New Zealand Green Building Council submission on the Interim Hydrogen Roadmap

Thank you for the opportunity to make a submission on the *Interim Hydrogen Roadmap* consultation paper.

About the New Zealand Green Building Council

The NZGBC is a 700-member organisation comprising construction firms, suppliers, major property owners, banks, and research institutions focused on improving the environmental sustainability of buildings and building methods. We represent the construction industry's expertise on sustainability and, with thorough input from industry experts, design and operate the Green Star, NABERSNZ, and Homestar certification programmes that are the benchmarks for the environmental sustainability of buildings in New Zealand.

Commentary

The Interim Hydrogen Roadmap very clearly struggles to find use cases for hydrogen that would consume green hydrogen in the quantities needed to reach economies of scale, justifying the enormous capital investment required in the creation of green hydrogen production and the additional renewable electricity generation that would be needed to power the energy-inefficient process of electrolysis.

The paper paints a picture where the main use for green hydrogen is displacing huge volumes of diesel used for heavy transport and fossil gas used heating and cooking in the reticulated network, to the point where the electricity demand for the hydrogen production could at least double the amount of additional generation already forecast to be required by 2050.

Effectively, the equivalent of New Zealand's entire current electricity production would be assigned to producing green hydrogen. This is quite fanciful given the ability to employ electricity directly for these uses, and would not stand up to a cost benefit analysis.

Realistic potential use cases, such as high-temperature process heat, aviation, and green steel (and possibly as an ingredient to create ammonia for ship fuel), will demand relatively small volumes, denying green hydrogen economies of scale.

Contrary to the paper, land transport will not be a viable use case for hydrogen, given battery technology is far more advanced and economical. EVs are being produced in the millions, including over 120,000 buses and trucks in 2022, while hydrogen vehicle production is in the low thousands and declining.

This drives a search for other uses that are less realistic. One of these is blending hydrogen with fossil or bio-gas in the reticulated gas network.

Blending hydrogen in the reticulated gas network would primarily benefit the owners of that network and fossil gas producers, because it would help the network to remain viable longer as fossil gas production declines. Ultimately, it would mean more fossil gas would be burned by delaying the transition to electricity for household and business applications, and substantial capital would be expended on modifying the reticulated network, which is doomed to be a stranded asset in the medium-term anyway.

Using green hydrogen blended with fossil gas would be monumentally wasteful in terms of energy and wouldn't provide any unique benefit to household and commercial users. Using electricity directly in homes and businesses is more than 50% more energy efficient than creating green hydrogen (it takes 55kWh of electricity to make 33.3kWh worth of green hydrogen), with additional energy savings from the greater energy efficiency of heat pumps compared to gas heating.

Use of renewable gas would prolong the use of the current gas system which is high carbon, volatile and costly and in a number of instances unhealthy. Household gas use, especially from gas stoves, is thought to contribute up to 12 percent of the childhood asthma burden in Australia. Gas cooktops produce contaminants that increase childhood asthma risk: in particular, nitrogen dioxide and fine particulate matter.

Recent research shows there are serious concerns about renewable gas and hydrogen

- Renewable gas and other fossil gas alternatives are not clean like other forms of renewable energy. Because these products are still chiefly methane, the unavoidable leaks in transmission and distribution along with their ultimate combustion are significant sources of emissions.

- As for other fossil gas alternatives, we note that even the highest grades of 'certified gas' - which refers to gas from a facility with a low rate of methane leakage - still allow for some methane leakage. Further, certification only focuses on methane leakage from production and does nothing to address leaks in distribution. For hydrogen blends, the problem is even more complex.

  Earthjustice reports that even "the most optimistic scenarios estimate that the gas system that serves homes and most businesses could only handle up to 20% hydrogen by volume—representing just 7% of the energy in the gas pipeline system because hydrogen is less energy dense than methane."

  Furthermore, "because hydrogenmolecules are much smaller than methane molecules, utilities may also need to upgrade their infrastructure to prevent it from leaking into the atmosphere. When a pipeline carries a blend of hydrogen and methane, hydrogen can leak at three times the rate of methane."12These are not clean alternativesto traditional fossil gas.

Every use for gas in homes or businesses can be delivered by electricity, instead. Using a single energy transmission network that is already connected to homes and businesses, electricity, rather than adding or maintaining a second one, gas, brings cost savings.

The higher cost of green hydrogen and the lack of unique applications in homes and businesses (with the exemption of process heat) make it a dead-end for the decarbonisation of buildings.

The billions of dollars of capital investment that would be required would be better used on making buildings more energy efficient, subsidising conversions from gas to electricity, and increasing renewable electricity generation.