30 October 2019

The Green Freight Project: Z Energy Submission

Z Energy welcomes the Green Freight Project consultation document. It is a well-informed and thorough piece of work that we are please to see produced, and we appreciate the opportunity to input into it.

Z is committed to realising a meaningful contribution to a net zero-carbon future for New Zealand. We are a Kiwi company committed to New Zealand, but the products we sell make up 9% of New Zealand's total gross emissions.

However, we are determined to move from being a significant part of the emissions problem to accelerating the solution. This is why we have a deliberate focus on future fuels, and helping our freight customers de-carbonise with cleaner fuel options is something we have been committed to and working on since 2012.

Thank you again for the opportunity to submit, and please don't hesitate to get in touch if you require any further detail or have any questions.

A. Key questions worth considering

1. **How effective are minimum fuel efficiency standards in reducing GHG emissions? Would strengthening these over time provide part of the solution to reducing GHG emissions from road freight?**

   Z believes that minimum fuel standards such as the European standard (i.e. Euro V and VI) does provide part of the solution to reducing GHG emissions from road freight, especially when it comes to reducing pollutants like particulate matter emissions.

   However, this shouldn't be the sole lever relied on for reducing emissions as fuel economy standards for freight can be technically complex, and gains from fuel efficiency will plateau over time and will not be enough to meet our GHG reduction obligations.

2. **How could we reduce GHG emissions by changing the composition of the heavy truck fleet (e.g. size and weight of trucks entering NZ)?**

   There is direct correlation between fuel consumption and kilometres travelled. As a general rule, the larger the capacity of the truck, the less trips required for goods and services, which means less fuel used and less emissions.

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Studies have shown that the marginal increase in fuel for additional weight or size of truck is far outweighed by the fuel-saving benefit from reduced trip numbers.

We're not aware of a lack of ability to source large / heavy capacity trucks in New Zealand – the supply side doesn't seem to be an issue. Others such as freight companies or the Ministry of Transport may have more data and expertise on this. Our understanding is that better *utilisation* of these trucks can deliver emissions benefits. So an increase in weight / size of the heavy truck fleet should go hand in hand with better capacity utilisation where possible. Increasing size / weight and utilisation also has positive safety implications, as less trucks on the road results in reduced risk exposure.

Heavier trucks are also run under permit systems that typically require more demanding levels of safety management.

3. What other mechanisms might support GHG emissions reduction from road freight?

Apart from the thought already given to fuel efficiency standards and composition of the heavy truck fleet, the area of greatest gain would be in reducing the carbon intensity of the energy used to power road freight.

As outlined in the paper, battery electric, biofuels and hydrogen all offer credible pathways. Rather than 'picking winners', Z's view is that a policy framework that encourages investment in low carbon alternatives and enables the best solutions to rise to the top would be the best option for New Zealand, especially given New Zealand tends to be a technology taker from a fleet perspective.

An example of such a policy is the California Low Carbon Fuel Scheme (LCFS)[1], which appears to be highly regarded and enduring. The LCFS aims to reduce greenhouse gas equivalent emissions from transport by 20% by 2030. Oregon and British Columbia, Canada also have existing LCFS programs in place, and parts of Washington state, including Seattle, are attempting to pass a similar standard. In addition, Additionally, Quebec participates in a cap and trade programme with California, expanding the size of the emissions-trading market. Companies in California can trade carbon emission allowances with companies in Quebec.[2]

[1] https://ww3.arb.ca.gov/fuels/lcfs/lcfs.htm

[2] Note that President Donald Trump is currently suing the state of California for entering into a cap-and-trade agreement with the Canadian province of Quebec, arguing that only the Federal government has the power to forge agreements with another country on limiting air pollution and GHG emissions: https://www.latimes.com/environment/story/2019-10-23/trump-administration-sues-california-cap-and-trade-canada

LCFS works by establishing a carbon intensity (CI) benchmark for gasoline and diesel fuel and their equivalents in each calendar year (the CI decreases each year). The CI is calculated based on lifecycle emissions. Fuels that fall below the CI benchmark generate LCFS credits, and fuels that emit more CO_2e than the CI benchmark generate deficits and require a purchase of LCFS credits to meet obligations, thus establishing a market. As of October 2018, the average carbon intensity of fuels sold in California has declined almost 5% since 2010, resulting in a reduction of over 38 million tons of carbon[3].

Another example of government policy that seeks to lower emissions but lets the market decide how to fulfil it, is New Zealand's own proposed Clean Car Standard and Clean Car Discount. A similar mechanism (or an extension of it) could be put in place for heavy vehicles, but one that also takes into account the fuel used in the vehicle, such as sustainably produced biodiesel, as opposed to just the vehicle itself.

4. How do we better understand the life-cycle emissions generated by each alternative fuel option?

There is already robust international research on alternative fuel options, with life-cycle emissions research on biofuels, followed by battery electric vehicles, the most prolific. International research is a good starting point, but New Zealand's conditions are different, so locally commissioned life-cycle analysis that consider New Zealand's unique conditions such as availability of non-arable land and the country's renewable energy profile, will be important.

In Z's opinion, New Zealand has the local expertise to do this. Aside from capable government and crown owned entities and universities, there are also organisations such as Arup, Aecom and Beca among others with the relevant expertise.

It would be worthwhile also delving deeper into how California calculates carbon intensity under the LCFS, as it is takes into account the full emissions lifecycle of the product, from land use to electricity usage and generation through to tailpipe emissions.

[3] https://www.forbes.com/sites/danielsperling/2018/10/17/how-almost-everyone-came-to-love-low-carbon-fuels-in-california/#4f3bfdc05e84

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5. **What influence does the end consumer have in driving changes to the way freight is delivered?**

   The most powerful way for consumers to make an impact when it comes to the way freight is delivered is by exercising choice.

   For large consumers, such as councils or corporate companies, procurement guidelines and practices play a big role influencing changes to the way freight is delivered. Companies who invest time, money and energy in sustainable initiatives and practices should be shown preference for contracts over competitors without emission reduction initiatives. There is an opportunity for government to lead by example in this space, with government contracts only awarded to companies that can provide evidence of a clear path to sustainability.

   While it might be hard for individual consumers to have a view of the whole supply chain when making purchasing decisions, being aware of companies' efforts to reduce supply chain intensity and supporting them over those that do not will also send a clear economic signal.

   Members of the Climate Leaders Coalition pledge to work with their own people as well as suppliers to reduce their greenhouse gas emissions, and they report on this each year. This could be a good guide for consumers wanting to understand the sustainability practices of the companies they buy from and exercise their choice.

B. <u>Key questions worth considering around electricity</u>

1. **Are there any other opportunities or challenges around electricity that the paper needs to highlight?**

   Z believes there are further opportunities around electricity as follows:

a. As the electric freight fleet grows it could become a useful source of resilience in the electricity grid if it were able to support vehicle to grid technology, particularly the segments of the fleet that are only used for parts of the day, for example delivery vehicles.
b. Plug-in hybrid vehicles could be used for many tasks where full battery electric is not suitable, the hybrid component could be fuelled by low carbon liquid fuels such as biofuels, or hydrogen.
c. Road freight costs would be less affected by oil prices which are prone to volatility.

Whilst not insurmountable, there are also challenges that will need to be considered:

d. New skills needed for mechanics/drivers and industry participants.
e. Uncertainty over lifetime total cost of ownership in early stages of market, and how quickly a current model will be superseded by better technology. This is particularly pronounced in the early stages as BEV technology rapidly improves, and consumers are unsure whether to purchase now or wait for what might be better technology in a year.
f. Availability of vehicle supply, particularly when New Zealand is in competition with other jurisdictions that may have more advanced markets or support for deployment of new technology.
g. Chicken and egg of infrastructure or service providers to support rollout vs ability for providers to invest "ahead of the curve".
h. Constraints around range, access to infrastructure and charging times will need to be carefully planned and managed within fleets, as freight operators currently are generally not limited by refuelling time or access to energy.
i. Challenge of ensuring freight providers who invest in expensive new technology are rewarded by consumer choice – freight procurement guidelines play a large role here.

2. What freight tasks could be achieved in New Zealand using commercially available electric battery trucks?

We expect lighter vehicles with regular routes, stop/start operation and return to "depot" patterns to be first use cases, for example urban delivery and service vehicles such as courier companies and waste or recycling trucks. Use cases expand from there as vehicle cost and availability and infrastructure expands.

3. What would support the growth and deployment of high-speed charging infrastructure?

High speed charging roll-out is limited by at least two factors, the possibility of technology leapfrog, and the cost of low volume early stage deployment with low customer demand.

The Low Emission Vehicles Contestable Fund approach has some merit when applied to the freight task. Alternatively, a general grant or subsidy scheme for investments into charging infrastructure with a specified end date may bring forward investment and market development.

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4. **If selectively deployed, where could induction electric roads help mitigate battery range issues in New Zealand?**

   While this has promise, in our view it is still very early stage technology with significant uncertainties regarding viability and cost benefit desirability relative to other choices.

   Uncertainties include:

   - The technical viability of installing long lived electrical infrastructure with roading assets subject to high engineering stresses
   - The economic viability of rolling out a meaningful network, prior to demand existing
   - The economic risk of a stranded asset as batteries or H2FC technology continue to improve
   - The cost competitiveness with counterfactuals such as electric rail or, renewable liquid fuels or hydrogen
   - The commercial model that would support such an asset on a public road, for example controlling access and measuring offtake

   If an economically viable technology emerges the most likely location for induction electric roads technology is for very high use/uptime, defined route use cases, most likely in private or semi-private settings such as ports.

5. **How many of the current issues limiting battery electric technology do we expect to be resolved over the next 10 years?**

   We expect a continuation of the trends in cost reduction, energy density and other characteristics improving for vehicle batteries. The degree to which these will solve current issues remains to be seen, but it is clear that more and more uses cases will become viable for this technology over time.

   Bloomberg New Energy Finance (BNEF) project that in 2029, in China, the United States and Europe combined, 23% of light commercial vehicle sales 10% of medium vehicles sales and 6% of heavy vehicles sales will be electric. This implies that a number of use cases will have reached viability by this point.

6. **What are the implications for investment decisions across all three fuel options?**

   Battery electric, hydrogen and biofuels are all great options to help decarbonise freight. It is important to have policy frameworks that provide incentive and certainty to invest, but that doesn't try to prematurely pick winners.

It's interesting to compare the transport emissions reductions in California credited to the LCFS with Norway's strong focus on EVs (though Norway also has biofuels targets and incentives). Norway's transport emissions increased in 2018 from the preceding year, albeit slightly[4]. This was put down to reduced use of biofuels as the country seeks to phase out palm-oil based fuel, insufficient amounts of "good biofuels"[5] and corresponding increase in fossil fuel use.

It's worth noting that New Zealand has plenty of feedstock for "good" biofuels, such as tallow, forestry waste as well as availability of non-arable land that can be used to grow biofuels crop.

New Zealand is a technology taker for vehicles and infrastructure, so it's important to incentivise uptake while keeping our options open for a low carbon fuel mix and encouraging investment in all the options that help us meet our carbon reduction targets (see Q A3).

C. Key questions worth considering around hydrogen

Z's submission on* A Vision for Hydrogen in New Zealand *green paper includes our view on the below questions, and can be found here: https://z.co.nz/about-z/news/submissions-and-presentations/z-energy-submission-on-a-vision-for-hydrogen-in-new-zealand/

1. Are there any other opportunities or challenges around hydrogen that the paper needs to highlight?
2. What level of infrastructure is needed to establish a hydrogen refuelling network, and what would it cost?
3. What is required to keep the price of hydrogen low enough to compete with other alternative fuels?
4. Which parts of the New Zealand road freight sector could shift to hydrogen fuel cells relatively quickly?
5. How can public perceptions around the safety of hydrogen be managed? Whose role is this?

[4] https://www.bloomberg.com/news/articles/2019-06-03/norway-greenhouse-gas-emissions-rise-despite-renewable-push
[5] https://www.newsinenglish.no/2019/06/03/norways-carbon-emissions-up-again/

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D. Key questions worth considering around biofuels

1. Are there any other opportunities or challenges around biofuels that the paper needs to highlight?

The key opportunity with biofuels is the fact that it is available *right now* in some regions with an *immediate* GHG reduction impact with each fill.

Z's locally produced biodiesel, even at a blend of only 5% biodiesel mixed with mineral diesel, reduces GHG emissions by around 4% per tank. It is currently available to commercial customers in the Auckland, Bay of Plenty and Waikato regions, and already being used by customers with bulk tanks and private truck stops such as Fonterra.

Biofuels are also the most common alternative fuel used worldwide and have been safely used for decades, as they can be blended with mineral fuel and used in the current vehicle fleet with no modifications. This makes them an excellent fuel option for fleets that currently use fossil fuels, and are not due for replacement, or cannot easily be replaced by electric or hydrogen technology.

Advanced biofuels are also available internationally and are not subject to a blend limit as the molecules resemble hydrocarbons. While this is available for import (albeit at a premium to mineral fuel), there is a real opportunity for New Zealand to locally produce advanced biofuels with strong co-benefits for economic development, regional development and reduced dependency on fuel imports.

According to Scion – a Crown Research Institute focused on the forestry and biomaterials sectors – New Zealand has the potential to displace 30% of fossil fuels used today with advanced biofuels, from feedstock made from plants grown on non-arable land.[6]

The challenge however is that biofuels cost more to manufacture than mineral diesel. Ethanol, when used in petrol, is exempt from fuel excise tax, however no such policy setting exists for biodiesel. The higher cost of Z's biodiesel is currently jointly borne by Z and customers who have agreed to pay a small premium for the product in the interest of making immediate emissions reductions. While the premium is small in cent per litre terms, in the competitive freight market where fuel is a major cost, every cent on a litre of fuel counts.

[6] https://www.scionresearch.com/science/bioenergy/nz-biofuels-roadmap

2. Could existing biodiesel blends be a near term option for reducing GHG emissions? What would it take for greater uptake of higher blends of conventional biofuels?

Yes, in fact it already is.[7]

Z is currently producing biodiesel from locally sourced inedible tallow, a by-product of the agricultural industry, at its production plant in Wiri, Auckland.
A blend of 5% biodiesel blended with mineral diesel (called B5) is currently being used by a number of customers with bulk tanks and/or private truck stops, such as Fonterra. Even a B5 blend of biodiesel can reduce emissions by around 4%. Under New Zealand fuel specifications, this blend can be safely increased to 7%. Some trucks and equipment are also capable of taking higher blends of 20%.

The single biggest thing in the way of greater uptake right now is price – Z's biodiesel costs more to make, and we are competing for feedstock with overseas manufacturers selling into subsidised markets such as California and Europe.

Z's biodiesel costs more to make than mineral diesel, and we've waived any recovery on capital cost to keep the price competitive for customers. Customers pay a small premium, so this higher cost is shared between Z and customers, because it's the only real option right now to reduce fuel emissions.

The economics remain difficult, and is likely to become even more so given the projected increase in the price of tallow, our main feedstock. This projected increase is due to:

a. Increasing restrictions on the use of palm oil to produce renewable fuel. Pal oil will no longer be used in France, Norway and Sweden from 202, and progressively banned in the entire EU between 2023 to 2030. While this is the right thing to do, it has the effect of increasing demand for by-products such as tallow.
b. Expansion of one the world's largest renewable diesel plants in Singapore (Neste) to more than double its current capacity (1.5 million MT expansion).
c. Construction underway for more renewable fuel plants in the United States and Europe.

What this means is Z is competing for New Zealand tallow with large-scale advanced biofuel manufacturers selling into subsidised markets such as the United States and Europe. So rather than the tallow being utilised locally and displacing

[7] See Z's case study with our first biodiesel customer, Fonterra: https://www.climateleaderscoalition.org.nz/__data/assets/pdf_file/0007/172708/Z-and-Fonterra-Bio-D-Case-Study.pdf

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fossil fuels in New Zealand, it is typically exported to Singapore, manufactured into renewable diesel, then shipped to California and Europe.

Given these factors, , any further investment by Z in either increasing plant capacity or building another plant is unlikely to happen without something changing at a policy level.

On the flipside, anything that would enable the cost of biodiesel in New Zealand to reach price parity with mineral diesel will result in much greater uptake of the lower carbon fuel, and will likely see more investment in biofuels/renewable fuels, not just by Z but likely other companies too.

3. What would it take to fast-track the production of advanced (second-generation) biofuels in New Zealand?

New Zealand companies have already demonstrated a willingness to invest in biofuel production and to even pay a small premium for a cleaner fuel. However, apart from Z's plant in Wiri, none are at commercial scale, and even Z's volumes are small by international standards.

It is difficult to justify investment when there is little policy certainty that biofuels, particularly biodiesel, will be supported as a lower carbon option. Manufacturing biodiesel comes at a higher cost than diesel, and the cost is higher again for second-generation biofuels. A combination of technology advancement and scale will likely bring costs down over time, but given the ease with which trucks and diesel vehicles can switch to biodiesel for *immediate* GHG emissions reduction, Z strongly believes that fast-tracking the production of sustainably produced biofuel, both first and second generation, should be a priority for government given it is the low-hanging fruit.

There are a number of ways to fast-track the production of sustainable biofuels (both first and second), bearing in mind that second generation biofuels have higher capital start-up costs.

a. Biofuels mandate: As outlined in the Green Freight Project background paper, New Zealand briefly had a biofuels sales obligation. This would encourage both conventional and advanced biofuels production as the latter is not constrained by blending limits.
b. Biodiesel Grants scheme: Also outlined in the Green Freight paper, this sales credit would help get the cost of production closer to break even, and promotes scaling up, which could further help reduce the cost to consumers.

c. Capital funding: For advanced biofuels, the capital costs present the largest barrier. The availability of capital funding would address this barrier and help fast-track advanced biofuels in New Zealand.
d. Enforceable GHG reduction programme for transport energy: For example, the Low Carbon Fuel Standard explained above in Question A3. Requiring fuel suppliers to reduce the overall carbon intensity of fuel sold or face buying additional credits, would incentivise fuel suppliers to offer lower carbon options to customers.
e. Higher carbon price: The Productivity Commission's view is that for New Zealand to move to a "low-emissions" economy by 2050, a key change needed is to progressively increase the price of emissions from to between $75 and $152 per tonne of carbon. To go further and reach "net-zero emissions", the price of carbon needs to rise to between $200 and $250 per tonne.[8] A higher carbon price would help narrow the price gap between low carbon fuels and conventional fossil fuels which are still comparatively cheap.

4. What feedstock(s) would be suitable for biofuels production in New Zealand? Which region(s) would be best for producing those feedstocks?

There are two main feedstock pathways that would be suitable for biofuels production in New Zealand:

a. Fats and oils (such as canola and other vegetable oils, used cooking oil and tallow).

b. Lignocellulosic feedstocks (such as miscanthus, fibre logs and forest residues).

The New Zealand Biofuels Roadmap produced by Scion contains comprehensive detail on possible feedstocks what regions would be most suitable for producing these feedstocks, and the regional development opportunities it would bring.[9]

Additionally, it is worth noting municipal waste as a potential feedstock. While not yet a mature technology, this pathway seems to be gaining traction and attracting capital globally, as evidenced by Canadian based Enerkem[10] who already have a small albeit commercial scale plant in Alberta, and United States based Sierra

[8] New Zealand Productivity Commission, *Low Emissions Economy Final Report* (August 2018), p61: https://productivity.govt.nz/assets/Documents/4e01d69a83/Productivity-Commission_Low-emissions-economy_Final-Report.pdf
[9] Scion, *New Zealand Biofuels Roadmap Summary Report* (February 2018), p30-36: https://www.scionresearch.com/__data/assets/pdf_file/0005/63293/Biofuels_summary_report.pdf
[10] Markets Insider, *Enerkem closes a new round of financing for $76.3M,* https://markets.businessinsider.com/news/stocks/enerkem-closes-a-new-round-of-financing-for-76-3-m-1028116079

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Energy[11], who between them have raised over US$100 million in financing this year alone.

5. **What do you consider to be the Government's role in biofuels development?**

   See Questions A3 and D3 above.

   Additionally, the Government also has a role to play in relation to:
   a. Vehicle emissions guidelines and regulations.
   b. Developing skills training.
   c. Assistance with consenting processes where required.
   d. Ensuring the Government's own procurement practices send the right signals and lead by example.
   e. Helping to facilitate conversations with iwi and landowners about potential biofuel crop opportunities.

E. Where to from here?

The Ministry of Transport would like to hear your views on the information provided in this paper.

1. **Does the paper highlight new information or raise questions that are useful?**

   Yes, it is very important to have these conversations and we thank you for the opportunity to submit.

2. **Does it challenge your current thinking or reinforce what you already knew? Or do the ideas presented run contrary to your experience or understanding?**

   The paper reinforces the opportunities available to New Zealand to reduce emissions, and the need to act.

[11] Fast Company, *This startup just raised $33 million to vaporize trash,* https://www.fastcompany.com/90382101/this-startup-just-raised-33-million-to-vaporize-trash