# Submission on the Productivity Commission's Low Emissions Economy inquiry

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## Introduction

Thank you for the opportunity to submit. We are especially grateful for the extension which enabled more time for research. We congratulate the Commission on a comprehensive and thought-provoking Issues Paper.

For this submission, we have focused on areas of prior research, as well as new research in other areas which we thought might receive less feedback. In many cases we offer ideas and issues for consideration, rather than firm views and recommendations.

The submission is structured with responses to the Issue Paper's questions in order. We have not written responses to some questions.

We would be very happy to discuss any of the issues and ideas raised.

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

We agree with the points listed in the Issues Paper.

Regarding the first two points, it would be useful to see analysis broadly comparing pathways involving strong near-term domestic action with those involving delayed domestic action (with increased reliance on international purchasing) and later compensation. This has been a major shortcoming of past economic analyses undertaken in relation to setting national emissions targets, which have tended to ignore costs beyond the target date in question.

Regarding "developing conceptually sound but doable recommendations for change", it would be useful to see recommendations for key policy priorities: e.g. what needs to be done in the next year, five years, ten years.

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

We note the body of research on opportunities and barriers undertaken in recent years by Motu, as well as the work by the Parliamentary Commissioner to the Environment, to which we do not have a lot to add.

At a high level, a barrier in recent times has been economic strategies which depend on growing the volume of primary production and lead to neglect of environmental harms and limits. Better opportunities for New Zealand in an emissions-constrained future lie in diversification of land use and food production, and a focus on environmental excellence.

At the smaller scale, two potential barriers preventing farmers from experimenting and pursuing transitions to different land uses or farming models are financial debt and lack of relevant, independent advice. There is potential here for government to assist in providing a wrap-around service involving research, expert farm advisers, and financing options.

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

- The benefits of greater diversification and resilience in the face of potential for disruptive food technologies;
- Co-benefits for water quality, and the potential to develop a joined up environmental services policy package;
- The effect of land prices and interactions with the tax system;
- Potential for encouraging mixed land-use systems (e.g. agroforestry and "mosaic" approaches) in addition to large-scale conversions.

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

The big one is presumably the lack of price certainty and loss of confidence in the ETS. We understand there are also significant issues around land prices.

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

Within the ETS, higher prices will help and the introduction of a price floor at a sufficient level could be very influential. Introducing averaging as an accounting option and some recognition of harvested wood products would also presumably make planting more attractive. We discuss these matters in more depth in Q20.

Response to improved ETS settings will take time. Given the contribution towards meeting the 2030 target will be higher the more immediately planting occurs, there is at least a short-term case for greater intervention, for example through Crown-led planting schemes or expanding the Afforestation Grant Scheme.

We strongly agree that it would be better to incentivise small-scale planting such as riparian strips outside of the ETS. This could be funded through revenue raised from a price on biological emissions.

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

We understand the primary barrier in most cases is the higher upfront cost compared to internal combustion engine vehicles – although this is reducing fast. It is important to consider this in the context of the "head wind produced by a lack of policy pressure on the adverse effects of conventional vehicles" (Barton and Schütte, 2015).

For some households, lack of off-street parking is a barrier. Nationwide, about 85 per cent of households have off-street parking, but the proportion is smaller in urban centres such as Wellington.

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

In our view, the most important policy to encourage the uptake of electric vehicles is a system of efficiency standards and/or feebates on all vehicles.[1] Either instrument will put pressure on internal combustion vehicles and would be expected to reduce the upfront cost barrier on EVs. But they have important wider impacts:

- They deliver a coherent price signal across the entire vehicle market, incentivising more efficient vehicles in general;
- They can be designed to be technology-neutral, incentivising other low emissions vehicle technologies such as hydrogen.

Efficiency standards cover over 80% of global passenger car sales and exist in all developed countries except for New Zealand and Australia (Barton & Schütte, 2015). The Australian Government now appears to be moving towards implementing a standard.[2] This would leave New Zealand as one of the last "dumping grounds" for inefficient, high-emissions vehicles.[3]

This is a matter of considerable urgency given that the efficiency of light vehicles entering the New Zealand fleet – which was already poor by international standards – has likely worsened over the last few years. Figure 1 shows the average $CO_2$ emissions per kilometre for light vehicle registrations, based on laboratory tests. This shows that efficiency was improving, but has plateaued since around 2013. However, the gap between real world efficiency and laboratory test results has been widening year-on-year, from which the Ministry of Transport concludes that "average real world economy may have worsened" (MoT, 2017). This, along with an increase in per capita travel, helps to explain why transport emissions have grown by 2-3 percent per annum since 2014 after a period of relative stability.[4]

It is important to consider these observations through a lifecycle or cumulative emissions lens. On current trends, the average new light vehicle import would be expected to operate for around 18 years and lock in over 40 tonnes of $CO_2$ over its lifetime.[5] The record 301,280 new and used light vehicles purchased in 2016 will have heavy impact on meeting New Zealand's 2021-2030 carbon budget. The same applies even more so to heavy vehicle purchases. This further highlights the urgent need to accelerate EV uptake and improve the fuel efficiency of internal combustion vehicles entering the fleet.

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[1] A vehicle efficiency standard would set an annual average efficiency rating (using a metric such as $gCO_2$/km) for vehicles entering the fleet. (A minimum efficiency standard could also be used, but an average standard is less restrictive on choice and much more common in other jurisdictions.) A feebate system would mean vehicles entering the fleet attract either a fee or rebate depending on their performance relative to a chosen benchmark (or "pivot point"). For more information see Barton & Schütte, 2015, and ICCT, 2010.

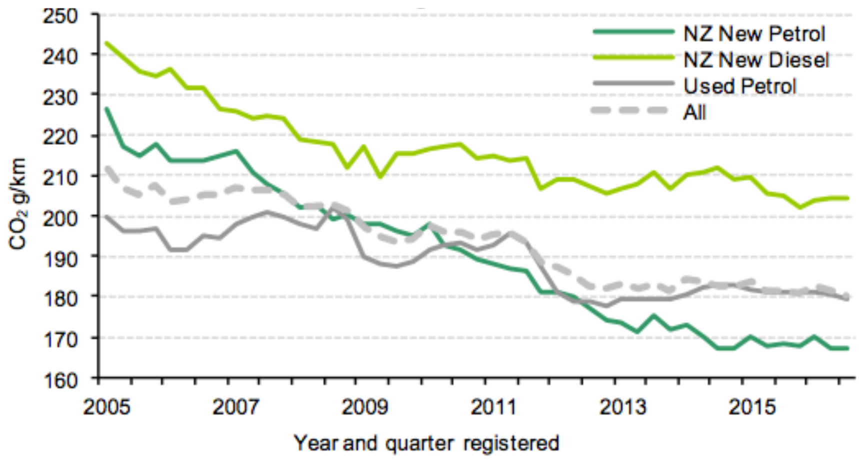
[2] The Ministerial Forum on Vehicle Emissions produced a draft Regulation Impact Statement in December 2016, and intends to provide a draft implementation plan for potential measures "later this year". See Commonwealth of Australia, 2016, and https://infrastructure.gov.au/roads/environment/forum/

[3] For discussion of this in the Australian context see Vorrath, 2016.

[4] Liquid fuel consumption data up to 2016 is available (MBIE, 2017).

[5] This assumes annual travel of 11,500 km, real world emissions of 200 $gCO_2$/km, and an average scrappage age of 18 years (based on MoT, 2017).

**Figure 1: Average $CO_2$ emissions of light vehicle registrations**




*Source: MoT, 2017*

Positively, fuel efficiency standards are likely to be among the most cost-effective policies for reducing New Zealand's emissions. The EU's standards are expected to deliver net economic benefits due to fuel savings (Barton & Schütte, 2015). Similarly, recent Australian government studies predict a strongly negative $CO_2$ abatement cost from vehicle emissions standards, with the most stringent standards delivering the highest net benefits (Commonwealth of Australia, 2016; Commonwealth of Australia, 2014).

The difference between an average emissions standard and a feebate system is somewhat analogous to the difference between an emissions trading system and a carbon tax.[6] In principle, either system could be designed to achieve the same outcome. The two systems can also co-exist – and do in many countries and states.

An important consideration is administrative complexity and efficiency. This is especially the case in New Zealand, due to a relatively high number of small companies importing second-hand vehicles. This complexity was a key justification given for abandoning the previous Labour Government's proposed vehicle emissions standards (Office of the Minister of Transport, 2009). If a single instrument were to be chosen, a feebate system is likely to be simpler to implement and more cost-efficient to run.

> *"Countries that have not adopted fuel economy or greenhouse gas emission standards may find feebates a good alternative first step. Standards require a great deal of knowledge about vehicles, technology, market demographics, and future developments in order to set them properly. This knowledge is much less critical for establishing an effective feebate program, which can be put in place while expertise and information are being developed. Feebates may also be useful for sectors that are more complex and diverse than the light duty sector, such as heavy-duty vehicles."*
> (ICCT, 2010)

We recommend the Commission investigate efficiency standards on light vehicles and a feebate system on all vehicles, including heavy vehicles.

[6] We understand that the system proposed by the previous Labour Government would have created permits tradeable between vehicle importers to achieve an industry-wide average emissions level.

If implemented, these instruments should replace the current road user charge (RUC) exemption for EVs. The RUC exemption is a poorly-designed policy to address the main barrier of upfront cost (Barton & Schütte, 2015; The Treasury, 2016). If efficiency standards or feebates are not pursued – and perhaps in the meantime regardless – the RUC exemption should at least be replaced with an upfront rebate of equivalent value. However, unlike a revenue-neutral feebate system, this acts as an overall subsidy towards vehicle ownership, which has negative side-effects.[7]

Three other complementary policies that would encourage uptake of EVs are:

1. Electrification of government-owned vehicle fleets. In addition to targets, agencies and councils could implement an "electric first" vehicle purchasing policy like Greater Wellington Regional Council (GWRC, 2016).

2. Fringe benefits tax adjustments. Inland Revenue has undertaken a review on whether depreciation rates and FBT settings are disadvantaging electric vehicles. Information we have received through an OIA request indicates that the IRD identified a bias in favour of internal combustion vehicles of around 20 percent under current FBT rules (we are happy to provide this information on request). There are larger issues around how FBT rules favour cars and encourage car travel in general, discussed under Q10 (p. 10).

3. Electricity pricing reform. Concept Consulting found that EVs are currently penalised by an electricity pricing structure that does not reflect their benefits to the electricity system (Concept Consulting, 2016).

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

Looked at from a systems perspective, urban transport systems dominated by private vehicle travel are highly unproductive and wasteful in terms of energy, space and capital:

- In a typical single-occupancy vehicle, only around one percent of the source energy actually goes into moving the occupant (Young, 2017). While this can be improved upon, particularly through a shift to electric motors, part of the reason is the inherent inefficiency of moving, say, an 80 kg person in an 1,800 kg vehicle.
- Cars require much more road and parking space than other travel modes. In U.S. cities, the combined road and parking space required per car is between 80 and 240 square metres, meaning a car consumes a similar area of land to a house (Litman, 2015). This is especially pertinent given the chronic pressures on housing and land prices in Auckland.
- The average car is only in use around five percent of the time (Barter, 2013), but is typically the second-most expensive item a family will purchase after a house. In the year to June 2017, New Zealand spent $8.2 billion on road vehicle imports – 15 percent of total merchandise imports and the largest single category by far (Statistics New Zealand, 2017). Petroleum products were next at $5.0 billion.

In addition to this, motor vehicle transport imposes large costs on society through accidents, congestion, the health effects of physical inactivity, noise, local air pollution and greenhouse gas emissions (CE Delft, 2011). Only the last three of these are reduced by a switch to electric vehicles. Emissions reduction opportunities that help to reduce private car dependence therefore tend to

[7] As an aside, the largest selling electric vehicles in New Zealand by far are in fact e-bikes, but these do not receive any subsidy.

offer the largest co-benefits and improvements in productivity and equity. One way to reflect this in policymaking is to use the "Avoid-Shift-Improve" approach shown in Figure 2.

As one example of what can be achieved, the city of Paris has reduced car traffic by 30 percent and passenger transport emissions by 23 percent over the last decade (Quiret, 2016).

The main opportunities to reduce transport emissions are largely covered in the Issues Paper. One important opportunity missing is reducing travel demand, for example through better land-use planning, enhanced digital connectivity and "telepresence" technologies. For more analysis on this topic, see MoT, 2014. Demand reduction is a particularly important focus for air travel, given the greater difficulties in mode shift and fuel substitution.

Some of the main barriers to reducing transport emissions include:

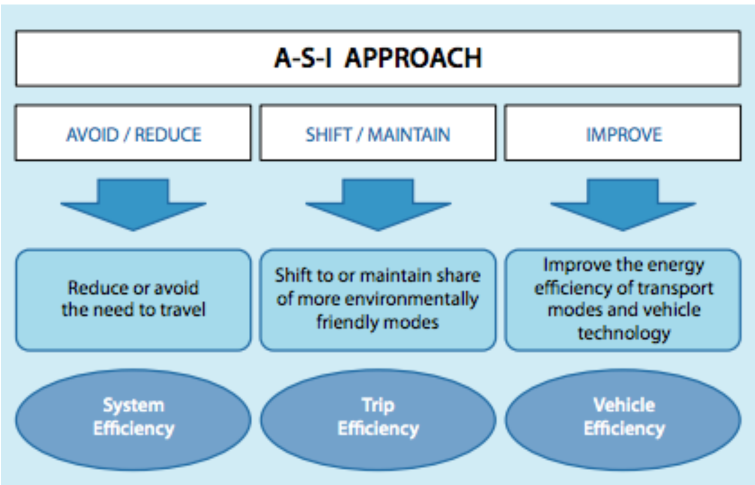
- Sprawling, low-density urban development;
- Market distortions that subsidise car ownership and use (such as minimum parking requirements and tax-exempt free parking provided by employers);
- Path dependence caused by a "predict and provide" model for transport investments (MoT, 2014);
- An unlevel playing field for investment in different transport modes;
- Low or non-existent pricing of externalities;
- Other political and institutional biases towards private vehicle travel (Litman, 2017).

Here we discuss four key enablers of change.

## Low-carbon built environment and infrastructure

The built environment and infrastructure define the transport choices available to people and businesses, and the quality of those options. The goal should be making sustainable transport options convenient and attractive for as many as possible.

**Figure 2: Avoid-Shift-Improve approach to sustainable mobility**




*Source: GIZ, 2011*

Urban form is at the core. As former Vancouver city planner Brent Toderian says, “The best transportation plan is a great land-use plan”. Sprawling, low-density development forces people to travel further and makes public and active transport costly or unviable, locking in dependence on private cars. Governments and councils should encourage compact urban form and allow more homes to be built near to where people work, study and play. This means loosening height and density restrictions, rezoning for mixed-use development, and removing detrimental regulations such as minimum parking requirements.

Smart land-use planning needs to be integrated with infrastructure that provides quality low-carbon choices for moving people and freight:

- Walkable communities that prioritise people over vehicle movements;
- Cycleway networks that are safe and comfortable enough to encourage riders of all ages;
- Dedicated public transport corridors that enable buses and trains to run reliably and frequently without getting caught up in congestion;
- Upgraded rail infrastructure (electrified where possible) and an efficient, multi-modal freight network that maximises use of rail, through coordinated solutions such as freight hubs.

Reform to institutions and funding processes is needed to address barriers identified above, which inhibit rational multi-modal transport planning in New Zealand: for example, enabling rail infrastructure to be funded through the National Land Transport Fund and having a single agency oversee all investments in land transport infrastructure including railways. That way Kiwirail could be run as a proper SOE and be expected to return a profit.

## Efficient pricing

Like many other countries, road transport in New Zealand is significantly underpriced compared with the costs to society, especially in urban areas.[8] As well as greenhouse gas emissions, costs that are largely not borne by users at present include air pollution, congestion, and parking. Additionally, fixed charges are used in some cases to recover costs that are largely variable. This all leads to higher levels of vehicle travel – and hence higher emissions – than would occur with efficient pricing. Todd Litman estimates that, in the U.S. context, optimal pricing would see the variable costs per vehicle-mile increased around two- to five-fold (Litman, 2017). Clearly, this would have large effects on vehicle choices and travel behaviour.

Here we discuss some options for pricing transport externalities, restructuring charges and removing other market distortions. A holistic review of transport pricing is really needed.

### *Carbon pricing and fuel taxes*

It is often claimed that a price on carbon will make little difference in the transport sector. Certainly, this is true for the low prices seen to date. However, evidence suggests that the effects could be meaningful over the long run with strong and sustained prices, particularly if these are clearly signaled and communicated to the public.

The Intergovernmental Panel on Climate Change reports a long-run price elasticity of demand for fuel of -0.6 to -0.8 based on an average across hundreds of studies (IPCC, 2014). Using a value of -0.8, Sterner finds that fuel taxes in Europe have reduced transport $CO_2$ emissions there by 50% compared with if they had adopted low tax rates like in the U.S. (Sterner, 2007). This would make fuel taxes the most impactful policy at reducing greenhouse gas emissions to date, reducing the

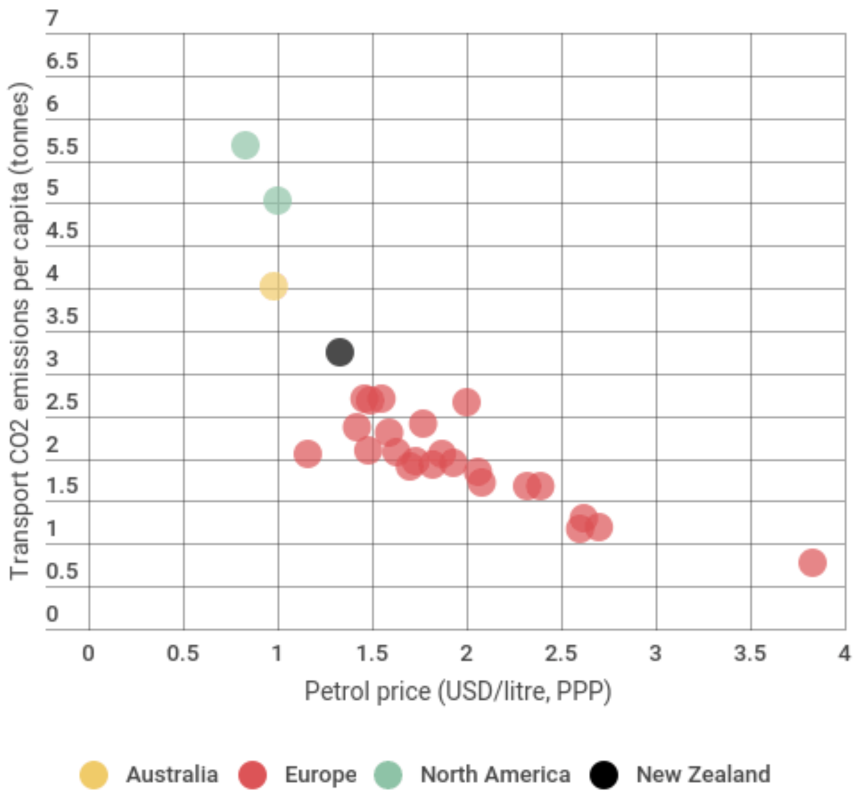
[8] See Booz Allen Hamilton, 2005, and Jakob, Craig, & Fisher, 2006. I am unaware of more recent studies.

atmospheric $CO_2$ concentration by several parts-per-million. The option of electricity as an alternative fuel will presumably mean price elasticity is higher now than in the past.

Studies on fuel price elasticity in New Zealand and Australia have found significantly lower long-run values than in countries in North America and Europe (Kennedy & Wallis, 2007). But curiously, comparing per capita transport emissions against petrol price adjusted for Purchasing Power Parity across OECD countries shows a remarkably consistent near-inverse relationship (Figure 3). While this comparison is simplistic and does not address causation, it shows that transport fuel consumption in New Zealand is roughly at a level we would predict based on the relative price of fuel.[9]

There is growing evidence that consumers respond more strongly to price changes from fuel taxes than to other variations (Andersson, 2017). Consistent with this, some recent studies have found that carbon taxes in Sweden and British Columbia reduced fuel consumption by more than three times what would be expected from the standard price elasticity (Andersson, 2017; Noah, Obeiter, & Krause, 2015). This suggests there is a significant behavioural response involved, potentially explained by factors such as 'salience' (e.g. enhanced awareness due to media coverage around tax changes) and 'persistence' (belief that tax changes are long-lasting, unlike fluctuations in oil price and exchange rates).

**Figure 3: Transport $CO_2$ emissions per capita versus petrol price using PPP, 2006-2015 averages**




*Data sources: UNFCCC, 2017; IEA, 2017.*

[9] I'm assuming that charges on diesel are roughly in proportion to charges on petrol across these countries. Note also that the graph shows emissions from all transport modes, not just road transport.

This finding has important implications for the New Zealand Emissions Trading Scheme, which may be failing to activate beneficial behavioural responses due to a lack of salience and uncertainty around current and future price impacts. Similar effects may also apply in other sectors. A clear and well-signaled price floor in the ETS that increases over time should increase both salience and perceived persistence. A further idea to specifically address the salience issue here is to make fuel retailers display the estimated carbon charge due to the ETS (e.g. on receipts).

A complementary option is to use fuel taxes to increase the effective carbon price. This is also a straightforward way to help account for other externalities such as air pollution, though location- and vehicle-specific charging methods would be more efficient in theory. The proposed regional fuel tax in Auckland – while motivated by revenue gathering for infrastructure investment – is well-aligned in this regard, given that around half of all premature deaths and social costs due to air pollution from motor vehicles occur in the Auckland region (Kuschel, et al., 2012). Kuschel et al. estimated annual social costs of $PM_{10}$ air pollution from motor vehicles in the Auckland region in 2006 at $520 million (in 2017 NZD). Auckland Council has said the proposed 10 cents per litre tax would raise around $120 million per year.[10] New Zealand's unique road user charge system instead of an excise tax for diesel complicates things – this is discussed further below (p. 11).

Lastly, a carbon price will have an impact not only on fuel consumers but on fuel producers. Higher prices will incentivise biofuels and other alternative fuels, initially from waste sources as with Z Energy's new tallow-based biodiesel plant.

### *Congestion charging*

Congestion charging is a way to explicitly internalise the costs of, and thereby reduce, congestion. It will also deliver corresponding reductions in $CO_2$ emissions, air pollution and other external costs.

Congestion charges have had a large impact where they have been implemented. London's USD2010 15.4 congestion fee led to a 34% reduction in incoming private cars, and Stockholm's USD2010 2.6 fee reduced total road usage by 15% (IPCC, 2014). They also raise revenue which could be used to improve the availability, quality and price of public and active transport options, or to reduce rates.

These and other road pricing tools will become increasingly important as driverless vehicles are introduced (Fishman & Davies, 2016).

### *Parking pricing*

Provision of "free" or underpriced car parks is widespread. This subsidises private car ownership and use, and also encourages "cruising" to find free spots, adding wasteful vehicle travel (Shoup, 2007).

Shoup argues local authorities should use variable pricing to limit parking occupancy rates to around 85 percent (with revenue re-invested in local communities). This is possible now with automated parking services and can be justified on the basis of operating a 'market price'.[11] Litman further argues that any parking costs not recovered through direct user fees could be incorporated in

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[10] It is unclear whether this includes diesel and what assumptions were applied. If the tax was applied on petrol only, this would have a negative side effect of encouraging people to switch to diesel vehicles.

[11] In an ideal world, we would go further: the use of public space for parking would need to generate a return commensurate with the commercial value of the unimproved land. If the return is not being generated in a CBD, then some carparks are uneconomic and should be retired.

distance-based charges (Litman, 2017). Parking prices also provide an alternative lever to help address congestion where a congestion charge is not possible for whatever reason.

There are particular issues around employer-provided parking spaces, discussed below (p. 11).

### *Restructuring existing charges*

In addition to externalised social costs, another issue is that current pricing arrangements use fixed charges for vehicle registration, licensing and insurance to recover costs or reflect benefits that are largely variable (i.e. related to road use). This results in a marginal price of travel below the true marginal cost, even when externalities are ignored. As Litman puts it, "Fixed fees encourage motorists to maximize their mileage in order to 'get their money's worth' from their fixed investments" (Litman, 2017). Where possible and appropriate, fixed charges should be restructured in a revenue-neutral fashion towards variable charges.

In the case of insurance, the ACC Motor Vehicle levy already has a variable component for petrol vehicles (6 cents per litre), but is an entirely fixed annual charge for diesel vehicles. This should be reviewed. A further, probably larger, opportunity lies in "pay-as-you-drive" private insurance to reward motorists for reducing their travel and remove cross-subsidies from low-mileage drivers to high-mileage drivers. To give an indication of potential impact, annual insurance fees currently equate to around 30 percent of the annual fuel cost for a typical light petrol vehicle.[12] Pay-as-you-drive schemes are emerging overseas (see for example Brignall, 2017) but we are not aware of any in New Zealand yet.[13] There may be things the government can do to support development and uptake of these schemes.

The level of local government contributions to transport investments could also be reviewed. In 2014, the overall National Land Transport Fund co-investment rate (i.e. central government contribution to local transport projects) was set at 53 percent following a review of funding assistance rates (NZTA, 2014). However, this review did not look at efficiency of revenue gathering and no economic analysis was undertaken (NZTA, 2013). Vehicle charges could be increased with a corresponding increase in the NLTF co-investment rate, allowing rates to be reduced.

### *Removing other market distortions*

The OECD's environmental performance review highlighted that current fringe benefits tax settings apply favourable treatment to company cars and parking lots, "which is a cost for the public budget and tends to encourage private car use, long-distance commuting and urban sprawl" (OECD, 2017). A NZTA research report came to similar conclusions (Scott, Currie, & Tivendale, 2012). Regarding company cars, the OECD review states:

> *"Like many other OECD member countries, New Zealand favourably taxes benefits deriving from the personal use of company cars. According to an OECD study, the New Zealand tax system captures slightly more than 40% of a benchmark for neutral tax treatment of company car benefits relative to cash wage income [Harding, 2014b]. This is a relatively low share compared to the other 25 OECD member countries covered in the study. This is because company cars used for private purpose increase an employee's annual taxable income by only 20% of the vehicle's acquisition value. In addition, the fuel costs paid by*

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[12] This assumes: $700 annual insurance fee; 12,000 km per year; 9.5 litres per 100 km; $2 per litre.

[13] Tower Insurance's SmartDriver programme uses a smartphone app to detect how safely customers are driving, but apparently does not charge by distance or time driven. Schemes like this could still have some effect on emissions by incentivising safer, smoother driving.

*employers do not increase the employee's taxable income. As a result, there is no incentive for employees to limit the use of company cars or choose more fuel-efficient vehicles. This tax treatment results in an annual subsidy of more than USD 2 500 per year, the third highest among the OECD member countries surveyed. Therefore, it is attractive for employees to be paid part of their salary in the form of company cars. Assuming about 30% of newly registered vehicles were company cars in 2012, this favourable tax treatment led to approximately USD 205 million in revenue forgone, or about 20% of the tax revenue from vehicle-related taxes, in the same year."*

Car parks provided on a company's premises are exempt from FBT entirely, which provides another substantial subsidy to drivers. In 2013, an attempt to remove this exemption for workplaces in the central business districts of Auckland and Wellington was defeated due to political opposition and claims that the compliance costs would exceed the revenue raised (Small & Mace, 2013); this neglects the wider economic picture. The exemption should be removed. If it is not, then a second-best solution would be to also exempt public transport passes and bicycles provided to employees from FBT to at least reduce the distortion. A complementary measure which could be pursued either way, but especially if the exemption remains, is a parking cash-out law like in California. This law requires employers to offer all employees an equivalent cash payment to subsidised parking. A report evaluating the impact on eight companies found an overall 12 percent reduction in vehicle emissions from commuting (Lowrie, 2017).

The OECD review also highlights two issues around the road user charge (RUC) system and lack of excise tax for diesel vehicles. First, the way RUC rates are currently set creates a disparity between petrol and diesel vehicles, favouring diesel.[14] This helps to explain why the diesel proportion of light vehicles has steadily increased. Second, the lack of an excise tax means there is no price signal to encourage smaller or more fuel efficient diesel vehicles and eco-driving. As Figure 1 shows, emissions per kilometre for new light diesel registrations are around 20% higher than for new light petrol registrations (according to laboratory tests). Diesel vehicles also tend to emit more harmful pollutants than petrol vehicles. So these two issues in combination lead New Zealanders towards buying diesel vehicles that are worse for $CO_2$ emissions and for local air pollution. The OECD recommended considering introducing a diesel excise tax.

## Complementary regulation and incentives

Without optimal pricing including all externalities – and perhaps even if that were the case – regulations and additional incentives are justified. The most important ones are vehicle emissions standards and feebate systems, discussed under Q9.

Incentives are also particularly justified to capture the very large health benefits from increased use of active transport. NZTA's Economic Evaluation Manual assigns a value of $2.60 per kilometre walked and $1.30 per kilometre cycled based on these health benefits (NZTA, 2016). A Copenhagen study found a net socio-economic benefit of 1 EUR per kilometre shifted from car to bicycle (State of Green, 2016). Another study estimated that people who shift their daily commute from car to bicycle commute will increase their life expectancy by 3-14 months; a monetised benefit of €1,300 per year (Transport for London, 2014). In addition to infrastructure funding, these health benefits may provide a case for fiscal incentives, such as tax breaks for cycle commuters, which have been introduced or trialed in several countries (Haubold, 2017).

[14] The rates are apparently set based on litres of fuel consumed, but do not take into account the higher energy (and carbon) density of diesel, introducing a systemic bias.

## Support for innovation

Innovation is especially needed in the areas where electricity will struggle: long-distance road freight, aviation and shipping. These make sense as areas to target for R&D given New Zealand's particular geographical challenges. Driverless vehicle technology and shared mobility models also offer huge opportunities to accelerate the transition to electric vehicles, but there are risks of perverse outcomes that need to be researched and actively managed (Lowrie, 2016).

Some specific areas of potential opportunity to New Zealand where innovation could be supported are:

- Advanced cellulosic biofuels, which still appear to be one of the best prospects for decarbonising aviation and shipping in the long-term;
- Targeted application of renewable hydrogen along main freight routes, like the company Nikola is pursuing in the U.S. (Davies, 2016);
- Biogas as a transport fuel, which while limited in scale could potentially provide a low-cost fuel for heavy vehicles (biogas buses are relatively common overseas).

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

The main opportunities probably lie in switching low- and medium-temperature heat generation from coal and gas to electricity and biomass. Together, low- and medium-temperature heat make up nearly two-thirds of total heat emissions (Vivid Economics, 2017). As discussed in the Issues Paper, energy efficiency is another important opportunity.

Use of biomass residues and municipal wood waste are particularly key opportunities in the near-term due to the low (or even negative) feedstock cost, and in the latter case, associated reductions in waste emissions. Scion, the Bioenergy Association and the University of Waikato are leading the research in this area (Hall, Hock, & Alcaraz, 2017; Atkins, 2017). Their work indicates that up to 10 PJ of coal could be substituted with biomass residues, reducing emissions by around 1 $MtCO_2e$.

The upcoming "wall of wood" will further increase the availability of biomass residues, particularly if there is an increase in domestic wood processing. New forestry plantings could enable higher harvest volumes to be sustained. There are significant economic and environmental opportunities here through a joined-up strategy around land use, renewable energy and industry. "Industrial symbiosis" offers potential for developing highly profitable, low-emissions industries (Hall, Hock, & Alcaraz, 2017; Embrace Change, 2017).

Barriers include:

- Low and unpredictable carbon price;[15]
- Lack of secure biomass supply chains;
- Lack of coordination;
- Lock-in effects due to long asset lifetimes;
- Access to capital;
- Lack of robust data and evidence base.

Policy ideas include:

- Strengthening the carbon price;

[15] Intensity-based free allocation in the ETS is important for some manufacturing activities – see Q20.

- Regulations such as emissions standards on new boilers, a requirement for new or refitted coal boilers to be capable of co-firing with biomass, or a ban on some types of boilers in certain applications (e.g. no new fossil-powered boilers for low-temperature heat – see Danish Government, 2012);
- Consenting fees or a feebate system for new boilers, to create a targeted upfront cost equivalent to a high carbon price trajectory;
- Leadership through government procurement, especially in hospitals and schools;
- Accelerated depreciation of heat plant;
- Free energy consulting services and low-cost loans for SMEs;
- A national low carbon heat strategy (see e.g. DECC, 2013).

## 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?

- More cost-reflective pricing.
- Putting a directive to reduce greenhouse gas emissions into the Electricity Authority's mandate.

## 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)?

The Issues Paper doesn't mention the Kigali Amendment to the Montreal Protocol, adopted in October 2016. This agreement requires developed countries including New Zealand to begin phasing down hydroflurocarbons (HFCs) in 2019 and follow a schedule towards an 85% reduction (from a calculated baseline) by 2036. In May this year, the Government consulted on a permitting system and detailed phase down schedule (MfE, 2017).

The EU already implemented regulations in 2015 to phase down emissions of all fluorinated greenhouse gas emissions (including HFCs) by two-thirds by 2030 (European Commission, 2017a). Low-cost, energy-efficient and climate-friendly alternatives are already available for most applications (European Commission, 2017b).

For other industrial process emissions, the Issues Paper helpfully describes three categories for potential opportunities: low-carbon production technologies; end-use substitution by lower carbon products; and carbon capture and storage (CCS).

On CCS, we agree with the view that conventional CCS (by which we mean injection of gaseous $CO_2$ into porous rock or other geological formations) will likely remain economically unviable in the near future. Furthermore, we doubt that this will ever be a wise or socially-supported option given New Zealand's tectonic activity and the risk of leakage. However, the Issues Paper does not mention other potential CCS options, which we believe are far more likely to become viable. A key one is mineral carbonation, where $CO_2$ is reacted with calcium or magnesium to produce carbonate rock (Beyond Zero Emissions, 2017). The substances produced (such as magnesium carbonate and silica) have potential commercial applications, including as building materials; this is a critical factor in making the technology commercially viable. Australia-based company Mineral Carbonation International recently launched a pilot plant (Davidson, 2017) and intends to achieve commercialisation within five years at a price of AUD$40 per tonne of $CO_2$ (Beyond Zero Emissions, 2017).

For cement, a recent report by Australian think-tank Beyond Zero Emissions describes a pathway to a zero-carbon cement industry (Beyond Zero Emissions, 2017). The pathway involves five strategies:

1. Supplying 50 percent of cement demand with geopolymer cement, which does not cause process emissions;
2. Supplying 50 percent of cement demand with high-blend cements (increasing the proportion of replacement material to 70 percent);
3. Carbon capture and storage through mineral carbonation;
4. Using less cement through more efficient design and substituting concrete with timber;
5. In the longer-term, developing carbon-negative magnesium-based cements.

Beyond Zero Emissions argue that the first three strategies could deliver a zero-carbon Australian cement industry in just 10 years.

For steel, potential opportunities include:

- Reducing process emissions by replacing coking coal with biomass-derived "green coke" as a reductant. New Zealand Steel entered a future supply agreement with Blenheim-based company CarbonScape in 2013 (NZ Steel and CarbonScape, 2013), but we are not aware of any more recent public communications.
- Reducing demand for steel in buildings through greater use of timber and advanced wood products – see for example University of Canterbury, 2017.
- Using waste carbon monoxide to produce transport fuels such as jet fuel, helping to reduce emissions in other sectors – see LanzaTech, 2016.

For aluminium, we are not aware of any significant opportunities to reduce process emissions or for end-use substitution. Increased recycling would help to reduce demand for new product, but most aluminium produced in New Zealand is exported.

In terms of barriers, an important one is the high level of free allocation in the ETS, and the very low marginal carbon price this creates (see Q20). A further issue is that companies such as New Zealand Steel likely banked freely allocated NZUs during 2012-15 and surrendered cheap, poor-quality international units instead. This would mean they have a sufficient stockpile to avoid any need for unit purchasing for around a decade (Young, 2016).

There are justified carbon leakage concerns here which pose a challenge to implementing a strong carbon price. Cement and steel companies' inability to pass carbon costs into the domestic market is in turn a barrier to incentivising use of alternative building materials like wood. Interestingly, the EU considered a proposal for a border tax adjustment on cement earlier this year, but this was rejected (ICTSD, 2017).

We are unaware of any national policies to encourage the use of wood as a building material. A high carbon price should help over the long run, particularly if harvested wood products are recognised in the ETS (see Q20). There is a more immediate opportunity for government leadership here through procurement for public sector buildings. Examples of this include Rotorua's Wood First Policy (Rotorua Lakes Council, 2015), the Tasmanian Wood Encouragement Policy (Tasmanian Government, 2017) and British Columbia's Wood First Initiative (British Columbia Government, n.d.).

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

Upgrading the building code and reinstating subsidies for home insulation retrofits seem obvious choices. These could potentially be funded through ETS revenue.

Other ideas include:

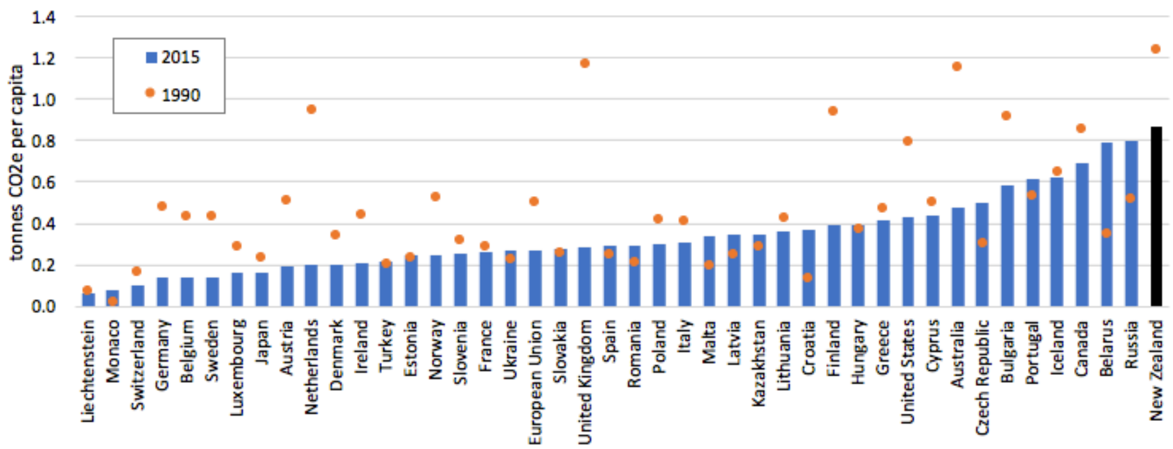
- Introducing a mandatory energy efficiency rating system for large commercial buildings, similar to Australia's Commercial Building Disclosure Programme introduced in 2010.[16] The Australian programme has been effective at inducing behavioural change and delivered significant net benefits (Acil Allen Consulting, 2015).
- Leading improvements to the building code through building social housing to higher standards: ideally Passive House standard. This will help to create economies of scale for products such as thermally broken window frames, which are currently niche in the New Zealand context.
- Enabling local councils to require higher building standards than the building code in district/unitary plans.
- Development incentives for greener buildings, such as reduced development contributions and pre-validated building consents.

Embodied emissions in the building are also important (see Q15).

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

According to the most recent data, New Zealand's waste emissions per person are the highest among all UNFCCC Annex I countries (see Figure 4).[17] Some countries – notably Australia and the UK – had similar per capita emissions levels to New Zealand in 1990 but have achieved far larger reductions. This certainly points to significant emissions reduction opportunities.

**Figure 4: Per capita greenhouse gas emissions from the waste sector in 1990 and 2015**




*Data sources: UNFCCC, 2017; World Bank population statistics*

[16] http://www.cbd.gov.au/

[17] Note that uncertainties are quite large here and it is likely there are methodological differences between countries.

As the Issues Paper highlights, there are opportunities for win-wins through use of waste products for energy where this reduces the use of fossil fuels. A prime example is the use of wood waste from construction and demolition as a substitute for coal; Golden Bay Cement was able to reduce its coal use by around one-third by doing this, reducing $CO_2$ emissions by 58,000 tonnes and delivering annual savings of $3 million (EECA, 2012).

In 2015, only 30 percent of methane emissions from solid waste came from municipal waste disposal sites (down from 37 percent in 2005) (MfE, 2017b). While significant opportunities exist to further reduce emissions from municipal waste, unmanaged sites for farm, construction and demolition, and industrial waste are the bulk of the problem. The Government no longer reports estimated emissions from farm dumps separately, but in the 2014 Greenhouse Gas Inventory this was estimated to contribute 62 percent of emissions from non-municipal waste sites, and 42 percent of total emissions from solid waste.

As the Issues Paper notes, non-municipal waste sites are not subject to an emissions price. They are also exempt from the waste levy, which is not mentioned in the Issues Paper. This creates a perverse incentive to redirect waste to non-municipal sites. Extending either the emissions price or waste levy would help incentivise waste reduction and diversion, while an emissions price would also incentivise methane capture.

The UK landfill tax was introduced in 1996, at which point waste emissions were still rising. It sets different rates for standard waste and inert waste (such as rocks and soil). The initial rates were £7 per tonne and £2 per tonne respectively (Seely, 2009). A "duty escalator" mechanism was introduced in 1999 to ramp up the standard rate each year. The current rates are £84.40 per tonne and £2.65 per tonne for standard and inert waste respectively (UK Government, n.d.). The UK Committee on Climate Change reports that biodegradable waste sent to landfill has fallen by 84% since 1990 and states that "the landfill tax has been the key driver of progress to date" (CCC, 2017).

New Zealand's waste levy is currently $10 per tonne. A recent study investigated the effects of raising the levy significantly, introducing a differentiated rate for inert waste, and extending this to all classes of landfill (Wilson, Chowdhury, Elliott, Elliott, & Hogg, 2017). The study finds net economic benefits without considering reductions in emissions or other environmental and social benefits. The highest net benefits were achieved under the scenario with the highest levies of $140/$15 per tonne for standard/inert waste.[18] The authors outline an implementation plan including changes to the regulatory regime to address risks such as illegal dumping.

Wilson *et al*. did not extend the waste levy to farm dumps in their scenarios (although they do recommend improved management practices and monitoring). The UK Government introduced legislation in 2006 which required farmers to obtain a landfill permit or pursue other options for dealing with their waste (University of Hertfordshire, 2011). However, administration and monitoring costs – and the potential for transport emissions from waste collection to exceed savings – may make this an inefficient solution. Further investigation of this and other ideas is required.

Lastly, the OECD has highlighted that only some local councils apply quantity- or volume-based waste charges for household waste (OECD, 2017). They report that:

> *"Evidence from the Auckland region indicates that districts applying volume-based charges send nearly half of the waste volume to landfills than districts financing waste management through flat charges included in property taxes."*

[18] The benefit-cost ratio was higher for the scenario with lower levy rates of $90/$10 per tonne.

Extending volume-based charges to more towns and cities will help to reduce emissions from municipal waste.

## 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?

- Land use in general, and the interactions with other environmental policy areas, especially water;
- Energy demand associated with agriculture, including downstream processing and irrigation electricity demand (Fitzgerald, Norton, & Stephenson, 2017);
- Bioenergy opportunities from forestry and waste, which tend to be geographically constrained;
- Energy system interactions – considering the system as a whole and identifying synergies and integrated solutions.

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

In our view, direct regulation is most necessary and appropriate to address lock-in from long-lived assets. As covered in earlier questions, key possibilities include:

- Emissions standards on new vehicles (Q9);
- Emissions standards, co-firing requirements or bans on certain types of boilers (Q11)
- Strengthening energy efficiency standards in the building code (Q16).

## 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?

We endorse the framework developed by Motu for managing future ETS unit supply and prices (Kerr, et al., 2017). Review decisions undertaken by the government so far are broadly consistent with this, except for the lack of a price floor. A price floor is a critical component to give certainty for low-carbon investments and ensure a clear signal for domestic mitigation. It will also aid public comprehension of the ETS, which is important from a political economy perspective. As discussed in Q10 (p. 9), a price floor may help to elicit a stronger behavioural response due to salience and perceived persistence.

Here we discuss other changes to free allocation and forestry settings, followed by agricultural emissions and some more radical ETS reform options.

### Free allocation

Total free allocation volume is projected to rise to 13.9 $MtCO_2e$ in 2030 under current settings – 17 percent of projected gross emissions (MfE, 2017c). This constitutes a 60 percent increase from 2015 after adjusting for the one-for-two surrender obligation. Combined with projected emissions from agriculture and other sources outside the ETS, this would fully absorb New Zealand's annual emissions budget by 2030. Clearly, something has to give. On the face of it, it is plainly unacceptable to have a growing volume of free allocation shifting more of the burden to other sectors and the taxpayer over time.

There is a raft of underlying problems with the current free allocation mechanism and settings which need to be addressed.

*Free allocation levels are getting more generous over time in real terms.*

The number of free NZUs a firm can receive for an eligible emissions-intensive trade-exposed (EITE) activity is calculated from:[19]

- The amount of prescribed product(s) produced;
- The allocative baseline for the prescribed product(s);
- The level of assistance for the activity.

With levels of assistance frozen, and allocative baselines set to a historic industry average,[20] the number of free NZUs received per unit of product stays the same each year. However, in most cases we would expect the actual emissions per unit of product to fall over time due to efficiency improvements – even under business-as-usual.[21] It therefore seems very likely that, on average, firms are now receiving a higher proportion of their required units for free than the levels of assistance would suggest. Each year that levels of assistance remain frozen, the free allocations will get relatively more generous.

*Allocative baselines need scrutiny.*

Allocative baselines are set out in the Climate Change (Eligible Industrial Activities) Regulations 2010. Since the full list was completed on 30 June 2011, these have been updated three times:

- On 1 January 2013, the electricity allocation factor was raised and all allocative baselines were increased accordingly;
- On 1 January 2014, fugitive coal seam methane emissions and direct use of liquid fossil fuels in stationary equipment were included in allocative baseline calculations, leading to increases for around half of the eligible activities;
- On 1 January 2015, allocative baselines for production of burnt lime and caustic soda were decreased slightly.

We have compiled all amendments to these regulations in a spreadsheet which we can provide on request. Overall, the allocative baselines are on average 2.6 percent higher now than they were at 30 June 2011.

The electricity allocation factor is especially contentious and warrants attention. This factor is intended to compensate for the ETS price impact on electricity generated or purchased ("indirect emissions"). It was raised from 0.52 tCO2e/MWh to 0.537 tCO2e/MWh on 1 January 2013, following in-depth technical discussion between industry and government (EAG Contact Group, 2012), and has not been changed since.[22] Meanwhile in the 2015 ETS review discussion document, MfE estimated

[19] Climate Change Response Act 2002, 83(2)

[20] These were determined using data collected from companies for financial years 2006/07, 2007/08 and 2008/09 (MfE, 2009).

[21] Industrial emissions intensity (kg$CO_2$e/$ GDP), excluding the basic metals and chemicals manufacturing industries, fell by 1.0 percent per annum on average since 1990 (EECA, 2017). Trends in emissions per unit of product will of course differ.

[22] Current emissions factors for gas and coal generation are 0.455 t$CO_2$e/MWh and 0.630 t$CO_2$e/MWh respectively (MBIE, 2017b). The allocation factor therefore implies a marginal generator averaging around half gas and half coal.

the ETS pass-through cost to households using a marginal emission factor of 0.44 tCO2e/MWh, which it describes as "a modification of an electricity factor included in allocation regulations" (MfE, 2015, p. 36). It is unclear why these factors should be different – if anything, one would expect the price impact for households to be higher than for industry given that they consume a higher proportion of their electricity at peak times. A crude estimate is that reducing the electricity allocation factor to 0.44 tCO2e/MWh would reduce total free allocation volume by around nine percent: roughly 800,000 NZUs under full surrender obligations, with a value of $20 million at $25 per unit.

While we would expect the ETS price impact to reduce over time with declining shares of fossil generation, there is currently no legislated schedule or process for updating the electricity allocation factor and allocative baselines.

*Uncapped intensity-based free allocation weakens the carbon price at the margin.*

The effect of the intensity-based free allocation mechanism on the marginal carbon price is under-appreciated, but was a key part of the reason the National Government adopted it.[23] Unlike under the grandfathering mechanism in the original ETS legislation, it does not disincentivise expansion in EITE industries. Production increases from existing firms or from new entrants do not face the full carbon price – they are heavily subsidised.

This rationale needs to be revisited in the context of New Zealand's transition to a low carbon economy. Free allocation on this basis "tends to drive investment toward subsidised sectors, potentially locking in high-emissions activities" (Hood, 2010). Companies trading in an activity below the "emissions-intensive" threshold must pay the full emissions cost of any increased production, while under current settings those trading in an activity above the threshold would only need to pay for 40 or 10 percent of their emissions (depending on whether the activity qualifies as moderate or high emissions-intensity). This is especially a problem when there is not a clearly signaled phase-out of the subsidy, as is currently the case. Through any long-term lens, this will drive inefficient allocation of capital in the economy.

*In general, allocation decisions have not been subject to proper analysis and scrutiny.*

The thresholds and settings for free allocation were rather hastily pushed through based on close alignment with Australia's Carbon Pollution Reduction Scheme, which was repealed in 2014. As Christina Hood details in a 2010 article in *Policy Quarterly*, public good and carbon leakage arguments have never been robustly analysed:

> *"Compare [allocation decisions] with the government's annual budget process. If, for example, a new energy efficiency programme is proposed, it must demonstrate a very high benefit-cost ratio to proceed. Spending decisions are balanced against all other government priorities – education, health, superannuation and so on – and against overall taxation and debt levels. If free allocation in the ETS were subject to the same scrutiny, this would soon flush out whether it is in fact a good investment. Would, for example, corporate tax cuts provide a better return than subsidising existing emissions intensive sectors?"*
> (Hood, 2010)

Carbon leakage risk only applies if a company is competing against overseas products with an equal or higher emissions footprint. The argument also hinges on the assumptions that few mitigation

[23] See the explanatory note in the Climate Change Response (Moderated Emissions Trading) Amendment Bill.

options exist and that other prices won't adjust to compensate (e.g. land prices or the exchange rate). None of these are tested as part of the criteria for determining free allocation in the NZ ETS, and they do not necessarily hold for the activities that currently receive free allocations.

### *Possible solutions*

The easiest step would be to begin phasing down the levels of assistance for EITE activities, as was originally meant to occur from 2013. Current legislation prescribes a phase-down rate of one percentage point per annum. Based on MfE's projections, it is likely that free allocation volume would still grow with this phase-down rate. It would also mean the subsidy persisting for 60/90 years for moderate/highly emissions-intensive activities. Clearly a faster phase-out rate is required.

Given the third and fourth issues raised above, there may be better solutions. For example, Hood suggests "capping the pool of units available for free allocation, with this pool declining at least in line with overall target levels" (Hood, 2010). An intensity-based approach can still be used to allocate within the cap, as is now done in the EU ETS. A further reform which would complement this idea very well is for an independent regulatory body to allocate the free units based on clear, objective criteria and impartial evidence. This should involve robust assessment of carbon leakage risks and economic efficiency. Taking these decisions out of politicians' hands would help to avoid rent-seeking behavior (Pezzey, Mazouz, & Jotzo, 2010).

## Forestry settings

Introducing the averaging approach as an accounting option is likely to encourage more small-scale foresters to engage with the ETS and should lead to additional planting as a result.

Devolving carbon storage and emissions from harvested wood products (HWPs) into the ETS makes sense in theory, but there are a number of practical difficulties to consider. First, application at the processor level would add significant further complexity and cost to an already complicated scheme. Second, the uncertainties around HWP carbon flows are very large – even in the context of land carbon, where this is an issue in general.[24] Third, this compounds existing problems around treating temporary carbon storage as equivalent to a reduction in gross emissions (discussed further below). On balance, the proposals made by Woodco seem sensible (Wood Council of New Zealand, 2016):
Devolve HWP flows to forest growers through deferred harvest liabilities, using a simplified average decay curve;[25]
Provide other support to the wood sector and incentives for using wood products outside of the ETS, reflecting the wider national benefits from HWPs.
Given the large uncertainties in carbon flows, highly conservative assumptions should be used for any integration into the ETS.

## Agricultural emissions and trading baskets

The points made above about economic efficiency and investment signals in relation to free allocation apply equally to exclusion of agricultural emissions from the ETS. However, there are special considerations to be made including the characteristics of the biological greenhouse gases; the ability to reliably measure and monitor changes in emissions; and the large number of small firms involved.

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[24] New Zealand's GHG Inventory assigns an uncertainty of ±51.3% to emissions from HWPs from post-1989 forest land (MfE, 2017, Table 11.4.1).
[25] For example, the ETS already uses a simple 10-year linear decay for deferred liabilities from harvest residues.

"Agriculture in or out" remains one of the dominant debates in New Zealand climate policy, but this should not be treated as a binary. As Simon Upton proposed last year, there are multiple different configurations that should be explored in light of up-to-date scientific understanding of the different emissions sources and sinks (Upton, 2016). Focusing on changes to the ETS, there are at least four main options:

| | |
|---|---|
| Status quo | Non-ETS measures introduced for agriculture (N.B. this could include other price measures). |
| All sectors, all gases | Agricultural emissions fully introduced into the ETS. |
| Two baskets | Nitrous oxide introduced into the ETS; other measures for methane. |
| Sectoral approach | Separate trading schemes for energy & industry and for the land sector (agriculture & forestry). |

For each of these options there are questions of how offsets should operate, and more fine-grained design considerations (e.g. point of obligation and free allocation settings). It would be useful for the Commission to examine arguments for and against the different options and report on its conclusions.

Whatever the preferred option is, it should be implemented as soon as practical so that the gradual adjustment can begin.

## Valuing gross emissions reductions versus offsets

Assuming something like the status quo persists, there is a case for looking at current treatment of forestry offsets.

Introducing supplementary carbon charges on top of the ETS is an idea that has had little discussion in New Zealand, but we believe it warrants consideration. Catherine Leining discusses the concept in her recent paper, *Improving Emission Pricing in New Zealand*, concluding that a price floor is preferable (Leining, 2017). She notes that in the context of a fixed ETS cap, adding an additional charge will not lead to further emissions reductions overall, but could redistribute mitigation effort within the cap and affect revenue generation. One caveat is that it may enable reductions in the cap level over time – for example, if it helps to avoid lock-in of emissions-intensive assets or activities.

Moreover, the idea is worth considering for the following reasons:

1. In the near-term, there are questions about how feasible it is to raise ETS unit prices by a significant degree – for example if New Zealand wanted to heed recommendations of a carbon price of US$40-80 by 2020 (High-Level Commission on Carbon Prices, 2017). Currently, despite no confirmed future supply other than forestry units, future contracts for NZUs in 2020 are trading at around NZ$21.

2. The longer-term issue is the way carbon storage in forests is currently treated as equivalent to a reduction in gross emissions. We discuss multiple problems with this in our *Cook the Books* report last year: non-guaranteed permanence; albedo effects; implications for long-term cumulative emissions;[26] and measurement uncertainties (Young & Simmons, 2016, Ch. 3). In

[26] Pathways that rely less upon forestry sequestration to offset gross emissions in the near-term will enable lower cumulative emissions, because forestry sequestration is effectively a one-off hit which can still be done later.

sum, gross emissions reductions – especially fossil carbon – are of significantly higher value than forestry sequestration. A supplementary carbon charge is one way to reflect this and adjust the balance of effort.

A supplementary charge could be easily administered through a surrender fee in the ETS. One option would be to target it as a "fossil fuel levy".

An alternative approach to address the issues above would be to place restrictions on the percentage of forestry NZUs that a firm can surrender. This would enable more control over gross emissions and create a price premium for auctioned units.

Finally, the other way is to rely less on the carbon price and more on a range of complementary measures that reflect the higher value of gross emissions reductions to drive stronger mitigation action.

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

Market instruments proposed in answers to earlier questions are:

- Feebate systems for vehicles (Q9) and potentially boilers (Q11) (though direct regulation may be better);
- Transport pricing measures such as congestion charging (Q10);
- Increasing and expanding application of the waste levy (Q17).

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

Strong carbon prices and national policy direction combined with meaningful, broad-based support for research and development (for example though tax credits) would hopefully go a long way to encouraging low carbon innovation.

Overseas, strong deployment policies for emerging low carbon technologies have been key to technology gains and cost reductions. In some cases, such as targeted feed-in tariffs, this has involved "picking winners". In New Zealand, there is a strong case for at least redirecting current financial support for oil & gas exploration and irrigation towards low carbon solutions.

Another idea to consider is a National Science Challenge or Centre of Research Excellence focused on New Zealand's low carbon 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?

As discussed in Q10, green transport infrastructure is very important.

## 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?

A framework like the UK Climate Change Act is key to providing greater confidence through having legislated targets with cross-party backing, extending decision timeframes beyond election cycles, and developing clearer national understanding of each sector's contribution to meeting carbon budgets. As discussed in Q20, a price floor in the ETS is also critical.

## 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?

No. Under the current framework there has been no clarity around how emissions targets will be met, and a notable lack of policy coherence across government. Climate policy has been "ghettoised" rather than being integrated in New Zealand's economic strategy as it needs to be.

An illustrative example is the Government Policy Statement on Land Transport Funding 2015. This sets funding parameters and strategy for national transport investments for the next three years, and gives an indicative funding range for the next decade. Despite the fact that the transport sector is the largest contributor to $CO_2$ emissions, the GPS makes no mention of any of New Zealand's climate change targets or the role of transport investment in helping to meet them.

*[Paul helped develop Generation Zero's Zero Carbon Act proposal, and the Morgan Foundation endorses this.]*

## 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?

Yes – as above, we support the UK model and Generation Zero's submission on this matter.

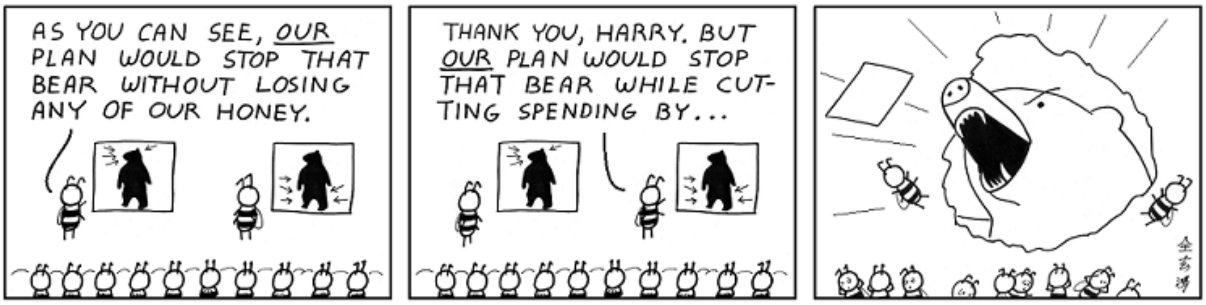
An independent body like the UK's Committee on Climate Change would generally raise the calibre of the climate policy debate in New Zealand. One minor point that is not often made is that this will be of great benefit to opposition parties and enable development of well-informed climate change policies without access to the resources of government.

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

As the Issues Paper touches on, there is a balance to be struck between adaptability and a beneficial amount of path dependence, where this can create virtuous cycles. In our view there needs to be a fairly high degree of rigidity around the 'what' – in particular getting strong buy-in to the emissions outcomes. This is central to the successful functioning of a UK-style law. Adaptability is mainly needed in the 'how'. In general, an approach of favouring broad price-based measures and other technology-neutral policy design lends itself to adaptability.

We need to be very wary of uncertainty about 'best' solutions being used to delay action altogether. We should be at least as worried about not doing enough as about adopting a solution that turns out to be second-best.

**Figure 5: Mind the Bear**




*Source: http://abstrusegoose.com/383*

## 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?

*[Paul contributed the response to this question in Generation Zero's submission.]*

The two baskets approach is discussed in relation to the ETS in Q20 (p. 21).

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