Submission template

Submitting on *Interim Hydrogen Roadmap*

This is the submission template for responding to the *Interim Hydrogen Roadmap.* The Ministry of Business, Innovation and Employment (**MBIE**) seeks your comments by **5pm on Thursday, 02 November 2023**.

Please make your submission as follows:

1. Fill out your details under the "Your name and organisation" heading and, if applicable, check the boxes underneath on privacy and confidentiality.
2. Fill out your responses to the discussion document questions. Your submission may respond to any or all of the questions. Where possible, please include evidence to support your views, for example references to independent research, facts and figures, or relevant examples. If you would like to make other comments not covered by the questions, please provide these in the "General comments" section at the end of the template.
3. Before sending us your submission:
   a. delete this first page of instructions; and
   b. if your submission contains any confidential information, please:
      - state this in the cover page or in the e-mail accompanying your submission,
      - set out clearly which parts you consider should be withheld and the grounds under the Official Information Act 1982 (**OIA**) that you believe apply, and
      - provide a separate version excluding the relevant information for publication.
4. Submit your submission by:
   a. emailing this template as a PDF or Microsoft Word document to hydrogen@mbie.govt.nz; or
   b. mailing your submission to:

      Energy and Resource Markets Branch
      Ministry of Business, Innovation and Employment
      15 Stout Street
      PO Box 1473, Wellington 6140
      Attention: Interim Hydrogen Roadmap Submissions

Please direct any questions that you have in relation to the submissions process to hydrogen@mbie.govt.nz.

Release of Information

Please note that submissions are subject to the OIA and the Privacy Act 2020. In line with this, MBIE intends to upload copies of submissions received to MBIE's website at www.mbie.govt.nz. MBIE will consider you to have consented to uploading by making a submission unless you clearly specify otherwise in your submission. MBIE will take your views into account when responding to requests under the OIA and publishing submissions. Any decision to withhold information requested under the OIA can be reviewed by the Ombudsman.

Submission on the *Interim Hydrogen Roadmap*

Names	
Organisation (if applicable)	Tūaropaki Trust/Halcyon Power Ltd
Contact details	

Release of information

Please let us know if you would like any part of your submission to be kept confidential.

☐ I would like to be contacted before the release or use of my submission in the summary of submissions that will be published by MBIE after the consultation.

☒ I would like my submission (or identified parts of my submission) to be kept confidential, and **have stated below** my reasons and grounds under the Official Information Act that I believe apply, for consideration by MBIE.

I would like my submission (or identified parts of my submission in blue text) to be kept confidential because

(2) Subject to sections 6, 7, 10, and 18, this section applies if, and only if, the withholding of the information is necessary to—

(a) protect the privacy of natural persons, including that of deceased natural persons; or

(b) protect information where the making available of the information—

(i) would disclose a trade secret; or

(ii) would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information

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Responses to questions

Section 1: Hydrogen is emerging as an important part of the future global energy system	
	Are there other issues we should be considering in our assessment of the strategic landscape for hydrogen in New Zealand?
1	Thank you for the opportunity to provide feedback on the interim hydrogen roadmap. In context, the value of hydrogen as a fuel, a chemical feedstock and a low-carbon alternative to fossil fuels is well understood and the product has been tried and tested for decades across multiple use cases. Therefore, it is ready to deploy now with only incremental technology development and offers the possibility of rapid decarbonisation of several hard-to-electrify applications. An actual use case in New Zealand is being explored with our Mokai Rural Green Hydrogen Hub concept and Auckland Hydrogen Innovation Hub concept, for which we provide details in the General Comments section. These are examples of projects planning to deploy new technology to help decarbonise heavy transport, operational from early 2024. Globally, significant progress is also being made, which has advanced the development of the green hydrogen supply chain. Where this has been most impactful, government funding support and the removal of regulatory barriers have been critical in levelling the competitive playing field with high-carbon alternatives. Moreover, where a system-wide approach has been taken, which includes the true opportunity cost of carbon abatement or specifically the cost of climate change impacts through delay or inaction, green hydrogen is proven to be an economic and very effective solution. In New Zealand, some progress has been made in developing discrete projects from a combination of private-sector entrepreneurship and several government-funded projects. To capitalise on these initial steps and accelerate deployment, solutions will need to stimulate customer demand, incentivise network infrastructure development and bridge the cost gap between green hydrogen and existing high-carbon energy sources. We believe that the most effective way to achieve these outcomes is to include the true opportunity cost of carbon (and the true cost of climate change) in the economic calculations and incentivise and penalise accordingly through regulation. The existing ETS mechanism, if working effectively, offers a possible solution. For additional context, we have provided a link to a publicly available, independent assessment of the true cost of climate change and how action now is a much better economic solution than coping later. https://www2.deloitte.com/content/dam/Deloitte/nz/Documents/about-deloitte/nz-turning-point-report.pdf Looking forward and anticipating growth, the global supply chain for equipment is a key risk. This has been borne out recently across industries in NZ accessing imported equipment. This could be de-risked by enabling the development of in-country skills and capability. For green hydrogen, the availability of electrolysers and access to technological development to increase efficiency and reduce costs is important. The opportunity exists for NZ to become a technology exporter. Some good examples already exist where companies are applying their capability to

	green hydrogen already, including Fabrum which is leading the development of next-generation, liquid hydrogen systems.
Section 2: The role for hydrogen in New Zealand's energy transition	
	Do you agree with our assessment of the most viable use cases of hydrogen in New Zealand's energy transition?
2	Yes, we agree with the assessment in the Interim Hydrogen Roadmap and see immediate viable use cases for hydrogen in heavy transport and heavy machinery where battery electric is impractical because of reduced range or increased weight. The fundamentals around weight and distance also apply to marine and aircraft, particularly for long-haul routes. For transport the fundamentals are km per tonne carried – minimising Tare Weight for long-range heavy vehicles – and that applies to road, sea, rail and air. That's the place where hydrogen looks most effective. For long-distance freight or passenger transport, a carrier will be looking to minimise the weight of the generation source – obviously, the technology is the furthest advanced for road, but ferries, rail and air are also, of course, being explored. We note that the use case for stationary FC generators is also being commercially investigated and would be worthy of support too. Companies like Miraka, which has to cover an annual maintenance shutdown of its geothermally-based process heat generator, and engineering company MB Century, which is often working remotely, are both looking into backup or remote electricity generation from hydrogen FC generators. This will reduce their reliance on current diesel technology. The viability for such uses (both in reducing carbon and proving part of a wider business case), where the power draw and duration of use are known are likely to be the best local condition testing of this developing technology by companies like Toyota and Hyundai which are both looking to scale up the output of their hydrogen-powered stationary generators and are already active in the hydrogen sector in New Zealand. Given the disruption to power supplies during recent weather events, these trials could also see FC generators used initially for small-scale emergency backup electricity provision in the case of civil defence emergencies and in hard-to-service rural applications. FC generators can possibly play an important role in providing specific cover in critical applications where the cover solution is currently diesel. As mentioned above milk producer Miraka and engineering company MB Century are currently investigating use cases for FC generators to cover known outages during maintenance shutdowns from energy suppliers or to provide electricity for remote area work.
	Do you support some of these uses more than others?
3	We agree with the analysis in the Roadmap that hydrogen is most likely to find its immediate viable use in hard-to-abate and hard-to-electrify applications. We see government's role as levelling the playing field in supporting low emission solutions until a more developed market emerges. For this reason, government support for both areas, and not just favouring particular participants, will be crucial.

	What other factors should we be considering when assessing the right roles for hydrogen in New Zealand's energy transition?
4	As discussed in our response to Question 1, as well as consuming hydrogen domestically and potentially exporting it as a commodity, we need to remember that a more immediate earner could be the export of technology developed here in NZ. Government investment is necessary to encourage companies currently producing or using hydrogen to further invest, and in stimulating ongoing research and development (whether in the public or private sector). From these will emerge technology with export potential, with the obvious benefit of overseas earnings, resilience and independence. In the likes of geothermal field development and power station servicing, New Zealand already has companies that are world-leading exporters of technology and services. Some, like MB Century are now gaining experience in hydrogen. Building up our manufacturing and technological ability in hydrogen will enhance our reputation as not just a clean and green but also as a high-tech economy.
Section 3: Government position and actions	
	Do you agree with our policy objectives?
5	The injection of capital to companies testing the business case or researching hydrogen here in NZ is welcome. The high-level government subsidy of $100m over 10 years for projects (and $30m for FCEVs) will have a positive impact but a more enduring policy will be required to maximise hydrogen's potential over the long term. To illustrate this, we estimate that $100m is sufficient to support fewer than 200 hydrogen heavy vehicles. According to the Green Freight Strategic Working Paper there are approximately 67,000 trucks (over 10 tonnes) in NZ. This fleet is responsible for 87% of CO2 emissions from trucking (2017 figures). Replacing up to 200 trucks with dual fuel or fuel cell alternatives to diesel would be a good start to reducing heavy fleet emissions but obviously a greater uptake of the technology would be needed to have significant impact. As detailed in Section 1, we believe the most enduring mechanism to achieve sustainable growth is to include the true cost of carbon in hydrogen and diesel economics. We envisage that this can be phased in gradually to enable a smooth and just transition. According to the Road Map documentation, the estimated cost of producing green hydrogen is $8kg. This appears low. In our estimates, this will vary with electricity price and does not appear to include any cost of transportation or depreciated cost of capital. It is worth noting however that we estimate the cost parity price with diesel (based on energy equivalent and not including the true cost of carbon) is in the range of $13-$20kg (taking into account the energy efficiency of fuel cells over the internal combustion engine). We estimate that if the true cost of carbon is included, green hydrogen achieves cost parity with diesel today. The end of any policy period involving financial support needs to be carefully managed. A concern of the industry will be the end of any subsidy period. 10 yrs sounds like a long time but what happens at the end when the subsidy falls off?

	We would advocate for looking into some kind of transition from subsidy to no subsidy. We accept the market must stand on its own at some point, but it needs to be linked back to carbon price at that stage – if not before, in a graduated transition.
	Do you agree with our positioning on hydrogen's renewable electricity impacts and export sector?
6	We agree that resource consent processes for renewable energy will need to have any potential burdens or barriers reduced and can see that hydrogen production for export is likely to be some time off and dependent on local demand and local electricity pricing. For hydrogen production to be seen as helping underwrite investment in the overbuild of intermittent renewables may require some sort of financial security for those investing – i.e. ongoing confidence that there will be a market for green hydrogen.
	Do you agree with the proposed actions and considerations we have made under each focus area?
7	Regulatory settings and standards will need to be carefully managed in order to keep ahead of the development of the technology. The Standards NZ three-stage project is not intended to be completed until mid-2025, over a year and a half away. Halcyon has already been producing green hydrogen and distributing it to customers. We expect to develop a local hub, which aggregates production and consumption across several use cases. We are bringing together consumers and technology partners for FCEV or dual fuel vehicles operating at enterprises nearby to Mokai. Trials are underway to test the viability and uncover barriers to deployment. We believe the hub concept is a good way of delivering scale as it can be replicated across NZ. It's clear the skills in oil and gas, geothermal and to a lesser extent minerals are fully applicable to hydrogen. We have a declining oil and gas sector in Taranaki with the majority, if not all of, the skills for hydrogen, which would be a neat transition. They may have to top up the skills to cover some of the uniqueness of hydrogen but it's a great thing that we've got a technical industry emerging when we've got another one declining.
	Is there any evidence we should be considering to better target actions in the final Hydrogen Roadmap?
8	We see that investment support is necessary to accelerate the reduction of carbon emissions and the catastrophic impacts of climate change. We see green hydrogen as having a significant part to play. As well as reviewing available funding to ensure a level playing field, the government can reduce costs for private investment by ensuring regulatory ease in the sector. From the information in the Interim Roadmap, it looks likely that the most fruitful application of money has been where smaller amounts are invested as grants or in co-funding – rather than large loans (some of which becomes a grant when certain milestones are met). We would

like to see continued evaluation of the funding model and that decision-making is transparent to help maintain confidence in the process and encourage collaborative partnerships in the developing hydrogen sector in Aotearoa.

We applaud the boldness to go early on hydrogen investment and feel it's important that those who have received funding are held to account for their commitments. We would expect no less if we were successful in receiving any support.

General comments

Mōkai Rural Green Hydrogen Hub

The Mōkai Green Hydrogen Hub is intended to be a scalable concept, replicable across the rural sector, which enables the mass distribution of green hydrogen across Aotearoa.
Participating businesses are: Central Transport Limited, Miraka and Tuaropaki Trust/Halcyon Power Ltd.
The collaboration anticipates the development of 'close-coupled' production and consumption under circular economy principles to support Aotearoa's transition to a low-carbon future.
It acknowledges that the primary sector contains many hard-to-electrify processes and equipment, often working in remote or off-grid situations and/or requiring long-haul trucking to get products to market. Green Hydrogen is seen as a viable, low-carbon, alternative for all these situations.
Initially, the collaboration will involve end-users in dairy operations (milk collection and processing) but is designed for expansion into heavy equipment and broader energy applications in agriculture, forestry and horticulture, such as remote or back up electricity generation cover.
This initiative is consistent with and supportive of the development of Aotearoa's Hydrogen and Energy Strategies and will both inform and adopt the outcomes of these strategic initiatives for the primary sector.
Leading Central North Island freight company, Central Transport (CTL) is the exclusive supplier of milk tanker transport to Miraka. CTL intends to transition its 80-strong fleet to low-carbon sources, first using mixed fuel and then full hydrogen vehicles. It sees hydrogen as the preferred technology for the future fleet and wants to demonstrate the necessary technology application in heavy vehicles.
Low-carbon dairy processing company, Miraka Limited already uses geothermal energy to reduce its carbon footprint post-farm gate. Its kaitiakitanga strategy aims to materially reduce on-farm greenhouse gas emissions to the lowest levels found in Aotearoa. The hub fits in with its renewable energy strategy as well as enabling other businesses to decarbonise with greater ease as a result.
Tuaropaki Trust/Halcyon Power is Aotearoa's first, commercial-scale, green hydrogen producer. The Trust has over 20 years of experience with geothermal energy and has industry-leading facilities at Mokai, north of Taupo. Tuaropaki is the exclusive provider of steam to power Miraka's dairy factory and has aspirations to create the first vertically integrated hydrogen generation and refuelling hub in Mōkai consistent with the commitment to develop a viable green hydrogen supply chain in Aotearoa.

The parties see the opportunities for green hydrogen to reduce fossil fuel emissions in each of their businesses and Aotearoa, particularly the primary sector. A sustainable hydrogen economy will require innovation and collaboration between manufacturers, infrastructure providers, end-users and government. The Mokai Green Hydrogen hub will provide a tangible demonstration that a local green hydrogen economy is feasible and open access to experience and learning to support development elsewhere.

Intentions

The parties agree in principle to undertake the following activities jointly:

a. Develop a concept for a rural hydrogen hub that can be scaled more broadly across Aotearoa and the primary sector.
b. Identify further partners and technology providers whose participation would enhance the concept.
c. Undertake an assessment of both financial and non-financial benefits of the hub concept, with the intent for all parties to find cost-effective solutions and carbon emission reduction.
d. Identify rapid investment opportunities which kick-start learning and demonstrate proof of concept.
e. Identify and seek funding opportunities that would accelerate the initiative and enable wider adoption across Aotearoa.
f. Build confidence in the sector through the active, joint, promotion of green hydrogen as a low-carbon, cost-effective, energy source.

Although the agreement does not bind the parties to financial commitment, the intent of the collaboration is to identify investment opportunities that lead to the establishment of a rural hydrogen hub in the Taupō rohe.

Next steps

As the collaboration develops, more detailed formal written agreements will be entered into as appropriate. Other activities will be identified which support the establishment of rural hydrogen hubs and Aotearoa's transition to a low-emissions future.

The parties recognise the challenges of being first movers in the primary sector but make this commitment as kaitiaki to bring about change.

Auckland Hydrogen Innovation Hub (Wiri)

Similar to the Mōkai hub, the Auckland Hydrogen Innovation Hub plans to provide green hydrogen (initially shipped from Mōkai but eventually produced on site) to a number of nearby off-takers. Immediate customers will be the Auckland Transport FCEV bus and the Toyota Hydrogen Project's Car Share Scheme.

Marine users could be a likely addition with potential future opportunities in short haul passenger transport close to the coast.

The Auckland site will source its electrolyser from Christchurch company Fabrum Liquid Hydrogen Systems – a purchase that shows support for the development of technology and skills here in Aotearoa.

While this hub is based in an industrial setting, the principles of close coupling production and consumption are the same as the Mōkai hub, with applications in transport providing the first use case for the hydrogen.