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Hydrogen Team  
Energy and Resource Markets Branch  
Ministry of Business, Innovation, and Employment  
By email: [hydrogen@mbie.govt.nz](mailto:hydrogen@mbie.govt.nz)

## Submission on the interim hydrogen roadmap

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### Introduction

1. Energy Resources Aotearoa is New Zealand's peak energy advocacy organisation. Our purpose is to enable constructive collaboration across the energy sector through and beyond New Zealand's transition to net zero carbon emissions in 2050.
2. This document constitutes our feedback on the Interim Hydrogen Roadmap (the "roadmap"). We also refer the reader to our submission on the Regional Hydrogen Transition technical design paper.<sup>1</sup>

### Overarching view

3. The roadmap outlines a range of interim actions and other issues the government is considering as a more durable long-term hydrogen strategy is developed. Despite a change of government, and a potential refocussing of the energy strategy work, some of the actions outlined in the roadmap are sensible and noncontroversial.
4. While the case is made for hydrogen as a means to decarbonise those hard to abate sectors, our strong preference is for policy that reflects fuel and technology agnosticism. In this respect we wonder why hydrogen has been singled out for the development of an adoption strategy while other high potential fuels, such as biomethane, have not. We believe officials should pause to consider how this roadmap fits with the preferences of the incoming Government.
5. We are concerned about the lack of consideration in the roadmap regarding interaction of any interventions with New Zealand's emissions trading scheme (the "NZETS"). In our view the NZETS provides important price signals and the appropriate incentives for firms to consider alternative, lower carbon energy

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1 Available at <https://www.energyresources.org.nz/dmsdocument/download/256> .

sources to meet their requirements. With many of the industries identified in the roadmap already covered by the NZETS, hydrogen uptake will likely reduce market pressure for units. With the overall number of units set as a maximum allowable amount, this creates the space for other sectors covered by the scheme to delay or increase their emissions. This is known as the waterbed effect.<sup>2</sup>

6. A key omission in the roadmap, and in the context of an emerging hydrogen economy, is a discussion of the warming potential of hydrogen. Hydrogen is a notoriously difficult gas to store and transport, so leakage during production and storage is expected. While the warming effects may be indirect, it is important for investors that the government determine how leakage from production, transport, and use will be factored into greenhouse gas accounting and the emissions trading scheme.
7. It remains unclear why the potential hydrogen rebate is part of a “just transitions” package specifically targeting the Southland and Taranaki regions. Given the potential use cases for hydrogen are national, we consider it unnecessary to limit the application of the rebate to a limited number of regions.
8. Finally, in our view the roadmap unnecessarily constrains the development of a hydrogen market in New Zealand to only considering green hydrogen. This approach unreasonably favours a higher cost solution, potentially at the expense of developing the domestic market at scale. We recommend that officials consider all forms of hydrogen production when finalising New Zealand’s hydrogen roadmap.

### **Hydrogen has a niche role in New Zealand’s energy transition**

9. Much of the roadmap makes the case, and provides suitable examples, for hydrogen uptake as a means to decarbonise hard to abate sectors. We agree with the government view that there is sufficient potential for hydrogen in New Zealand – particularly in those areas where there is unlikely any viable economic low-emissions alternative – to warrant serious consideration of policy barriers to uptake.
10. As an emerging technology yet to achieve commerciality at scale, the government could play a role in supporting the development of New Zealand’s hydrogen sector. This roadmap identifies the range of ways the government could support and influence the development of the hydrogen sector in New Zealand. This includes government acting in roles such as; strategic policy setter, regulator, funder and service delivery agent, major participant/procurer in the economy, owner and investor in infrastructure, diplomatic actor on the world stage, and as a public source of information.

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<sup>2</sup> For a discussion of this effect, we refer the reader to our perspectives note on the waterbed effect, available at: <https://www.energyresources.org.nz/dmsdocument/202>

### ***We agree that government should not invest directly in hydrogen projects***

11. In principle we favour a least cost energy transition, whereby energy and decarbonisation projects proceed on their economic merits. Therefore, we support the decision that the Crown should not be a direct investor in hydrogen projects (therefore picking “winners”) but will instead use its influence to identify and reduce barriers to entry for project proponents.

### **Government actions**

12. The roadmap commits the government to undertaking six actions in respect to helping enable a hydrogen economy. We agree in principle with the overall approach that sees the Crown leveraging its influence and involvement to support the development of a hydrogen economy, without needing to invest directly in projects. These are listed below:
  - a. establish a hydrogen government and sector coordination body;
  - b. progress regulatory work to enable safe basic operation of common hydrogen infrastructure and near-term use cases;
  - c. a hydrogen consumer rebate;
  - d. a clean heavy vehicle grant scheme;
  - e. develop or recognise, emissions-intensity standards, trading and guarantee of origin frameworks for hydrogen production; and
  - f. continue and build on international relationships and cooperation.

### ***The need for a coordinating body should not be overstated***

13. While we do not agree there is a market coordination failure in New Zealand’s nascent hydrogen sector, we do agree there is value in convening a coordination group to ensure regulatory barriers and other policy matters are surfaced and able receive appropriate attention from policymakers. Potential producers already appear to be lining up with potential buyers across a range of use cases, which suggests a coordination failure is not persistent.
14. We also agree that public support is essential to ensure hydrogen projects and hydrogen use have the necessary social licence to proceed. We have already seen

some delays due to consenting and cultural issues, as well as public reservations around the safety of having facilities near populated areas.<sup>3</sup>

### ***If progressed, a hydrogen consumer rebate should be available nationally***

15. We acknowledge the Government has taken the decision, as part of a just transitions strategy, to develop a hydrogen market, and that initially this market will be focussed on the Southland and Taranaki regions.
16. In our feedback on the design of the design of the regional hydrogen transition we agreed, in principle, with the proposal for a time and value limited rebate. This approach should alleviate any concerns an early mover might have with subsidising hydrogen uptake by any “fast followers”. However, we question why this is regionally specific, when decarbonising hard to abate sectors is a national issue.<sup>4</sup>

### ***International cooperation is vital to the success of New Zealand’s hydrogen sector***

17. With no domestic electrolyser or vehicle manufacturing capability New Zealand will be reliant on technology transfer and import from overseas. We are encouraged to see officials continue to actively engage with their counterparts in other jurisdictions, and to learn from their experience.

### **Government considerations in finalising the hydrogen roadmap**

18. In addition to the actions noted above, the government has indicated a number of areas requiring further consideration in finalising a hydrogen roadmap. These areas for consideration are:
  - a. how hydrogen fits into a wider mix of alternative fuels, to be considered in developing the New Zealand Energy Strategy;
  - b. more detailed workforce and infrastructure consideration with input from the government and sector coordination body;

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3 For example, see the appeal by Greenpeace New Zealand against the resource consent granted to Hiringa Energy to produce green hydrogen in Taranaki on the basis that hydrogen may be used in the manufacture of nitrogen-based fertilisers. We note the irony that a project which will reduce net emissions and enable scale-up of a hydrogen economy is being opposed by environmental groups on the basis it is not a perfect solution – only a good one. See: <https://www.greenpeace.org/static/planet4-aotearoa-stateless/2022/11/a8eb335c-notice-of-appeal-greenpeace-vs-hiringa.pdf> and an article from the University of Canterbury <https://www.canterbury.ac.nz/news/2022/nz-is-touting-a-green-hydrogen-economy-but-it-will-face-big-environmental-and-cultural-hurdles.html>

4 We refer the reader to our feedback on the Regional Hydrogen Transition Draft technical design paper, available at: <https://www.energyresources.org.nz/dmsdocument/download/256>

- c. opportunities to align hydrogen with New Zealand's national research priority-setting and investigating gaps in our funding support environment across research, development, and deployment;
  - d. whether further action from government is needed to support a green hydrogen industry in New Zealand to become commercially viable; and
  - e. the potential effect of hydrogen production on electricity prices, including for an export market.
19. We agree the issues listed above require consideration. We offer some feedback on certain issues below.

***The premise of surplus electricity may be unrealistic***

20. When considering how green hydrogen fits into New Zealand's energy mix, it is important to consider New Zealand's current electricity generation context. Currently, New Zealand has about 9,800MW of installed generation capacity, across a fleet of generating assets. The generation mix includes hydroelectric (60%), geothermal (18%), natural gas (9.9%), wind (6.5%), and coal (2.9%).<sup>5</sup> Importantly, this generation capacity and distribution system was developed over the last 100 years.
21. The underlying premise of green hydrogen, and key to the economics of production, is a reliance on there being a surplus of electricity generated from inexpensive, low emission sources that can be used to produce hydrogen through electrolysis of water. Indeed, the roadmap estimates electricity prices need to fall to about 40% of the current average to meet a production cost of NZ\$2/kg. It is unclear how or why this would happen when all evidence points to upwards pressure on electricity prices.
22. The growth of the domestic hydrogen sector is expected to be complimented by a growing international hydrogen demand. New Zealand appears to be well placed to help meet this demand by developing its significant renewable energy resources. However, exports must primarily be competitive on a price basis. Even if there is sufficient electricity generation capacity to produce green hydrogen, it is not clear how realistic it will be that hydrogen produced in New Zealand will be cost competitive as an export commodity.

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5 See Section C of Energy New Zealand 23, available for download at: <https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-publications-and-technical-papers/energy-in-new-zealand/>

### ***Grow the market or continuing pursuing a “green dream”?***

23. In finalising New Zealand’s hydrogen roadmap officials should consider whether the priority is to decarbonise those hard to abate sectors already identified, or whether the priority is to develop a market for green hydrogen.
24. We recommend officials consider all forms of hydrogen production as beneficial to the development of a domestic hydrogen market. Lower cost hydrogen production from natural gas, combined with carbon capture and storage, may prove to be the key to unlocking the domestic hydrogen market, particularly during the buildout phase for additional renewable electricity generation capacity. Given the economics of carbon capture and storage (CCS), as compared to the production and distribution of green hydrogen, this may provide a more feasible pathway to upscale hydrogen production.<sup>6</sup>

### ***The effect of hydrogen uptake on the New Zealand emissions trading scheme needs to be considered***

25. While we agree with the government providing some measure of support to the uptake of hydrogen those hard to abate sectors, it is important to also consider the potential impact on the NZETS. As firms move to lower carbon emissions energy sources to meet their needs, this reduction in emissions creates the space for other firms to maintain or increase their carbon emissions. This is known as the waterbed effect.
26. Many of the areas identified as suitable for hydrogen uptake are already covered by the NZETS. With a sinking lid on the maximum amount of carbon emissions in the scheme this neutralises most other policies to reduce emissions. For example, subsidising electric vehicles might lower our transport emissions but cannot lower New Zealand’s *total* net emissions because transport is already covered by the ETS.
27. While difficult to forecast or model actual hydrogen uptake, we recommend officials remain cognisant of this effect when considering what policy interventions might be implemented.

### ***Building the right skill base to support the sector is vital***

28. We are pleased to see officials focussing on building the right skill base to support the sector. The engineering, operation, and maintenance of hydrogen production and using facilities will require the development of specialist skills and knowledge.
29. Energy Resources Aotearoa’s industry skills action plan, referred to in the roadmap, is a timely report that recognises the transformational change happening in, not just New Zealand’s energy sector, but across the globe. In the

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6 For more on this see our submission on the *Gas Transition Plan Issues Paper*

plan we identify the key barriers, gaps, and opportunities for our energy sector workforce.

30. It is critical over the coming decade that we retain the skills we have so that they are available to transfer to new industries as they develop. Otherwise, we risk having to compete in a global market to attract the necessary skills, at international prices, when they are needed domestically.
31. The action plan outlines an ambitious industry skills action plan with the strategic goals of attracting and developing talent, as well as identifying areas for collaboration.<sup>7</sup>

### ***The global warming potential of hydrogen cannot be ignored***

32. The focus of the emerging hydrogen economy is on how hydrogen is produced and the potential to displace carbon-based fuels. While hydrogen is not directly considered a greenhouse gas there is increasing attention being paid to the atmospheric and environmental consequences of potential hydrogen leakages.
33. In a recent scientific paper published in the journal *Nature*, the authors, led by Norway's Centre for International Climate Research (CICERO), estimated the GWP100 of hydrogen to be  $11.6 \pm 2.8$ , suggesting hydrogen is a far more potent greenhouse gas than previously thought.<sup>8</sup>
34. The warming effect of hydrogen is a result of hydrogen's interactions with other atmospheric compounds, which has the effect of prolonging the life of atmospheric other greenhouse gases and increasing ozone production.
35. We also note that a study by the Center on Global Energy Policy at Columbia University<sup>9</sup> found that despite hydrogen being expected to play a key role in decarbonising the energy system, there has been very little attention paid to hydrogen leakage in the hydrogen value chain. The authors found their 2050 high-risk scenario led to a 5.6% (about 30 million tonnes), economy-wide, leakage rate.
36. These findings pose a serious issue for the nascent hydrogen economy and may have a chilling effect on investment. Clearly further scientific and technical work is needed to understand the atmospheric chemistry and the potential leakage rates for hydrogen use, but significant policy work is also required to determine how hydrogen will be treated as a potential greenhouse gas.

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7 Our report can be downloaded from: <https://www.energyresources.org.nz/assets/Uploads/Building-Energys-Talent-Pipeline-Skills-Plan-5-October-22.pdf>

8 That is the 100-year time-horizon Global Warming Potential (GWP100) of hydrogen as compared to the GWP100 for carbon dioxide. (ref: Sand, M., Skeie, R.B., Sandstad, M. *et al.* A multi-model assessment of the Global Warming Potential of hydrogen. *Commun Earth Environ* **4**, 203 (2023). <https://doi.org/10.1038/s43247-023-00857-8>)

9 See <https://www.energypolicy.columbia.edu/publications/hydrogen-leakage-potential-risk-hydrogen-economy/>

## Conclusion

37. Thank you for the opportunity to provide feedback on the interim hydrogen roadmap. In our view the range of actions and areas identified for further consideration while finalising the hydrogen roadmap follow a sensible line of reasoning that recognises the government's significant role in supporting and influencing the development of a hydrogen sector.
38. Should you wish to discuss anything in this submission further, or seek clarification, please contact Craig Barry, policy director upstream and climate, at [craig.barry@energyresources.org.nz](mailto:craig.barry@energyresources.org.nz).