

Firstgas Group



BRINGING ZERO CARBON GAS TO AOTEAROA

Report Summary

Firstgas

rockgas

Flexgas

gas services nz

WE ALL KNOW THE BENEFITS OF GAS

Continuous hot water, efficient water and space heating and the good old kiwi barbecue. Every day Firstgas Group supplies the energy needs of 430,000 New Zealanders with reliable natural gas and LPG. We generate jobs and value for New Zealand by supplying gas to businesses and industrial users such as restaurants, hotels, greenhouses, hospitals, the meat, dairy, steel, petrochemicals and pulp and paper sectors.

Firstgas is 100% behind helping Aotearoa achieve zero carbon emissions by 2050. We have some challenges ahead in trying to decarbonise our economy. That's why we see New Zealand's energy future being a combination of renewable electricity and zero carbon gases that can meet our varied energy needs; from vehicles, to homes, to restaurants, to steel production and to electricity generation at peak times.



TRANSITIONING TO ZERO CARBON GASES IS AN ESSENTIAL STEP IN LOWERING NEW ZEALAND'S CARBON EMISSIONS.

That's why we have been investigating zero carbon gas options, such as hydrogen, biogas, and bioLPG. Developing these options will help us provide low emissions choices for our customers in the future, while retaining the benefits of gas, delivered via existing pipeline networks and distribution channels in New Zealand.

FIRSTGAS GROUP TARGET IS 20% BLENDED HYDROGEN BY 2035 WITH 100% BY 2050

We've investigated what New Zealand's hydrogen future could look like and how our network can play its part. In 2019, Firstgas received \$260,000 in government funding managed by the Provincial Development Unit to investigate how existing gas infrastructure could adapt to transporting hydrogen. The first phase of the work programme was a hydrogen pipeline trial study to investigate the role of hydrogen in decarbonisation and what we will need to do for our network to carry hydrogen.

We have sufficient network capacity and a viable strategy for converting the networks to hydrogen

blends and then 100% hydrogen. Our study findings confirm that our network could be 20% hydrogen by 2035, with a move to 100% hydrogen by 2050, this would be supported by large scale storage of hydrogen in Taranaki to provide inter-seasonal and inter-year flexibility for the energy system.

BY DOING SO WE CAN REDUCE NZ'S ENERGY SECTOR EMISSIONS BY UP TO 25%.

Hydrogen is a cleaner alternative to natural gas. Hydrogen can be produced by electrolysis, which is the process of using electricity to split water into hydrogen and oxygen. If the electricity is generated using renewable resources, like wind and solar, then the process creates no carbon emissions.

Based on our study, hydrogen could replace natural gas demand in most sectors by 2050. Hydrogen has the potential to displace a range of different fossil fuels currently used for high-temperature process heat, building heating, electricity generation and large-scale energy storage which goes a long way to supporting a 100% renewable electricity system.

While natural gas today provides over 20% of New Zealand's primary energy supply¹, hydrogen has the potential to decarbonise more parts of the economy than are currently fueled by natural gas, such as vehicles like trucks, trains, ferries and planes.

¹ Gas Industry Company, 2016, NZ Gas Story, p6.

HYDROGEN'S ROLE IN DECARBONISING OUR ENERGY



Decarbonising industrial energy uses that are not well suited to electricity, such as steel, cement, chemicals.



Removing the need to overbuild renewable electricity generation in order to achieve a 100% renewable electricity grid.



Improving the economics of renewable electricity generation projects through the conversion of off-peak electricity generation into a valuable commodity, being green hydrogen.



Providing inter-seasonal and inter-year storage of energy to support the electricity system in dry years when the dams remain at low levels.



Allowing on-demand power generation to support the intermittency of renewables when the dams are low, the wind isn't blowing or the sun isn't shining.

THE TRANSITION TO HYDROGEN

EARLY 2020s

Transport demand for hydrogen commencing

EARLY 2030s

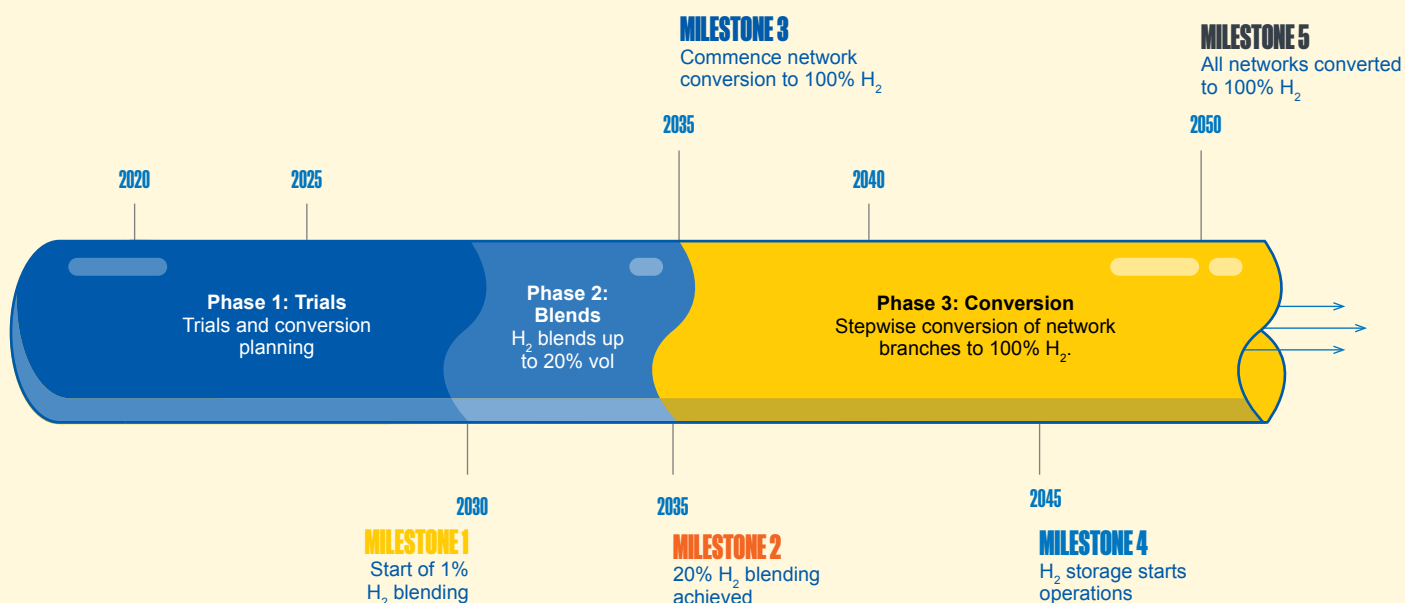
Hydrogen blending into the network – reaching 20% by 2035

FROM 2035

100% hydrogen

FROM 2045

Large-scale storage of hydrogen



WE ESTIMATE THE COST OF HYDROGEN WILL BE COMPETITIVE WITH OTHER FUELS IN THE FUTURE

But will be higher than most energy costs incurred today. Using our existing pipeline network to transport hydrogen improves its affordability and avoids truck movements so it is safer and a more environmentally friendly method of transporting energy. The future costs of electricity, hydrogen and carbon are highly uncertain, so it makes sense to keep our options open as we transition the energy system.

Most of the Firstgas network will be capable of transporting hydrogen blends and hydrogen without replacement of the pipelines. Existing gas pipeline networks will play a critical role in enabling the wide-ranging benefits of hydrogen. By repurposing existing infrastructure we can help make the costs of hydrogen more competitive and can make gradual increases in response to hydrogen demand over time. One of the key findings of the report is that New Zealand's gas network is already well-positioned to meet this need.

RESEARCH TO DATE SHOWS THAT MOST APPLIANCES WILL NOT BE AFFECTED BY BLENDS OF HYDROGEN UP TO 20%.

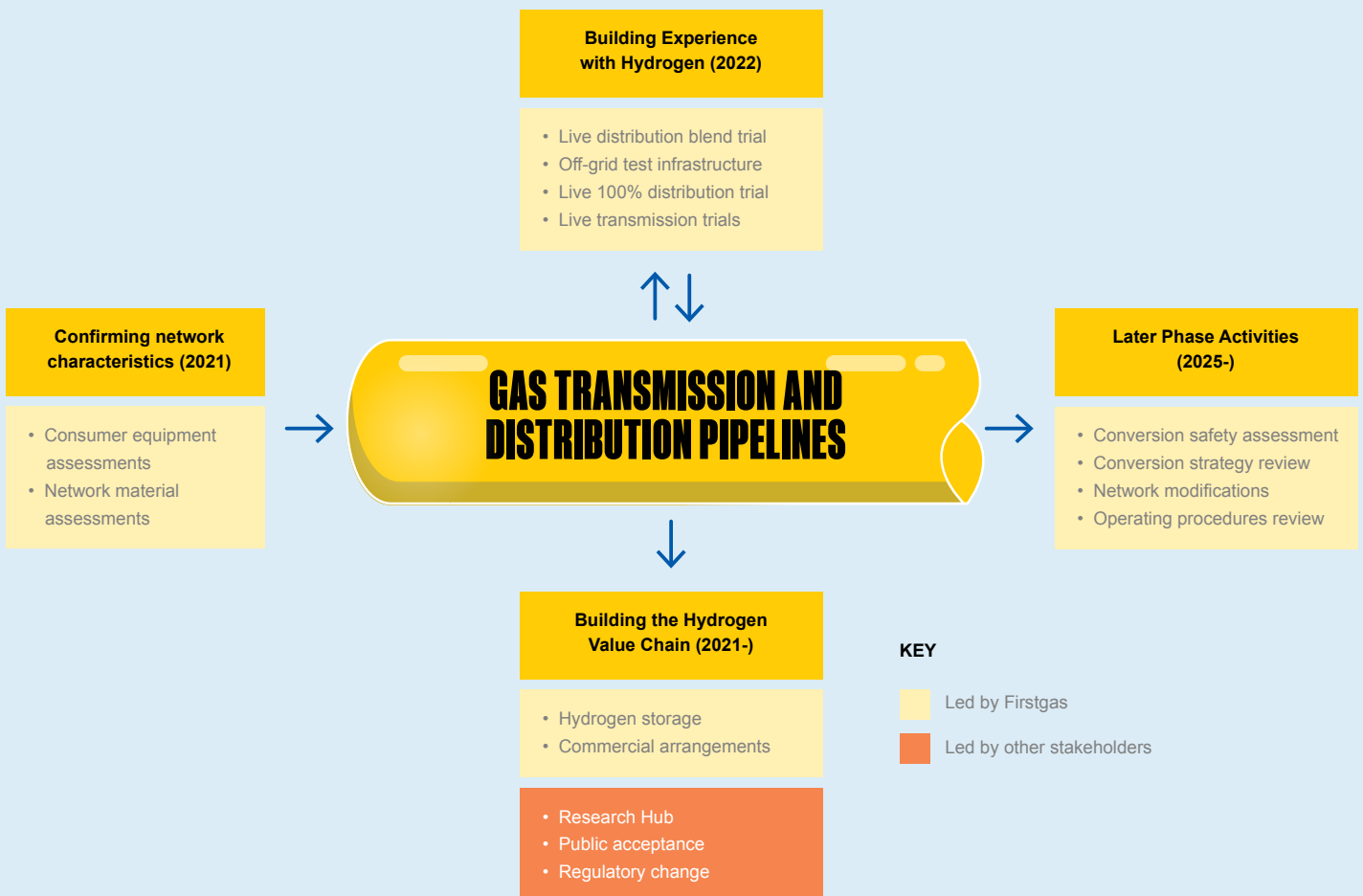
However, existing appliances will not operate with 100% hydrogen and will therefore need to be replaced as part of the conversion strategy.

We anticipate that most equipment will be able to be replaced in its natural retirement cycle as we convert the network to 100% hydrogen by 2050.

Our results set a good foundation to our future work on hydrogen. We will build up our experience of dealing with hydrogen on our networks over the coming years. We will begin design work in 2021 on a physical trial on a pipeline network that is blend ready (or nearly blend ready) to start building that experience. We would start with a small amount of hydrogen (1% by volume) and build to 20% by volume over the trial.

Testing is happening internationally and some networks are already successfully blending up to 20% hydrogen. To prove reliable and safe operation of our pipeline networks with hydrogen, we are regularly reviewing worldwide research and will adopt successful results where possible.

Alongside changes to the network to allow the injection of hydrogen, there will also need to be changes to our regulations and we will be working with Government and policy makers to achieve this.





THIS STUDY IS A GOOD FIRST STEP

Firstgas Group's hydrogen trial study is a good start. When launching this study, we said realising a hydrogen economy will be a collaborative effort. Our findings support this view. We see Firstgas as the natural leader for work relating directly to our network assets, while others can join us in developing other parts of the hydrogen ecosystem.

This collaboration will ensure New Zealand is well placed to roll out hydrogen as a part of its approach to energy sector decarbonisation.

This summary highlights the key elements of the summary report, which can be found on our website firstgas.co.nz

We invite you to contact us if there is something you would like to know more about.

Please contact
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