



**Road Transport Forum NZ Submission
to the:
Climate Change Commission
2021 Draft Advice for Consultation**

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1. Representation

- 1.1 Road Transport Forum New Zealand (RTF) is made up of several regional trucking associations for which the RTF provides unified national representation. RTF members include Road Transport Association NZ, National Road Carriers, and NZ Trucking Association. The affiliated representation of the RTF is some 3,000 individual road transport companies which in turn operate 16-18,000 trucks involved in commercial road freight transport, as well as companies that provide services allied to road freight transport.
- 1.2 The RTF is the peak body and authoritative voice of New Zealand's road freight transport industry which employs 32,868 people (2.0% of the workforce), and has a gross annual turnover in the order of \$6 billion.
- 1.3 RTF members are predominately involved in the operation of commercial freight transport services both urban and inter-regional. These services are entirely based on the deployment of trucks both as single units for urban delivery and as multi-unit combinations that may have one or more trailers supporting rural or inter-regional transport.
- 1.4 According to Ministry of Transport research (National Freight Demands Study 2018) road freight transport accounts for 93% of the total tonnes of freight moved in New Zealand.

2. Our approach to commenting on the draft advice

- 2.1 The Road Transport Forum (RTF) supports the principle of reducing harmful emissions from road freight transport over time.
- 2.2 In commenting on the draft advice of He Pou a Rangi, the Climate Change Commission (CCC), the RTF is mindful that there is currently:
 - no proven fossil-fuel alternative fuel source to power heavy trucks in a New Zealand context, available in a reliable and affordable form;
 - no infrastructure in place to support any alternative fossil-fuel source to power heavy trucks; and
 - no commercially available heavy trucks using alternatives to fossil-fuels, at scale, to replace the current heavy truck fleet used to keep

the New Zealand economy moving.

- 2.3 This gives the road freight transport industry a different perspective to other sectors discussed in the draft advice and it is this perspective we are commenting from.
- 2.4 The CCC's evidence report (some 800 pages) and two accompanying advice reports (around 180 pages each) are a significant challenge to readers to make meaningful comment on within the prescribed consultation period. We hope this is just a starting point and that there will be ongoing consultation on policy settings that will essentially, make dramatic changes to New Zealand society including removing choice from the individual regarding their preferred means of transport.
- 2.5 The RTF has chosen to send its commentary in a single document as we feel the approach of using a preformatted response guide is restrictive to free and frank discussion and doesn't allow for continuity in commentary.

3. Introduction

- 3.1 The Road Transport Forum recognises the considerable work done by He Pou a Rangi, the Climate Change Commission (CCC) in preparing this draft advice. In this commentary we have focused on the areas of advice where we think there needs to be broader discussion because of both the impacts on the supply chain, and all the downstream users of the supply chain of which road freight transport is an integral part.
- 3.2 The New Zealand road freight sector is informed on the various opportunities to decarbonise the transport chain and consequently lower the relevant environmental impact thresholds. We have previously commented on the Ministry of Transport's (MoT) Green Freight Project and the A vision for Hydrogen in New Zealand discussion paper, citing the limitations the policy approaches outlined in both documents would have had in reducing the environmental impacts of the supply chain system, due in a large part to the unavailability of technological solutions (in terms of vehicle drive train developments) and customer freight delivery expectations.
- 3.3 That is not to say the industry is not willing to find solutions and a number of road freight operators are trialling trucks powered by alternatives to fossil fuel. These are very much fact finding trials to see how businesses will adapt to the possibility of less diesel trucks in their fleets over time.
- 3.4 With respect to RTF's sphere of interest, our response to the draft advice focuses on the trucks that perform the freight and

transportation tasks that support the supply chain and end user consumption imperatives. These are, moving goods around New Zealand for domestic use, and to ports for export, as fast and cost-effectively as possible and delivering door-to-door on time. Road freight transport plays a significant role in the New Zealand economy.

- 3.5 The recent 2020 and 2021 Covid-19 lockdown experiences have shown just how vital to economic sufficiency a reliable road freight transport system is. The rail system is at capacity, and there is little potential for growth in that service for freight. Disrupting the existing transport solutions model with a Government imposed vehicle selection criteria (as suggested in the draft) and a continued lacklustre investment in roading is almost certainly a recipe for economic stagnation.
- 3.6 The CCC's draft for consultation is, in parts, vague in reference to any economic or business impact analysis to support the dramatic change to commerce in New Zealand that is being put forward, or commentary on what the financial and social impacts might be on widely dispersed communities, especially rural New Zealand. In effect, no one knows, or even alludes to, what the real impact of the changes will be on individual households given the direction of change put forward for discussion. However, it is difficult to not see those who can least afford it being most impacted by the advice in this draft.
- 3.7 The concepts presented in the collective publications/reports appear on the face of it to be almost entirely city centric (despite the lengthy discussion on how the farming and pastoral community must reduce their environmental liability), showing a lack of understanding of New Zealand's unique transport requirements. We are not a wealthy northern European country with a large population base centred in cities with efficient public transport, cycling and walkways that have been in play since the 1940s.
- 3.8 As New Zealand's public roads are the workplace for the road freight transport industry, we are familiar with the challenges for private car and other road users in the context of a country that has never presented reliable, affordable, public transport – even in cities – and which makes most of its money from rural and provincial communities. Car ownership represents freedom to many New Zealanders; and freedom is a foundation principle for them.
- 3.9 The draft report says that: "Emissions must be reduced at pace while allowing the country to continue to grow"; and that any transition must be equitable. We are concerned that much of the advice strays from these principles.
- 3.10 The road ahead must be guided by evidence and economics. As a trading nation, New Zealand already has the significant cost challenges

that come from being a modern, western economy, the most distant from markets compared with competitors.

- 3.11 In a quest to lead the charge in climate change mitigations, we cannot do that at the expense of the businesses that contribute to our prosperity and the individual households that wear the costs of any pressures in the supply chain. In short, we cannot price ourselves off the global market while our competitors make no significant changes; or leave New Zealand without a viable food supply.
- 3.12 In our view, it is premature to rule out different emission reduction options for purely ideological reasons. The discussion in the advice seems to be portraying the electricity driven battery option as the only viable vehicle power system, ignoring alternatives.
- 3.13 We believe any advice must include consideration of the fact that climate change solutions are being developed and refined all the time, so policies and processes should not be too fixed. The pace of change should not outweigh the benefits and should not place greater burden on one part of society over another. This is particularly relevant as New Zealand recovers from the economic damage from the Covid-19 pandemic.

4. Specific comments

- 4.1 The prevailing proposition is that this draft report, with its prescribed necessary actions, constitutes the plan going forward to meet New Zealand's Paris Accord climate mitigation obligations.
- 4.2 We acknowledge the need to meet those obligations but also recognise New Zealand's contribution to reducing the worldwide environmental impact of climate change is always going to be small when it comes to emissions alone. Part of our approach should also be geopolitical – being conscious of where other nations have, or haven't, attempted to also meet their Paris Accord obligations.
- 4.3 Any prescribed timeframes must take consideration of the impact on our economy and the businesses and households that make up our nation.
- 4.4 Any policy settings should be framed around there being viable, safe, affordable, widely available alternatives to what is being phased out and that we are not merely swapping like for like when it comes to the environmental footprint of the replacements.
- 4.5 The technology suppliers including truck and transportation system vendors have already grabbed the opportunity to provide solutions into the market to meet the CCC's goals even though many are untested

and under developed. Small scale applications of heavy-duty truck alternative propulsion systems in various markets, including New Zealand, do not necessarily mean the solutions are market ready, even for 2035. Furthermore, New Zealand's infrastructure, particularly its electrical generation capability and distribution network, is heavily weighted to service household consumption, not huge increases in industrial consumption.

- 4.6 RTF's response to the various documents covers predominantly the road freight transport sector proposals. However, we cannot not entirely ignore the collateral household and community wide impacts of what the CCC is proposing within the scope of recommendations for the transport and freight services topic area covered in the document **January 2021 Draft Advice For Consultation**, more specifically, **section 6.1.1 transport**. We will also cover **1 February 2021 Draft Supporting Evidence for Consultation, Chapter 4b: Reducing emissions - opportunities and challenges across sectors Transport, buildings and urban form**. Finally, we will comment directly on **Chapter 17: The direction of policy for Aotearoa, 17.3.1 Transport, page 17 to 23**.

5. 31 January 2021 Draft Advice for Consultation Document comments

- 5.1 **Section 3.8.1, page 57** clearly documents the challenges of decarbonising the heavy vehicle fleet but it also makes some broad-based generic assumptions about households and living environments presenting, by implication, a willingness to change. There is no evidence to support this assumption, though undoubtedly some households give considerable thought to what contribution they can make to mitigating climate change. Many households have become increasingly reliant on the door-to-door convenience of the global supply chain by ordering goods online, around the world, and having them delivered directly.
- 5.2 Various assumptions in this section are made about changes in travel patterns including electrification of some parts of the rail system. It is balanced, in part, by an acknowledgement in the text that liquid fuels will still be required for some vehicle applications. But even taking account of the balanced view, the outcome relating to the speed of change to largely decarbonise the trucking fleet and supply chain is somewhat overstated. Some US transport publications have indicated the internal combustion diesel engine will be still around in 2050, especially as the diesel engine technology becomes more refined with new developments.
- 5.3 **Section 6.1.1 transport** - This section lays out the transport sector priorities with an initial focus on private mobility options. While the

goals of encouraging walking and cycling are laudable, the necessary action options on page 106 will clearly bring about increases in living expenses for different sectors of the community. The people who are mobility challenged will remain mobility challenged, and while the text speaks about encouraging councils to implement a range of public access transport services, the cost will inevitably fall on the already financially stressed rate payers. Providing reduced fares for the under 25 year olds will not come about without the true cost of transport falling upon someone else, be it the tax payer, or rate payer, or both.

- 5.4 **Necessary action 2 (page 106)** - favouring the use of electric vehicles (EV), ignores the fundamental environmental costs and social impacts of manufacturing these vehicles and the supplying of their propulsion and drive train systems. The latter is associated with exploitation of population groups (especially children) involved in producing the raw materials for the batteries. This aspect of the EV supply chain has been well documented by various researchers and the internet is awash with articles about the human cost to produce an EV. The EV battery resource issue is not unlike the Bangladeshi T-shirts sold by the fashion houses where it was only when the ethical sourcing discussions exposed exploitation of the garment makers did anything begin to change.
- 5.5 The ethical sourcing argument hasn't impacted the EV supply situation but as the resource demand for batteries increases as every jurisdiction chases the market, the true human cost may become more obvious. Similar situations arose with introduction of biofuels where equatorial populations were disenfranchised off their land so the biofuel advocates could take it grow the raw biofuel feed stock products.
- 5.6 Chinese interests have largely cornered the available market for EV battery resource constituents such as lithium and cobalt. While the cost of EV batteries has fallen dramatically in the past few years (est 85%), this price fall will be countered by resource availability and reprocessing costs. As vehicle manufacturers seek to use more complex materials to increase range, reduce charging time, and increase energy density, the reprocessing (as opposed to repurposing) costs will continue to rise.
- 5.7 One of the few places capable of extracting the valuable minerals from end-of-life EV batteries is in Belgium at a facility that relies on nuclear power.
- 5.8 The clean image of the EV is somewhat tarnished if the environmental impact of resourcing and making the batteries (input energy demand) is taken into account.

- 5.9 In a New Zealand context the CCC does touch upon the environmental impact of the manufacture and disposal of end-of-life batteries, but in a nonspecific way leaving the private sector, most likely the vehicle suppliers, to adopt a battery management programme. The CCC ignores the processes involved in achieving that outcome and consequently any vehicle supplier will have to add additional costs into the EV purchase price to cover the end-of-life battery costs.
- 5.10 **Necessary action 3 (page 109)** - recommending government introduce incentive schemes, feebates and subsidies to reduce the upfront costs on EVs is not equitable, as the true cost will fall on those less able to purchase an EV. Whatever subsidy platform the government implements the costs will come from taxes.
- 5.11 Point (e) covers off the battery recycling and battery refurbishment policy options. What is not disclosed is the cost. EV battery recycling occurs largely in Europe and recycling processes are way behind in the processing demands. What's more, significant energy is required to reprocess the batteries to reclaim some of the raw constituents, which we have discussed in more detail above.
- 5.12 Point (g) speaks of setting government policy to mitigate the impacts of its EV policy on the low income and other disadvantaged sections of the community.
- 5.13 Again, this is a laudable approach but the actual impacts and assistance required in dollar terms is unstated. The financial support demands required for the EV subsidy programme will require a reduction in government spending elsewhere, so there needs to be transparency on the real and societal costs of that. On one hand, New Zealand proposes adopting a policy position of reducing emissions to ostensibly save lives, but spending for that competes with other legitimate lifesaving expenditure demands, such as medicine. The economic vulnerability of New Zealand to meet the CCC's objectives could possibly favour one sector of society over another as government grapples with priorities within the fiscal realities.
- 5.14 **Necessary action 4 (page 110)** - The discussion leading toward necessary action alludes to the alternatives to conventional fossil fuels and focuses on electricity, green hydrogen and biofuels. However, taking that approach rules out advances in fuel engineering and internal combustion engines to some extent, implying that all liquid fuels are inherently bad.
- 5.15 There is no doubt going to be swing to EVs, but according to overseas research they are not the only option for achieving the low carbon outcome. The difficulty we have with the CCC's guidance is grasping whether the policy is to ban liquid carbon fuel per se, and personal

vehicle mobility, or if it is aimed at reducing carbon emissions and the environmental impact from road transportation. If it's the latter, then the scope for solutions is wider, particularly given the advances in both fuel technology and diesel engine and drive train development.

- 5.16 European vehicle propulsion advocates are talking of E-fuels, or synthetic fuels, that would reduce carbon impacts by as much as 85 percent and be compatible with both current and older vehicles. Taking into account the total carbon footprint from production to supply, the impact of low carbon fuel would be on a par with the present EV options. Siemens Energy, AME and Enel, and the Chilean company ENAP, have formed a partnership to produce the new liquid fuels using wind power.
- 5.17 According to Porsche, the E10 and E20 (ethanol) fuels require engines built to or calibrated to use those fuels, but the new synthetic fuels present no such problems and are entirely compatible with existing fuel storage and distribution systems.
- 5.18 Necessary action 4 is not entirely in conflict with new generation synthetic liquid fuels but (c), suggesting pricing market influences on fuel choices, in our view should be dropped.
- 5.19 The government should settle on setting the fuel specifications, not trying to predict or pick winners on the resource supply side especially when the end user service is as volatile and competitive as the transport services market. In essence, we believe we have answered consultation question 14 on page 110.

6. 1 February 2021 Draft Supporting Evidence for Consultation

- 6.1 **Chapter 4b Reducing emissions - opportunities and challenges across sectors Transport, buildings and urban form, Page 4 -**
The statements in the table disaggregating the truck fleet into two groups is a simplistic approach and better data would be derived from looking at the actual vehicle service applications. The Ministry of Transport's data sets about the truck fleet are woefully inadequate and include in excess of 25,000 mobile homes. "Medium trucks" up to 30,000kg are not big rigs by any stretch of the imagination. The so-called medium trucks are involved in urban delivery and some regional activity. A small number may draw trailers. This vehicle group is predominantly two-axled and a few have three axles. They cover every application from rubbish collection, civil contracting, farm and agriculture support, and utility maintenance, as well as the aforementioned urban freight delivery.

- 6.2 Not all will be candidates for electrification because the duty cycles will drain out the batteries too quickly and the charging times using current technology are slow. Battery performance declines quickly when subjected to high payloads or trailer towing, or regular use on gradients. Range limitations will also discourage uptake unless the energy density of the batteries improves. We suspect the most likely vehicle for battery power or electrification are 3.5 to 7 tonne segments while the heavier vehicles in the medium segment may show more promise as fuel agnostic hybrids or fuel cell electric vehicles (FCEVs).
- 6.3 Heavy duty trucks typically are poor candidates for electrification and battery operation as suggested in the draft. The load demands are particularly variable and these vehicles often draw one or more trailers to ensure full payload versatility. We see the battery option as being a nonstarter unless there is some significant breakthrough in battery performance, particularly energy density. The FCEV option seems to show some promise despite the present tensions in the market among the various power system and vehicle drive train developers.
- 6.4 That aside, at a recent Engine + Powertrain Technology International conference held in Europe, the proposition put forward was that the even in a near net zero carbon environment the internal combustion engine (ICE) still had a future. A number of international developments are taking place that will improve the environmental performance of the ICE. One of critical aspects is the development the integrated drive train system.
- 6.5 In our view, it is premature to rule out different emission reduction options for purely ideological reasons. The discussion in the advice seems to be portraying the battery option as the only viable vehicle power system, ignoring alternatives.
- 6.6 We appreciate the comments on page 6 which reflect on growing economic activity driving the increase in transport activity and this in turn increasing emissions outcomes. It is only by improving economic resilience through domestic growth that New Zealand will get anywhere near achieving the possibility of implementing some aspects of the CCC's policy objectives.
- 6.7 **Page 9** - We have already commented on the walking and cycling and public transport scenarios and potential uptake and possible cross-subsidisation to fund these options to make the end user price palatable. Although the various documents touch on the working from home option, that may be fine for some office workers but it is not entirely feasible for many private sector occupations. One thing that's not covered in a lot of the work-travel discussion relating to using substitutes to the private car, is the alternatives would entail individuals using multiple modes, which introduces more complexity as

well as extended travel timeframes. Typical examples today can be characterised by walking to catch a bus, busing some distance, and walking to the final destination. That scenario has merits for some, but for others the door-to-destination merits of car travel are more appealing when it comes to time-cost, times of work eg. at night, or personal mobility.

6.8 Page 14 - Electrification of trucks and buses - The points made in draft in this particular section are reasonably valid. Battery technology will continue to improve but its application to trucks is relatively limited. Battery technology is applicable to modest weight payloads and mid-range truck operating masses, with vehicles operating on low to mid-range duty cycles. The economic costs of dealing with stranded trucks is not inconsiderable and the down sides of range anxiety will likely persist, even with improvements and advances in battery technology discussed in the text.

6.9 According to a Transport Topics [article](#) (10 February 2021) Cummins Inc. CEO and Chairman Tom Linebarger is reported have stated:

The current challenge for emerging battery-electric technologies is the systems have not yet demonstrated benefits that by themselves will drive the commercial vehicle market's adoption of them.

They're not in the money in trucks. What is pushing those technologies, instead, is regulations in certain states, which means that it's not really a strength, technology and performance kind of discussion.

In Linebarger's view any talk about market share in the segment is premature, It's bouncing all over the place.

Cummins noted its strategy remains to innovate continually across its product portfolio of power solutions, including diesel and natural gas to fuel cells, hybrid and fully electric options.

6.10 It's worth noting that operators of medium and heavy-duty trucks not only require confidence in the vehicles' power systems and drive trains, but also in the reliability and longevity and some foreknowledge of potential repair cost impacts.

6.11 The business cost comparison will always be made against the tried and proven diesel-powered systems. There will be those that take a leap into the future but most transport operators are conservative and will wait until any new drive train technologies have been bedded down and demonstrate they meet reliability expectations.

6.12 We note the alarming suggestion from some quarters for repowering present ICE vehicles with aftermarket conversions. This approach is problematic. Recent experiences in New Zealand and overseas with

aftermarket battery electric conversions of ICE chassis has resulted in mixed reliability outcomes, which suggests the Original Equipment Manufacturer (OEM) technology development is still the best option. The repower approach is a localised solution which shouldn't be considered or encouraged. The best options are complete drive train and power system solutions. This is the fully integrated system approach.

- 6.13 The policy position should be to support only global solutions for the vehicle fleet, not back yard domestic conversions.
- 6.14 **Page 15 - biofuels and synthetic fuels for trucks and buses** - In the earlier part of the submission, we touched on the concerns we have with the biofuel raw material production impacts on equatorial populations. This is serious issue that should not be ignored and was well documented in the late 1990s, where biofuel feed stock competed with food production for access to land. The CCC's draft acknowledges the limitations of biofuel opportunities due to engine compatibility limitations. While the engine manufacturers haven't written off biofuel as an option entirely, research is moving to the low GHG synthetics, such as low GHG diesel.
- 6.15 Diesel engines already achieve a significant level of thermal efficiency, circa 45%. New advances in diesel engine technology and low GHG fuels hold considerable promise for the near future.
- 6.16 The discussion on page 16 about synthetic fuel costs compared to fossils fuel costs is at this juncture a valid comment; but the next 15 years may see the price difference reduce considerably.
- 6.17 At present, the relative process of the new generation fuels versus diesel are a market disincentive and, coupled with incompatibility aspects of present engine designs to biofuels, the synthetics may come to the front. This appears possible given the recent price rises in oil and retail diesel in the United States. Page 17 refers to the inelasticity of transport to pricing signals due to demand. Road transport is a demand sensitive service so economic decline is one of the few features that dampen demand. Price impacts end up being fed through the economy to the end user, usually the public.
- 6.18 **Page 17 - Hydrogen trucks and buses** - Hydrogen FCEVs show considerable promise and number of heavy-duty truck manufacturers are exploring the technology. However, the market is split between the genuine manufacturers and new start-ups, the latter being very clever at sourcing investor funds on the basis of somewhat dubious vehicle performance promises. Nikola motors under the management of Trevor Milton being just one example until it was exposed by Hindenberg Research as explained here: <https://hindenburesearch.com/nikola/>
- 6.19 Only more recently, after General Motors (GM) purchased a substantial stake and installed its own management structure – and Milton

departed - has Nikola begun to move forward. It has recently announced its Nikola 2 Class 8 truck for in service trials in 2022; moving to market in 2024. This announcement gives some hope that something tangible will rise from the ashes of a messy divorce from the original owner.

- 6.20 The Daily Mail UK confirmed Elon Musk's Tesla brand had an operational BEV truck in this [article](#).
- 6.21 The problem with Musk's initiative is it's difficult to be sure where the development trajectory is at, especially when measured against recent hydrogen fuel developments. The big call is an emissions-free hydrogen manufacturing process that can fuel a 300-mile (482km) trip on a full tank compared to the average Elon Musk-owned electric vehicles that go 250 miles (402km) on a single battery charge.
- 6.22 *Blue gas* has the potential to threaten Tesla according to some commentators as the hydrogen fuel is made in a carbon-neutral process from methane and water unlike conventional, or 'grey' hydrogen. However, released carbon is captured.
- 6.23 Vehicles powered this way produce no harmful emissions — only water vapour - and unlike battery-powered systems, they do not use environmentally-damaging metals such as lithium.
- 6.24 Apart from Tesla and Nikola, other start-ups have had similar questions raised over their company's operational performance and the substance to their energy and environmental claims.
- 6.25 The benefit of the hydrogen FCEV option is that the tare weight impact is considerably less than the tare weight of the battery electric option; the latter reducing payload and payload is what earns the money, not tare weight.
- 6.26 In our comments on the hydrogen policy, we indicated that we see the market maturing and developing through end-user demand. However, it's worth noting nearly all the FCEV bus options in international jurisdictions have been based on joint ventures between vehicle suppliers and transit companies, with government support through technology grants.
- 6.27 In other words, there has been some form of subsidy from government sources to test and evaluate the viability of FCEV propositions. These are not open market vehicle sourcing operations but tightly controlled evaluations of the design vehicles applied technology through the joint venture initiatives.
- 6.28 With commercial trucks, the market might be more difficult to establish than the bus market.

- 6.29 Hyundai Motor Company has entered into a cooperative arrangement with H2 Energy to introduce 1600 trucks into the Swiss heavy vehicle market over the next six years. The objective is to establish a beachhead market for the rest of Europe, before embarking on the US market. These vehicles are essentially what New Zealand would term medium-duty trucks, with a range of 400km. They are not heavy-duty trucks capable of taking products from New Zealand's pastoral and hinterland production, to market or processing for export. The Hyundai model would most likely be deployed in urban delivery in a New Zealand context.
- 6.30 An article, by John Kingston, in the US *Freight Waves* magazine (<https://www.freightwaves.com/news/alternatives-to-diesel-in-long-haul-trucks-still-face-big-challenges-report>) states with some authority "Alternatives to diesel in long-haul trucks still face big challenges", citing a report by S&P Global Platts Analytics.

We have taken the following extract from the full article because it frames the present state around heavy-duty truck alternative power technologies particularly well.

A problem for alternative technologies – the diesel truck is simply too efficient. "Our analysis of contemporary long-haul semis shows that across battery electric vehicles, fuel cell electric vehicles and compressed natural gas [CNG] drivetrains, none were economically competitive on average with the status quo diesel truck," the report said in its conclusion.

And it's not as if diesel engines are standing still. As noted by the report's authors, Zane McDonald and Roman Kramarchuk, diesel engines have a 30 percent efficiency improvement capability using existing technologies. That potential move away from the status quo – which for the most part has never truly been static but is always evolving – "further complicate(s) any prospects of unseating diesel as the primary energy source for long-haul semis in the near- to medium-term."

That doesn't mean that there aren't strengths in other technologies. The report focuses heavily on the advantages and disadvantages for battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEV) in the long-haul market. But as the onion is peeled away, the report finds that significant penetration by these technologies is going to need enormous technological gains alongside the improvements in diesel engines, or will need a government boost through programs like the California Low Carbon Fuel Standard, which gives low-carbon technologies like BEVs an advantage.

What the Platts report does find is that there are more immediate opportunities for alternative fuels in the regional haul market, which it defines as less than 200 miles per day with a truck averaging 29,000 miles per year. The lower range of these vehicles means that regional haul trucks can use smaller battery packs, a major cost source in long-haul tractors because of their weight.

Platts lays out a mathematical case that the smaller battery in a regional vehicle reduces the "purchase premium" – another term for higher price – of a regional truck to \$22,500 from \$63,000 for a long-haul tractor. Throw in the savings on diesel and maintenance and "during typical regional haul operation, a 2030 BEV semi will break even with a high-efficiency diesel in less than two years," the Platts report said. "Past this point, there is an economic advantage to be had in reduced fuel and maintenance expenditure."

But for long-haul trucking, that \$63,000 price premium on the cost of a BEV is too large for the fuel and maintenance cost savings to compensate. "Reduced operational costs to improve the competitiveness of the drivetrain with increasing cumulative mileage, it is not enough for the average BEV to be cost-competitive with an anticipated high-efficiency diesel semi," the report said.

The numbers on the weight of batteries in BEVs are stark. The unit needed to service the average long-haul truck can weigh more than five tons. The report says existing diesel trucks can approach a gross vehicle weight of 33,000 pounds, so a five-ton battery would be 10,000 pounds (though offset in part by the loss of the weight of the internal combustion engine).

Such a battery pack would "reduce the overall freight that a truck can carry, reducing revenue per mile," the report says. "Furthermore, batteries are relatively expensive, increasing the cost of a long-haul semi by over 80 percent at current technologies."

For other technologies being utilized in the long-haul segments, the figures are stark on how much two key costs would need to decline to make them competitive with diesel. Fuel cell costs would need to decline to a level near \$90/kW from nearly \$250/kW today, and the cost of hydrogen would need to be down toward \$4.40/kg. The price today is \$16/kg.

This summary of the Platts report puts into context the real opportunity for FCEV heavy-duty trucks, and also identifies the practical limitations of the battery electric vehicle (BEV) technology for the same vehicles.

- 6.31 The USA has more conservative tare weights than we have in New Zealand, but because we have road user charges as our road tax system for heavy vehicles, tare weight considerations become even more imperative in as much they impact on the payload capability of the vehicle.
- 6.32 If we take pragmatic view of the opportunity to displace diesel as the dominant fuel source for heavy vehicle applications, the market is a split model with potentially two-thirds of the commercial fleet involved in short range distribution and intercity deliveries being candidates for either FCEV/FVET (fuel cell electric truck) technology, or BEV technology, where the vehicles are predominantly back-to-base operations within typical 200km range limits.

- 6.33 The other third are the multi-unit heavy-duty combinations where the payload demands are such that FCEV will most likely dominate due to the fact that operating ranges are likely to be in the order of 1000km, and load demands are at the upper levels commonly utilised by 50MAX and HPMV vehicles.
- 6.34 It's premature to throw weight, especially in New Zealand's case behind the hydrogen FCEV when the vehicles are still under development. There is a risk of moving too early when there is no established hydrogen fuel distribution system and the suppliers are hesitant about when they will have vehicles fit for the wider market.
- 6.35 It's important to point out New Zealand is a technology taker and by world standards, an insignificant market. We import the trucks but build the truck bodies and the trailers they draw in New Zealand. This simple fact places New Zealand operators in a very vulnerable financial position and significant or dramatic shifts in the truck market aren't easily accommodated. This goes back to the basic economic imperatives for successful commercial truck operations, which are low operating and maintenance costs, and modest capital costs. Vehicle propulsion system longevity and in-service reliability are other cornerstones applicable to commercial truck operations and operator confidence.
- 6.36 The New Zealand trucking industry is beset by low margins, and fleet replacements result in a long legacy of finance costs that must be recovered before the vehicle's first life comes to an end. Large fleets have more scope for purchasing new technology than smaller fleets. New Zealand's transport industry, like every other jurisdiction, is made up of small businesses, with single unit operators and independent contractors making up the bulk of players.
- 6.37 In light of the limited capacity to purchase new technology, Government might like to consider a transitional subsidy or suspensory loan approach to help encourage the uptake of FCEVs, although this approach is far from ideal and new technologies should stand and fall on their performance merits. Once the reliability and pricing profiles of the FCEVs come closer to the diesel option, Government support might be able to be withdrawn. The difficulty here is future state of the heavy-duty vehicle market is somewhat unknown.

7. Page 21 - Shift freight to rail and coastal shipping

- 7.1 **Is either scenario feasible?** There is little point in discussing the transfer of freight to coastal shipping other than to say it suffers from the same capacity and capability limitations as the road freight to rail scenario. In this response to the draft supporting evidence, we will

comment predominantly on the rail option.

- 7.2 The response to Covid-19 in New Zealand has shown the stark reality of rail and coastal shipping – neither measured up and road freight took the extra delivery load. No amount of investment – and for rail it would be completely ridiculous amounts – is going to change the market wanting door-to-door, time sensitive delivery of goods.
- 7.3 Rail systems have historically proven to be bottomless pits as far as investments go and the corollary argument of environmental benefits over road are simply illusionary, as any level of success of rail transport is entirely dependent on truck transport. In New Zealand, freight trains are powered by diesel and the track system accommodates that, not electric trains.
- 7.4 A 13 December 2019 press release statement from Rt Hon Winston Peters and Hon Phil Twyford stated that they had already committed \$2.8billion to rail since coming into office in 2018, expecting rail to accommodate the expected increase in freight demand.
- 7.5 The same statement referred to Government contributing \$1billion in 2019 budget, \$741m to restore a reliable and resilient functioning network. This was further supported by the Provincial Growth Fund to the tune of \$300m.
- 7.6 These figures give some idea of the typical drawdowns that rail requires in a New Zealand context, just to maintain its status quo.
- 7.7 To further assist rail Government has already amended legislation to allow rail services to access the funds of the national land transport fund (NLTF).
- 7.8 This presents considerable uncertainty in terms of how the revenue demand for funds from the NLTF will be sufficient to serve both masters, road and rail, arguably (if you believe in the competition scenario) competing for the same freight traffic. However, this is not pure competition that the government is tempting the market with.
- 7.9 One entity is a government funded and owned nationwide corporate entity and the other a conglomerate of, in the main, financially vulnerable small businesses.
- 7.10 In excess of 75% of New Zealand's road freight enterprises (3,885) employ five or less full time equivalent employees (RTF sourced data from NZ Statistics 2019).
- 7.11 New Zealand is long thin country with challenging topography and widely dispersed centres of population, with a reasonably large portion of the total population spread in the golden triangle of Auckland to Bay of Plenty region, including Hamilton. Even the regional centres of Wellington, Christchurch and Dunedin have insufficient consumption or

production per capita to sustain a rail freight transport system as postulated in the evidence document.

- 7.12 Those obvious facts of circumstance and the huge funding commitment to make rail a viable service have failed to inhibit various government officials making comparisons between road and rail freight services contestability. This is not comparing apples with apples and implies a desire by Government to be able to pick winners in commercial market such as freight delivery
- 7.13 In a small freight market, such as New Zealand, road and rail should operate as complementary modes, and indeed they do. Market manipulation has failed to work in the past and our concern is that the climate change approach appears to be driven by rebalancing the transport service profiles and removing customer choice.
- 7.14 No matter what the size of the freight market, the customers decide which mode they want. This is evidenced by the Ministry of Transport's National [Freight Demands Study 2017/18](#), Executive Summary, Table 1, showing a decline in freight growth for rail of 17% and road transport conversely increasing by 16%. There is footnote to the table citing the Kaikoura earthquake and decline in coal traffic as impacting the rail freight performance and that must be acknowledged.
- 7.15 The New Zealand freight market sets its own equilibrium, and should be allowed to continue to do so without Government intervention. The main driver of logistics companies' decisions and customer decisions to favour road is due, in large part, to the inherent flexibility and timeliness of road freight and the ability to complete door-to-door deliveries; all not possible for rail.
- 7.16 Potentially the market could be changed by using an inverted tax system, that is, tax road freight to make rail viable. Such market manipulation doesn't fit the principle of equity as the losers in this approach are the communities and households in the general population, as a new thread of inflationary freight cost increases and consequential price rises would be introduced to consumers purchasing commodities.
- 7.17 Given that most of New Zealand's economic wealth is derived from the rural hinterland, where trains don't actually go, rail is on the back foot from the get go. Its problems are compounded by its narrow-gauge, low tunnel heights and as the regulatory impact statement for the rail funding bill pointed out, its aging infrastructure.
- 7.18 On many parts of the rail infrastructure train movements are already at network capacity, so the outstanding question is how is rail expected to grow further to meet a climate change solution when it has all these well documented disadvantages? One could argue under these circumstances, the Government is simply funding rail as an institution and not a viable business.

- 7.19 Without the availability of reliable and cost-effective surface vehicles, particularly trucks, food supply, industry and commerce in New Zealand would cease to be possible in today's form. Product distribution by commercial road vehicles has, over the past 100 years, resulted in a cost effective and almost unchallengeable service for household consumers and value adding producers alike. The reliability, flexibility and efficiency of road transport has, since the 1950s, largely displaced much of the rail terminal-to-terminal distribution service, which is simply reiterating the point that rail cannot deliver point-to-point.
- 7.20 Any step to enhancing rail's capability is actually entirely dependent on road transport support.

8. Rail environmental benefits over road freight services

- 8.1 The environmental benefits of rail are a mirage, being completely undone by the environmental costs of transshipping goods to road vehicles to meet end-point customer expectations.
- 8.2 In New Zealand, rail also has considerable one-way laden traffic, that is, the freight is only transported one way and the empty freight cars have to return to base as there is little chance of getting substantial freight to offset the return journey costs.
- 8.3 Measuring environmental performance solely on the basis of the relative performance of the truck versus train approach, instead of the point-to-point sender to end receiver approach, is a very narrow perspective. Freight service purchasers take into account total trip cost and service convenience when selecting their modal method, as even in the most modern freight context rail will fall to being an alternative choice.
- 8.4 So, while we will agree rail services need support to provide their complementary services, the facts cannot be ignored. In New Zealand, rail freight's strength is in long distance transportation (over 500km) of high volumes of relatively low value products. We would argue that funding rail, or cross-subsidising rail as a low emission form of freight transport, will just add even more costs to end consumers of both modes for little or no tangible benefit.
- 8.5 The principle of cross-subsidisation has been the subject of assessment in the past by European transport interests, to test the viability of the concept.
- 8.6 We refer to research by Transcare AG where author Ralf Jahnke et al examined the influence of using truck tolls (what Jahnke means is road user taxes) to support the transition of freight to rail. They found the outcome was almost negligible because the actual amount of freight that is truly contestable in the market is only about 4% across both

specified EU countries and more generally across the EU25. (Reference Transcare AG; Ralf Jahnke et al, *Influence of truck tolls in the model split in cargo traffic*; March 2006)

- 8.7 The report of Jahnke also commented that any goods transfer is entirely dependent on distance with the 0-100km range showing no transferability of freight and 100 to 250km having only about 10% of this volume a candidate for transfer. It is not until the freight distances get beyond this that there is some measure of transferability and then it is largely thwarted by pure economics, time sensitivity, and special requirements not offered by rail services. The nub of his analysis is: don't tax trucks to foster rail performance; the very solution the climate change scenario will be required to do. If rail can't fulfil its promise in the European markets where there is a strong rail centric vision, it has little chance of doing making any significant change to market here.
- 8.8 Corporate financial dependency is not an option for rail to become an environmental solution to climate change when it remains incapable of examining and optimising its present efficiencies.
- 8.9 Rail must learn to operate efficiently and on its financial merit, just like trucking companies. There is no real competition between the modes. In a New Zealand transport context rail simply cannot do what trucking does. But there is plenty it can do and it needs to exploit these opportunities.

9. Page 22 - Use of low carbon fuels for off road vehicles and heavy machinery

- 9.1 In our response to the biofuels option, we discussed the potential advantages and opportunities for synthetics and low carbon fuels. These comments were a reflection of our views in part of our response to necessary action point 4.
- 9.2 Expanding those comments further, we believe both synthetic and low carbon fuels have a future but not just for off-road vehicles and the evidence seems overwhelmingly in their favour, apart from cost. It is a multi-solution approach with adaptive propulsion system developments that will change the face of transport and transport applications of low carbon options.
- 9.3 The European magazine *Engine and Powertrain Technology International* documents the latest research in the power train and fuel developments and has particular emphasis on low carbon outcomes www.enginetechnologyinternational.com
- 9.4 According to various European fuel engineers, low carbon fuels and synthetics offer considerable advantages over biofuels.

- 9.5 Ansgar Christ, renewable synthetic fuels expert, Bosch, makes the point: "they are chemically much more stable, they do not age. Their chemical structure is basically identical to that of fossil fuels, which allows a 100% replacement without any disadvantages, or a fully flexible admixture. Additionally, the 'raw material' of synthetic fuels is electricity, water and carbon dioxide taken from the air, turning a greenhouse gas into a resource. There is no potential conflict with the food industry, and this also enables 100% CO2 neutrality".
- 9.6 However, he goes on to say the business case remains highly complicated. A study carried out for the German Association of the Automotive Industry (VDA) by energy and environmental consultancy Ludwig-Bölkow-Systemtechnik (LBST) and the German Energy Agency (DENA), showed power-to-liquid diesel or gasoline production costs between €4.50 and €5.00 (US\$5-5.57) per litre based on 2015 figures, compared with 40 cents for fossil fuels. By 2050, the study suggests a 50% increase in fossil fuel production costs, but predicts that even imported synthetic alternatives could still be more expensive.
- 9.7 LBST managing director Dr Uwe Albrecht says economies of scale for the fuel itself will help, but that the price disadvantage is largely down to renewable energy costs.
- 9.8 Cost reductions are vital to encourage uptake in heavy-duty vehicles, as well as marine and aviation, where the energy density of batteries makes it a less viable option.
- 9.9 Likewise, Stephanie Searle, the ICCT's fuels program director, believes they have a role to play. "Synthetic fuels are significantly more expensive than gasoline and diesel, but this isn't a reason not to support them. We need the introduction of strong policy incentives now to start building a low-carbon fuel industry. Eventually, these fuels should be cost competitive if the environmental cost of petroleum is accounted for".
- 9.10 In the meantime, suppliers are focused on improving the production process.
- 9.11 In conclusion, there is a strong sense among the European fuel research community that synthetics and low carbon fuels have a viable future, not simply as an alternative to the battery electric option but a real competitor and not just for off-road machinery applications. The outcome for future heavy duty vehicle drive train technology looks very promising.

10. Chapter 17 the direction of policy for Aotearoa

- 10.1 In our response to this section our focus is on the policy applications to the road freight transport sector.
- 10.2 **Page 17: 17.3.1 transport,** In many respects our view on the general direction of policy applicable to freight transport decarbonisation opportunities have been captured in our comments above. The commentary from the CCC acknowledges the challenges in fostering change in personal mobility options and the desire for New Zealanders to be attached to their vehicles. The reason for this is often the investment value, as the car or vehicle represents the second biggest household investment after housing.
- 10.3 New Zealand is basically a low wage economy and motor vehicles have remained relatively expensive. The explanation of the challenges associated with housing density and urban planning are all valid, as are the comments relating to the mobility challenged, meaning those with disabilities.
- 10.4 The approaches and policies on page 19 are all aspects of policy that are likely to be part of the solutions approach however, not all are feasible. The rollout of broadband has been chaotic because the solutions are based on the lowest cost input, not the best solution. While working from home is appealing and possible for some, it's not applicable for a number of occupations especially revenue wealth generating occupations such as manufacturing and the services industry.
- 10.5 All the alternative working options seem to involve some level of financial support to ensure appeal for both employers and employees however, the financial burden for this approach must eventually fall somewhere.
- 10.6 If we move onto the prioritising accelerated electrification of light vehicles, that policy initiative has some well documented challenges (page 20) and will require a carefully crafted approach to achieve the signalled outcome. An associated problem is the lack of confidence in electric vehicle per se and until both the cost implications and range anxiety are resolved, the growth in the fleet may be limited. We suspect that not many users of EVs would be aware of the towing limitations of the present models and how quickly that would drain out the battery reducing useable range for any given charge. New Zealand is a country with a passion for towing boats, caravans, and trailers, and these tasks are far from ideal for the EV.
- 10.7 The challenges of the present charging infrastructure and environmental impacts of EV battery disposal are also acknowledged (page 21), but there is no mention of the environmental or exploitive impacts of producing the vehicles. This latter aspect has little appeal to

environmental advocates but we believe this rapid race to electrify New Zealand's vehicle fleet should not be at any cost.

- 10.8 Disappointingly, the policy options seem to run through a menu of controlled purchase objectives favouring EVs, broadly supported by subsidies and unconventional tax and charge incentives, removing business tax benefits for non EVs. The EV market should stand on its merits. Many of the initiatives are about removing consumer choice in support of the greater societal goal, which will no doubt have supporters. The problem is the benefits-based approach will not be free; someone, somewhere will be picking up the cost of this approach which once again brings into question how equitable some of these policy settings will be.
- 10.9 Page 26 covers increasing the use of low carbon fuels, given the limitations and performance challenges of BEVs to undertake the transport task as we know it. We have already acknowledged the low carbon fuel and synthetic fuel approach as more costly than diesel fuel, but if the international technology developments are successful, then new opportunities for drive train developments will present themselves.
- 10.10 The CCC's commentary (page 27) in regard to commercial trucks recognises the difficulties presented by this aspect of transport policy although in our view, the solutions are too heavily weighted toward rail being a solution. Once again the benefits-based incentive approach seems to be tool for Government to employ to re-adjust the market, but the details are far from settled - although page 27 refers to potential tax credits or grants.
- 10.11 On page 28, in Box 17.3 Low carbon fuel standards, the CCC alludes to the development of low carbon fuel standards, an initiative the freight transport sector would largely endorse. The other power source options, such as hydrogen (FCEVs) and heavy duty BEVs for heavy duty trucks, are far being bedded down or fit for open market heavy duty applications and are some way from being reliable alternatives to displace fossil fuels propulsion systems .

11. Summary of our key points

- The Road Transport Forum (RTF) supports the principle of reducing harmful emissions from road freight transport over time.
- The RTF recognises the considerable work done by He Pou a Rangi, the Climate Change Commission (CCC) in preparing this draft advice.
- We come from a unique standpoint in that solutions for decarbonising the heavy truck fleet are at this stage largely hypothetical.
- That is not to say the industry is not willing to find solutions and a number of road freight operators are trialling trucks powered by alternatives to fossil fuel. These are very much fact finding trials to see

how businesses will adapt to the possibility of less diesel trucks in their fleets over time.

- In this context, the speed of change to meet the climate change goals set out in the draft is dramatic and incredibly ambitious. We feel there has not been thorough risk, economic or geopolitical analysis.
- The fossil-fuel alternatives mooted come with pluses and minuses that need to be more explicit, particularly their impacts on the environment and human rights. There also needs to be consideration of the unique New Zealand context for road transport, including the road and rail funding models.
- The alternatives to conventional fossil fuels focus on electricity, green hydrogen and biofuels. However, taking that approach rules out advances in fuel engineering and internal combustion engines to some extent, implying that all liquid fuels are inherently bad. We believe more recognition needs to be given to synthetic fuels and to the fact that diesel engines already achieve a significant level of thermal efficiency, circa 45%. New advances in diesel engine technology and low GHG fuels hold considerable promise for the near future.
- The draft report says that: "Emissions must be reduced at pace while allowing the country to continue to grow"; and that any transition must be equitable. We are concerned that much of the advice strays from these principles.
- In a quest to lead the charge in climate change mitigations, we cannot do that at the expense of the businesses that contribute to our prosperity and the individual households that wear the costs of any pressures in the supply chain. In short, we cannot price ourselves off the global market while our competitors make no significant changes; or leave New Zealand without a viable food supply.
- Any policy settings should be framed around there being viable, affordable, safe, widely available alternatives to what is being phased out and that we are not merely swapping like for like when it comes to the environmental footprint of the replacements.
- Without trucks, food supply, industry and commerce in New Zealand would cease to be possible in today's form. Product distribution by commercial road vehicles has, over the past 100 years, resulted in a cost effective and almost unchallengeable service for household consumers and value adding producers alike. The reliability, flexibility and efficiency of road transport has, since the 1950s, largely displaced much of the rail terminal-to-terminal distribution service.
- The RTF believes the government should settle on setting the fuel specifications, not trying to predict or pick winners on the resource supply side especially when the end user service is as volatile and competitive as the transport services market.
- Going early and forcibly introducing unrefined truck technology won't lead to truck owner confidence and potentially could leave New Zealand transport operators with a legacy of worthless and unreliable vehicles.

12. Conclusion: The common goal approach to decarbonising transport

- 12.1 The CCC's transport objectives are heavily weighted to the BEV option for both light vehicles and commercial trucks. They acknowledge that the heavy-duty transport sector vehicle replacement will present challenges both in respect of the time lines to achieve the desired outcome, and the availability of technologically advanced vehicles and drive systems.
- 12.2 The RTF believes the vehicles and the fuel options put forward must be allowed to come to technical maturity and fit the settings of affordability, accessibility, reliability, safety, and meeting corporate profit-loss responsibilities.
- 12.3 Going early and forcibly introducing unrefined truck technology won't lead to truck owner confidence and potentially could leave New Zealand transport operators with a legacy of worthless and unreliable vehicles.
- 12.4 We seriously doubt the CCC's suggested time frame is achievable.
- 12.5 However, we are optimistic that to some extent carbon reduction in freight transport can be progressed especially when we view the new technologies on the horizon. The process of decarbonising transport will require what has been termed a blended approach; a combination of mechanical propulsion system improvements, electrification, and fuels with a lower environmental impact.
- 12.6 These don't need to be delivered in isolation. Even markets with a high share of electric and fuel cell vehicles will require synthetic fuels as part of the mix.
- 12.7 Increasing the provision of low-cost renewable electricity benefits both; it enables cheaper synthetic fuel production for combustion engine heavy-duty vehicles and older cars and vans, while also supporting further greenhouse gas reductions for plug-ins.
- 12.8 Sunfire, just one example of the new wave of energy producers www.sunfire.de/en/home takes a similar approach. Its electrolyzers are modular, scalable, and designed to reduce the reliance on fossil fuels to produce hydrogen. In turn, this offers a cheaper and greener feedstock for manufacturing hydrocarbons, including synthetic fuels; or it can be compressed and used in fuel cell electric vehicles. It also reduces fossil hydrogen reliance for the steam reforming of conventional gasoline, diesel and kerosene.
- 12.9 Heavy reliance on the BEV as the only policy option for all transport mode spectrums is short-changing better opportunities and it's positive to see the CCC's advice raise the flag on the blended solutions approach.

12.10 Unfortunately, the climate advocacy players have been captured by the one solution option, the BEV, and electrifying everything.

12.11 The future state options presented in the CCC's advice warrant a comprehensive cost impact analysis so the full impact of the various options on the country's economic capability can be gauged with a level of confidence. Otherwise the advice remains stranded from reality as simply a menu of desirable ideals.