

New Zealand Productivity Commission Inquiry into the Opportunities and Challenges of a Transition to a Lower Net Emissions Economy for New Zealand

Submission by

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Q1 How can the Commission add the most value in this inquiry?

A1.1 ***By examining, understanding, and reporting clearly on this history of New Zealand's attempts to reduce emissions.***

The government has been looking at this since at least 1992, when New Zealand became a party to the UNFCCC, and agreed, amongst other things, to “take the lead in addressing climate change,” and to stabilize our emissions at 1990 levels by 2000. Twenty-five years later, we are one of the worst performers in the developed world, and our mitigation mechanisms are an international joke. Unless we understand how this happened, we are unlikely to be able to correct it.

As the issues paper notes on page 40, we are in the midst of a tragedy of the commons. One possible explanation for our poor performance, that is consistent with the evidence, is that the New Zealand Government is a colluding player in this tragedy (or alternatively, is caught up in it at a higher level). Namely, they see an advantage to New Zealand in not reducing our emissions, so that we can pay no costs now, but can reap the benefits of other country's actions. Even better if they can convince other countries that we are acting in good faith, and convince enough New Zealanders that enough is being done and they won't have to pay anything for it. Perhaps this inquiry itself – the latest of many – is another part of this game.

The concepts of tragedy of the commons, the free rider problem, and collective action are well known to economists and to students of climate change. They are not well known in society at large and are not the language of government. My view is that they act as a prism through which all the questions raised in the issues paper can best be understood

and answered. Good outcomes in other areas that share these features, to greater or lesser degrees, have been successfully (if painstakingly) achieved. Examples are voting, taxes, vaccination, rubbish, labour laws, health & safety, and human rights. We need to add “emitting fossil carbon” (or converting atmospheric gases to more harmful ones) to this list.

A1.2 *By determining how New Zealand can move towards the centre of the OECD in its attitude to regulation and taxing of externalities.*

There are many tools available to reduce emissions. Many are noted in the issues paper, I will list some more in my submission, and many are in current use worldwide. A key object of the inquiry should be to understand why New Zealand has not wanted to implement them, and instead has enacted many policies that act to prevent any decrease in emissions (e.g. by cancelling plans for vehicle fuel efficiency standards, making the ETS into an international joke or cautionary tale, and re-allowing new fossil-fuelled power stations). We are an outlier in the OECD in our resistance to taxing or regulating externalities. Economists of all stripes, even libertarians, view the tragedy of the commons (identified as long ago as 1833, in William Lloyd’s rebuttal to Adam Smith) as a market failure that must be addressed (although their remedies differ).

Countries that are successfully reducing their emissions have done so by using many different charges and regulations simultaneously. I am sceptical that a single tool such as the ETS can ever be tweaked enough to produce good results. To take an extreme example, suppose that a carbon charge of \$200/t was introduced overnight. Dairy, sheep, and beef farming would collapse, while drivers would hardly change their behaviour as a result of the extra \$0.35/l on petrol – exactly the opposite outcome to what is wanted. Particularities of each sector (here, the trade exposure of agriculture and the non-rational behaviour of drivers) must be targeted¹.

A1.3 *By studying the relationship between MfE policy advice, the Government’s actions, and external expert advice.*

I have read the published speeches of successive Ministers for Climate Change over the past five years and I see no evidence of a genuine intent to reduce emissions. For example, most recently Paula Bennett has said, “Large parts of our [climate change] plan are already underway, and our target will be met through a combination of domestic emissions reductions, removals of greenhouse gas emissions in the atmosphere by forests, and international carbon markets.” In fact, there is no detailed domestic emission reduction plan (e.g. including reductions per year by sector), MfE has no published reports on the matter,

¹ Some economists might say that the drivers are rationally optimizing their personal utility – but that is merely to restate the tragedy of the commons in different terms.

and domestic emissions are not, in fact reducing. Only in the 2017 budget was MfE asked to study domestic emissions reductions, with a budget of \$1m/year. However, they have had a budget of \$12m/year for many years to measure emissions and provide climate change policy advice. That's a lot of advice.

New Zealand has a lot of international experts in all areas of climate change. But there is no mutual interaction between the Minister, the MfE policy advisers, the public, and our non-governmental experts. The government received 10,000 submissions on the 2030 INDC, some of them very long and detailed, from reputable bodies like the Royal Society of New Zealand; but it made no detailed reply to the arguments presented.

A1.4 ***By focusing on cumulative emissions.***

The paper mentions on pp. 5-7 that cumulative emissions of CO₂ are the important factor, not their flow rate. But the Government has never accepted that publically. This creates a false incentive for delay. A true accounting, including all emissions since 1990, makes it clear that any delay only makes it more difficult for us in the future.

The budget of 1000 Gt CO₂ (p. 7) remaining in 2011 amounts to 130 t per person. Not counting methane for now, New Zealand emits 9 t/person/year; thus our budget will be fully exhausted by 2025.

Following the science means shifting the focus of policy advice and public discussion to cumulative emissions. Annual emissions targets are a means, not an end.

Consider the analogy with deficit (annual emissions) and debt (cumulative emissions). A household is struggling with annual deficits and constantly increasing debt. They claim to have a focus on deficit reduction (amongst their many other household goals).

Unfortunately, they are operating under the mistaken belief that their debt is being wiped at the end of every year. This makes it much harder for any deficit reduction efforts to be taken seriously by the family members.

A1.5 ***By focusing on mechanisms that achieve short-term as well as long-term reductions.***

At present we have longer-term goals (2030, 2050) but have seen no actual reductions.

Ask: how are we going to cut emissions by 2.5% ***this year?*** By 7.5% ***in three years?*** There are three reasons why this is important. First, emissions are cumulative; so reductions made

this year have greater cumulative effect than reductions made later. Second, we have to act as if we will in fact reduce global emissions enough; for this, the next decade or two are critical. Third, distant goals without short-term intermediaries can function as a delaying tactic.

What we have agreed to in the Paris Agreement is much stronger than described in the issues paper. All countries have agreed to reach zero net emissions in the second half of the 21st century, and that this will take longer for developing countries (Art. 4.1). As I read it, we have therefore already agreed to reach zero net emissions soon after 2050. That requires net reductions of 2.5% per year.

A1.6 *By addressing the questions of population growth and industrial policy.*

The issues paper does mention the relevance of population and economic growth, but only in passing. None of the questions seem to be relevant to it, so I include it here. The Kaya identity decomposes CO₂ output into population growth, GDP per capita, energy use per GDP, and CO₂ per unit of energy. CO₂ growth is then the sum of the growth rates of each of the four terms. New Zealand's population growth over the past 5 years has been 1.7%/year, well above the world average of 1.1%. It's projected to be 1.8% for the next few years. Real GDP growth per capita has averaged 1.2%/year. This total growth of 2.9%/year has to be offset from the other two remaining terms. Energy use per GDP has been declining by 1%/year for hundreds of years, and we can expect some further gains here as we switch away from the low efficiency of internal combustion engines. The main gains have to come from decarbonizing the energy sector. This means concentrating all future economic growth in low-emission sectors, and probably also moving away from high-emission sectors entirely.

Q2 Chapter 3 of this issues paper mostly looks at ways to reduce emissions directly at their source. What other approaches would help identify opportunities to effectively reduce emissions?

A2 *Industrial policy (including research funding) affects whether economic growth is focussed on high intensity or low intensity sectors.*

Q3 To what extent is it technically and economically feasible to reliably measure biological emissions at a farm level?

A3 *It doesn't have to be that reliable. It would be enough to classify each farm as low, medium, or high emissions based on a points system.*

Q4 What are the main opportunities and barriers to reducing emissions in agriculture?

A4.1 **Barrier: Trade exposure**

This is the biggie. All analysis of New Zealand's agriculture emissions falters when running into the size of the sector (\$20b last year). It is an obstacle, for sure. But it should not be seen as an insuperable obstacle. It should be viewed in the context of global emissions. Most countries have some valuable, high-emission industries, whose profits could be affected by reducing emissions (e.g. fossil fuel exporting countries). It has to be tackled head on. The commission should look at all ways in which emissions of trade-exposed industries have been addressed so far. The issue is just the tragedy of the commons again, at an international level. Some mechanisms are:

A4.1.1 **A discount based on trade exposure and ability to reduce emissions.** Sweden originally gave all industry a 75% discount on their (very stiff) carbon tax, although this has since been reduced.

A4.1.2 **Each trade-exposed industry to prepare a global action plan, through their appropriate international organization.** Some industries, like cement and air travel, are already doing this.

A4.1.3 **Border adjustment tariffs.** This seems the best bet globally. Suppose China has a carbon tax of \$0; NZ \$25; and US \$75. NZ dairy farmers are charged \$25/t. If they export to China, they get a rebate of \$25/t. If they export to the US, the US collects a border adjustment of \$50 (= \$75-\$25). Such source-neutral, producer-neutral tariffs are allowed under international trade rules and produce the right balance of incentives for producers and consumers.

A4.1.4 **Climate clubs.** While envisioned by William Nordhaus as an incremental approach to avoid free riding, they could also be approached in even smaller steps, by sector. I have to say even this brilliant idea presents unique problems in the case of dairy. New Zealand is the world's largest exporter, but we produce a tiny share of the world's dairy emissions. Who would join us in a club and for what benefits? On the other hand, we have to move at least fast enough to avoid being shut out of someone else's club. Perhaps, by virtue of our position in world dairy trade, we can at least get other countries to come to the table.

A4.2 **Barrier: Political influence of the farming lobby.** I could add that this is not helped by a constant stream of misinformation in the farming press.

A4.3 **Barrier: research funding.** Funding for the NZGGARC and GRA (\$11m/year) is woefully inadequate compared to the size of the industry (\$20b revenue, 40Mt emissions ~ \$1b carbon equivalent).

A4.4 **Opportunity: Internal revenue-neutral charges within each industry.** For example, suppose 20% of Fonterra's payout were an 'environmental dividend' based on a points system involving emissions, nitrogen runoff etc. Over time this would tend to improve overall environmental practice. Farmers are already able to buy lower-emission cows, but they have no incentive to do so.

A4.5 **Opportunity: Consumer labelling of GHG emissions on food packaging.**

Q5 What are the issues for government to consider in encouraging alternative low-emissions land uses?

A5 **How it has been encouraging growth of high-emission agriculture, e.g. through funding irrigation to support dairy conversions.**

Q6 What are the main barriers to sequestering carbon in forests in New Zealand?

A6.1 **Tinkering with the ETS. Lack of a rising floor to the carbon price. Lack of a cap in ETS.**

A6.2 **Pitifully inadequate responses.** E.g. 3000 ha annually planted under the AGS (which doesn't really cost anything, it's just an advance of the first 10 years of ETS credits), c.f. 55000 ha planted annually in the 1980s, c.f. a need to plant more like 1-2m ha. This would sequester 8-16Mt of CO₂ per year, offsetting 20-40% of current agricultural emissions (i.e., still not enough).

Q7 What policies, including adjustments to the New Zealand Emissions Trading Scheme, will encourage more sequestering of carbon in forests?

A7.1 **Government buying large areas of marginal farmland to regenerate to bush.**

A7.2 **Emitters, e.g. dairy farmers, directly sequestering carbon.** (Then they could pick up the environmental dividend, or consumer packaging dividend, discussed above.)

I would add that forest sequestration cannot shift our main focus away from gross emissions. Current mitigation efforts, though ineffectual, have been too focussed on sequestration. At best it can buy us a couple of decades; eventually the sources need to be cut as well, as we will run out of land.

Q8 What are the main barriers to the uptake of electric vehicles in New Zealand?

The discussion in Figure 12 is not a fair reflection of the actual state as of 2017, yet alone the near future.

- EVs do not have similar road performance to an ICV, they are generally superior, being quieter, smoother, with greater acceleration and better handling. All EVs drivers agree and I have never read an opinion to the contrary. A basic EV like a 3-year-old Nissan Leaf drives better than a luxury ICV costing four times as much.

- "EV slower to recharge than an ICV" - many see charging as a strength, rather than a weakness, as it takes seconds to plug in at home and you don't have to visit a petrol station.

- "disposal of batteries" - everything is going to be electrified and EV batteries will have a valuable second reuse before being recycled. Lifecycle analysis puts the impact of an EV far below an ICV, including disposal.

- "currently more expensive" - not really. You would need to study the price distribution of actual new and used imports. Most EV purchasers have found that their car cost the same or less than the ICV they might have bought instead.

Another major strength of EVs is that the money currently spent on fuel mostly goes overseas. We spend \$5b/year on importing fuel. Each 20% of this that is removed by electrification not only saves \$0.8b a year net, but the fuel costs would now be spent in New Zealand. Switching away from imported fossil fuels will have a huge beneficial effect on our current account.

In the long run, everything is going to be electrified. The sooner we start, the more our total benefits.

Another strength is that EVs are expected to last longer and require less maintenance. A friend has just completed 5 years and 100,000km in a Nissan Leaf, the only maintenance cost being six new tyres.

Another strength is that buying an EV is one of the few actions an individual can take that substantially reduces their personal emissions while enhancing their material standard of living. Incentivising EVs taps into a vast pool of private investment money that is already being spent – \$505m spent on importing cars in June 2017 alone. In the past 12 months NZ imported 300,000 light ICVs. We love spending a lot of money on cars.

A8.1 *The main current barrier is lack of public knowledge, public inertia, and lack of incentives compared to other countries.*

A8.2 *The cost of petrol/diesel is insufficient to bring about change.* Even compared to other countries it is very cheap. The ETS component, currently 4c/l, is not going to affect anyone's behaviour. Even if the ETS price of carbon rises to \$100/t, which seems unlikely in the near term, adding an extra 12c/l is not going to be enough. Because individuals do not make their decisions based on rational economics, a single carbon price throughout the economy will not lead to the best decisions being made overall.

A8.3 *Constant advertising of SUVs and pickups on TV, none of EVs.*

A8.4 *It seems strange that a Renault Zoe costs \$70K new from a dealer, when it can be parallel imported new and sold for \$40K.*

Q9 What policies would best encourage the uptake of electric vehicles in New Zealand?

A9.1 *A fleet emission standard.*

A9.2 *Progressively increasing registration charge based on emissions.*

A9.3 *Massively faster rollout of charging infrastructure.*

A9.4 *Progressively increasing petrol/diesel tax.*

A9.5 *Consumer information*, e.g. at petrol stations, information such as (sourced from a climate activist website) "This vehicle emits known carcinogens and you may be killing your neighbours by its continued operation"; "This vehicle emits gasses known to be damaging to the long term stability of the climate, estimated to cause trillions of dollars in damages, especially impacting at risk populations such as minorities and the poor"; "The product you

are dispensing is directly responsible for major wars and terrorist attacks". It may seem farfetched, but the public has become accepting of analogous warnings on cigarettes.

In rough terms we can measure the size of each sector by its financial size (\$10b in cars + fuel) and emissions (16Mt = \$0.4b at \$25/t). The societal response in each sector should be proportional in some way to its size and to the cost-effectiveness of reductions in each sector. In light vehicles we have a very large sector, with very large emissions, which is at the same time one of the most cost-effective areas in which to reduce emissions while achieving amazing co-benefits. Putting this all together, we should be putting something like \$100m/year into electrification of light vehicles through incentives, charges etc.

Q10 In addition to encouraging the use of electric vehicles, what are the main opportunities and barriers to reducing emissions in transport?

A10.1 **Barrier: Lack of an integrated national transport strategy (active/public/private)**

A10.2 **Barrier: Lack of an integrated national freight strategy (truck/train/sea)**

A10.3 **Barrier: Lack of vehicle emissions standards.**

In particular, the cabinet decision of August 2009 not to proceed with vehicle fuel efficiency standards has been disastrous. (It has not, as far as I can tell, been officially reviewed.)

Since 2009 the CO₂ emissions of light vehicles registered has only fallen from 195 to 180g/km². In the UK, where a whole suite of policies has been in place in this area, emissions fell from 185g in 2000, to 150g in 2009, to 122g in 2015. The EU target for 2020 is 95g/km. The arguments presented in the cabinet paper (<http://www.transport.govt.nz/assets/Uploads/Our-Work/Documents/Vehicle-Fuel-Economy-Standard-Cabinet-Minute.pdf>), wishful thinking at best, can easily now be seen to be false. Another government initiative, on fuel efficiency of heavy vehicles, launched in 2012, was reported in January 2017 to be effectively dead, having saved about 0.03% of transport emissions in 3 years.

A10.4 **Barrier: RUCs.** This system is going to have to be reformed sooner or later. At present, if EVs came into RUCs at the same rate as light diesel cars, they would be paying 6.2c/km. A Toyota Prius C, fuelled entirely by petrol, uses 0.03l/km and pays only 2c/km in fuel excise taxes and 0.12c/km in the ETS. The EV emits 0.015 kg/km CO₂, the Prius 0.07

² Iain McGlinchy, from the Ministry of Transport, says that even this decline is illusory, and actual real-world fuel efficiency has remained constant at 10l/100km (or 236g CO₂/km) for many years.
<http://greaterakl.wpengine.com/wp-content/uploads/2014/12/2014-vehicle-fleet-for-Fuels-Conference-28-Oct-2014.pptx>

kg/km. Clearly, the system does not add up. I think the government realises this, as they originally announced that there would be no RUCs for EVs until they made up 2% of the fleet; but what was actually enacted was a simple extension to the end of 2021.

One large area of transport, not mentioned at all in the issues paper, is aviation. Aviation emissions are 2.7Mt/year and growing (as are global aviation emissions). In their submission to the ETS review, Air New Zealand argued that they were fully on board, but had already achieved most of the available reductions. This is not quite true, even though Air New Zealand are a leader in this area. International emissions are not part of any national or international taxation system. All domestic air travel could switch from jets to turboprops, which have 50% lower emissions, with the prospect of further reductions in future.

More broadly, our whole tourist industry – now the country's largest – is based on long-distance air travel, which is extremely high emission. (Remember, emissions of incoming flights are not even counted in the above total.) Like dairy, we have chosen to invest heavily in high-emission areas. There is no easy fix for this, but we can start by admitting it. Instead, we lobbied the UK to **remove** their long-haul carbon tax (which they did). Air freight is another large sector. It would be interesting to know how much of this is essential for the economy, and how much is just for convenience (buying a book from the UK at 10kg CO₂ per kg of book, or getting used to 'free' 7-day delivery from anywhere in the world).

A10.5 **Barrier: size, status, and emissions profile of the tourist industry.**

A10.6 **Opportunity: encourage fewer, longer-stay tourists.**

A10.7 **Opportunity: charge GST on all imported goods.**

Q11 What are the main opportunities and barriers to reducing emissions from the use of fossil fuels to generate energy in manufacturing?

A11 **Malfunctioning ETS.** The price of carbon would not have to be very high to make Fonterra dry milk with woodchips instead of coal. Some analyses say woodchips can be even cheaper than coal, if there is infrastructure in place and the chips are sourced close enough to where they are used. Likewise, if gas was just a tiny bit more expensive, industry would switch to other heat sources, whose cost would in turn fall through economies of scale.

Electricity

The figures on page 27 are wrong. In 2015 emissions were about 1Mt from burning coal for electricity, and 3Mt from burning gas, not the other way around (see <http://www.mfe.govt.nz/node/23304/>). The figures in the issues paper make gas look five times cleaner than it really is. It is not a low-emission fuel: its emissions are 50% those of the dirtiest fuel, coal. In addition, there were 0.7Mt of emissions from geothermal electricity generation not mentioned in the paper. Altogether, these 4.7Mt are a significant part of our CO₂ emissions, and are perhaps the easiest and most cost-effective part to get rid of, even easier than cutting 4.7Mt from land transport.

The issues paper mentions that two gas plants closed in 2015, but not that two opened in 2011 and 2012 (total 300MW), with an additional 100MW under construction and consent granted in May for a 360MW plant in Otorohanga (even as peakers, their GHG output will be considerable - about 0.33Mt/yr if used 10% of the time)³. Genesis is considering building another one in Huntly. To reduce our emissions, it is essential to stop investing in expensive, long-lived, high-emission infrastructure.

Q12 What changes will be required to New Zealand's regulatory, institutional and infrastructural arrangements for the electricity market, to facilitate greater reliance on renewable sources of energy across the economy?

A12.1 *Firm, rather than aspirational, targets, with mechanisms to achieve them.*

A12.2 *Central funding of innovative projects*, such as the tidal turbines (cancelled because of uncertainty over electricity policy) and pumped hydro storage at The Neck (great environmental co-benefits, and potential to scale later).

A12.3 *Minimum solar feed-in tariffs*. Even better would be higher tariffs, to be wound down over a pre-agreed time frame. Like EVs, this taps into a new source of funding.

There are regulatory failures throughout the New Zealand electricity system, which is perhaps not surprising since it is much less heavily regulated than is typical in OECD countries. Some examples would be the rise in consumer prices, the risk of failure of the DC link not properly addressed, the risk of a dry year not properly addressed, and unreliable lines in many rural areas. Residents of Chatham and Stewart islands pay 4x the price for electricity, with 10x the emissions, compared to mainlanders. For Stewart Island, 10 years of studies into renewable energy have come to nothing; for Chatham, the two wind turbines (that once provided 35% of the island's electricity) are now mothballed.

³ According to <https://www.trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2015-ContactEnergyStratfordPowerStation.pdf>, the 200MW Stratford peaker plant emitted 240,000t CO₂ in the 2014-15 year, implying that it was running 27% of the time.

Q13 What evidence is there on the possible physical effects of future climate change on sources of renewable energy in New Zealand, such as wind, solar and hydro power?

Q14 Apart from the regulation and operation of the electricity market, what are the main opportunities and barriers to reducing emissions in electricity generation?

A14.1 **Public awareness.** Few people know that Genesis Energy burns coal; even their salespeople who ring me up at dinner time deny it and blame Meridian! Monthly electricity statements should report the emissions of the parent company.

A14.2 **Woeful underfunding of EECA,** and lack of focus on emissions. For many years they were apparently forbidden to mention climate change on their website; perhaps they still are, although they do now talk about “carbon reduction”. Still, the emissions reductions achieved through the actions of EECA are minute compared to what is required.

A14.3 **Policies of generators.** The generators have no plans to phase out fossil fuels, or even reduce emissions. Just this morning (23.08.18) the CEO of Genesis said that their priority is adding more dual fuel customers – i.e., selling more gas and more coal-fired electricity. They even imported coal from Indonesia this year.

Q15 What are the main opportunities and barriers to reducing emissions in industrial processes (such as the production of steel, aluminium and cement) and in product use (such as the use of hydrofluorocarbons in refrigeration and air conditioning equipment)?

A15 **Best dealt with through mechanisms for trade-exposed industries, see above.**

I'm not an expert on this, but aluminium is an interesting example to look at. To produce 1kg of aluminium requires 1.8 kg CO₂ and 14 kWh of electricity. That's another 14 kg CO₂ if using coal, or 0 kg for Tiwai Point. Even a small carbon tax would wipe out coal-fired aluminium. Another way of looking at it – Iceland has 5 aluminium smelters, 1/13 of our population, and still has lower per capita emissions. On the other hand, world aluminium production is growing very rapidly and most of the new production uses coal.

I found Box 4 on page 27 interesting. The government is willing to pay a private company \$18.6m to reduce emissions by 13000 tonnes a year, or \$1430/tonne. Fantastic! Imagine what this kind of investment would achieve if applied uniformly across the economy.

Q16 What policies and initiatives would best promote the design and use of buildings that produce low greenhouse gas emissions?

A16.1 **A higher price on carbon.** This will stop people building buildings heated by coal and gas pretty quickly.

A16.2 **Support infrastructure for woodchip space heating.**

A16.3 **One tiny, tiny thing: stop selling coal in supermarkets.**

Q17 What are the main opportunities and barriers to reducing emissions in waste?

A17 **Barrier: Government inaction.** Waste is a huge issue that deserves an inquiry of its own. Ultimately, all products should include all of their ultimate life-cycle costs. This is the philosophy of the EU e-waste strategy. But look how things work here on even a relatively tiny issue like supermarket shopping bags.

Q18 Policies to lower emissions from particular sources, technologies and processes can have interactions with emission sources in other parts of the economy. What are the most important interactions to consider for a transition to a low emission economy?

A18 **The fossil fuel industry itself.** It emits 1.3 Mt through refining and 0.7 Mt through venting and flaring gas, in addition to the emissions caused by burning their products. To our 16Mt of transport emissions should be added another 4Mt emitted by mining, refining, and transporting the fuel (much of which is emitted overseas). The current New Zealand energy strategy states that "Continuing world demand for oil and gas provides New Zealand with a major economic opportunity to expand oil and gas exports." What would do that for the emissions of this sector?

"There is no viable alternative to coal, I mean we realize it's a transition fuel, but there's a lot of businesses, dairy, food manufacturing, ... that rely on coal be a reliable, storable source of energy... Coal will still have a place to play in the next 15 years plus." - Bathurst Resources CEO Richard Tacon RNZ 4 September

So, in addition to planning to stop using fossil fuels, we should consider how best to deal with the fossil fuel industry itself.

Q19 What type of direct regulation would best help New Zealand transition to a low-emissions economy?

A19 **Product labelling.**

Q20 Acknowledging the current review, what changes to the New Zealand Emissions Trading Scheme are needed if it is to play an important part of New Zealand's transition to a low-emissions future?

A20 **A cap and a rising floor price.** But I don't think it is possible for it to play a very important part.

Q21 What type of market-based instruments would best help New Zealand transition to a low-emissions economy?

Q22 What type of support for innovation and technology would best help New Zealand transition to a low-emissions economy?

Q23 How can New Zealand harness the power of financial institutions to support a low-emissions transition?

Q24 What type of alternative approaches (such as voluntary agreements or support for green infrastructure) would best help New Zealand transition to a low-emissions economy?

After reading the discussion in the issues paper on these questions, I want to repeat my point that the main stumbling block is not a lack of tools to reduce emissions, or deciding which ones to use. There is a vast literature on these and mountains of evidence from successful emission reductions overseas. Many of them have negative net cost and hardly any gross costs. For example, one 'nudge' is to allow only daily parking charges (not monthly or annual – this is easy to implement with electronic cards), and to require companies to allow employees to cash out any parking benefits provided.

The main stumbling block is that the government has not wanted to deploy any of the known, tested tools enough to actually reduce emissions.

A24 **Intended Sectorally Determined Contributions** (echoing Paris's INDCs). Each sector of the economy (the sectors to total 100%) indicates their contribution for each four-year period and how they are to be achieved. If the contributions aren't enough, then the regulatory tools can be strengthened. ISDCs should be even more effective than INDCs as international cooperation is the most difficult part of the whole 'tragedy of the commons' situation.

Q25 In addition to “core” climate policies and institutions, what other changes to policy settings or institutional frameworks are required to effectively transition New Zealand to a low-emissions economy?

A25 ***Handing control over carbon budgets to parliament seems to have worked well for the UK, and depoliticized the issue to some degree.***

Q26 What are the main uncertainties affecting New Zealand businesses and households in considering investments relevant to a low-emissions future? What policies and institutions would provide greater confidence for investors?

Q27 What approaches, such as regulatory frameworks or policy settings, would help embed wide support among New Zealanders for effective reduction of domestic greenhouse gas emissions?

A27 ***Leadership.***

The study “Elite cues, media coverage, and public concern: an integrated path analysis of public opinion on climate change, 2001–2013”, J T Carmichael & R J Brulle, *Environmental Politics*, 26:2, 232-252 (2017), found that “elite cues” (i.e., political leadership) had the strongest effect on public concern about climate change. Advocacy (e.g. by environmental groups) had a moderate effect. Extreme weather events and the state of the economy had weak effects. Availability of scientific information had no effect. These effects act both directly on the public and via the media.

Another relevant study is Jan Sinclair, “Entertaining Facts: what the news media do with expert information about environmental risks”, PhD thesis, University of Auckland 2013. She reviews how the media reports on climate change (poorly) and the interactions (unsatisfactory) between scientists, media, and politicians.

It’s a complex area. I suspect that the ideas of Professor Jonathan Boston (VUW) on how to avoid presentist bias may be useful, as will the international trend for evidence-based policy which is starting to make inroads into New Zealand.

Q28 Is New Zealand’s current statutory framework to deal with climate change adequate? What other types of legislation might be needed to effectively transition towards a low-emissions economy?

A28 ***Feedback from emissions to policies.*** In addition to my answers to question 1, which are relevant here, we have a problem in that the feedback from the results of the policies is extremely weak. The ETS has been reviewed, several times, but this takes a long time and

has not achieved emissions reductions. Other areas have not been reviewed in light of events. Each mechanism should include a reduction target and a seamless process for adjustment in light of observed reductions.

Q29 Does New Zealand need an independent body to oversee New Zealand's domestic and international climate change commitments? What overseas examples offer useful models for New Zealand to consider?

Q30 How can adaptability best be incorporated into the system supporting New Zealand's low-emissions transition?

Q31 What types of analysis and underlying data would add the greatest value to this inquiry?

Q32 What should be the mix, and relative importance of, different policy approaches (such as emissions pricing, R&D support, or direct regulation) in order to transition to a low-emissions economy?

Q33 What are the main co-benefits of policies to support a low-emissions transition in New Zealand? How should they be valued and incorporated into decision making?

A33 *Keep your eye on the ball.*

The ball is reducing emissions. A price on carbon, as used here and in the issues paper, is just one nominal way of approaching the issue. In reality, the full impacts, such as the possible loss of most large coastal cities (some thousands of years old), mass extinction, industrial collapse, widespread unrest and de-population of areas, cannot be priced. Already 25% of the Great Barrier Reef has died, and the rest is likely to die in future decades. Pricing that is beside the point. Co-benefits like fewer deaths from particulate emissions, or New Zealand becoming admired around the world for our amazing energy transition, are beside the point too.

The 'best' price on carbon is not the one that matches the total future damage it causes. That is impossible to estimate reliably in any event. If the expected future damage were infinite, we would still want to decarbonize at the best price. The appropriate price for a sector is determined by the propensity of that sector to decarbonize, the ensuing effects on the New Zealand economy, the effect on the world economy, and the effect on world GHG emissions. At the present time, the right price for cars is much higher than the right price for dairy.

Q34 Who are the most important players in driving forward New Zealand's transition to a low-emissions economy?

Our performance is derisory. So I would rephrase this as

Q34b. Who should be the most important players in driving forward the world's transition to a low-emissions economy?

A34b. ***Everyone. But some more than others.***

The oft-quoted figure that NZ's emissions are only a small part of the world total (see e.g. page 11, and several statements by our Ministers of Climate Change) reveals a fundamental point that requires a shift in the public's perspective. The point is that this is a collective problem. Any one tonne of CO₂ doesn't matter, but collectively they do matter. We are no stranger to collective issues. Any one vote doesn't matter, but collectively they do matter. Losing one dollar doesn't matter, losing them all does. Normally, we address this aspect sensibly: no politician would tell the 5000 sick residents of Havelock North that they are "only 0.1% of New Zealand's population".

So I would start from a position that every tonne of CO₂, and every person, is created equal, and then adjust them as follows:

1. NZ's 4.7m people have a greater-than-average responsibility to reduce emissions, because they are so large;
2. and because we are a wealthy, developed country with more ability to adapt;
3. and because we have world-leading renewable energy resources per capita;
4. and because our historical emissions are high;
5. and because we form a nation state (unlike some other groups of 4.7m people), so can act collectively more easily, and influence other nation states out of proportion to our population.

Within New Zealand, I would start from the position that every individual, family, business, institution, and government body has a responsibility to act collectively. Having said that, there are many required actions that can only be taken by the large emission sectors and the government working together. (For example, only the government can arrange international treaties on border adjustments.)

Q35 What measures should exist (and at what scale and duration) to support businesses and households who have limited ability to avoid serious losses as a result of New Zealand's transition to a low-emissions economy?

A35 This comes up a lot. I view it as a ***distraction fallacy.***

In the long run, we all have a limited ability to avoid serious losses. Poor people will inevitably be impacted more than rich people by climate change, so they will benefit more from mitigation. Transition effects are relatively tiny and may be positive or negative (walking to catch an electric bus is healthier and cheaper for you). In any event, they are tiny compared to existing unequal impacts of e.g. the housing crisis. The 300,000 people

who bought newly imported cars last year are already disadvantaged financially, as well as imposing costs on others. As for businesses, there is no way that fossil fuel industries can avoid serious losses – their entire business needs to close. They can be compensated, but that just moves the loss somewhere else. They know that and are understandably fighting delaying actions. The best way for them to avoid losses is to acknowledge reality and start planning for it.

Q36 What are the essential components of an effective emissions-mitigation strategy for New Zealand that will also be economically and politically sustainable?

A36 *The economic benefits of the first 20% of CO₂ reduction, by decarbonizing electricity and moving to EVs, are so enormous that once they get seriously underway they will have widespread support.* This has already been observed in other countries.

Q37 Should New Zealand adopt the two baskets approach? If so, how should it influence New Zealand's emissions reductions policies and long-term vision for the future?

A37 *Yes, at least internally and in the short term.* But it would be risky to push too hard for it internationally as it makes us look protectionist. True, milk and beef are food, but they are very high-carbon foods. We need to be some part of the world's solution for lower-carbon food.

Q38 How should the issue of emissions leakage influence New Zealand's strategy in transitioning to a low-emissions economy?

A38 *See A4.1 (trade-exposed industries).* It may be premature to worry about this; at present we are transitioning to a high-emissions economy, and have, in addition, been party to a huge international fraud in carbon trading. It's a bit rich for us to worry now about leakage!

Q39 What do you see as the main benefits and opportunities to New Zealand from a transition to a low-emissions economy?

A39 *Working with the rest of the world to avoid the most catastrophic impacts of climate change such as mass extinction and industrial collapse.* Minor immediate benefits include saving money – especially foreign exchange – and cleaner air.

Q40 What does your long-term vision for a low-emissions economy look like? Could a shared vision for New Zealand be created, and if so, how?

A40 *What a great question!*

Here is my vision for New Zealand in 2050. The vision includes moving steadily along the path over the next 33 years: moving 3% of the way every year.

New Zealand is carbon neutral. Emissions have declined from 40Mt to 4Mt CO₂, and from 40Mt to 20Mt of agricultural emissions, these being offset by 3m ha of new planting, half in new native forest.

Economic growth has been concentrated in low-emission knowledge industries, including high-tech manufacturing using renewable energy – the dream of the late Sir Paul Callaghan. However, the agricultural economy has grown too: we now have 30% fewer cows emitting 50% less GHG, but total production is only down slightly and the total value of exports has doubled, due to value added processing. Another high-emission industry, tourism, has changed too, with 50% fewer tourists each year staying 3x longer on average.

In transport, we have achieved mode shares of 40% walking/cycling, 20% public transport, 20% private cars, and 20% shared cars. Freight is carried on electric trains, electric trucks, and coastal ships.

Population has stabilized at 6m.

Electricity production has doubled, the new supply being wind and solar, with some tidal power. Coal plants were closed in 2017 and gas plants by 2025, and the highest-emitting geothermal plants soon after. Pumped hydro and batteries stabilize the grid.

No native birds have gone extinct since 2020 and all species have populations of at least 1000. Large areas of New Zealand, such as Stewart Island and Coromandel, are predator free. Indigenous biodiversity is coping well with the extra challenge of climate change, thanks to healthy ecosystems.

A few surprises on the down side, including 1m of sea level rise to the rapid collapse of the West Antarctic Ice Sheet, and rapid deterioration of the weather due to the warming Tasman Sea and the shift in the East Australian Current, were coped with admirably due to the resilient nature of our society; planning for the expected extra 3m of sea level rise by 2100 and 7m by 2200 is already well underway. [4m by 2100 is at present thought to be possible under business as usual, but a low risk – somewhere in the 5% range. Longer

term, at 2 degrees of warming, Greenland and West Antarctica will melt and add at least 10m to sea level.]

To return to 2017, at Auckland Airport there is a moving inscription taken from Tennyson's poem ***Locksley Hall***:

*For I dipt into the future, far as human eye could see,
Saw the Vision of the world, and all the wonder that would be
Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight dropping down with costly bales*

These lines were written by a 25-year-old Tennyson in 1835. His vision extended 150 years into the future, and turned out to be correct – although with some unintended consequences. I cannot try to replicate Tennyson's prescience. Anything might happen: organic solar cells might become as cheap as newsprint, unleashing terrific economic growth and making “sunlight-to-liquid fuels” economic. Positive carbon feedbacks from the oceans, forests, and arctic methane might overwhelm our mitigation efforts. Climate sensitivity – notoriously ill-constrained – might surprise us on the high side. Is the computer revolution just beginning, or has the low-hanging fruit been picked? Will artificial intelligence, robots, and the internet of things make society more resilient, or more fragile? What parts of the natural world will survive climate change and the attempted sustainability transition?

I don't know the answers to these questions, but I hope to live long enough to find out, and to do what I can to shape our future direction.

Robert McLachlan