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, 2 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*

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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) to be kept confidential because [Insert text]

[To check the boxes above: Double click on box, then select 'checked']

Introduction

Auckland Transport (AT) welcomes this opportunity to provide feedback to MBIE on the Interim Hydrogen Roadmap.

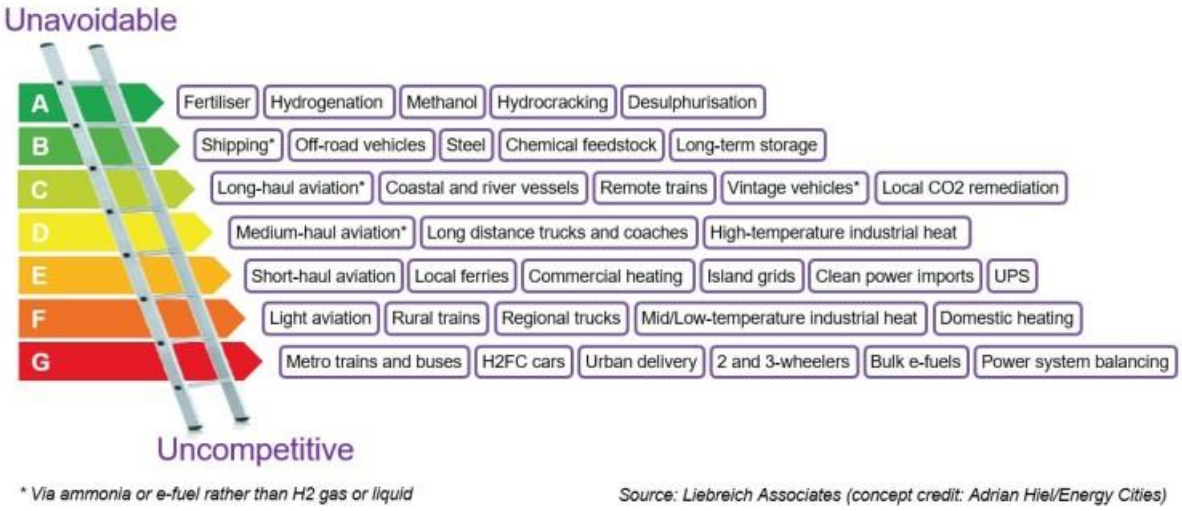
AT is a council-controlled organisation (CCO) of the Auckland Council. This submission represents the views of AT as a statutory entity responsible for providing local transport services in Auckland.

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	Auckland Transport strongly supports the issues raised in the section regarding the strategic landscape for hydrogen in New Zealand. As we transition to zero-emission (at tailpipe) bus fleets, ensuring a resilient energy system is absolutely critical to ensuring we can continue to deliver public transport, particularly in times of crisis. We also support the strategic focus on increasing renewable energy supply in order to be able to meet our emissions reduction targets. We agree with the challenges raised regarding scaling the hydrogen sector. Central government support could help to overcome many of these challenges, particularly regarding the establishment of infrastructure (by supporting from a regulatory point of view), and perception challenges.
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?
	Yes, we agree with the assessment of the most viable use cases of hydrogen in New Zealand's energy transition.
	Do you support some of these uses more than others?
	- There should be a more emphasis on 'transport' (medium to heavy weight with particular focus on heavy vehicles) and the 'electricity systems and backup' areas. This is where a significant portion of New Zealand's emissions are created. - Vehicle transition has additional environmental, social, and financial impacts beyond removing emissions at tailpipe, as vehicles (particularly in the heavy-duty diesel vehicle category) wear the road surface and cause degradation. While heavy vehicles can be electrified in some cases, electric vehicles are generally heavier than their hydrogen

counterparts. Amplified across the whole fleet, the additional weight has a significant impact on transport performance – more money is required for road maintenance and repairs, ride quality is reduced and particulates and other biproducts make their way into the surrounding environment. Electrification for urban bus fleets is the current priority given efficiency losses from the production and transmission of hydrogen, but hydrogen should be considered for certain circumstances (for example longer, higher frequency routes where a 1:1 replacement of a diesel to an electric bus is not possible).

- The Clean Hydrogen Ladder (pictured below) indicates a priority system that could be useful to inform hydrogen adoption.



** Via ammonia or e-fuel rather than H2 gas or liquid*

Source: Liebreich Associates (concept credit: Adrian Hiel/Energy Cities)

What other factors should we be considering when assessing the right roles for hydrogen in New Zealand's energy transition?

Regarding factors that should be considered when assessing the right roles for hydrogen in New Zealand's energy transition, accounting for the time required to develop technology (and in many cases find a solution to develop the technology for) for the hard to electrify and hard to abate sectors particularly, as these need to be addressed as soon as possible. If this is not done, the low hanging fruit transitions will have been made and there will potentially be years of development still required for the harder sectors.

Do you agree with this assessment of the potential for hydrogen supply and demand in New Zealand?

Yes, we agree with the assessment of the potential for hydrogen supply and demand in New Zealand. However, we do believe that focus needs to be given to developing a domestic market first. With the electrification of many industries, additional grid capacity is required and as such, focus needs to be on upgrading the electricity grid to meet our domestic requirements and emissions reduction targets prior to assisting other countries. If not, additional investment will be required to meet our own goals, likely at a greater cost than if this was the focus initially.

Do you agree with the key factors we have set out that are likely to determine how hydrogen deployment could play out?

We agree with the key factors that have been set out that will likely determine how hydrogen deployment will play out, however, there needs to be increased emphasis on energy security and resilience. As we move to electrify, we are at risk of relying too heavily on one power source. This is relevant to many areas but, in the case of public transport, if all buses are electric, a failure in the grid would mean that buses cannot charge. Public transport is a critical service and needs more resiliency than is being suggested. A potential solution here may be a mixed fleet of hydrogen fuel cell and battery electric buses, but there needs to be certainty in the grid and in hydrogen fuel security for this to happen.

What do you think needs to happen to address these factors?

In order to address these factors, forward planning in line with Transpower and Vector forecasts for grid capacity needs to be undertaken to ensure MBIE's planning for development of the hydrogen sector is actually achievable and does not conflict with the wider decarbonisation targets already in place.

Do you have any evidence to help us build a clearer picture?

Do you agree with our findings on the potential for hydrogen to contribute to New Zealand's emissions reduction, energy security and resilience and economic outcomes?

Yes, we agree with the findings on the potential for hydrogen to contribute to New Zealand's emissions reduction, energy security and resilience and economic outcomes. However, it appears very conservative regarding the role hydrogen could play (its potential benefits seem to be understated). Given the uncertainty around the future capacity of the New Zealand power grid and the power required to produce hydrogen, this approach is sensible.

Do you have any insights we should consider on what is needed to make hydrogen commercially viable?

In order to make hydrogen commercially viable, additional certainty from central government that hydrogen will be utilised as an energy source in the future is critical. The rebate proposed in the Just Transition programme is a good starting point, but this is quite limited given the strict timeframes. More focused work into updating New Zealand standards to include hydrogen, which should flow into decreasing timeframes for granting resource consents for establishing hydrogen production, should help increase supply, which will increase confidence in those who would be consumers and make hydrogen more commercially viable.

Is there any further evidence you think we should be considering?

Global progress on developing hydrogen economies should be regularly evaluated. Many countries have already developed standards to enable hydrogen to become a commercially viable product so New Zealand should be looking at what they have already done and learn from this. Many of these standards could be used as is, or as templates that could be adapted for a New Zealand context.

Section 3: Government position and actions	
	Do you agree with our policy objectives?
12	Yes, we agree with the policy objectives of scaling up supply, safe use, supporting early demand for hydrogen, and monitoring outcomes and progress. Ensuring hydrogen deployment happens at a pace with the generation and transmission capacity to support is very important.
	Do you agree with our positioning on hydrogen's renewable electricity impacts and export sector?
13	Yes, we agree with positioning on hydrogen's renewable electricity impacts and export sector. There is a need for future planning of the electricity grid as this will significantly influence the rate at which the sector can develop. Equally, while it is agreed that hydrogen export is important and will likely play a role in the size of the sector, this must be done in line with grid constraints. New Zealand has its own decarbonsiation goals which is driving electrification in many sectors. Given there will likely be high demand for green hydrogen (which could be produced here due to our highly renewable grid), it needs to be ensured that we have the grid capacity to meet our own emissions reduction targets and don't drive up the price of domestic power with higher demand resulting from hydrogen production for export. As New Zealand further electrifies, power resilience will increasingly become a key issue.
	Do you agree with the proposed actions and considerations we have made under each focus area?
14	Yes, we agree with the proposed action and considerations, but the actions proposed are lacking in tangible milestones or end goals. The lack of accountable targets will likely have the effect of reducing confidence for investment in the hydrogen industry, which may slow progress towards building a hydrogen economy.
	Is there any evidence we should be considering to better target actions in the final Hydrogen Roadmap?
15	In order to better target actions in the final Hydrogen Roadmap, we think more consideration should be given to what is occurring globally (Europe in particular has been doing a lot in this area). There have been a number of accountable targets that different governments have committed to for building hydrogen sectors and / or hydrogen production and consumption.

General comments

- Auckland Transport owns one hydrogen fuel cell bus (3 axel) that was introduced as a trial in July 2021.
- This roadmap covers the required topics, however, we would like to see more tangible actions.

- As New Zealand further electrifies, power resilience will increasingly become a key issue. As a public transport and infrastructure provider, Auckland Transport provides a critical service to the people of Auckland.
- Agencies (including the likes of Vector and Transpower) must work together to ensure that grid capacity is able to support New Zealand's electrification goals long-term. While there is significant potential for an export market for green hydrogen, given our highly renewable grid, it needs to be ensured that we are able to meet our own demand and have a secure and resilient system domestically, prior to export.
- We recommend that the government take a critical-minded approach and listen to independent experts, as well as industry, to plan for how and whether to use New Zealand's largely renewable but still limited energy sources to produce hydrogen for different energy/fuel uses.
- Auckland Transport sees future potential for hydrogen for replacing routes that are harder to electrify (such as longer, high frequency routes where charge time is limited). However, in order for us to introduce more hydrogen fuel cell vehicles, we need confidence in the fuel supply and security. We are seeing minimum offtake agreements being required, meaning there will need to be a certain amount of hydrogen vehicles introduced if this does occur, but there needs to be a refuelling network in place to support these vehicles in the event that one of these refuelling sites becomes unavailable (temporarily or permanently).
- Auckland Transport sees future potential in hydrogen fuel cell vehicles as a resiliency factor for emergency events where electric vehicles may be temporarily unable to be used (for example in the event of a power cut and the BEVs being unable to be charged).
- There is significant potential for hydrogen use in the maritime space given the challenge presented by battery weight versus speed for battery electric vessels, however, the cost of the vessels and the cost of the hydrogen itself (including installing the required refuelling infrastructure), is currently prohibitive. There is potential that more funding could be made available that focuses on maritime, or the opening up of already established funds to include maritime.

There is a useful international website which was developed by a group of independent scientists and engineers to communicate evidence-based viewpoints around the potential use of green hydrogen in the energy/fuel transition : https://h2sciencecoalition.com/data-resources/
Their main arguments of relevance are:

- Green Hydrogen should be prioritised to replace the grey/fossil hydrogen that is currently used today (i.e., in making ammonia fertiliser for food production, for chemicals such as methanol and to remove impurities during oil refining). Just to decarbonise the grey hydrogen the world is already using today; we need almost three times the amount of wind and solar electricity than the world produced in 2019.
- It takes about 3.3 times more electricity to power a hydrogen fuel cell truck than one running on an Electric Road System.
- Battery vehicles are around 3.2 times more energy efficient than hydrogen fuel cell vehicles.

- Fuel cell technology will likely improve in efficiency over time, but we have to be mindful of the extra step and energy need to create the hydrogen to then create the energy to drive the vehicle:
    - Energy -> Hydrogen -> Vehicle -> Energy -> Drive

  Energy is lost at each step of this process. Compare that to the EV steps of:
    - Vehicle -> Energy -> Drive

AT thanks the Ministry for this opportunity to submit.