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From: no-reply@mbie.govt.nz
Sent: Sunday, 15 September 2019 4:20 p.m.
To: [redacted] Hydrogen
Subject: Hydrogen green paper - submission

Submission on Hydrogen green paper recevied:

Introduction
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Professor of Mechanical Engineering, Energy Expert

Is this an individual submission or on behalf of a group or organisation?

Individual

Please give the name of the group or organisation this submission is on behalf of.
What is the role of Government in developing hydrogen for storage and distribution?

The appropriate government role is to ensure the engineering capability in the country is sufficient to effectively assess, screen and manage all new technologies which are either developed in NZ or imported. If H2-Tech is ever imported, the essential role of government will be regulation, enforcing safety rules and standards, and policing. Again, to do this, the government must rely on the expertise of engineers.
The role that the government is assuming in the vision document is not appropriate. When the government decides that it will champion a particular technology, then there is serious risks of circumventing the rational engineering work that must be done to ensure safety because of political forces.

What are the challenges for using hydrogen for storage and distribution?

The "challenges" are technical, and MUST be dealt with by engineering experts. If government is asking the general public what are the challenges, then we are already embarking on a dangerous trajectory.
The technical requirements are well known internationally, and by NZ's few real hydrogen experts. It is never going to work out well for the country if the government thinks the technical challenges are possible to address through policy.

What are the opportunities for using hydrogen for storage and distribution?

The opportunities are already fully well known internationally, and by the few hydrogen experts in NZ. They have been thoroughly researched and investigated more than a decade ago. It is risky for policy vision to supersede technical reality.

What is the role of Government in developing the complementary role of electricity and hydrogen?

The government's role is to understand the facts, and ensure that adequate training and regulation are in place at all times. This is serious engineering work involving very dangerous equipment and highly corrosive and explosive gas.

What are the challenges for achieving this complementary role of electricity and hydrogen?

The challenges are already fully well known by experts in the field. Any number of engineers with first hand experience can advise the government regulators.
It is troubling that the government feedback survey asks what are the challenges for achieving "this complementary role..." What is the evidence from any major country through commercial development that there is such a complementary role? It is often hard to distinguish between the "forward looking statements" of companies whose income is derived from speculation and government funding, and real engineering. There are people in NZ who can help.

What are the opportunities for this complementary role of electricity and hydrogen?

The vision story goes like this: There is a possible future of development in which NZ builds wind generation capacity larger than its potential geothermal capacity. This overbuild would then cause serious overgeneration at times. The owners of the wind assets would either have to sell at no profit or curtail wind generation during these times. The story is that this overcapacity is "free" - do the asset owners agree? Are they privatised SOE's or charities? The story continues that since there is all this "free electricity" around, giant electrolysis factories could be fired up on the spot and crank out hydrogen which would then be compressed and stored. If there is a demand for electricity, then it is no longer "free" and the generators would demand to get paid for the electricity that the electrolysis factory consumes. The story continues that the hydrogen company would then fire up a fuel cell system to generate electricity when demand is high and the price is high. What we know is that if there is sufficient capacity then the price is not so high.
If an investor with technical knowledge were to decide what to do with "extra" or "free" money then they would not make this blunder into a technically highly risky and money losing venture that could be economically solved with demand side re-development of substandard houses.

What is the role of Government in supporting hydrogen use for the transport sector?

The government's role is the same as petrol or LNG or CNG or electric recharger - regulation and safety.
It is fundamentally not equitable for the government to support or subsidise a consumer choice available only the very few highest income members of the citizenry. Trucking, shipping and rail companies have engineers on their payroll who are tasked with evaluating technology and determining what vehicles produced overseas they wish to purchase and import. If the government interferes in normal due diligence business decisions then there are risks of politically induced financial disasters. The government would do well to study the history of Solid Energy. The capitalisation of the wood pellet company, Nature's Flame, was advised and analysed by experts at Canterbury University. Nature's Flame is still supplying customers with clean, renewable heating fuel. The same experts advised Solid Energy not to go into CCS in Australia, lignite briquets, hydrogen, and biodiesel. But political vision may have had undue influenced in bad business decisions at the SOE.

What are the challenges when using hydrogen for mobility and transport?

The realities of using hydrogen for mobility and transport have been well known for more than at least 2 decades. For an illustration of what government "support" does, look at the 24 year history of the stock price of Ballard Power Systems. https://www.macrotrends.net/stocks/charts/BLDP/ballard-power-systems/stock-price-history
There are realistically only two possible mass manufacturers of fuels cells that can be used in vehicles. If the government wants to know about the technology and what the challenges are, they can ask experts.

What are the opportunities for using hydrogen for mobility and transport?

Virtually none. Again, why is the government asking the general public these things? Is it a test to see if the vision document caused a vision in the general reader?

What is the role of Government in encouraging the use of hydrogen for industrial processes including process heat supply?

The government should take no role in encouraging the use of hydrogen. The government should take a major role in encouraging efficiency and energy transition to low energy products, technologies and operations.

What are the challenges for using hydrogen in industrial processes?

Industry well knows what the challenges are.

What are the opportunities for the use of hydrogen in industrial processes?

Hydrogen is currently manufactured and directly used in industrial processes where the engineering and chemistry require it. Again, why would the government ask the general public?

What is the role of Government in encouraging hydrogen uptake for decarbonisation of our natural gas uses?

This is a false proposition, so the government should find expert help and not engage in encouragement based on vision only.

What are the challenges for hydrogen to decarbonise the applications using natural gas?

The technical challenges and realities are already well known.

What are the opportunities for hydrogen to decarbonise our gas demand?

None

What is the role of Government in producing hydrogen in sufficient volume for export?

Absolutely None.

What are the challenges for hydrogen if produced for export?

Physics.

In addition, we welcome your feedback about the opportunities of hydrogen to Māori and how this will support their aspirations for social and economic development.

The best opportunity for Maori is for them to get good expert advice so they do not make bad decisions that actually strip them of funds they could otherwise use for real transition projects.

What are the opportunities for hydrogen if produced for export?

None.

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