Bringing zero carbon gas to Aotearoa

Hydrogen Feasiblity Study

Firstgas Group

19 June 2021

Firstgas Group

Owns and operates over 7,000 kilometres of gas pipelines in the North Island

NZ's largest LPG retailer, serving over 100,000 NZ customers

Provides energy storage at scale through our Ahuroa gas storage facility in

Our dedicated gas infrastructure company

NZ has emissions challenges in key sectors

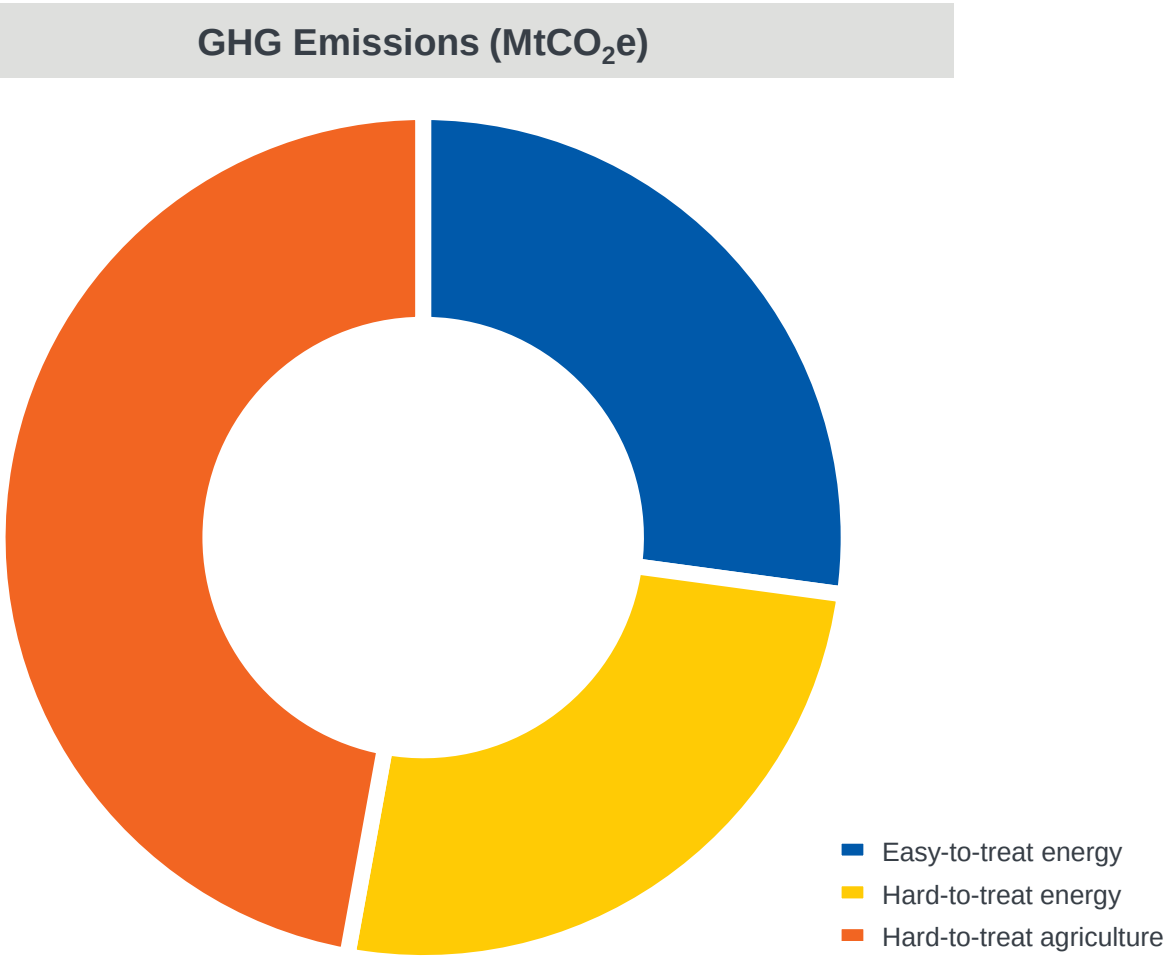
High temperature process heat

Heavy transport

Electricity dry year

Electricity peak demand

Chemical feedstocks & production



Source: Gas Infrastructure Futures in a Net Zero New Zealand, Vivid Economics 2018

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Key study findings

We have the pipeline capacity and a viable plan for converting gas networks to 100% hydrogen by 2050

There will be no need to change most appliances with a blend of up to 20% hydrogen

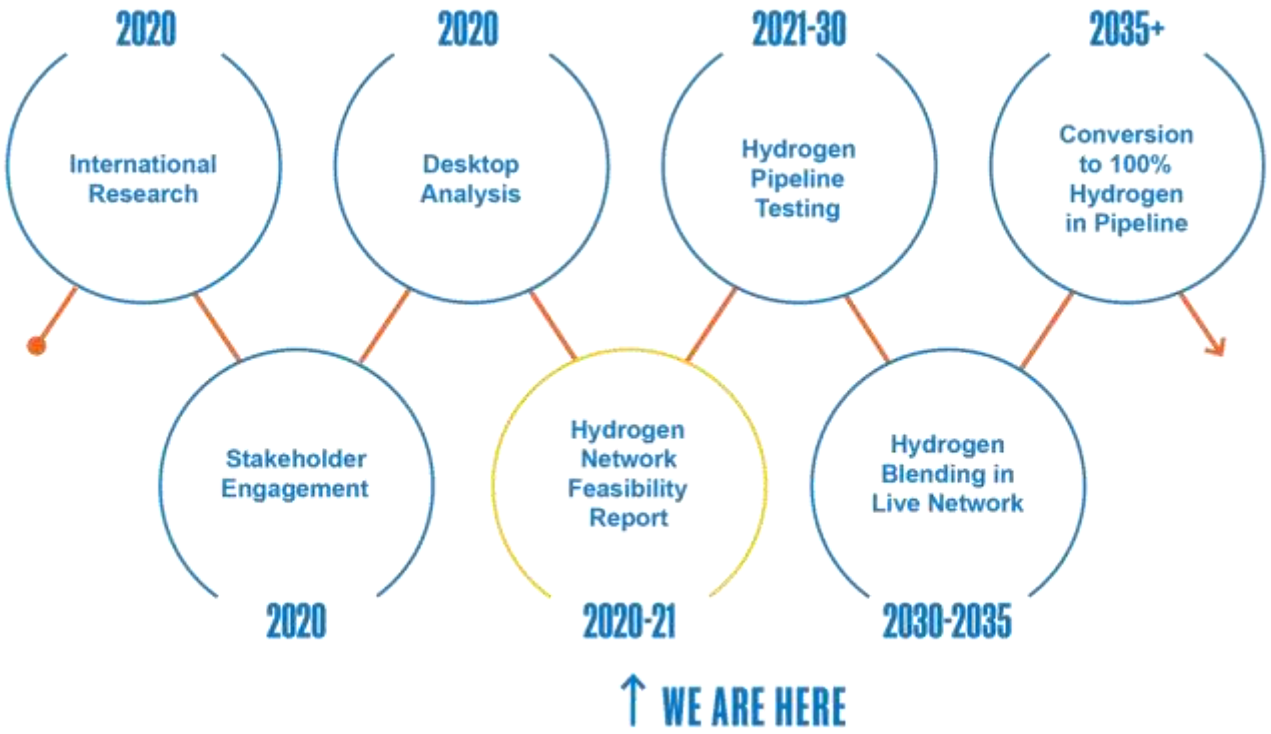
We will begin work on trialling a hydrogen blend in a pipeline network that is hydrogen blend ready later this year

We can start with a 20% hydrogen blend from 2030 to 2035

Hydrogen can reduce total emissions from the energy sector by 25 per cent

Significant R&D is happening internationally, and some networks are already successfully trialling blends up to 20% hydrogen

Our study scope



About our feasibility report

- What does our hydrogen future look like?
- Is it feasible for us to convert our gas network?
- What do we need to do to make that happen?

Our consultants

elementenergy

aquaconsultants
water · environment · energy

Supported by

PROVINCIAL DEVELOPMENT UNIT

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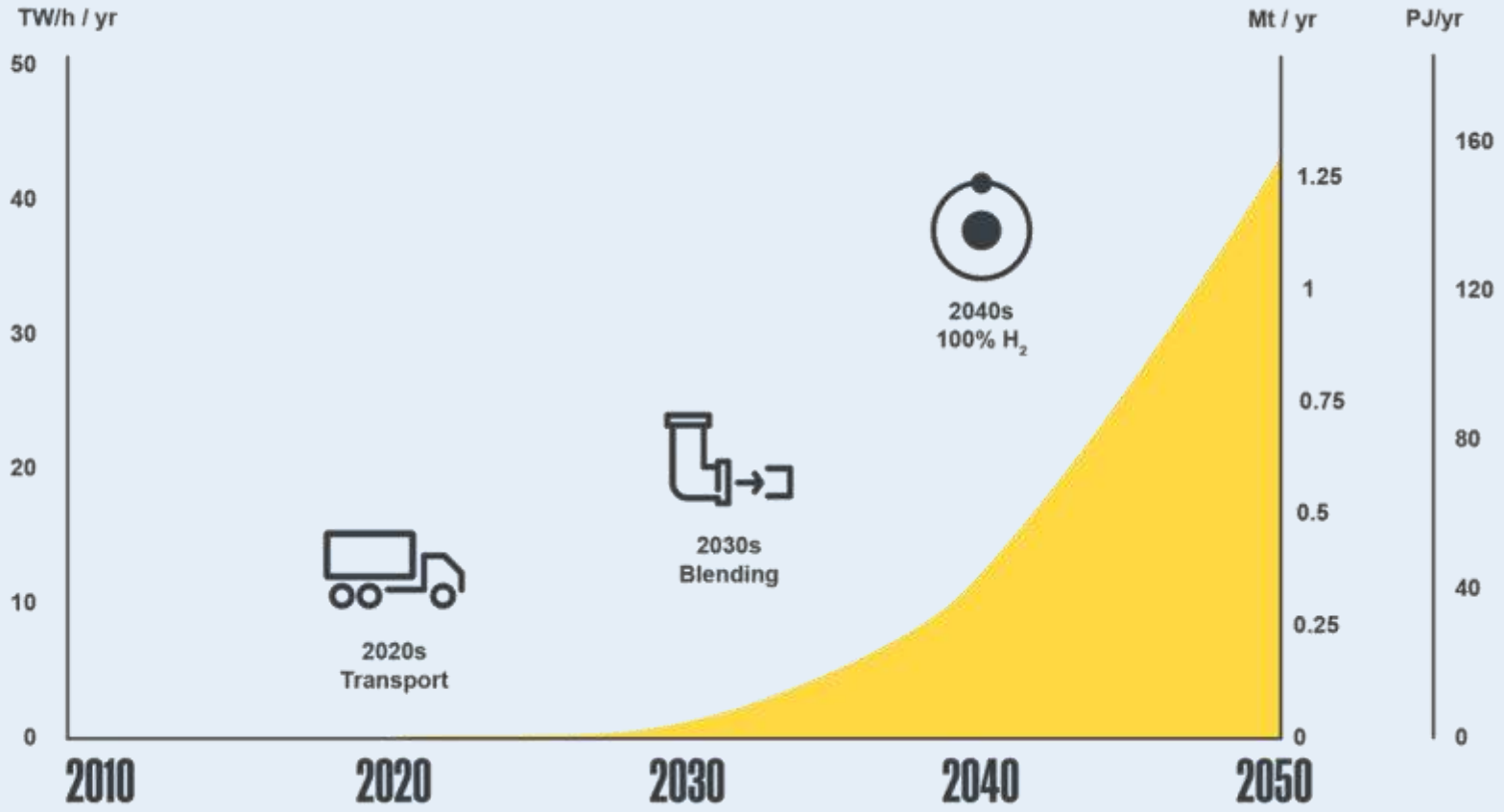
Hydrogen demand grows with the market

Hydrogen displaces a range of different fossil fuels:

- Heavy transport
- High temp process heat
- Industrial feedstocks
- Heating, hot water
- Electricity grid balancing



ANNUAL HYDROGEN DEMAND PROJECTION

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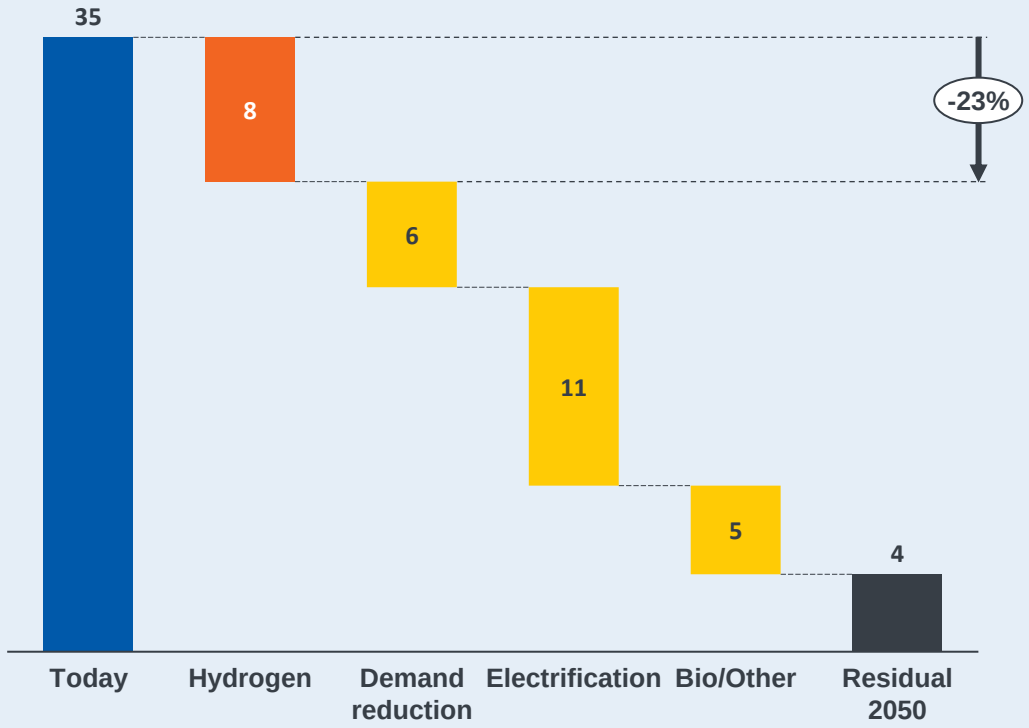
Hydrogen allows deeper decarbonization of energy

- Using hydrogen for high temperature process heat frees up electricity for other sectors e.g. production of steel, cement, chemicals
- Transporting hydrogen via pipelines supports hydrogen for heavy transport
- Support for a 100% renewable electricity grid:
  - Addresses intermittency of renewables
  - Reducing the need to overbuild renewable
  - Inter-seasonal and inter-year storage of energy
  - Improving the economics of renewable electricity

Energy Emissions* (Mt CO_2)



*Excludes agricultural, land use, forestry and waste emissions

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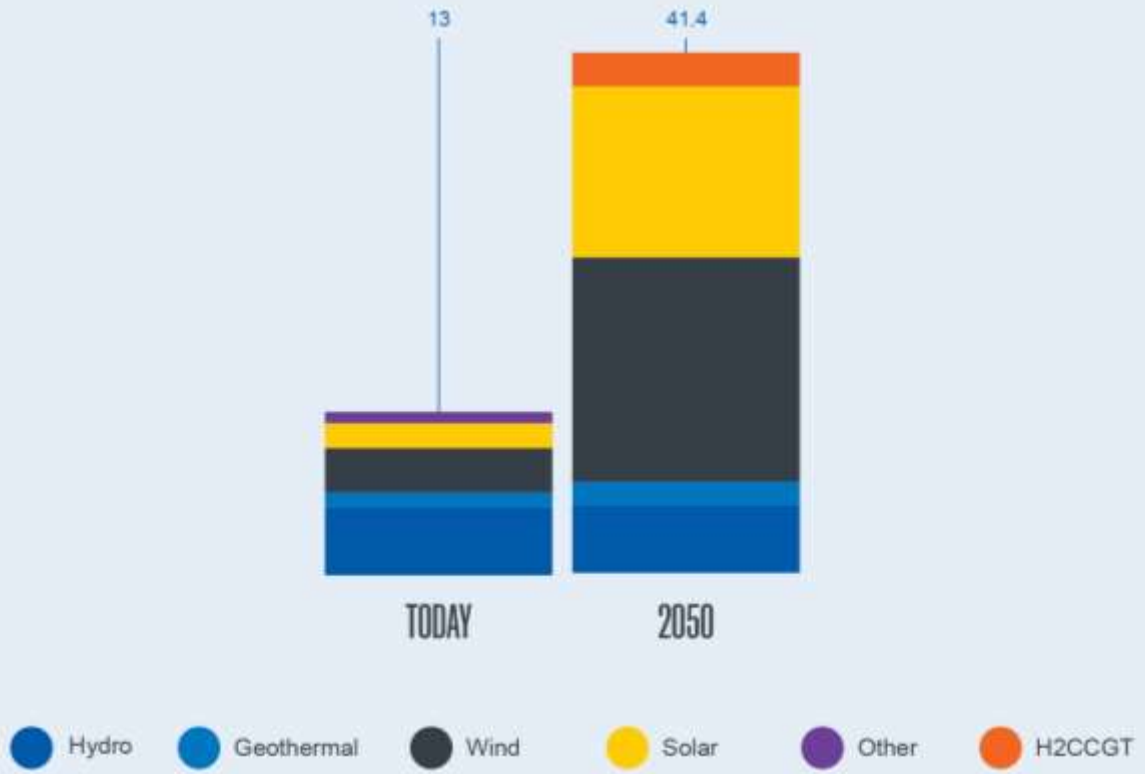
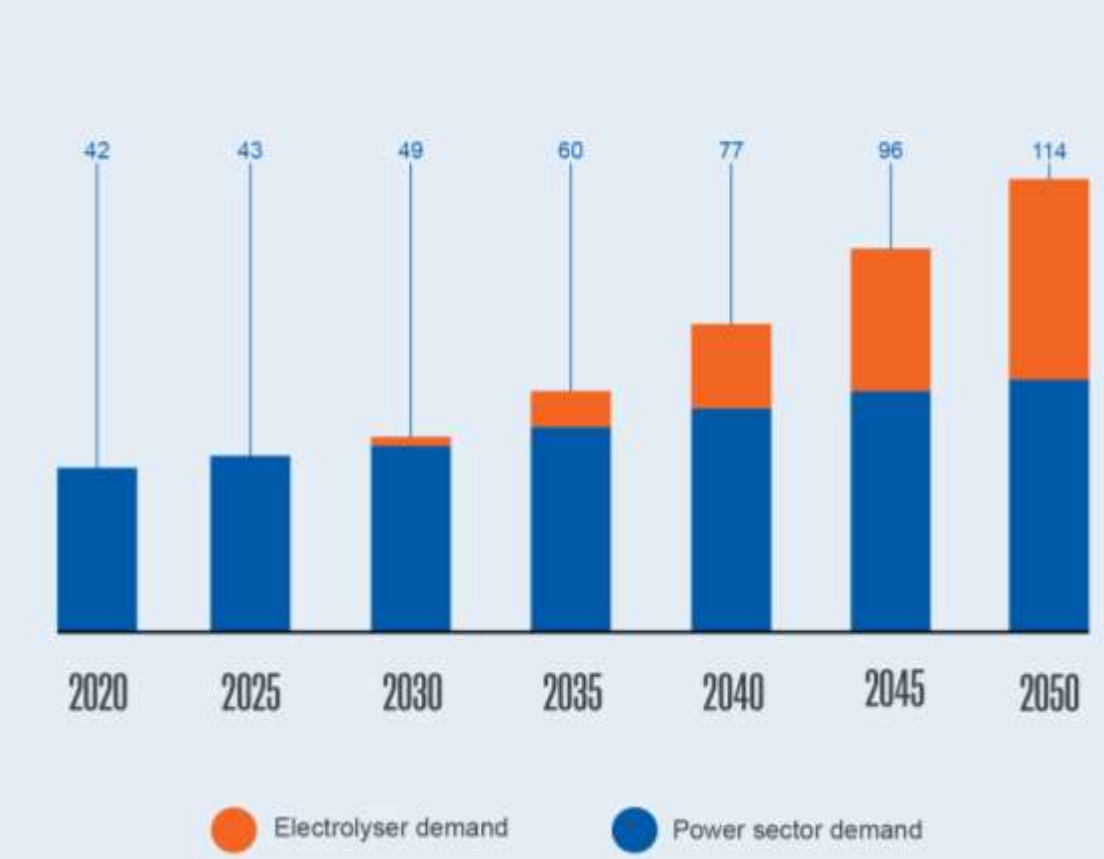
Deep decarbonisation requires a massive generation build

Electricity Generation Stack (GW)

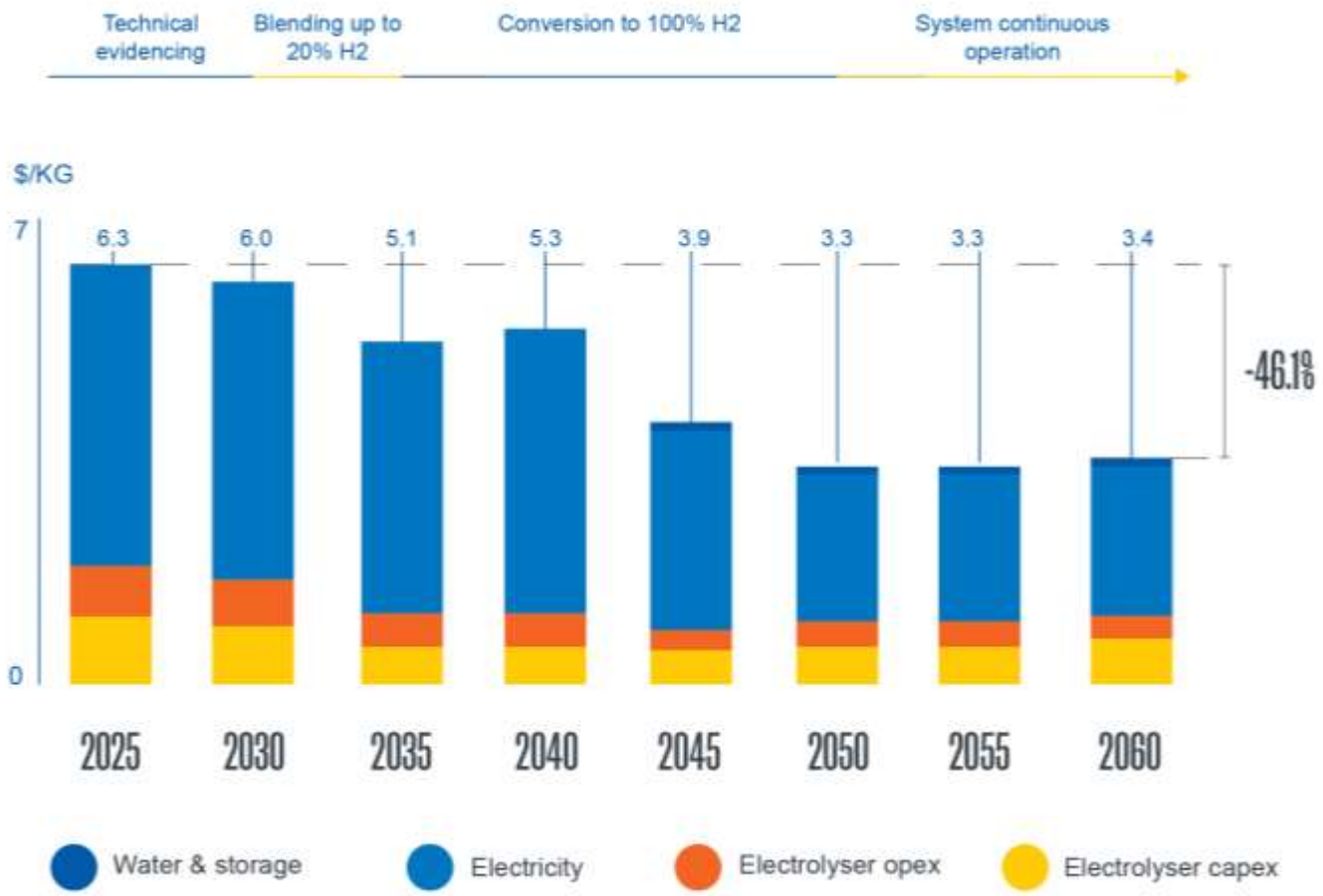


Annual Electricity Demand (TWh/Y)

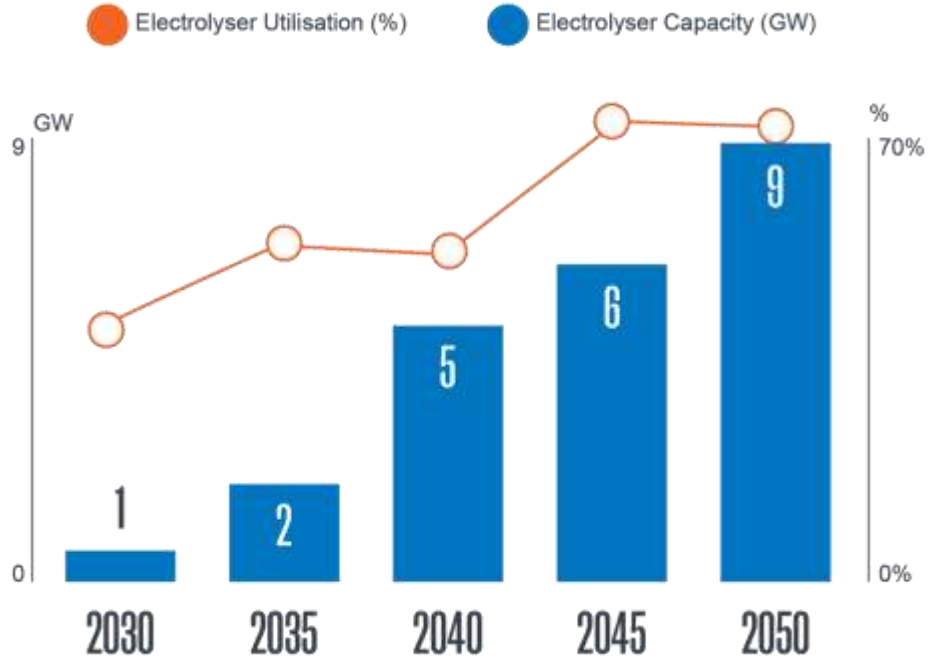


Costs decrease as supply grows

Hydrogen cost in NZ$/kg



Electrolyser Capacity and Utilisation



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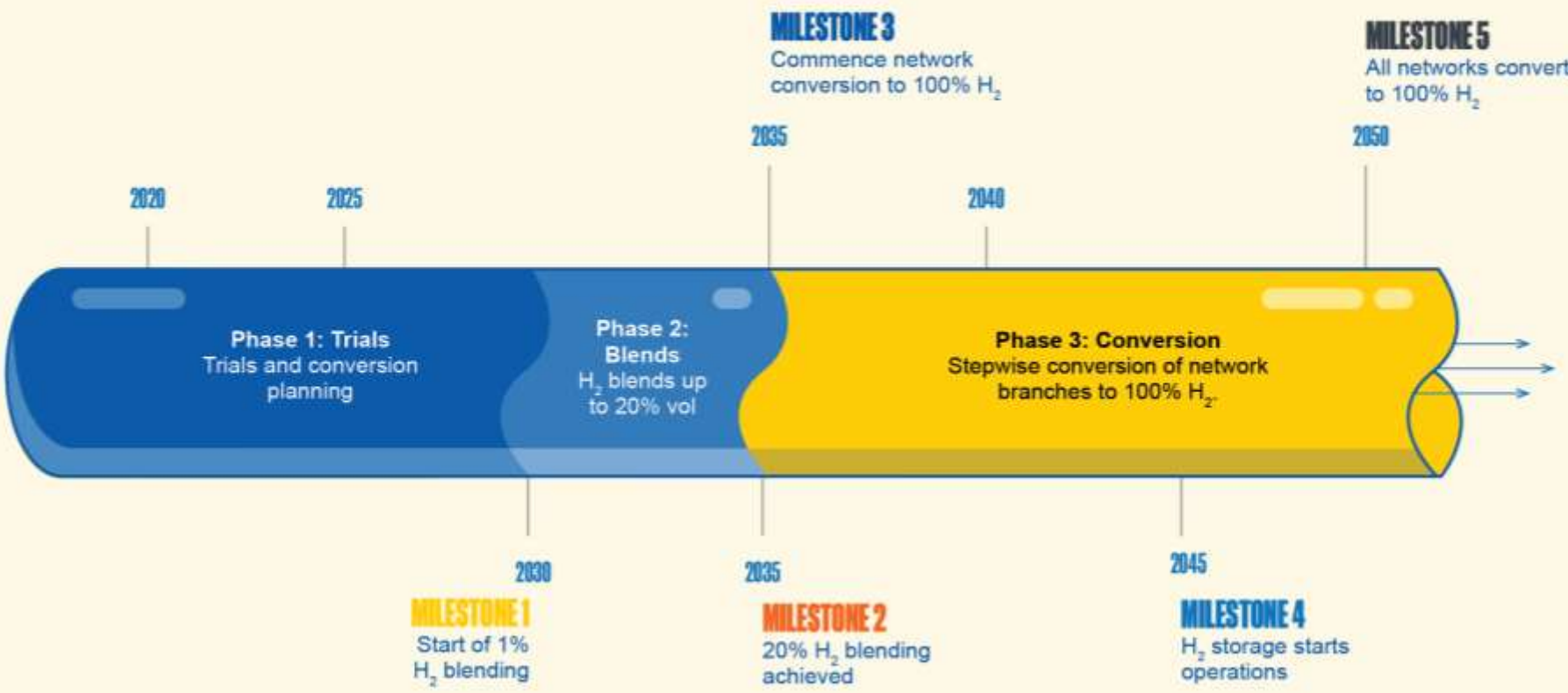
Staged gas grid conversion as demand grows



Realistic timeframe for a zero emissions gas system by 2050

Acceleration is possible to meet shorter term challenges if required

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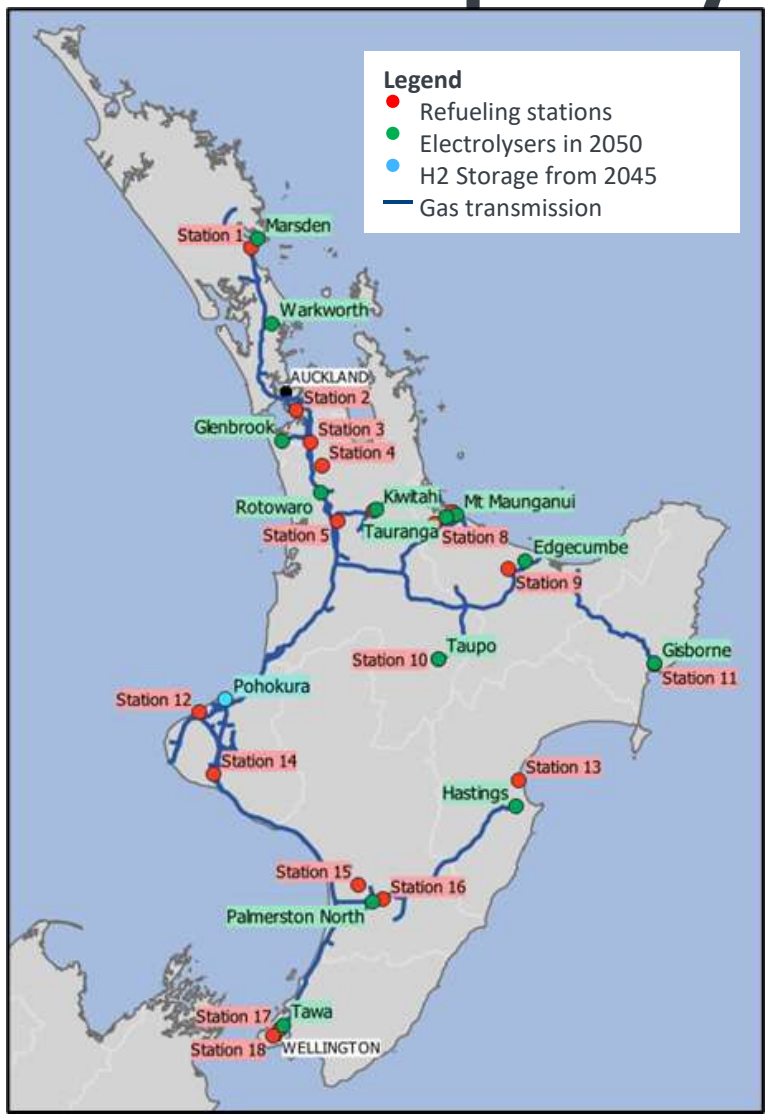
Conversion supported by distributed hydrogen production capacity

Large scale storage in Taranaki from 2045

rs discharge at pressure into gas



Electrolysers at hydrogen transport hubs

Electrolyser buildout follows transport growth

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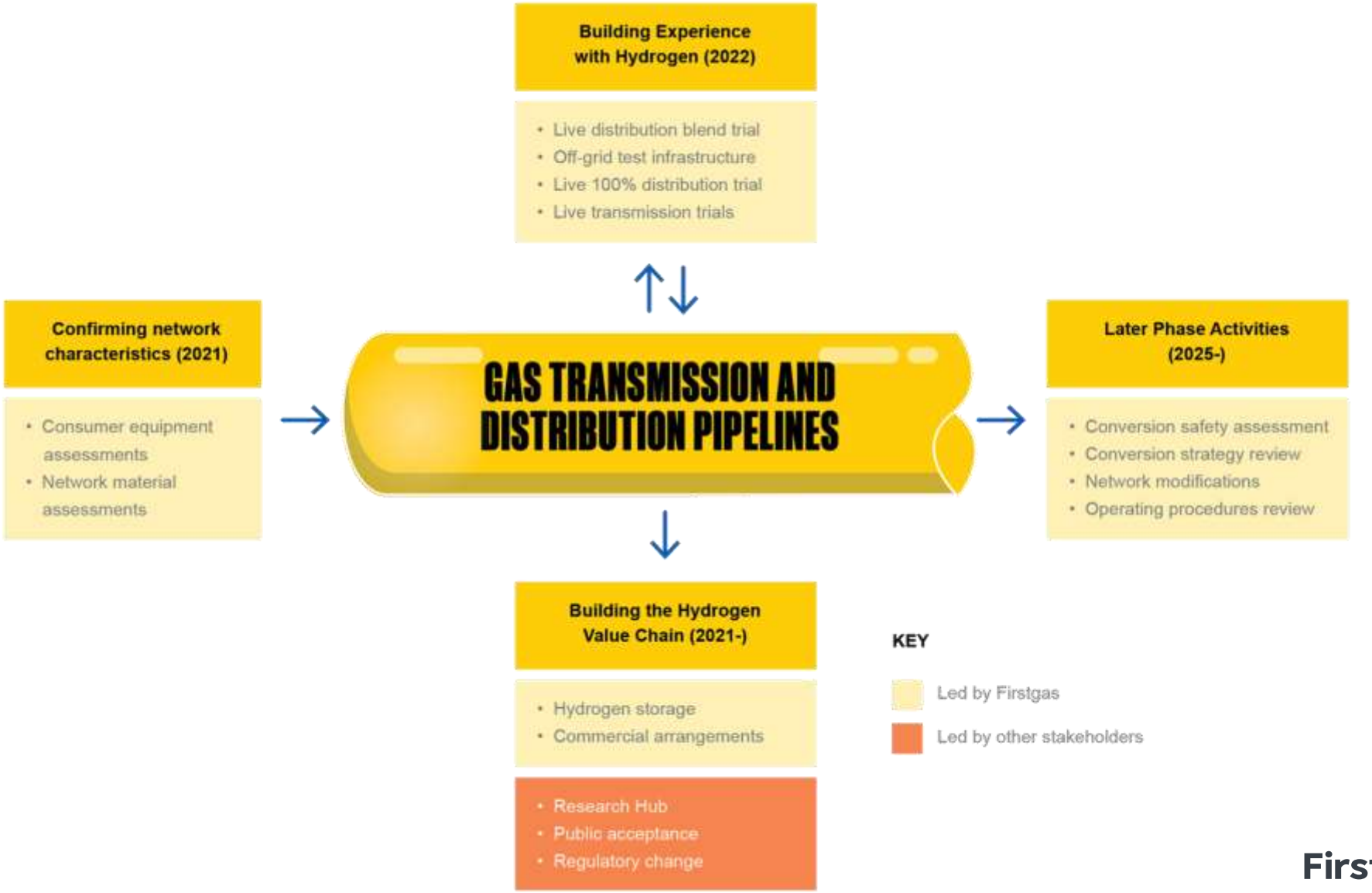
What we plan to do



Next steps

- Working with government to maintain momentum on NZ's hydrogen strategy
- Engaging with our partners on our research, development and demonstration programme
- Consultation and coordination with customers to ensure minimal impact as blends increase over time
- Sharing the results of our

Thank You

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