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Subject: Hydrogen green paper - submission
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Submission on Hydrogen green paper recevied:

Introduction

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

Behalf of group or organisation

Please give the name of the group or organisation this submission is on behalf of.

Hiringa Energy Ltd

What is the role of Government in developing hydrogen for storage and distribution?

General comments

• Hiringa Energy welcomes the Government's green paper "A Vision for Hydrogen in New Zealand" and the Government's on-going commitment to the adoption of green hydrogen as a zero emission energy carrier in New Zealand.
• We strongly support the New Zealand Hydrogen Association's work and see a role for the association and Government in education and promotion of hydrogen adoption in New Zealand.
• Hydrogen technology is ready for commercial deployment and immediate investment and incentives are required to seed the industry and build a domestic market.
• Immediate action is required to start the transition now in order to meet New Zealand's emissions targets.
• Hydrogen represents an opportunity to be an early and meaningful participant in what is a new high growth industry globally.

Background

• Hiringa and partners are developing a network of hydrogen fuelling stations that incorporate storage and distribution. The design phase of the initial network has included support from by the Provincial Growth Fund. The network design incorporates both onsite hydrogen production to rationalise storage and distribution costs as well as a distribution system. A network of stations provides resilience and the onsite storage allows low cost production during off-peak power periods.
• The ICCC identified the opportunity for using ammonia as a viable long term storage solution for

green hydrogen to meet New Zealand's dry year energy needs. Hiringa has partnered with Ballance Agri-Nutrients, New Zealand's only Ammonia producer to develop a commercial scale green ammonia production facility pilot.

Role of Government
Government support in the early stages of hydrogen supply and distribution network establishment will enable the creation of a viable commercial scale storage and distribution ecosystem. There is a role for the government to bridge the initial uncertainty period prior to commercial offtake being achieved. This may be via direct investment, and/or measures to stimulate market demand for green hydrogen. (For example, use in heavy transport applications.)

A supportive regulatory regime to enable use of specialised hydrogen storage and distribution equipment is necessary. Core hydrogen storage and distribution equipment is manufactured overseas by leading international vendors. Adopting industry recognised international standards will allow use of leading technology in New Zealand. International efforts are leading harmonization of standards world-wide. These collaborations are key to leveraging lessons learned across countries and ensuring standard products are developed that comply across multiple jurisdictions.

Encourage and stimulate the use of existing natural gas infrastructure for both Hydrogen distribution and storage (see response to Question 13).

It will be most economic to develop national scale storage incrementally the domestic market grows. As the benefits of national storage are to government and all of NZ rather than one individual company, there is a role to play to stimulate development of projects that include a storage element and supports offsetting fossil alternatives. For example, by offering a contracted rate for MWh stored per day or year, government can create a virtual "revenue" stream which would help underpin supporting investments from the private sector.

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

Hiringa agrees with the challenges identified in the green paper.

In order to be an affective long-term storage mechanism, hydrogen needs to be deployed at multi-megawatt scale. Early projects must be at a scale that demonstrates the commercial viability of hydrogen, rather than at smaller demonstration scales. Government direct support and future policy support could unlock private investment in projects at scale.
The methods of storing and distributing hydrogen will change over time, and will evolve as the industry grows. It will be important to retain optionality and that legislation remains in step with emerging technologies.

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

Hiringa agrees with the opportunities identified in the green paper and emphasises the following:

• Hiringa's network design and key projects are designed to enable the progressive development of hydrogen storage and distribution.

• Ammonia is a high density storage solution for transportation of hydrogen and directly combustible in gas turbines for power generation applications.

• As the proportion of intermittent renewable resources in our electricity supply increases, over generation during periods of low demand will become a problem. Using this excess energy to create hydrogen will be an effective and economically efficient way to store this energy for future use. This stored energy can be moved towards long term seasonal storage in case of dry seasons, non-electricity based usage in hard to decarbonise industries, and providing peaking power for high demand periods.

• Hydrogen is crucial for maintaining a green energy system. The current grid can swing from 0.085 kgCO2e/kWh to 0.196 kgCO2e/kWh depending on the mix of generation. Hydrogen will allow for higher intermittent renewable generation percentages in the grid reducing the overall grid emissions. [Emission Calculations based off Electricity Authority generation data and generator type emission outputs]

• Repurposing and developing current gas infrastructure to accept hydrogen for storage and distribution in New Zealand gives renewable electricity the ability to decarbonise multiple industries previously reliant on fossil fuel, and reduces stranded assets following transition.

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

Background

Hiringa is working with partners to develop projects that will produce green hydrogen from new and existing renewable electricity generation. These projects will connect New Zealand's abundant renewable resource to traditionally hard to decarbonise sectors, such as heavy transport and industrial processing.

These projects are scalable and can accelerate the build of renewable electricity generation, while increasing system resilience through the load following capabilities of electrolysers.

Role of Government

Hiringa agrees with the ICCC's recommendation that the government pursue accelerated electrification and decarbonisation of transport, industrial chemicals and process heat over pursuing the last few percent in the 100% renewable electricity target by 2035, as this should result in greater greenhouse gas emission reductions. Hydrogen's advantages in decarbonising sectors of the transport industry are covered in our Mobility response.

Government funding and support for projects that encourage the development of renewable generation, and focus on projects that can link renewable generation to industries where the greatest amount of GHG reductions can be achieved.

Government must include hydrogen as one of the storage solutions for renewable electricity, given its advantages in longer-term storage and economic viability.

Create and revise legislation to reduce consenting barriers and allow for timely investment/development decisions in renewable generation.

Ensure the renewable origin and GHG reduction of hydrogen molecules are accurately certified.

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

Hiringa agrees with the challenges identified in the green paper and emphasises the following:

With predicted growth in electricity combined with a 100% renewable generation target, the two main challenges for New Zealand will be finding solutions that enable rapid growth of renewable generation and dealing with the associated short- and long-term intermittencies. There is no point in accelerating electrification if the additional generation does not come from a renewable source.

Current costs of hydrogen storage and re-electrification are restrictive, although these costs are

predicted to fall it is important to focus on scalable projects that unlock the advantages of hydrogen and use economies of scale to reduce costs.

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

Hiringa agrees with the opportunities identified in the green paper and emphasises the following:

Green Hydrogen will accelerate the deployment of renewable generation and increase security of supply, enabling New Zealand to meet its ambitious climate targets without compromising the energy system.

• Increased electrolyser capacity prevents any overbuild of renewable generation by using excess renewable electricity to produce hydrogen, this renewable energy can then be used to decarbonise multiple industries, both nationally and internationally.

Hydrogen is poised to become the lowest-cost option for storing large quantities of electricity over longer time periods (days, weeks and months), which is the biggest challenge facing the New Zealand electricity system as we move towards 100% renewable electricity.

Modern electrolysers can ramp up and down in seconds, providing additional and immediate flexibility to an over or under power systems and complimenting the short-term variability of wind and solar.

Hydrogen from renewable electricity is the most economical and effective way to electrify certain parts of the transport sector, such as commercial and heavy freight, buses and material handling equipment.

Technologies exist that enable coal and gas electricity generators to run partially, or entirely on renewable hydrogen, potentially allowing the use of existing fossil fuelled electricity infrastructure to be transitioned to zero emissions.

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

Hiringa agrees with the opportunities identified in the green paper and emphasises the following:

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renewable hydrogen, potentially allowing the use of existing fossil fuelled electricity infrastructure to be transitioned to zero emissions.

Role of Government

Hiringa Energy is working with leading New Zealand companies and members of the New Zealand Hydrogen Association to build and deliver a supply chain for fuel cell mobility. Some settings and incentive structures, particularly in relation to the transport system, will need adjusting to deliver the benefits for New Zealand in the most efficient and effective way:

Providing incentives for early adopters and vehicle owners to change. A RUC exemption for a minimum of 5 years, but preferably 10 years (similar to the BEV incentive) would provide am immediate and material incentive while other low emission fuel and vehicle policy settings are developed.

Supporting the development and importing of fuel cell electric vehicles for New Zealand roads through government regulatory leadership and leveraging lessons learned in other countries. Asian markets are developing fuel cell heavy vehicle solutions ahead of the European due to the relative flexibility of manufacturers – Class 8 heavy truck fleets are already planned for deployment in 2020. New Zealand regulators need to be prepared to work with Asian manufacturers to clearly specify the requirements for NZ on-road certification

Support for infrastructure is key to break the "chicken and egg problem" which is a widely recognized barrier for hydrogen uptake. NZ is fortunate in that due to its geographic borders and hub-based roading systems, little infrastructure is required to cover major parts of the countries transport and freight corridors. In early days, uptake uncertainty is a major barrier to getting finance for infrastructure, however commercial-scale build outs are key to ensuring the economic sustainability of hydrogen uptake. Government could help offset enough risk to stimulate private co-investment while market demand is building and is uncertain. Some support mechanisms can include offsetting initial capital costs. low carbon fuel incentives which help both reduce costs for vehicle users in early days and improves revenue for infrastructure providers.

Using government disincentives to drive change in the fleet make up, while supporting uptake of alternatives. For example preventing use of fossil fuel buses in public transit by 2025 in Europe has created a large market for zero emission alternatives that is driving greater uptake of FCEV solution. A similar program sends strong signals to operators and technology vendors that NZ committed changing its fleet make up.

Set targets for fuel cell vehicles alongside other zero emission solutions. The government's Electric Vehicles Programme sets a goal of reaching 64,000 electric vehicles by 2021. A similar target for FCEV would inform infrastructure development planning, signals long-term policy direction, and NZ's commitment to a zero-emission transport network. These government signals are key for increasing investor confidence in the long-term support of zero emission initiatives.

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

Hiringa agrees with the challenges identified in the green paper and emphasises the following:

Availability of NZ suitable vehicles in the early stages of commercialization, particularly in the heavy-duty space.

Availability of infrastructure – it is difficult to encourage uptake of hydrogen vehicles when virtually

no infrastructure is in place. Likewise it is difficult to develop infrastructure when there are few vehicles available.

Hydrogen price is a major driver of the total cost of ownership for vehicle operators. Infrastructure must be built at a scale that low priced hydrogen can be offered to encourage uptake. While it seems appropriate to build small demonstrations, these projects often are extremely expensive on a $/kg-H2 basis and will never be commercially successful without ongoing government support. It is key projects are built at an appropriate size so that once at full capacity they are commercially viable.

The Public Transport Operating Model, designed around conventional diesel based fleets, makes public/private partnerships that unlock the potential of hydrogen for urban bus and ferry fleets difficult. The effort to underpin commercial refuelling infrastructure with public transport fleet operations requires early multi-party partnering, outside of a conventional procurement process. The tendering process does not support the pre-tender development from private companies bringing privately developed IP or trade secrets as well as supplier relationships and capabilities.

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

Hiringa agrees with the opportunities identified in the green paper and emphasises the following:

Hydrogen has a high energy density and therefore is best suited to long-range, high payload and/or utilization applications like commercial logistics, heavy freight, buses, and material handling equipment.

While the high payload, range and utilization applications are in the minority for total vehicles, these vehicles are generally the highest emitting segments in transportation on a per vehicle basis. For example, 4% of the total vehicle fleet are heavy vehicles, yet they make up 26% of total transport emissions. Hydrogen has a key role to play in reducing emissions from some of the biggest emitters in transport. Heavy vehicles best suited for transition to hydrogen are those that generate the largest amount of emissions.

Fleets of heavy vehicles can better utilize hydrogen infrastructure than BEV charging and still have route flexibility across New Zealand.

NZ is uniquely positioned to create a sustainable FCEV heavy transport network due to its size and renewable energy potential.

Develop a pilot FCEV heavy vehicle program with Asian OEM's. Leading manufacturers have heavy FCEV's in the Asian market and capability to quickly deliver vehicles suitable for New Zealand.

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

Background
Industrial hydrogen is key to providing initial demand that can underpin the development of green hydrogen projects.

Hiringa and Ballance Agri-Nutrients have partnered to develop a project that creates green hydrogen from wind turbines, to produce green ammonia. The project is scalable, and the hydrogen produced can be directed to the transport market as industry develops.

Hiringa are exploring similar projects with other large industrial hydrogen users.

ROLE OF GOVERNMENT

Government support will be required for early projects that substitute existing fossil fuel feedstocks for industry, due to the current relative cost of green hydrogen, and the competition from products produced internationally from fossil fuels.

Focus on projects that prove material demand for green hydrogen to unlock economies of scale. Eg ammonia, methanol, steel, refining, hydrogen peroxide production.

What are the challenges for using hydrogen in industrial processes?

Hiringa agrees with the opportunities identified in the green paper and emphasises the following:

Industrial processes typically produce products that compete in global markets (either as exports) or against foreign imports. There is often no carbon pricing in the competitive markets which creates a disincentive for business to explore alternatives to low cost fossil fuel use and imports, which have experienced major economies of scale for the past century and a half.

The costs of green hydrogen production are rapidly decreasing and substantial reductions are possible with scale. However, large capital investments are required to replace existing installed industrial capacity without increase in production to underpin new investment. The transition will involve support for retirement of existing capacity, piloting of green technology and/or new market development.

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

Hiringa agrees with the opportunities identified in the green paper and emphasises the following:

Displacing industrial process that already require a hydrogen input with hydrogen produced in a sustainable matter
- Ammonia
- Methanol
- Steel
- Hydrogen Peroxide
- Flat glass

Using each of the above as an “anchor tenant” to justify large scale hydrogen production that can offer low-cost hydrogen pricing to other markets such as heavy transport and export.

Leverage opportunities where hydrogen based processing plants can produce additional production from green hydrogen feeds with minimal CAPEX to debottleneck. This enables low cost scale hydrogen production to assist transition to a green sustainable feedstock.

Provide a future beyond fossil fuels of existing industries, assets and skilled workforce with enabling sustainable fuels and feedstocks.

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

Background
Hydrogen is well placed to facilitate the decarbonisation of natural gas and will benefit from integration into existing infrastructure. Hiringa’s refuelling network would benefit from access to existing infrastructure, including gas networks to readily inject and offtake green hydrogen.

Hiringa is developing biogas offtake opportunities to produce green hydrogen, these offtakes provide a high value use (both in monetary and decarbonisation terms) for biogas and will underpin further production projects to decarbonise domestic gas supply.

Role of Government
Facilitate and incentivise a consistent decarbonisation of New Zealand's natural gas supply chain. This requires solutions that can be implemented quickly and scaled.

Provide clear vision and regulation for the decarbonisation of natural gas in New Zealand to give industry the confidence to make long term investment decisions that support a transition to zero emissions.

Define appropriate blend level targets for hydrogen into the gas grid, implement policy to ensure these targets are met.

Leverage off international projects and studies that integrate Hydrogen into existing infrastructure and support incremental R&D for NZ specific applications.

Begin to revise regulations, code and standards to prevent them becoming a barrier to deployment.

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

Hiringa agrees with the challenges identified in the green paper and emphasise the following:

Lack of market mechanisms and financial incentives will be a barrier to the injection of green hydrogen into a blended natural gas network.

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

Hiringa agrees with the opportunities identified in the green paper and emphasise the following:

Blending hydrogen into New Zealand's existing natural gas pipelines can decarbonise a material portion of the natural gas supply chain relatively quickly and provide scale for green hydrogen projects by accessing existing domestic gas demand.

The existing workforce and infrastructure can be leveraged and expanded to facilitate the delivery of hydrogen, as well as acting as a large and low-cost storage solution, significantly reducing the transportation and storage cost challenge for hydrogen. This also provides future job opportunities and security in the gas industry and minimises stranded assets.

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

Background
New Zealand should seek to demonstrate commercial business models in the domestic market as a precursor to export opportunities. This builds capability and credibility and significantly de-risks the export scale projects.

Hiringa's refuelling network and JV projects aim to contribute to the establishment of a domestic green hydrogen industry that demonstrates commercially viable domestic operations and capabilities that will be the foundation for a potentially significant export market.

Taranaki is well positioned to support a major hydrogen export project with:
- world class offshore wind resource
- Existing infrastructure (offshore platforms, pipelines, port)
- Existing hydrogen industry (ammonia and methanol production)
- Strong energy sector skills and capability

Role of Government

In incubating the establishment of a domestic hydrogen market the government will the building blocks for an export market.

Continue to foster friendly relations and advocate New Zealand's green hydrogen industry with other nations interested in importing renewable energy.

Help facilitate the creation of trade agreements for renewable energy

Create effective policies and minimise barriers for the safe and reliable commissioning, consenting and construction of large renewable electricity to hydrogen projects.

Ensuring domestic decarbonisation is not compromised by exporting renewable hydrogen and electricity overseas.

What are the challenges for hydrogen if produced for export?

Hiringa agrees with the challenges identified in the green paper and emphasise the following:

• Export hydrogen needs to be cost competitive with the global market to be feasible. The main contributor hydrogen cost is the feedstock, which in New Zealand's case is the cost of renewable power (or gas). To this end the more the government can do to drive down the cost of renewable electricity the better. Internationally policy such as the PTC/ITC policy in the United States has been shown to significantly reduce the cost of renewable power by encouraging the development of new projects.

• Securing early offtakes in a competitive market will be a challenge, proving domestic capabilities and continuous government support for hydrogen will can give New Zealand and advantage.

• Certifying the renewable origin and GHG reduction of hydrogen, can be resolved through certificate schemes.

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.

Hiringa agrees with the opportunities identified in the green paper and emphasises the following:

• By capturing the renewable export market New Zealand can not only meet its own targets under the Paris agreement, but also significantly reduce emissions internationally, positioning ourselves as a global leader in climate change action.

• Leverage New Zealand's rich renewable energy resources, skills and infrastructure to capture significant value in an emerging commodity that can be traded globally.

• Diversify New Zealand's heavily emitting export industry with a renewable commodity. Hedging against the global shift to decarbonisation.

• Offer premium green product attracting higher price point. Not only limited to Hydrogen but also hydrogen derivative products such as Ammonia and Methanol which are already commodity products traded internationally.

• The export industry offers economies of scale for a hydrogen industry in New Zealand, enabling green hydrogen to deliver cost effective decarbonisation across multiple sectors.

• Leveraging and integrating large scale domestic green hydrogen production for decarbonisation of industrial chemicals (ammonia, methanol, refining, hydrogen peroxide etc) with export will create a

significant economy of scale unlocking both opportunities.

• Accelerate New Zealand's transition to a low emissions economy with an affordable, resilient and sustainable energy system.

• Enhance the reliability of New Zealand's domestic energy supply by diverting renewable energy produced for export to cover any unexpected or sudden problems with domestic requirements

• Enhanced relationship and brand with major trade nations.

What are the opportunities for hydrogen if produced for export?

• Hydrogen will unlock distributed energy systems that enable community level participation in-line with Maori values.

• Projects are regional, and many have elements that encourage participation from local iwi – such as creating a new market for regional wind and geo-thermal assets on iwi rohe.

• Hydrogen also provides opportunity for commercial scale circular economies to develop on rohe. For example opportunities exist to the further explore the interplay between renewable energy, hydrogen, agriculture, aquaculture, horticulture

• Provides local investment opportunities for Maori trusts and can facilitate greater Maori participation in the energy sector.

If you wish to, you can attach a document to this submission.

Green-Paper-Executive-Summary-Hiringa.docx - Download File

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