

[REDACTED]

From: no-reply@mbie.govt.nz
Sent: Tuesday, 22 October 2019 1:36 p.m.
To: [REDACTED]; Hydrogen
Subject: Hydrogen green paper - submission
Attachments: Online-submission-form-uploadsHydrogen-green-paper2019.10.22-KiwiRail-submission-on-hydrogen-green-paper.pdf

Submission on Hydrogen green paper received:

Introduction

Name

Adam Williams

Email

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Business name or organisation (if applicable):

KiwiRail

Position title (if applicable):

Executive General Manager - Rolling Stock Asset Services

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.

KiwiRail

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

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

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

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

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

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

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

KiwiRail is committed to supporting New Zealand's goal of achieving a net carbon zero economy by 2050.

As a State-Owned Enterprise, we have a unique role to play in enabling ongoing improvement in the emissions performance of the rail sector (and subsequently the transport sector as a whole).

At present, freight carried by rail saves approximately 66% of the carbon emissions compared to heavy road transport, so each tonne of freight that moves from road to rail makes a tangible difference to New Zealand's carbon footprint.

The prospect of true zero-emissions propulsion systems for trains, and more particularly freight locomotives, is an exciting one that KiwiRail looks forward to enthusiastically.

At present, the only viable zero-emissions technology for heavy freight rail is through electrification, which is worth considering on the heavily utilised routes of the North Island Main Trunk (NIMT) between Auckland and Wellington, and the East Coast Main Trunk (ECMT) between Auckland and

Tauranga. The section of the NIMT between Hamilton and Palmerston North is already electrified.

Outside of these areas, we will need to move towards alternative zero-emissions propulsion systems as the technology and necessary infrastructure develops. As identified in the green paper, the final solutions are likely to be a mix of battery and hydrogen fuel-cell technology, where each solution is best suited to the specific freight tasks required.

In KiwiRail's opinion, the Government's role in supporting hydrogen use encompasses the following:

1. Supporting the development of enabling legislation, regulation and standards to ensure that the full spectrum of envisaged uses for hydrogen is allowed for (both as a fuel and as a transportable commodity). In particular to ensure that the adoption of technology trials and similar steps towards wider-spread adoption are not hamstrung by a regulatory environment that is not ready.
2. Devising and enacting legislation that better accounts for the true cost of carbon emissions across all sectors, thus driving investment in zero-emissions technology that will speed up the process of adoption through commercial incentives. This could be packaged with legislation that mandates emissions performance targets similar to the regimes already in place in the USA and Europe (although these deal specifically with NOx and particulate matter emissions at present, this will likely evolve into broader carbon emissions restrictions in the near future). Both measures will incentivise acceleration of both the development and application of the relevant technologies, including those related to hydrogen.
3. Potential financial or in-kind support for development of enabling infrastructure for trials and initiation of wider-spread hydrogen use, particularly where this is aligned to other Government priorities.
4. Facilitating a strategy for nation-wide distribution and storage of hydrogen fuel and associated refuelling infrastructure, to enable end users to plan and engage with uptake of the technology with an increased level of certainty. Currently the industry faces a classic "chicken or the egg" dilemma that will require significant upfront investment from Government and/or industry participants to reconcile.

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

While there have been several trial applications of hydrogen fuel-cell technology in passenger rail vehicles, including a commercially operating trial in Germany, there is currently no viable commercial freight locomotive product in service anywhere in the world.

Freight rail faces some considerable challenges, mainly related to the low energy density of hydrogen even when it is compressed. At present, it is envisaged this will require an additional tender wagon(s) to carry the volume of hydrogen required, which will have a negative economic impact due to it displacing an otherwise revenue-earning freight wagon(s). There are also technical challenges in the size of power required (typically >2500kW) and the characteristics and intensity of the power delivery required to operate a freight locomotive consist in a similar way to the current diesel-electric or electric overhead powered locomotives.

While the technology required to operate a freight locomotive is all theoretically in place and available, no-one has yet synthesised this into a viable product. Until this happens, it is difficult to forecast a timeframe for adoption of this technology in New Zealand. At present KiwiRail believes it likely to be beyond 2040 before we see a commercially available product that is relevant to our operating environment.

A related challenge for the rail sector is that our asset life is typically 30+ years, hence assets that are

purchased today are done so with an economic lens taking them out to 2050 and beyond. While this challenge can be mitigated through early disposal of the assets in question once suitable technology becomes available, this will have a negative financial impact at that point in time.

The final, and perhaps largest, challenge is the lack of suitable distribution and storage infrastructure across the country. As pointed out in the green paper, the technical challenges around storing and transporting hydrogen have largely been mitigated, however the cost challenges around enabling a wholesale switch by the transport sector from petroleum-based fuels to hydrogen are enormous.

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

KiwiRail envisage that passenger train applications of hydrogen fuel-cells will grow significantly over the next decade as the technology develops, costs decrease, and confidence and familiarity with the handling of hydrogen as a fuel source grows. Hydrogen fuel-cell technology as it stands today is well suited to certain passenger market applications, where the power and amount of fuel required is relatively low compared to a freight locomotive application.

New Zealand has some passenger applications that would theoretically suit this technology, typically for regional commuting services outside of the existing electrified networks in Auckland and Wellington. However, from a technical point of view these may be better suited to battery technology to achieve the same ultimate outcome of zero-emissions propulsion.

The displacement of existing passenger cars, taxis and buses with hydrogen fuel-cell vehicles is another opportunity; this technology is well understood and commercially available products well established, only awaiting establishment of suitable hydrogen refuelling and storage infrastructure to enable uptake.

KiwiRail also sees the displacement of existing diesel generators with appropriate hydrogen fuel cells as a large opportunity. Applications such as the powering of refrigerated shipping containers during transport and providing auxiliary power for locomotive-hauled passenger services (such as our Great Journeys of New Zealand services) are all conceptually promising opportunities. KiwiRail is actively exploring feasibility trials in this area.

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

What are the challenges for using hydrogen in industrial processes?

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

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

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

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

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

What are the challenges for hydrogen if produced for export?

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.

What are the opportunities for hydrogen if produced for export?

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

2019.10.22-KiwiRail-submission-on-hydrogen-green-paper.pdf - [Download File](#)

Use and release of information

We intend to upload submissions to our website at www.mbie.govt.nz. Can we include your submission on the website?

Yes

Can we include your name?

Yes

Can we include your email address?

Yes

Can we include your business name or organisation?

Yes

Can we include your position title?

Yes

Can we include the group or organisation your submission represents (if submitting on behalf of a group or organisation)?

Yes

If there are any other parts to your submission that you do not want public on the website please note them below:

OIA warning

If there is information in your submission that you wish to remain confidential, please note them below:

Tuesday 22nd October 2019

RE: SUBMISSION OF FEEDBACK TO THE GREEN PAPER “A VISION FOR HYDROGEN IN NEW ZEALAND”.

KiwiRail welcomes the opportunity to submit feedback on the recent green paper entitled “A vision for hydrogen in New Zealand”.

Our submissions to selected questions posed in the green paper are outlined below.

3A) WHAT IS THE ROLE OF GOVERNMENT IN SUPPORTING HYDROGEN USE FOR THE TRANSPORT SECTOR?

KiwiRail is committed to supporting New Zealand’s goal of achieving a net carbon zero economy by 2050.

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In KiwiRail’s opinion, the Government’s role in supporting hydrogen use encompasses the following:

1. Supporting the development of enabling legislation, regulation and standards to ensure that the full spectrum of envisaged uses for hydrogen is allowed for (both as a fuel and as a transportable commodity). In particular to ensure that the adoption of technology trials and similar steps towards wider-spread adoption are not hamstrung by a regulatory environment that is not ready.
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3. Potential financial or in-kind support for development of enabling infrastructure for trials and initiation of wider-spread hydrogen use, particularly where this is aligned to other Government priorities.
4. Facilitating a strategy for nation-wide distribution and storage of hydrogen fuel and associated refuelling infrastructure, to enable end users to plan and engage with uptake of the technology with an increased level of certainty. Currently the industry faces a classic “chicken or the egg” dilemma that will require significant upfront investment from Government and/or industry participants to reconcile.

3B) WHAT ARE THE CHALLENGES WHEN USING HYDROGEN FOR MOBILITY AND TRANSPORT?

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3C) WHAT ARE THE OPPORTUNITIES FOR USING HYDROGEN FOR MOBILITY AND TRANSPORT?

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Best regards,

A handwritten signature in blue ink, appearing to be 'Adam Williams', with a long horizontal stroke extending to the right.

Adam Williams

Executive General Manager – Rolling Stock Asset Services

