[redacted]

**From:** no-reply@mbie.govt.nz
**Sent:** Friday, 25 October 2019 3:00 p.m.
**To:** [redacted]; Hydrogen
**Subject:** Hydrogen green paper - submission
**Attachments:** Online-submission-form-uploadsHydrogen-green-paper20191025-Arete-Consulting-Ltd-Submission-on-A-Vision-for-Hydrogen-New-Zealand.pdf

Submission on Hydrogen green paper recevied:

**Introduction**
**Name**

Len Houwers

**Email**

len.houwers@aretelimited.com

**Business name or organisation (if applicable):**

Arete Consulting Ltd

**Position title (if applicable):**

Director

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

Individual

**Please give the name of the group or organisation this submission is on behalf of.**
**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?**
**What are the challenges when using hydrogen for mobility and transport?**
**What are the opportunities for using hydrogen for mobility and transport?**
**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.**

20191025-Arete-Consulting-Ltd-Submission-on-A-Vision-for-Hydrogen-New-Zealand.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)?**
**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:**

ARETÊ CONSULTING LTD

Resource Markets Policy
Building Resources and Markets
Ministry of Business, Innovation & Employment
PO Box 1473
Wellington 6140
New Zealand
(via on-line submission)

25 October 2019

**RE: Submission on "A vision for hydrogen in New Zealand: Green Paper"**

1. I am the owner and principal of a specialist advisory service, Aretê Consulting Ltd, based in New Plymouth. I am a professional engineer with a Bachelor of Engineering (Chemical and Process) from Canterbury University, and a Bachelor of Business Studies majoring in Finance from Massey University. My professional area of expertise is in energy, particularly in regulatory and commercial matters relating to the New Zealand gas industry and the upstream petroleum sector.

2. I have an interest in the Government's agenda to achieve a more sustainable future for New Zealanders, including achieving rapid achievement of net zero carbon emission target for our economy.

**Summary Points**

3. While the Green Paper is focused specifically on hydrogen, and in particular green hydrogen, I note from the "Message from the Minister" that the context of the Green Paper is within an overall vision for New Zealand to transition to a carbon neutral economy by 2050. The purpose of the Green Paper is to help the Government develop a renewable energy strategy for New Zealand, and to identify areas where the Government can make the biggest difference in incentivising and removing road blocks for encouraging new technologies to come on stream. Green Hydrogen is identified as one tool that may help reduce net carbon emissions.

4. While the Green Paper focuses on hydrogen to flesh out the challenges and opportunities of this final energy form, *the underlying intent is to define the role of Government in encouraging uptake of renewable energy technologies to mitigate for Climate Change risk*.

5. In general, it is not the Government's role to pick technology winners. Hydrogen (green, blue, or grey) will have a place as a preferred final energy form in the energy mix, but it is unlikely to be significant, and certainly not a panacea.

6. The role of Government should be to clarify the public policy outcome (net zero carbon) and provide for regulatory and policy certainty to allow economic actors (including the State) to choose the most economically efficient[1] technology.

[1] i.e. Pareto efficient – where future generations are included as stakeholders for assessment of Pareto optimality.

7. ***The main point of this submission is to highlight that climate change mitigation projects are prone to market failure risk[2].*** This is why the State must play a greater leadership role in ensuring early uptake of climate change mitigation technologies.

8. This submission is intended to address the silent and perhaps overlooked distinction between public and private costs and benefits when considering the investment challenges for addressing climate change mitigation measures.

9. The supporting points of this submission, explained further below are:

    a. For climate change mitigation projects to be effective, early investment must be made.

    b. The pursuit of green technologies are driven largely because of mitigation benefits for future generations, and global commons. That is, *the benefits are primarily societal and intergenerational, rather than private*.

    c. The synergy benefits of individual investments are captured in the *system transformation*. These benefits are cumulative and are not captured in the project economics of private investors.

    d. *The challenges of rapid adoption of green technologies (including hydrogen) are economic and political, rather than technical*.

    e. The New Zealand Government's reliance on the private sector for achieving public outcomes within a liberalised economic framework is a potential barrier when dealing with climate change mitigation projects.

    f. Regulation, the more common form of Government control for promoting public benefits generally translate to greater costs to business. In a globalised world that doesn't share a consensus on tackling climate change threats, costs imposed on New Zealand business not applied elsewhere can lead to carbon leakage, making reliance on domestic regulation potentially ineffective as a public policy tool[3].

    g. A greater recognition and emphasis needs to be placed on a ***net public welfare economic framework*** when selecting and financing green technologies. This includes a consideration of financing societal benefit components of private sector investment with public assets/ income, if this is required to expedite the technology transition.

        i. Public benefits accrue from *system transition effects over intergenerational timeframes* but are reliant on cumulative effect of individual private projects with shorter economic timeframes. The economic signals are different for public and private investment and need to be considered together. The State contribution to the investment equation is to ensure that maximum social welfare benefits of private investment can also be captured.

        ii. Social welfare recognises that intergenerational societal wellbeing is *contingent on having a sustainable ecology*, i.e. preservation and enhancement of natural

[2] i.e. allocation of goods and services by a free market is not efficient, leading to a net social welfare loss.
[3] A useful example is the free emission units provided to High and Medium Emission Intensity Trade Exposed industries under the ETS scheme. While necessary to avoid carbon leakage, they also significantly reduce the price signal (already too low) for the negative externalities generated by these domestic industries.

capital[4]. Hence loss or gain of natural capital is valued, and where it can't be valued because there is no effective substitute, these become regulated outcomes[5].

10. **The solution is a reappraisal of the State's involvement in the New Zealand economy**.
    a. A greater consideration of Public Private Partnership arrangements as an option in moving the electricity sector to 100% renewable energy before 2030.
    b. The State needs to apply the concept of social discount rate to its share of funding to achieve system transformation.
    c. Climate Change projects funded by the State should not be constrained by self-imposed and restrictive borrowing limits created for a different era.
    d. Adoption of technology neutral instruments aimed at final consumers (emission restrictions, mandates for renewable energy content) – while addressing concerns related to carbon leakage.
    e. Financial support instruments (e. g. capital expenditure subsidies, tax rebates and waivers) to cover the initial cost premium relative to incumbent technologies.

***Tonnes of carbon saved are not equal- the case for urgent action***

11. The effects of carbon in the atmosphere are cumulative over time, and because of system lag effects, atmospheric $CO_2$ levels lock in climate effects, even when carbon is later reduced. It is axiomatic that a tonne of carbon prevented from entering the atmosphere today is far more important than a tonne of carbon prevented from entering 1, 2, 5, or 10-years from today.

12. This is what makes dealing with carbon emissions urgent, and why waiting for "economic parity" (in a conventional private sector investment sense) to be achieved before investments are made to reduce carbon emissions, a questionable strategy for achieving *effective* mitigation.

***Net zero emission challenge is primarily economic and political***

13. Commenting more generally on competing renewable forms (including green hydrogen) that haven't achieved conventional economic parity, *the challenges to the renewable vision are primarily economic and political, rather than technical*[6].

14. The argument for investment in net zero emission technologies (including green hydrogen) rests mainly on their climate change mitigation benefits.

[4] Stock of natural assets - clean air, healthy oceans, clean freshwater, arable land, biodiversity
[5] This distinguishes degraded capital from destroyed capital. Air quality can be degraded but is potentially recoverable. Loss of a species is destroyed capital and money (penalty) is not an effective substitute for this loss.
[6] Green hydrogen has some technical challenges – particularly in steel production but also for high grade process heat. They also have potential solutions. There are currently two European projects experimenting hydrogen usage in DRI (Direct Reduction Iron). High grade process heat can be created from hydrogen by a methanation step for converting hydrogen to methane using CO2 to create synthetic natural gas.

15. The problem with mitigation is that benefits accrue to future generations while the mitigation measures are paid for by the current generation of investors[7].

16. Furthermore global benefits of mitigation are essentially game-theoretic. In other words the optimal strategy for each country is to get other countries to cut their emissions while each country does nothing – i.e. the "free-rider" problem.

17. Dealing with these economic realities becomes a domestic political challenge to convince current generation of voters that in order to have a sustainable future for future generations, the current generation must be prepared to foot the bill without participating directly in the benefits. Partisan politics and the electoral system also suggests that political parties find it difficult to put the interest of future generations ahead of the current generation of voters, and ahead of party political self-interest.

18. This is what makes green technology an economic and political challenge, not a technical one. The benefits are public, rather than private. The public benefits accrue to the future public which makes it a political challenge. Yet the paradox is that the only party who can effectively champion for public benefits is the State, represented by an elected Government, who in attempting to do what is right, may find their own political future shortened.

***Economic Paradigm***

19. The purpose of the Green Paper is to test the thinking and help scope out the role of Government in realising a hydrogen future (where it makes sense relative to other decarbonising pathways). With this in mind it is useful to further clarify whether that role is contemplated as being light handed to make it a private sector led, or whether the role of government should be more direct in representing the public interest to enhance social welfare. This key point is not clearly addressed within the green paper.

20. The more general recent history of governments in New Zealand since the early 1980s is for the State to have embraced a liberalised economic approach to managing the New Zealand economy. This implied lessening of government regulations and restrictions in the economy in exchange for greater participation by private entities, including the full or partial privatisation of government institutions. While there are some differences between centre left and centre right governments in interpreting the degree to which this should occur, it appears to be generally accepted across the centre of the political spectrum that economic liberalisation has been a positive experience overall for New Zealand. The "smaller" Government, anchored by legislation such as the Fiscal Responsibility Act has achieved general political consensus creating significant political inertia to change.

21. Yet, conversely in terms of transitioning the New Zealand economy away from fossil fuel dependence in a timely fashion we cannot expect the same economic approach that has created the problems of deteriorating ecological sustainability to provide a solution. (If it did, it would have already occurred). The current liberalised economic framework is the barrier to rational and timely action being taken.

[7] This is the reverse of the current economic system where the costs of negative externalities fall on future generations without any investment benefits accruing to them. There is therefore some equity in the argument that the current generation should start paying for the costs that it already has imposed on future generations.

22. The role of the State is to ensure that public welfare is maximised over the long term. If private sector investment is avoided because public benefits (or costs) are not accounted for in the investment accounting, then public welfare is likely to sub-optimal. When the Government also feels restricted to respond fiscally because of self-imposed borrowing limitations it neutralises its own role. In these situations the State should have a moral and structural mandate to have a more direct role in ensuring that climate change mitigation investment occurs. This can take a number of forms:

    a. The State risks public money directly to invest for net public welfare benefits.

    b. The State regulates to change private sector economic incentives through subsidies, change in tax laws, or simply legislates to ban net public welfare reducing investments.

    c. The State does a combination, including regulation, and co-investment via Public Private Partnership (PPP) arrangements.

23. Each of these options has its advantages and disadvantages. The combined approach is likely to be more effective.

    a. Achieving rapid energy transition is a public challenge on behalf of future generations. The State has a structural and moral duty to ensure a sustainable society.

    b. The State can adapt the existing economic models to assign full value to externalities of investment decisions, including the preservation and restoration of natural capital (clean air, clean water, biodiversity, clean oceans, healthy soils, etc.).

    c. The State can adopt the economic concept of **social discount rate**[8] to put greater weight on future societal benefits from system transition. This implies a zero, or even a negative discount rate applied to infrastructure investment[9].

        i. The State can use its shareholding in electricity SOE's to bring forward investment in consented renewable technologies to accelerate its renewable generation target.

        ii. The State can lower investment barriers for the private sector by considering accelerating depreciation of fossil fuel fired assets (effectively assuming the cost of stranded asset risk) and combining these with other tax incentives for investing in green technologies.

24. Note that in advocating for a reappraisal of the State's role in dealing with Climate Change risk I am not advocating for a return to the worst excesses of State planned economies. The role of the State is to deal with market failures and promote public welfare. In this case, the challenge is in coming up with the correct economic framework that recognises the different objectives and

[8] Social discount rates and relevance to climate change is an area of active debate. See for example http://www.lse.ac.uk/GranthamInstitute/faqs/what-are-social-discount-rates/

[9] As a minimum the State can borrow at the risk free rate, currently near zero, and in some economies zero or less. There is a strong argument that discounting should not be used at all when dealing with climate change mitigation. This is because, as highlighted by Harvard economist Martin Weitzmann, in the case of catastrophic climate change, the severe consequences would override the effect of discounting however low the probability of such an event.

drivers of private and public investments while also acknowledging the reality that other countries might play by other rules that doesn't create a level playing field.

25. The challenge is particularly difficult in democracies, but that is where Governments must step up in their leadership role, particularly in their advocacy for future generations facing existential risks created by the current dysfunctional economic paradigm.

26. New Zealand operates in a globalised world with little consensus on how to tackle climate change problems. We have to be mindful that New Zealand attempts to achieve rapid energy transition should not be undermined through carbon leakage, and at the cost of reduced resilience of our domestic economy. The approach therefore favours a greater leadership role for Government and relies on "carrot" rather than "stick" to get the private sector on board to mitigate leakage risk.

Yours sincerely

Len Houwers
Director Aretê Consulting Ltd

E: len.houwers@aretelimited.com
M: 0274-445-861