

The Climate Change Commission's Final report: A response

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Dr. Carr presents the Climate Change Commission's final report

The Climate Change Commission's Final report: A response

Introduction

In June 2021 the Climate Change Commission released its lengthy (over 400 pages) final report. When the Commission released its much more lengthy draft reports it said that they were open to alternative views and there were many references to submitters points in the final report. But it was a distinctly one-sided affair. There was plenty of space for those wanting a more 'ambitious' response, but not many comments critical of the Commission's work made the cut. Arguments that the Commission may have misrepresented some of the evidence and fiddled some analytics to get the 'right' results were simply ignored.

As one of the submitters who was critical of some of the Commission's analytics we think it appropriate to respond, particularly as the Commission has doubled down with some more egregiously misleading arguments.¹

To be clear, we do not disagree with the net zero objective, and on the big picture of the future for electric vehicles we substantially agree with many the Commission's assessments. Where we part company is on the Commission's claim that fundamental changes in the way all New Zealander's live and work is somehow essential to meeting the net zero target. That is simply not true. New Zealand can reach net zero at only a moderate cost, almost without the government doing much more than operating the Emissions Trading Scheme (ETS) and getting some institutional structures right. Taking the Commission's path could generate substantial and unnecessary social and economic costs.

We strongly disagree with the Commission's position on the role of exotic and native forests. The Commission has sold a switch from exotic to native forests by blatantly misrepresenting the facts.

¹ It is not that the Commission simply failed to read our submission, because there was an immediate response when it was released. The Chief Executive's brother Shaun Hendy let loose with a string of personally abusive tweets in a twitter exchange on our submission.

In this response we have focused on the analytical support for the Commission's claim that key policy recommendations including:

- a subsidy for electric vehicles;
- a ban on electric cars somewhere between 2030 and 2035;
- an enhanced role for biofuels;
- a more 'ambitious' approach to transport mode switching.

will generate substantial net benefits.

We also revisit the Commission's arguments for intervening in the EV market and discuss three interrelated issues:

- The Commission's response to the argument that it should have focused more on meeting the 2050 target at least cost.
- Removal of exotic forests from the ETS from 2035.
- Intergenerational equity.

Points of agreement and disagreement

We agree with the Commission's view on electric cars. The electric car revolution is coming and new cars will be overwhelming the vehicle of choice by the mid 2030s because they will be better and possibly cheaper than an equivalently priced internal combustion engine (ICE) vehicle.

Where we part company is that we think that this changes the ball game significantly. The big decarbonisation gains can be made at little or no cost, if we use forest offsets to stretch out the transition. There is little point in pursuing a range of other costly options to little ultimate effect.

The Commission, on the other hand, almost ignores the road transport energy transformation and proceeds as if all the other possible policy interventions are still, somehow, essential. It positively dislikes the idea that forest offsets can efficiently spread the impact of the emissions reduction process over a longer time horizon.

Key findings

Claim that policies will provide benefits equivalent to 2.3 percent of GDP appears to be fabricated

The Commission claimed that ‘delaying key actions like the move to EVs and embedding more efficient farm practices could result in the level of GDP in 2050 falling by around 2.3%’. The 2.3 % cost appears to be a madeup number. We found no clear evidence to support it in the report.

Little evidence of substantial co-benefits from the policies

The Commission implies that the co-benefits from its policies will amount to billions per year. Our assessment of the Commission’s supporting evidence suggests that the benefits will at best be a few tens of millions.

Commission misrepresented the impact of its transport recommendations

There will be economic benefits as electric vehicles get cheaper and more capable. However the Commission misleadingly ascribed these gains to its policy interventions, rather than the technical changes and market forces that will drive electric vehicle prices down.

Electric vehicle subsidy will have no perceptible impact on the 2050 net emissions target

The subsidy will encourage a moderate early increase in the EV uptake, but by 2050 nearly all of those vehicles will have been scrapped.

Commission misrepresented the role and impact of native forests

The Commission sold the switch from exotic to native forests by implying that this would provide a substantial resource for future generations to offset their ‘hard to abate’ emissions. It did not explain that after 50 years natives will only abate about one tonne of carbon per hectare. A permanent exotic forest will abate 26 tonnes at the same age. Future generations will have to service the debt on an expensive (\$5-15 billion) project that will make only a minor contribution to future emission abatements.

Advice not solidly based on evidence and analysis

The Commission says that its advice is based on evidence and analysis. Reviewing several of their major policy recommendations we found little to support this claim. Rather the Commission seems to have been pushing a pre-determined agenda, and evidence, where there is any, has sometimes been contrived or misrepresented to serve that agenda. This might be fine for those who share the Commission’s wish to

use climate change to push broader societal changes. But it means that the Commission cannot necessarily be trusted to a source of unbiased and robust evidence and analysis on climate change issues.

The benefits and costs of the Commission's proposals

In the Executive Summary of the report the Commission has this to say about the economic benefits of its proposals:

We have assessed that the level of GDP could be around 0.5% lower in 2035 and 1.2% lower in 2050 than it would be otherwise. This is consistent with findings overseas. Investing in low emissions technologies and practices now will open up new opportunities and reduce the risk of damaging the country's reputation due to a lack of credible climate action. However, delaying key actions like the move to EVs and embedding more efficient farm practices could result in the level of GDP in 2050 falling by around 2.3%.

A GDP fall of 2.3 percent is a large number but there is no obvious support for this asserted impact in the document. We did not see the number repeated or broken down into its component parts. We have had to work our way through the document to try to understand the basis for the Commission's claim.

On the farm practice side, what the Commission seems to be saying is that if their fairly general recommendations (such as better internet or better farm advice) are adopted then the required minimum reduction in emissions can be achieved at a significantly lower cost. We suspect that this is mostly wishful thing but it is difficult to say whether there is any substance to it without the supporting evidence.

On Electric vehicles (EVs), the Commission seems to be suggesting that unless we subsidise electric vehicles now New Zealanders will not buy EVs as they become cheaper and more capable in a few years time, and so will miss out on the benefits of the electric transport transformation. This is obviously nonsense. EV subsidies might speed up the transition in the early years but will make no difference to purchase decisions well into the 2030s. New Zealand will secure the benefits of this technological change by 2050, whether the Commission's recommendations are adopted or not.

In chapter 8 of the report the Commission set out its quantifications of the some of the larger benefits and costs. It is also claimed that the gains from transport mode switching will at least double these gains.

The modelled results are presented in the three figures presented below. One of the issues with this analysis is that it does not present the present value of the costs and benefits. This misrepresents the relative magnitude of these costs and benefits because it assumes that time value does not matter. This is not consistent with good practice.

The most significant benefits are presented is figure one, which shows the difference in costs and benefits for road transport between the Commission's demonstration path, and the current policy reference case. The net benefits are shown by the black line, which is the difference between the costs shown above the zero line and the benefits, which are below this line. By 2040-45 there is a peak net benefit of nearly \$3 billion a year.

Figure one: Road transport costs and benefits

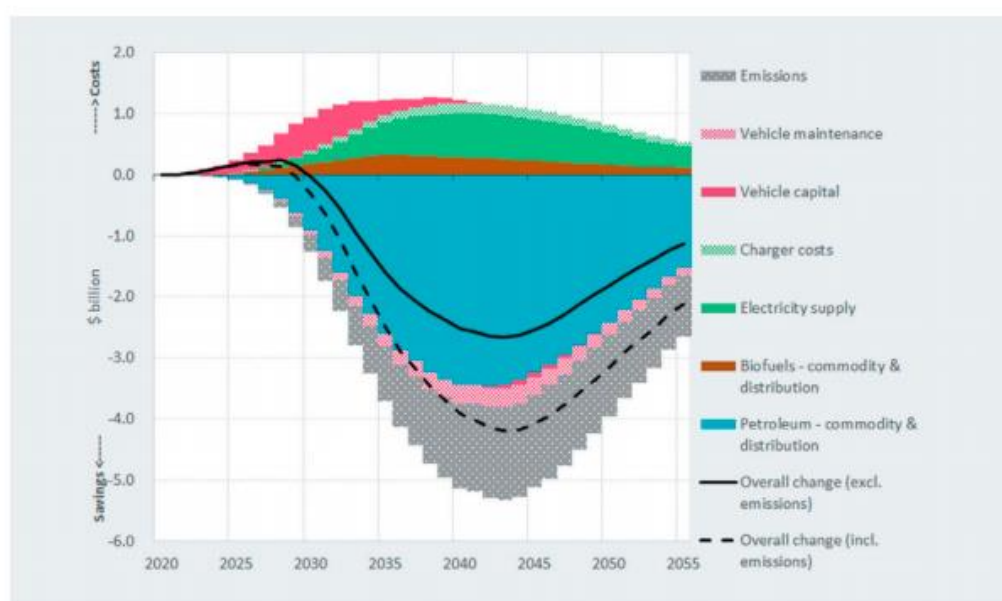


Figure 8.2: The projected increase and decrease in different elements of road transport costs in the demonstration path compared to the current policy reference, excluding the effects of mode shift and reduced travel demand

Source: ENZ modelling

The Commission gives the impression that the EV subsidy and its other recommended actions are responsible for the net gains. This is not true. It appears that it is mostly the difference in the assumptions about foreign EV prices that is

driving the gains, as well as some arbitrary constraints in the modeling, not the Commission's policies.

The Commission describes its modeling process in Appendix one of chapter seven of its evidence paper as follows:

There are also non-price barriers to electric vehicle uptake, such as consumer range anxiety and lack of vehicle charging infrastructure.

To represent these, ENZ includes three classes of penalties to slow the uptake of electric vehicles in New Zealand compared to what costs alone would indicate:

- *global early tech capital cost penalties, reflecting the global barriers to electric vehicle production;*
- *New Zealand -specific capital cost penalties, reflecting barriers to electric vehicle uptake specific to this country;*
- *productivity penalties, which apply mainly to trucks, reflecting how batteries could reduce vehicle payload or range, thereby increasing operating costs per unit of payload.*

In addition, there is a bias against electric vehicles built into the consumer choice function. This causes conventional vehicles to take a larger share of the market than electric vehicles even when the total operating costs of electric vehicles (including penalties) and conventional vehicles are the same. This bias reduces as electric vehicles gain in market share. There are also limits in the model on the speed at which the electric vehicle shares of newly registered vehicles can increase.

However, a full description of the Commission's modeling has not been disclosed and it is possible that no formal paper exists. There is a spreadsheet² with data inputs and a few snippets of information on the model logic. EV uptake is driven by three factors. First is the relative cost of ownership of EVs and ICE vehicles. The price differences drive a difference in EV demand. And as EVs are assumed to be less expensive than ICE vehicles after 2026, on a total cost basis, this accounts for the net benefits in subsequent years.

Second, there is an equation that describes an initial bias against EVs which diminishes as uptake increases. it is described as follows:

When EVs make up 0% of vehicle fleet, their average TCO must be 25% lower than the average ICE vehicle to achieve 50% market share (of newly imported vehicles), with only 8% market share at TCO parity. By the time EVs make up 50% of vehicle fleet, the bias is fully removed so that EVs achieve 50% market share at TCO parity

² Technical assumptions in ENZ energy and transport

Third there are limits on the maximum rates of EV sales growth. These have been set at fifteen percent plus one percentage point for current policy, but thirty percent plus three percentage points for the Commission's demonstration path. These assumptions make a huge difference to the allowable level of EV uptake. To illustrate, assume that the EV uptake is 1 percent in 2020. Under the policy reference case the EV market share is limited to 11 percent in 2026 and 30 percent in 2031. Even though EVs are assumed to be substantially cheaper than ICE vehicles they cannot be purchased. Under the Commission's path the limit effectively disappears by 2026. There is no discussion in any of the Commission's documents of what is driving the constraint and why the issues somehow disappear after a subsidy is provided.

There is no evidence that the Commission's recommended policy interventions (the EV subsidy and the import ban) were ever modelled. There is no provision for them in the technical paper and the Commission never presented any results in its draft report. It just said that subsidies should be introduced as 'a matter of urgency' without mentioning the size of the subsidy. It is obviously not possible to model an EV subsidy without a specific subsidy value. Further, the EV modeling was never subject to peer review.

Table two shows the battery and EV price assumption data we extracted from the Commission's modeling data spreadsheet. The reference and demonstration case EV light vehicle price assumptions start off from about the same point, but then there is a systematic divergence. By 2030 the prices are \$40,100 and \$34,300 respectively. These prices are driven by different assumptions on battery pack prices (the left hand columns show two examples). What the Commission is saying is that New Zealand subsidies will reduce manufacturers battery costs. This is obviously nonsense.

The price differences will feed through into EV demand and are amplified by the behavioral assumptions and constraints, resulting in the substantial differences in the uptake in EVs, and hence net benefits, by the 2040s.

As there is a larger stock of EVs in the demonstration case, by the 2030s and 40s, and as the cost of electricity is much lower than the price of petrol there is a significant net benefit by the 2040s.

Table two: Assumed ICE vehicle costs

	Cost \$'000
Light	36
Bus	304
Medium truck	144
Heavy diesel	324

Table three: EV cost assumptions

Year	Lithium ion battery pack US\$ /kwh Ref case	Lithium ion battery pack US\$ /kwh Tailwinds ³	Cost new EV Light ref \$'000	Cost EV bus ref \$'000	Cost new EV Heavy Ref \$'000	Cost new EV light 2035 path	Cost of Ev bus. Dem path	Cost medium truck 2035 path	Cost new EV heavy 2035 Dem path
2018	176	176	55.8	583	2467	56.0	590	654	2484
2019	149	139	53.5	534	2238	52.4	530	572	2172
2020	131	114	51.4	493	2036	49.5	479	506	1922
2021	118	98	49.7	458	1869	47.2	437	454	1726
2022	107	86	48.2	426	1714	45.2	402	410	1559
2023	97	75	46.8	393	1579	43.5	371	373	1414
2024	89	66	45.6	376	1457	42.0	346	340	1287
2025	82	59	44.4	356	1346	40.6	324	311	1175
2026	76	53	43.4	339	1247	39.3	306	287	1073
2027	71	48	42.5	325	1157	38.2	291	265	990
2028	67	44	41.6	313	1074	37.2	279	246	912
2029	63	40	40.8	304	999	36.2	270	229	843
2030	60	38	40.1	297	931	35.3	263	214	780
2031	57	35	39.3	292	863	34.4	259	200	722
2032	55	33	38.5	286	802	33.5	255	187	669
2033	52	31	37.8	281	745	32.7	251	177	627
2034	50	30	37.2	276	694	32.0	248	167	581
2035	49	28	36.5	272	647	31.2	246		544

If the Commission had done its modelling properly it would have compared the present value of the outcomes, with and without the policy interventions, using the same assumptions about future EV prices. This would have likely have shown a net cost as the effect of the subsidy would be to encourage an early uptake of EVs that are more expensive, on a whole of life basis, than the ICE alternatives.

³ Only tailwinds and reference case battery pack assumptions were presented in the modeling document

An obvious fraud?

The Commission's analysis seems to be obviously deceptive. It has misrepresented the benefits from a reduction in foreign EV prices as the benefits from adopting its policies and manipulated the maximum EV sales growth constraint to favour its policies.

But there may be another explanation. The Commission and its staff might have become muddled and were unable to master what should have been a simple analytical task.

The problem in sorting out what the Commission did, or did not do, is that the Commission has not disclosed all of its modelling. Fully specified models with a discussion of all of the input values should have been provided when the report was released. The Commission has said that this would be provided in June or July. That never happened. The Commission also says on its website that its modelling FAQ provides information on marginal abatement costs. Clicking on the link leads back to the home page.

Heavy vehicles

Figure one also captures savings from the electrification of the medium and heavy fleet. Here the most interesting number is the cost of heavy EVs. The 2018 starting point is \$2.5 million and the 2021 cost is \$1.8 million. With only a steady decline in costs, heavy EVs will not be economic for some time. By 2035 a heavy EV costs \$544,000 compared to \$324,000 for a diesel vehicle. As a consequence there will still be substantial emissions from heavy, and to a lesser extent medium, vehicles by 2050.

While we wouldn't necessarily rely on Tesla's claims that it shortly deliver long range heavy EVs at a price \$US180,000, and that they are already cost competitive with diesel trucks, we know that the economics will improve as battery prices come down; as battery energy densities improve; and lower drag coefficients and ultra rapid chargers improve ranges and ease of use. At least two shorter-range trucks (Volvo and Fuso) are already being marketed in New Zealand.

We don't know where the Commission got its numbers from but there appears to be a political motivation behind the pessimistic view on medium and heavy vehicle adoption, and the Commission's failure to seriously discuss pricing and adoption issues.

The Government⁴ is wedded to a role for a green hydrogen strategy and biofuels. If the economics for electric trucks were soon to become compelling then the case for both would fall apart

The Commission obviously took some flak for not being sufficiently enthusiastic about green hydrogen, so its changed its language to be more 'technologically neutral'. However, there was no shortage of enthusiasm for a biofuels mandate.

The biofuel mandate

Figure one also includes the costs and benefits of the biofuel mandate. It hits a maximum cost of around \$300 million around 2035 and then tails off as more of the fleet switches to electric vehicles. We cannot identify the petroleum cost savings, because this is subsumed within the overall petroleum savings in figure one. There is no information on the costs per tonne of CO2 emissions avoided, although the Commission's model purportedly generates this information⁵.

There is, however, some information in the Government's consultation document on a biofuels mandate, that came out immediately after the Commission's final report was released.⁶ The cost will be 0.3 percent of GDP, or \$1245 million for just the period 2023-25. This for replacing just 3.5 percent of diesel and petrol consumption, which suggests that the cost per tonne of carbon saved will be very high.

The Commission's main argument for a biofuel mandate (this compels fuel retailers to have a minimum proportion of biofuels in their fuel mixes) is that many countries are doing it. That might be the case, but that doesn't mean, it is good policy in New Zealand. It might be economic in some countries, or some governments may have imposed a mandate simply to be seen to be doing 'something', regardless of cost. In most countries the mandate will have been imposed well before it was clear that electrification of the fleet was likely to be the economic solution.

Now that there is clear and credible path for electrification of the bulk of the vehicle fleet it is particularly clueless to impose a biofuels mandate that will develop a new

⁴ The Government released its Green paper: A Strategy for Green Hydrogen in New Zealand. New Zealand is seen as having a comparative advantage as an exporter of green hydrogen because it has amongst other things: ports, the Treaty of Waitangi, and windpower potential.

⁵ The Commission says that the marginal cost of emissions are on its FAQ page. However, clicking on the link just leads back to the home page.

⁶ Increasing the use of biofuels in transport: consultation paper on the Sustainable Biofuels Mandate MBIE and NZTA

industry and its attendant supply chains that will only have a relatively short life before electric vehicles take over the fleet. This is readily apparent in figure one, where biofuels output peaks around 2035 - 38.

Replacement of space and water heating

Figure two shows the costs and benefits of electrifying gas and water heating. There is a net cost in the transition but it is claimed that there are later benefits.

We have tested whether delaying the transition from fossil gas and LPG to electricity would improve the economic costs to New Zealand. However, our analysis indicates that this would end up costing New Zealand more over the long term as the post-transition benefits are delayed.

However, the post transition cost reduction gain is based purely on the Commission's assumption that electricity will be substantially cheaper than gas (which is currently cheaper than electricity for many uses). But the Commission admits that its price estimates here are shakey because there are many uncertainties. A more balanced approach, in the light of this uncertainty, would have been to assume cost neutrality and admit that there would be a net cost of around \$5 billion in present value terms, rather than just asserting that the transition to electric heating will ultimately lead to lower costs, without any regard to the time value of money.

Figure two: Costs and benefits of space and water heating



Figure 8.3: The projected increase and decrease in different elements of space and water heating costs for homes and businesses in the demonstration path compared to the current policy reference, excluding energy efficiency improvements. Under our modelling all space and water heating in buildings is assumed to be electrified by 2050. There is a net cost of the transition while this happens due to the costs of converting existing building, but once complete there will be overall net savings

Process heat

The Commissions third figure shows unambiguously that switching to electricity will be costly.

The demonstration path sees a full transition away from using coal, fossil gas and diesel to generate heat in the food processing sector by 2050. Figure 8.4 shows that this leads to costs on the order of \$200 million per year by 2035 (more like \$300 million), largely due to higher fuel costs. This is because, unlike for EVs or space and water heating, conversion to a biomass or electrode boiler means using a more expensive fuel without any significant energy efficiency gain

Figure three: Costs and benefit of process heat changes

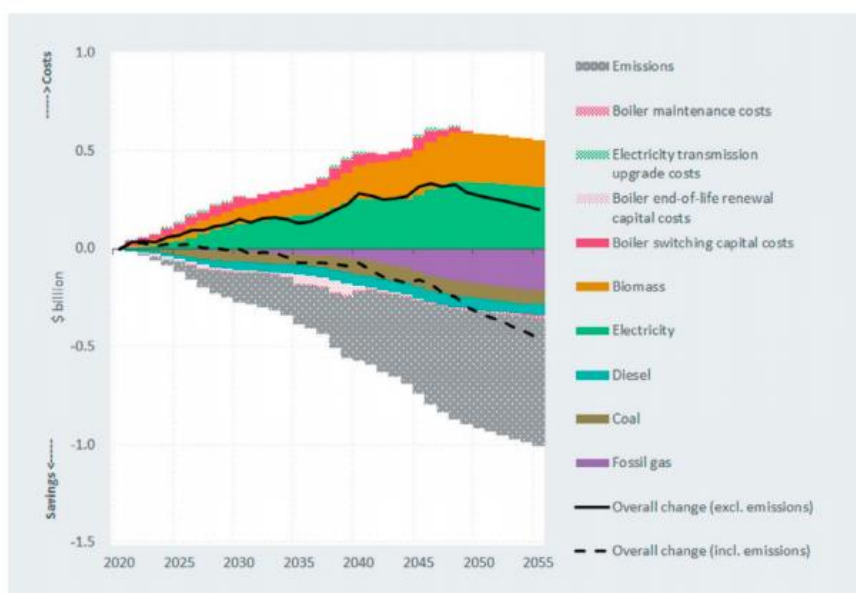


Figure 8.4: The projected increase and decrease in different elements of process heat costs for the food processing sector in the demonstration path compared to the current policy reference, excluding the effects of improved energy efficiency

Transport mode switches

In its final report the Commission scaled up its 'ambitions' on reducing emission by transport mode switching. Figure four shows the demonstration path for household light vehicle travel, which shows a small fall rather than an increase to 2035. As is generally the case the Commission does not present the emissions reductions associated with the switch, which would allow a better assessment of the scale of the contribution.

Figure four: Impact of mode switching and transport demand

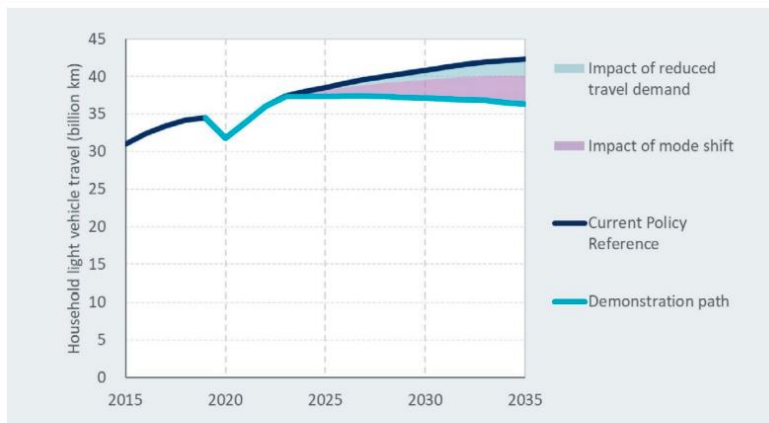


Figure 7.6: Household light vehicle travel in the demonstration path compared with under current policies

This is to be achieved by increasing the mode share of walking, public transport, cycling and e-scooters (6 percent in 2019), to 11 percent 2030, and 14 percent in 2035. The mode share for cycling increases from 0.6 to 1.5 percent by 2030; and public transport increases from 3.5 percent to 7.7 percent. Auckland's mode share triples by 2030; Wellington's increases by 60 percent, and the rest of New Zealand has a twenty percent increase.

This is what they had to say about the cost of achieving these ambitious targets.

*However, a complete picture would need to consider wider implications such as transport infrastructure investment, **which we have not been able to do.***

The Commission had nothing very useful to say on the issue. It just argues that more of the transport budget should be spent on public transport, cycle and walking infrastructure and that young people should receive a larger public transport subsidy (presumably to encourage them not to walk and cycle). Though, to its credit, there is a one line support for congestion charging.

Transport mode change are not critical to 'achieving the scale of change required'. Once all vehicles are electric land transport emissions will be close to zero, which should be largely accomplished by the 2050s. No further transformational change is required. This is a very simple idea, but one that the Commission seems quite unable to grasp. More public transport might be a good idea, in some areas, and more exercise is a good thing, but they have little to do with the Commission's mandate.

The Commission's call for Auckland to treble the numbers using public and active transport by 2030 appears to be more delusion than 'ambitious'.

The Auckland Regional Transport Plan, released just weeks before the Commission's final report, said:

Public and active transport

The significant investment in public transport and active modes outlined in the RLTP is forecast by our transport model to increase the combined AM peak mode share from 23 per cent in 2016 to 29 per cent in 2031. By 2031, public transport boardings are expected to reach 142 million per annum, which represents a 40 per cent increase on the 103.6 million achieved in February 2020.

AT estimate that the \$500 million increase in funding for public transport services identified earlier in this RLTP would enable annual boardings to reach 175 million by 2031.

At best the increase in will be about 75 percent a long way short of the Commission's call for a 200 percent increase.

Auckland has only \$2 billion of unallocated funds for the next ten years, so it is difficult to see how the Commission's transformational trebling of the numbers could be delivered. However, we have not taken into account the possibility that the Commission may have magical powers. Perhaps the Chair will part the Waitemata, allowing easy pedestrian and cyclist access to downtown Auckland.

Figure five: Auckland Commute 2030



The value of co-benefits

In its draft report the Commission argued that the co-benefits impact of their recommended policies were very significant. We pointed out in our submission on the draft report, that these benefits were exaggerated and in particular showed how the air quality benefits were based on some obviously shaky evidence.

In the Final report the Commission ignored this advice and continued to argue:

International and domestic research suggests there are significant co-benefits to reducing emissions in the more immediate term. Benefits to health and health equity, productivity and incomes all tip the balance further in favour of acting earlier to reduce emissions

people will benefit from warmer, drier homes, better air quality and from walking and cycling more. The benefits are significant and immediate’ and “add to the case for strong action to reduce emissions”

As discussed above these benefits are claimed to at least double the ‘benefits’ specifically identified in figures one to three. The Commission attempted to buttress its very slim, (three line) discussion in the evidence report with some further research results.

Warmer drier homes

‘Warmer, drier homes and improved health design could improve peoples health and improve health equity. Warmer drier homes can have significant health benefits for those people on low incomes, including increased comfort, reduced time off school or work, fewer hospital visits for circulatory and respiratory illnesses, reduced pharmaceutical costs and reduced mortality

A cohort of New Zealand researchers evaluated the Warmup New Zealand programme and found that low income households received greater health benefits from installing insulation than higher income households. This is because those on higher incomes are more able to live in higher quality homes. The evaluation found that low-income households saved on average \$818 each per year in health costs after installation, compared to \$227 for higher income households. The health benefits were found to be significantly greater than any potential bill saving.

For the most part the campaign to better insulate New Zealand homes has little to do with emissions reductions. Most homes use electricity and wood burners for heating, so changes in the owners’ behavior will have very little impact on their emissions. When homes are insulated the evidence is that homeowners respond by increasing the temperature rather than by reducing energy use. So even for those households using gas there will only be a trivial impact on emissions. The

Commission admits this this, but still could not resist trying to force a connection between the Warmup campaign, (which generated apparently impressive benefit/cost numbers) and climate change. On inspection the Warmup benefit/ cost numbers were largely contrived, and the favorable equity results an artifact of a suspect methodology.⁷

Benefits from reduced air pollution

On the benefits of reduced air pollution the Commission repeats its arguments from its draft report.

Modelling carried out by the Health research Council of New Zealand, Ministry of Transport and NZTA found that the social cost of air pollution is significant- it is estimated to cost New Zealand \$4,28 billion every a year. Of this is 22% is attributed to pollution from vehicles equating to \$940 million a years.

The New Zealand modeling was close to a scientific fraud. To repeat part of the discussion from our submission, which the Commission will (or should) have read:

- The research cited by the Commission estimated air pollution death rates 50 times the World Health Organisation's estimate for New Zealand, and was based on some shoddy and biased modeling.
- Jan Wright, former Parliamentary Commissioner for the Environment had previously reported that the New Zealand estimates appeared to be seriously overstated, but the report was ignored by the relevant authorities.
- The economic value of a death was based on the average cost of a road death, when it was known that most of the air quality deaths are amongst the elderly. This had the effect of increasing the economic cost by a factor of four and a half.
- Based on the WHO estimate the annual economic cost of vehicle pollution would be about \$10 million a year.

⁷ On the 'cohort' of New Zealand researchers' effort on the evaluation of the Warmup New Zealand campaign the big driver of the results was the impact of home insulation on the number of deaths. The 'cohort' did not present a relationship between the number of deaths and insulation, undoubtedly because there wasn't one. Instead they tested the relationship between persons over 60 who had recently been hospitalized with heart and respiratory diseases. They found a statistically significant negative relationship (just) between the former, but a positive relationship (but not significant) for respiratory disease. So the increase in deaths was not counted but the reduction retained. If it was accepted that there was no strong relationship with heart degrees the obvious policy response would have been to insulate just the houses with elderly heart disease occupants. The reason that low income occupants 'benefited' more than higher income homeowners is that more the over 60s with heart disease naturally fall into the lower income bracket.

Of the other benefits the study found that insulation did not impact on hospitalization rates though pharmaceutical costs did fall by \$10 per household. Another study directed at low income earners did report less time of school and work but these results were self reported. Self reported doctors visits also went down but the actual number of visits went up putting into doubt all of the self reported benefits.

Gas Cooking

Domestic use of gas in New Zealand 400,000 homes accounts for only 0.75 percent of New Zealand's emissions⁸ so the Commission's advice, to essentially phase out the industry, looks like overkill. It could be treated as a 'hard to abate' industry drawing on exotic forest abatements, which would require new plantings of perhaps 500 hectares of exotic forest a year.

However, given the sensitivity around the potential demise of the use of gas for cooking (especially barbeques), the Commission came up with two studies on the negative health effects of gas, to buttress its case.

In 2013 researchers at Utrecht University in the Netherlands reviewed 41 scientific studies and found that children are 42% more likely to develop asthma if they live in a home that uses fossil gas for cooking. Another study of over 12000 households in Australia attributes 12 percent of childhood asthma to fossil gas Adequate ventilation can reduce but not eliminate this risk.

Interestingly, the Utrecht study did not find any correlation between the presence of nitrous dioxide, the main pollutant from gas cooking, and asthma. The Australian study⁹ is probably the most relevant to New Zealand, as the Utrecht meta-study summarised work going back to the 1970s, across a wide range of countries. The Australian study provided a useful estimate of the health burden from gas cooking emissions. With proper ventilation the disability adjusted live years (DALY) lost is 18.5 per 100,000 children, and four times that without ventilation. Assuming the standard value of a DALY in the New Zealand health system of about \$50,000 and that say, 200,000 children might be affected, the annual costs would be between \$1.8 and \$7.2 million depending on ventilation.

This is not trivial, but it is not the huge co-benefit the Commission implies.

Benefits from increased walking and cycling

New Zealanders will benefit from increased fitness by using cars less and walking and cycling more. This can lead to less chronic disease and improved overall wellbeing. Modelling by researchers at the University of Otago, University of Melbourne, and University of Oxford suggests that switching from short car journeys to a combination of walking and cycling improves people's health, reduces emissions and reduces costs for the healthcare system.

⁸ [BLOG: BANNING NATURAL GAS INTO HOMES DOESN'T STACK UP](#) John Carnegie, Chief Executive of the Petroleum Exploration and Production Association of New Zealand (PEPANZ).

⁹ Damp housing, gas stoves, and the burden of childhood asthma in Australia Luke D Knibbs¹, Solomon Woldeyohannes², Guy B Marks³, Christine T Cowie⁴ Med J. Australia 2018

Over the lifetime of the current New Zealand population, these savings could be in the order of NZ\$127 million if 25% of trips under 1km were switched to walking, or up to NZ\$2.1 billion if all trips under 1km were switched to walking and all trips between 1 and 5km were switched to cycling¹⁰

The \$2.1 billion quality of life saving over the full lives of the current population looks impressive until you take a closer look at the paper, which says that only four percent of the savings would accrue over the next ten years.

Obviously not all vehicle trips of up to five kilometres will be substituted by active transport, so a lower figure of perhaps 20 percent might be more realistic. Not all New Zealanders will want to follow Dr. Carr's medical advice. The annual benefit up to year 10 would be $(\$210 \times .04)/5$, which is \$1.68 million.

To put the maximum health gain of \$2.1 billion over the lifetime of the current population in perspective, if walking and cycling cost one hour of valuable time per week then the lifetime cost would be in the order of \$150 billion.

The benefits are clearly not 'immediate and large' as the Commission claims. In fact, on an annual basis, they appear to be small.

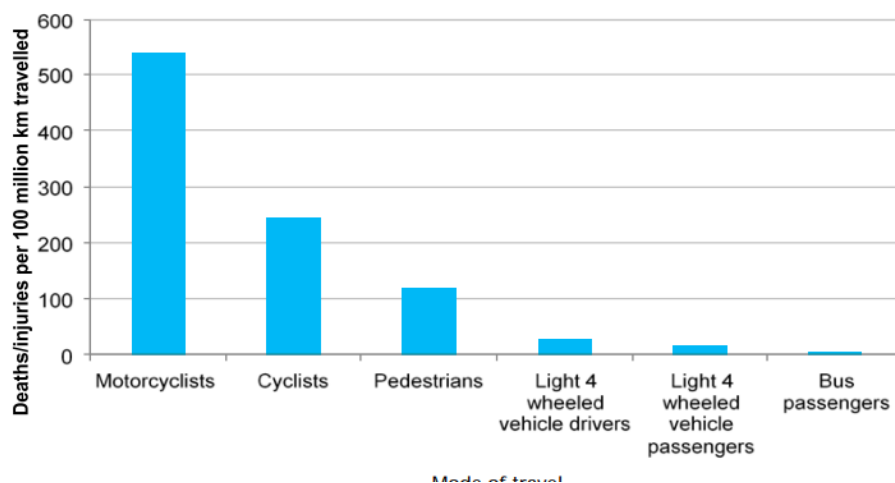
In the transport section the Commission presents some more arguments:

Improved public transport can also help to reduce health inequities. Public transport is a very safe way to travel, reduces crashes due to fewer vehicles while also reducing noise and harmful emissions – all of which have health benefit.

Buses might be good for their passengers but not so good for other road users, and as figure six shows, active transport is much riskier than car travel.

¹⁰ Potential of active transport to improve health, reduce healthcare costs, and reduce greenhouse gas emissions: A modelling study Anja Mizdrak, Tony Blakely, Christine L. Cleghorn, Linda J. Cobiack *Plos One*

Figure six: Deaths and injuries by travel mode



Conclusion on co-benefits

To summarise, the co-benefits from the electric transition are rather small and certainly not in the billions as the Commission claims.

- A realistic assessment of the emission reduction health benefits might be in the low tens of millions.
- Gas cooking savings could be in the low millions.
- It is unlikely that there will be a transformational change in active transport, as much as we might wish it, so the realistic assessment of co-benefits benefits might be in the low millions of dollars over the next decade.
- Emissions savings will not make houses warmer and healthier.

What happened to the 2.3 percent of GDP policy benefits?

We saw some material costs, but benefits just weren't there. There does not appear any substance to the Commission's claim that the benefits will amount to 2.3 percent of GDP.

Arguments supporting key transport policy recommendations

Electric car subsidy

The Commission's recommendation that subsidies are 'urgently' required followed from an argument that there is a structural problem with the supply of electric cars to New Zealand. This was based on a two line aside in the executive summary of a Bloomberg New Energy Finance electric vehicle market development report. It implied that manufacturers would not supply countries like New Zealand unless there was government support. That isn't altogether true. Tesla has been selling in New Zealand for eighteen months and several leading manufacturers are already here. It has been reported that BYD, a Chinese manufacturer will be selling cars in Australia and New Zealand at prices that are competitive with Internal combustion engine (ICE) cars by early 2022. The Australian importer Nexport has said that the Australian price for the compact BYD AE1 hatchback will be under A\$35,000.¹¹

While there might be some short term supply constraints, with some manufacturers preferring markets where sales will assist in meeting their emission mandates, it is not clear whether a subsidy will be a very effective remedy, even in the short term. We might just get a few more vehicles if we are prepared to pay a higher price. On a worldwide basis it will not increase the supply of electric vehicles, we might just get a slightly bigger piece of the pie.

What it will do, as well as giving a windfall to the New Zealand purchasers who would have purchased an EV without a subsidy, is induce manufacturers who have already decided to bring EVs to the New Zealand market, but haven't announced their pricing, to increase their margins somewhat. Certainly the effect of the used EV subsidy will be to drive up the price of used EVs in Japan as New Zealand importers compete for a limited stock of acceptable EVs. A part of the subsidy will go to Japanese car sellers.

What this points to is that the Commission never did any serious independent, and well documented analysis of the impact of EV subsidies. The point of the exercise was really just to provide support for the Minister who had his heart set on a subsidy regardless of the economic and technical logic.

No impact on the 2050 target

¹¹ While this announcement has gained media attention we do not know how much substance is behind it. Nexport's does even have a website. Its facebook page is light on detail.

Obviously the subsidy is a bit pointless. It will make no difference at all to reaching the 2050 net zero target because by then the subsidized vehicles will have been scrapped. It will have a small impact on new EV sales in the short term, but this will be an expensive exercise, with some of the subsidy going into increased margins and some into the pockets of those wealthy enough to afford vehicles than can cost up to \$80,000.

The ban on the importation of ICE vehicles by 2030-35

The main argument for a cutoff date somewhere between 2030 and 2035 (with a preference for 2030 'if possible') for ICE vehicles imports is, again, that 'everyone is doing it'. Some countries are joining the the new car ban club and more, no doubt, will follow. It is an easy thing to say with no immediate consequences. But not a single country, where used imports are an important part of the market, has imposed a cut-off.

The Commission is vague on the reasoning behind the phase out date. It might be based on its assessment of the price parity dates. The Commission mentions three. Price parity on a whole of life basis is projected for 2022; by 2026 on a commercial assessment basis (five year assessment); and by 2031 on an upfront price basis. It is not possible to have too much confidence in these assessments as the Commission never disclosed the detail of its assessments, either the final report, or in its draft reports.

While the direction of travel of EV pricing is clear, the timing is not. The Commission's estimates could be optimistic by a year or three or five, and there is always a lag in the latest technical advances getting to New Zealand. The timing matters in setting a cutoff date. If it is too early then there could be a substantial economic costs. A later date would deliver the Government's need for an 'announceable' and give importers a settled planning horizon, without having too much of an impact on consumers. 2035 might not be too bad a date for most new vehicle types if the Government is insistent on having a date.

One of the issues that was not addressed was the treatment of BEVs and PHEVs. They were distinguished in the draft report, but there is apparently no mention of the distinction in the final report. There is a logic in phasing out plug-in hybrids at a later date.

The main issue is that used imports are treated the same as new imports. There is a strong case for treating them differently. New ICE vehicles imported in, say, 2032 will have exited the fleet by 2050, or will be close to exiting. The average used

imports on the other hand, will be ten years old and will be nearing its exit point by 2042. It would be a straight-forward matter to set the cutoff date according to a vehicle's age. Vehicles that are ten years or older could have a cutoff date of, say, 2040 with a sliding scale to the new vehicle cutoff date.

The Commission knows that a 'hard-line' approach on second hand vehicles will impact disproportionately on the lower income earners who rely on that market. Because of the slow uptake in EVs in Japan it is unlikely that there will be a good supply of affordable used EVs in the early 2030's. However, the Commission has just waived the problem away by saying that the Japanese Government has suggested that ICE vehicles might be banned by 2035. This is inaccurate in an important respect. We understand the Japanese government has defined hybrids as a qualifying low emission vehicle. Hence, it is unlikely that there will be an early transformational change in EV uptake in Japan that would ensure an adequate supply of used EVs vehicles for New Zealand importers by 2030.

A breach of the treaty?

As the Commission could readily have recommended an alternative response that would meet the needs of lower income car buyers, including Maori, and has essentially ignored representations from Maori on the issue, it could be argued that the Commission's advice is a breach of the Treaty of Waitangi.

Commission's response to the least cost argument

The Commission did respond to several submissions that said that they should have taken a least cost approach, rather than picking favorites and often applying the metric: if it technically feasible it should be done (regardless of cost).

Before the final report came out the Chairman issued a news release on the subject, which we have reproduced in appendix one. It is a emotive, and in some respects misleading document, that doesn't add to the arguments in the final report. So we have restricted our assessment of the Commission's arguments to what was said in there.

The Commission's opening arguments are set out in their box 4.3:

- *Taking a 'least cost' approach is not one of the considerations laid out in the Act.*

Further, taking an approach that focuses solely on the 'least cost' cost now does not align with the requirements in the Act.

While the Act does not explicitly state that a 'least cost' approach must be taken, it certainly doesn't preclude giving cost a critical role. Arguably, 2(b) (iii) of 5ZC 'Matters relevant to advising on, and setting, emissions budgets' provides for a consideration of: existing technology and anticipated technological developments, **including the costs and benefits of early adoption of these in New Zealand**, requires it.

The Commission goes on:

Further, taking an approach that focuses solely on the 'least cost' now does not align with the requirements in the Act.

Of course the Commission is not bound to minimise some narrow measure of financial cost, and no-one is seriously arguing that. It can, and should, look at broader impacts. But in doing so it needs to credibly quantify those external costs and benefits. It is not enough just to make sweeping claims that the external benefits are 'large'. Our discussion of the 'co-benefits' showed that there was generally little substance behind the Commission's claims.

A solely 'least cost' approach does not align with the split-gas target, which factors in the different nature of biogenic methane.

This is a legitimate response to submitter's who might have thought that the two targets should have been integrated. The Commission had to work within the structure of the Act.

It does not consider the distributional impacts and who the costs fall on. It does not consider the potential impacts on communities, particularly rural communities and the broader food and fibre sector, from the significant amount of forest that would be needed beyond 2050 to sustain net zero long-lived gases. A 'least cost' approach does not appropriately consider intergenerational equity. For example, using forests to offset gross emissions means there will be an ongoing burden in future to reduce those gross emissions. This will also lock land into forestry over the long term and limit future generations' choices about land use.

This response is just so much handwaving. The Commission seldom clearly explains just how these broader considerations affected its advice in particular cases. For example, why did it assume that New Zealand Steel should be protected, while the interests of hundreds of thousands of domestic gas consumers, who are responsible for a very small fraction of New Zealand Steel's emissions, should be largely ignored.

And what distributional or intergenerational ‘equity’ considerations drove it to recommend a biofuels mandate? Or why was it essential to give urban middleclass EV purchasers a windfall gain?

Most of the Commission’s argument centres on its advice not to support exotic forestry plantings from 2035. We discuss this advice below. It is based on a gross misrepresentation of the contributions of exotic and native forests.

Further into the report the Commission make more of its case for early intervention.

Even where limited or no technical change is expected, another reason for early investments is because reducing emissions takes time. This is particularly relevant where transformation of long lived infrastructure or systems is needed, such as in buildings, urban form and urban transportation systems.

As we explained in our submission, investments in urban form and transportation systems have little to do with the 2050 net zero target. Once the light vehicle fleet is electrified it will not matter, from an emissions perspective, whether urban form is compact or not, or whether people use public transport or not. It will matter from an urban congestion perspective, but the role of public transport and urban form in addressing this issue should be argued on their merits. The risk is that uneconomic investments will proceed because it will be argued that it helps ‘fight’ climate change, citing the Commission’s arguments that it is a critical part of an overall package.

There is, however, a linkage between electric vehicles uptake and congestion that should have received more attention. The marginal cost of operating an EV is substantially less than operating an ICE vehicle, so other things being equal, they should worsen congestion. Part of an optimal response to the problem is congestion charging, which now seems finally to be getting on policy makers’ radar screens¹². However, we have yet to see any analysis of the relative weights that should be given to increased public transport and congestion charging in reducing congestion. It would seem to be premature to assume that some massive increase in public transport is the answer, before this work is done.

While reducing emissions in these areas is expensive and difficult, it makes sense to start early to spread the effort and reduce cost over time. In most cases, abrupt transformation would be more expensive than a gradual transition.

¹² For example see a recent MOT paper on the costs and benefits of a congestion charging scheme for Auckland.

This may mean accepting a higher cost in the short term. However, it avoids the highly costly scenario of having to transform a city over an infeasibly short timeframe, such as only a decade.

The Commission's argument on urban form reads as if it is seriously contemplating some major changes in urban structure over the next thirty years. However, when we look at the Commission's actual recommendations the rhetoric does not flow through to its proposals, which are:

For existing urban areas

6. Ensuring regulatory settings allow for increased density and use of existing infrastructure, land and built form to reduce emissions.

Reducing existing restrictive urban planning rules should be supported for a number of reasons. Emissions reductions are the least of these, but if the emission rhetoric helps then that may not be a bad thing, even if it really out of scope for the Commission.

For new urban areas:

7. Enabling low emissions choices by ensuring services, amenities, facilities and infrastructure are accessible and interconnected. This includes providing safe cycle and walkways and connections to public transport.

In some cases these actions will make sense, but in others, say, a lifestyle development, less so.

The point here is that urban form not a critical part of the zero emissions journey and does not provide a rationale, as the Commission is trying to argue, for an acceleration of emission reduction measures across the board.

The core of the Commissions argument is as follows:

Emissions pricing can only play a limited role in bringing new technologies or system change online. This is because a price on emissions, assuming rational behaviour by those subject to it, leads to cheaper emissions reduction opportunities being used up first.

As long as these less expensive options exist (for example, efficient internal combustion engine vehicles), the emissions price will not incentivise the uptake of new options that are at an earlier, costlier stage in the 'S-curve,' or which require upfront investment in new infrastructure (for example, Evs).

This gets to the heart of the Commission's approach. The ETS will push people to act rationally. The Commission doesn't always like economic rationality arguments

because they can be constraining. Their ‘irrational economic model’, on the other hand, allows the Commission to recommend policies that just sound good, without the inconvenience of demonstrating a net benefit.

But by the time these cheaper options have been exhausted, or are no longer viable given tighter limits on emissions, it will be too late to develop and deploy the transformative solutions needed.

Emissions pricing is key for scaling up solutions that are approaching market maturity, but will not initiate and guide the roll-out of transformational solutions. Other policies, along with capital to fund investment, will be needed to drive deep and enduring systems change.

These argument simply don’t make sense, particularly when applied to EVs in New Zealand, which is the primary ‘transformational’ change. They will become cheaper and more attractive, regardless of New Zealand’s emission policies. There is no need to develop ‘transformative technology’, as the cars and trucks can simply be imported when they are wanted, once we have not past the initial supply constraints. On the Commission’s (optimistic) analysis the price parity point will occur in 2026, which is not too late for the transformation by 2050 to occur.

The market will drive the transformation. At most the Commission’s argument amounts to is providing some assistance in getting the charging network a little ahead of the adoption curve. All early adoption achieves is paying more for vehicles that could be obtained more cheaply a little later. And early adoption has its risks. Suppose a government had adopted a massively ‘ambitious’ plan to electrify much of the light vehicle fleet in 2013, and three million Nissan Leafs were purchased at an additional cost of \$30,000 each. New Zealand would have spent \$90 billion and would have a fleet of vehicles with deteriorating batteries and average ranges of 80-90km. We would already be looking at another massive spend to replace this fleet.

Further, the move to electric vehicles will not require special measures to fund this ‘transformation’. The mechanisms that fund ICE vehicles can easily be applied to EVs.

Understanding effectiveness and efficiency requires a long-term perspective. Dynamic effects mean that some policies may appear in the short term to be expensive, but can contribute to a more economically efficient transition over time.

The reverse is also true – some policies that appear to be least cost today may increase costs over the long term because they lock in future emissions or create assets that will become stranded in the future.

It is important to consider these dynamic effects, and to take a long-term view of cost effectiveness. We have factored this into our approach to developing our policy advice.

Again it is never really explained how these ‘dynamic perspectives’ were factored into specific advice. It is all just words without substance.

Emissions pricing should be key to any policy package, so how other policies interact with it should be considered. Figure 11.3 below illustrates how different combinations of an ETS and companion policies can interact to affect the emissions price and reductions. It highlights that heavy reliance on an ETS risks triggering cost containment measures and failure to meet reduction goals, while relying too heavily on other policies can be inefficient. A balanced mix of policies should be the aim.

Figure 11.3 does not provide any evidential support for the Commision’s claims. It is just a ‘pretty picture’, that proves nothing. When it comes to it the Commision is just asserting that a mix of policies is required, and that they have got the mix ‘just right’.

Figure seven: The Commision’s figure



Figure 11.3: How different packages of ETS and companion policies impact emissions

Exotic forestry offsets

One of the more controversial points in the draft report was the advice to effectively close off access to the ETS from 2035 for exotic forests, promoting more native forests plantings instead. In the final report the Commission expands on its reasoning. Their starting point is that the time profile of carbon offsets are different, with natives provide much more enduring benefits.

Reliance on exotic forests as a carbon sink beyond this could divert action away from reducing gross emissions in other sectors and could make maintaining net-zero greenhouse gas emissions after 2050 challenging. However, new native forests could provide an enduring carbon sink that would help to offset residual long-lived emissions from hard-to-abate sectors over the long term.

However, this argument is misleading because it implies that native plantings will make a substantial contribution in the future. This does not appear to be consistent with the actual growth profiles of natives and exotics. The information in table four was taken from the Ministry for Primary Industry's ETS lookup tables (one and three of schedule six)¹³.

Table four: Carbon offsets by year since planting

Years since planting	Pinus radiata – Hawkes Bay/ SNI		Natives	
	Tonnes per hectare		Tonnes per hectare	
	Stock	Growth in yr.	Stock	Growth in yr.
10	210	13	40.2	8.6
20	547	37	158.7	12.4
30	852	27	257.5	7.4
40	1097	24	305.1	2.5
50	1345	26	323.4	1.1

Another fraud?

The data shows that Commissions claims are quite misleading. The Commission has given the impression that while native forests cannot compete with exotics on a financial basis in the short term, they provide substantial emission reductions in the longer term. However, the table clearly shows that most of the growth in native forests occurs in the early years and they provide little benefit past 30 years. By

¹³ Carbon Look-up Tables for Forestry in the Emissions Trading Scheme July 2017 Ministry for Primary Industries
Schedule 6: Tables of Carbon Stock per Hectare for Post-1989 Forest

2070 a native forest planted today will only be offsetting 1.1 tonnes of carbon per hectare. A permanent exotic forest will be offsetting 26 tonnes.

The Commission, of course knows about this data. It used the average native forest emission removal over thirty years in its modeling. It is difficult to believe that they did not understand that the marginal rate of removals for older forests was so low.

The Commission goes on:

Relying heavily on forestry might help New Zealand meet its 2050 emissions targets but it would make maintaining net zero long lived emissions beyond that date more difficult. It would delay people taking action that reduce gross emissions, lead to higher cumulative emissions and push the burden of addressing gas emissions on to future generations.

Maintaining net zero beyond 2050 would not become much more difficult. But relying on native forests, to sequester, say 10 million tonnes of 'hard to reduce' emissions beyond 2050 would require millions of hectares of native forest plantings. By contrast only about 400,000 hectares of exotic production forests would need to have to be planted over 25 years.

As the most economic sites will have already been planted the carbon price would have to increase to attract further plantings, but it would still be much lower than the \$250 (and increasing) required by the Commission's plan. The future generation would be disadvantaged because they would have to bear the burden of a higher carbon price and the debt cost (\$5-15 billion) relating to native forests plantings.

As a matter of logic substituting sequestrations for gross emission reductions does not lead to higher cumulative net emissions.

Climate change exacerbates forest fires, strong winds, storms, droughts, pests and pathogens=so there is also the risks associated with the permanence of using forestry to remove emissions from the atmosphere, as these emissions are released if the forest degrades or is destroyed,

We discredited the Commission's evidence base for this claim in our submission and review. The cited reference clearly showed that climate change will improve the effectiveness of exotic forestry, due to carbon fertilisation. In any event, it would be a relatively straightforward matter to adjust the measurement of emissions saving credits to account for these risks. Similarly native forests could be given a higher factor to account for genuine external benefits.

In the longer term (perhaps well beyond 2050) other forms of carbon capture (such as direct air capture) may well be economic and could substitute for exotic plantings. We don't know how this will turn out, but it would seem precipitous to assume that there will be no substitutes in the very long term, and then proceed on that basis.

Scenario analysis

Commission ran a scenario where the emissions price was allowed to increase, and there were no constraints on carbon removals. They found that:

increasing the emissions price from \$35 under the Current Policy Reference case to \$50 would come close to meeting the 2050 net zero target.

The results are shown in figure eight, which sets out the emission paths to 2070 under current policy (with the carbon price fixed at \$35). The unconstrained removals path with \$ 50 carbon price in figure nine. The current policy profile does not show a fall in forest sequestrations by 2070 with continued plantings. The unconstrained plantings, however, does and net emissions climb to about 10 million tonnes by 2070.

But again, figure nine, is quite misleading. Exotic forest plantings are not unconstrained. Indeed it appears that they are stopped from 2035 (not 2050 as indicated), which accounts for the sharp turn of around of forest carbon withdrawals from 2055. The difference between figures 8 and 9 is that the carbon price is \$15 higher in figure 9. It is scarcely credible that this will somehow sharply reduce the level of abatements after 2055. This appears to be another case of the Commission 'doctoring ' the analysis, to make it appear that the unconstrained plantings will create a problem post 2050.

But again we can't be sure of this because the Commission has not provided the detail on its modeling.

Figure eight: Current policy emissions to 2070

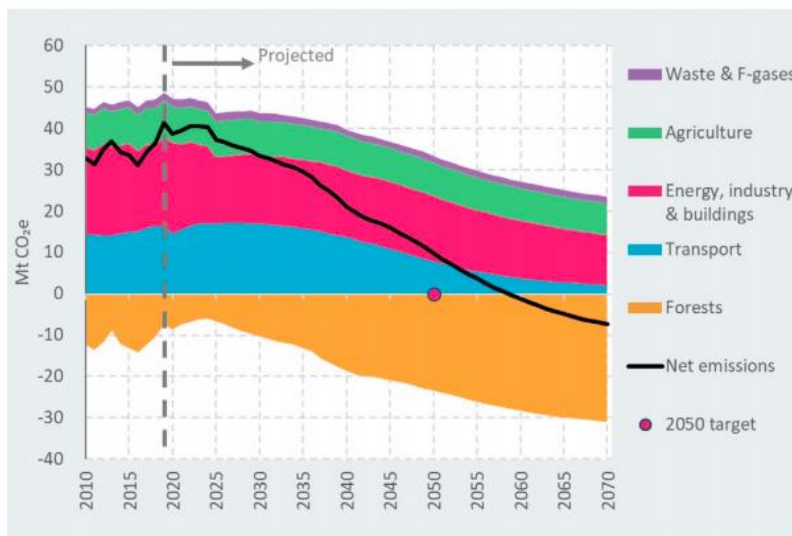


Figure 6.2: Long-lived greenhouse gas emissions to 2070 projected under current policies.

Figure nine: Unrestrained plantings to 2070

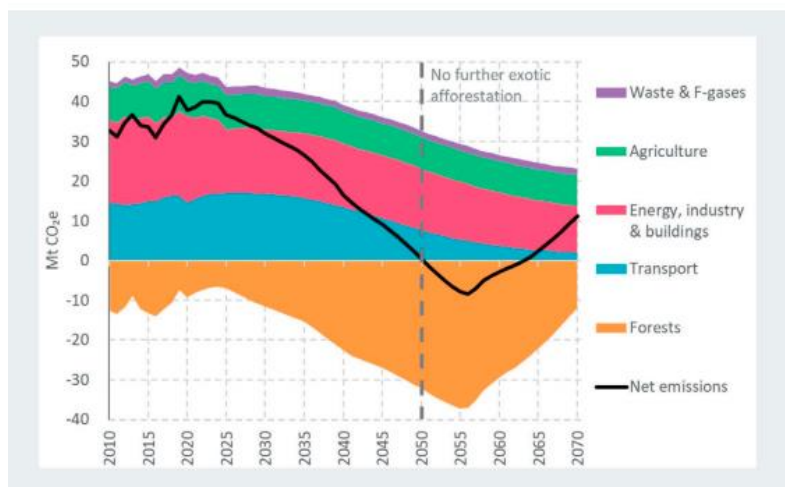


Figure 6.4: Long-lived greenhouse gas emissions in the 'unconstrained removals' scenario, with a 50/tonne emissions value applied to forestry, energy and transport.

Source: Commission analysis.

Impact on long-term emissions abatement

The Commission's main argument is that exotic forests are such an attractive economic proposition that they will effectively hold back 'permanent' reductions in emissions.

However the slightly higher emissions price would encourage only a small reduction in gross long – lived greenhouse gas emissions of around 0.5 Mt Co2. Instead it would encourage much more exotic forestry to be planted. Exotic forestry would encourage much more exotic

forest – 8.7 mt CO from planting an additional 400,000 hc. by 2050 to the 1.1 million under the base case.

Establishing 300,000 hc of native forests would cost between \$5 -15 b. The carbon credits alone would outweigh the establishment and maintenance costs after a few decades. This return could be achieved in 15 years for reverting forests or as long as 70 years for higher cost planted forests.

An approach that does not constrain carbon removals by forests would not drive meaningful decarbonisation before 2050 and instead would use up land resources for the purposes off offsetting emissions in areas where there are proven options to reduce gross emissions.

The first issue here is whether the Commission's modeling of the relationship between carbon pricing and afforestation rates is reliable. It assumes that about 10 percent of plantings will be natives, but it also reports that 12,000 hectares of natives are expected to be planted this year, well above this assumption. The Commission's modelling might well be too sensitive to the emissions price. We don't know, because the Commission has not disclosed its models and explained its sensitivity assumptions.

The second issue is the insensitivity of gross emissions to the carbon price. It should be no surprise that an increase in the carbon price of just \$15 will reduce long-lived emissions by only 0.5 Mt by 2050. Road transport emissions are relatively insensitive to fuel prices but will still trend down to close to zero past 2050 because of technological change. Greater increases in the carbon price would speed up this process a bit, but they are not essential to the process.

Much of the lack of 'progress' in other areas is by assumption. No, or limited reductions, in heavy industry emissions are assumed, so this sector's emissions will be price insensitive. Permanent emissions from agriculture are only minimally impacted by the ETS. There is not too much left for the ETS to bite on.

The Commission concludes:

This approach is not sustainable, would leave New Zealand out of step with the rest of the world and would leave to the next generation the task of reducing gross emissions at the same time that they would be needing to respond to climate change impacts.

The Commission has not demonstrated that continue plantings of exotics is 'not sustainable'. It would be easy to generate modelled result where a sustainable result was generated by a continued exotic plantings at a falling rate, the closure of 'unsustainable' heavy industries, supplemented eventually, by other sequestration methods, as technology evolves. 5,000,000 tonnes of hard to abate emissions in the

2050's might require additional plantings of 150,000 hectares on marginally productive land.

New Zealand is not 'out of step' with the rest of the world. The role of forest sequestrations was confirmed in the Paris agreement and has a place in many countries' plans. For example, the UK Climate Change Committee¹⁴ is assuming plantings of 30,000 hectares a year, and up to 50,000 hectares 'if necessary'.

The intergenerational equity argument

The Commission puts great store on its claim that its advice will enhance intergenerational equity. It sets out its arguments in section 8.1.

Intergenerational equity is reflected in He Ara Waiora, part of the Government's wellbeing framework, through the dimensions of wellbeing ('ends') and the tikanga ('means'). Both of these are essential to intergenerational wellbeing. This aligns closely with the concept of tiakitanga and guides Aotearoa to carefully consider the pace of the transition.

Climate change will disproportionately affect young people and future generations. However, if Aotearoa transitions too quickly, both current and future generations will also bear the brunt of the costs of disruptive change

We have recommended emissions budget levels that are both ambitious and predictable. Acting too hastily will result in abrupt and disruptive changes akin to the changes many people in Aotearoa experienced from the economic reforms in the 1980s. Delaying action carries the risk of a sharper and more disruptive transition later, locking in emissions intensive infrastructure that could become stranded and contribute to more severe climate change.

A key part of intergenerational equity is ensuring sustainable prosperity over the long term. To ensure sustainable prosperity, we have not only considered the need to reduce emissions as quickly as possible, but also the need to set future generations up with the resilience and ability to make continual and lasting emissions reductions over the long term. This means not only passing on to future generations a New Zealand that is low emissions, but also a New Zealand with a productive economy where people are well, healthy and have jobs that are environmentally and socially sustainable.

¹⁴ Sixth Carbon Budget 2020

This is long on words, and fluffy sentiments, but lacking in the specifics of how particular actions will improve intergenerational equity. When we look at most of the changes they do not have intergenerational consequences. With vehicles each generation will pay for its own vehicles. There is no 'legacy' to pass on to the next generation, because vehicles will only last for 15 years or so. And that generation will have the benefit of cheaper and better vehicles.

The investment in biofuels will be largely obsolete before the next generation arrives.

Climate change will not affect this generation of young people materially. The best evidence suggests that New Zealand might actually be (slightly) better off as the economy benefits from carbon fertilisation and warmer more stable summers. For a full review of the 'catastrophist' narrative that underpins the Commission's thinking see our paper 'The National Climate Change Risk Assessment: A case of science denial?'¹⁵.

The main possible intergenerational impact will be investments in public transport and, perhaps, more compact urban form. On the former the next generation may well rue the fact that its forbearers spent, say, \$100 billion, on an expensive to run, partially obsolete (because of the advent of autonomous vehicles) public transport system, funded by debt that they will have to support. That might well wish that policy makers had grasped the nettle and implemented effective congestion charging schemes that would have rendered some of the investment unnecessary.

Some might appreciate a huge investment in bicycle paths, but others might see it as an expensive way of pandering to mostly white male middle class preferences.¹⁶

The next generation is already bearing the cost of the mentality that underpins the compact urban form philosophy. Land prices have put homeownership beyond the reach of many younger people.

The 'jewel in the crown' for the coming generation is the 300,000 hectares of native forest added to the current 8 million hectares, funded by \$5 -15 billion of debt. It is not clear whether the next generation will appreciate the an investment that will deliver just one tonne of carbon abatement per hectare when they could have had exotic forests delivering 26 tonnes, that cost them \$50 a tonne.

¹⁵ Tailrisk.co.nz/documents

¹⁶ The author of this paper is a white male middle class cyclist

Once we pick apart the relativity of the energy transition most of the intergenerational arguments fall away.

Postscript: The Government's clean car package

Immediately after the Commission's final report was released the Government released its clean car package. It obviously did not take long to absorb the Commission's report. On EV subsidies the transport Minister said:

As technology develops and more manufacturers decide to stop making petrol and diesel cars, the cost of low emissions vehicles will come down. However at the moment they are still more expensive to buy. Today's announcement helps to address that. It will ensure more families can enjoy the benefits of low emission vehicles and their lower maintenance and running costs.

Unless they are on higher incomes not many families will benefit. Other might find that the money has run out when they go to claim the rebate.

If, due to high demand, rebate funds are exhausted, Waka Kotahi will notify that the rebate window is closed and no discounts (rebates) will be offered during this time. Once we announce the scheme has restarted, only vehicles registered from the restart date will be eligible for rebates¹⁷

However, there was at least one happy face.

Elon Musk interview on the EV subsidy

Interviewed after the Electric vehicle subsidy was announced Elon Musk congratulated the Chairman of Climate Change Commission, Rod Carr and Climate Change Minister, James Shaw. "We were worried there for a while" said Musk "The cut-off price for the subsidy could have been set at under the \$71,000 price of our Model 3 in New Zealand, forcing us to either cut our price or lose market share. Now we will be able to increase our margins over the longer term, as we have been doing in the US. It's a big deal for us. The whole world was watching New Zealand and this Tesla friendly policy sends a fantastic message. We think that over time it will put 3 percent on our share price. This might not seem like much, but it increases my net worth by \$2 billion".¹⁸

¹⁷ NZTA website

¹⁸ Tesla very recently dropped its standard model 3 price by about \$2000. Tesla prices dynamically so it not clear what drove that decision. It could have been a drop in demand in China prompting a need to get rid of excess production. Or it could have been a more strategic decision to compete aggressively with forthcoming Korean and European competition.



Elon Musk exultant on the New Zealand EV subsidy news

Appendix one

Dr. Carr: Why not the ‘least cost’ pathway to net zero May 2021

New Zealanders deserve better than just the least cost pathway to a low emissions future. Much of the debate around climate action over the past thirty years has centered on how to get to net zero in a way that incurs minimal costs – but when the Zero Carbon Act passed, Aotearoa showed we want to move beyond this. While cost matters, it is only one of the things we need to care about – and it is not the only factor that drives our choices.

We need to care holistically about the approach Aotearoa will take to transition to a low emissions future, ensuring that the Government takes what is important to New Zealanders into account when setting policy.

Society is complex. We weigh and value things differently, irrespective of their cost. And climate policy is complex – it interacts with many of the things we value in our lives.

We care about risk and uncertainty. About the next generation. About how land and resources are used. And we care about our personal relationships, and relationships between our communities. You can't put a price on these things.

When the Commission carries out its work, we are required to give advice on the direction of climate policy in Aotearoa and consider a range of factors – of which cost is only one.

Pursuing the cheapest path fails to consider impacts on individuals, communities, workers, businesses, families, and the principles of Te Tiriti o Waitangi.

We know that the least cost option often creates poor outcomes. Not everything we individually and collectively value can have a cost placed on it.

And if you discount certain things from your 'least cost' pathway, they could turn out to be enormously valuable – like biodiversity in the environment, or the rights of future generations that we have a responsibility to care for.

At the moment, with policy settings in Aotearoa, the cheapest option would be for us to continue planting our land with pine trees. This would capture carbon rather than reducing gross emissions – and it would mean that future generations would have their land locked under pine trees indefinitely. We would have missed the opportunity to open up other pathways to a low emissions future. Our advice focuses on removing emissions at source, rather than trying to plant our way out of the problem.

Achieving our targets will require a diverse range of policies and actions across many sectors. During our consultation, some questioned why the New Zealand Emissions Trading Scheme (NZ ETS) alone won't meet our emissions reduction goals – but no single instrument, market, or regulation is enough on its own.

While the NZ ETS plays an integral role in our transition to a low emissions economy, putting a price on greenhouse gas emissions does not represent the actual cost of our emissions to society. Emissions pricing won't provide support to people hit hardest by the direct or indirect impacts of climate change, and it won't ensure transformation across all sectors.

Our draft advice set out to show there are a number of pathways to achieve net zero for long lived gas emissions by 2050 – and looks at how we can enable a transition that is fair and equitable, rather than simply focusing on the cheapest cost.

It's not just about future generations – action on climate change has been delayed for so long that this impacts us today. We cannot assume that this is a 'next generation only' problem – this is an 'our and now' problem, and one where cost is one consideration – not the only one.

If we take responsibility for our emissions now – looking at what actions are needed across society as a whole and at what is valued most by our people – we can provide ourselves, our children and our children's children with better opportunities to manage our future world.