
	What role do you see for the government in supporting such a scheme?
17	See 15: Introduce a fixed price, variable volume green gas mandate.
	Carbon Capture, Utilisation and Storage
	On a scale of one to five how important do you think CCUS is for reducing emissions from fossil gas use? Why did you give it this rating?
18	Discussing Carbon Capture, Utilisation and Storage (CCUS) in the context of the gas transition plan (GTP) is inappropriate. Firstly, as a technology, CCUS does not unlock any new supplies of fossil or renewable gas energy. Since many CCUS techniques are energy intensive, there is more of a risk that large

scale CCUS practices in NZ have the potential to reduce the available pool of fossil and renewable gas energy.

Secondly, there doesn't appear to be a very direct link between gas production and CCUS. The scope for establishing a CO2 utilization industry within New Zealand's oil and gas sector appears limited for geological reasons, and even more so considering New Zealand's 2050 commitments, requiring less not more fossil fuel extraction and consumption.

With gas extraction and use projected to decline, options for gas production itself providing substantial volumes of CO2 for CCUS are also receding. Industry sectors like lime and cement, steel or aluminium smelting with their systemic CO2 emissions, often not fossil fuel derived, would appear as a much more logical context for discussing the applicability of CCUS in NZ.

For these reasons I recommend discussing CCUS in the context of other industries and/or the wider field of negative emission technologies including enhanced rock weathering, peatland restoration, biochar and improved geothermal resource utilisation.

19	**What are the most significant barriers to the use of CCUS in New Zealand?**
20	**Do you see any risks in the use of CCUS?**
21	**In what ways do you think CCUS can be used to reduce emissions from the use of fossil gas?**

Options to increase capacity and flexibility of gas supply

	What role do you see for gas storage as we transition to a low-emissions economy?
22	This depends on how quickly gas use is declining overall and what "peaky" gas demands will remain, for example within electricity generation. Overall, the operational buffer storage capacity of the natural gas network should relatively increase going forward, as a system designed for >250PJ/y will be operated with only 50 – 70PJ/y. However, should most baseload gas uses disappear first, and "peaky" gas use, such as for peak load electricity generation be promoted, then the issue of gas storage needs to be re-evaluated.
23	**On a scale of one to five, how important do you think increasing gas storage capacity is for supporting the transition? Why did you give it this rating?**
	Unknow at this point in time. This is a moving target, see 22.
24	**What should the role for government be in the gas storage market?**
	Unknow at this point in time. This is a moving target, see 22.

25	**Our position is that LNG importation is not a viable option for New Zealand. Do you agree or disagree with this position? If so, why?**
	Agree – LNG is too expensive, environmentally damaging, risky and overall unnecessary for NZ.
26	**What risks do you anticipate if New Zealand gas markets were tethered to the international price of gas?**
	Disastrous results - as illustrated by recent gas price volatility in instability in Europe and East Asia.

General comments