Sustainable Business Council

wbcsd Global Network Partner

CLIMATE LEADERS COALITION

ON A MISSION TO REDUCE EMISSIONS IN NEW ZEALAND

Briefing to Incoming Government on Climate Action Priorities

October 2020

DETA CONSULTING

sapere

Foreword

On behalf of the Sustainable Business Council (SBC) and Climate Leaders Coalition (CLC) we are pleased to be able to present a series of practical actions that can be taken over the next three years to accelerate the reduction of greenhouse gas emissions in New Zealand.

The report identifies priority policy and project recommendations on what an incoming Government could do to make the transition to a net zero New Zealand by 2050 go faster. This is the first of a set of reports we will present to Government over the next year.

The report was prepared for SBC and CLC by Sapere and DETA and represents the views of over 150 businesses contributing towards more than a third of New Zealand's GDP.

The report asks the new Government to continue to prioritise decarbonisation and to work in partnership with New Zealand businesses to accelerate that process.

We make 26 recommendations that we believe will set New Zealand on a path to achieve our collective goal of being zero carbon by 2050.

Top among these are increased investment in low carbon transport; an expansion of programmes to make process heat more efficient and low carbon; and speeding up the adoption of methane reduction technologies.

If we are to deliver a smooth, affordable, just transition for all, we need to think about the big picture that phases in the opportunities over the short, medium and long term. This briefing sets the direction to do this.

We support the cross-party approach that was taken to pass the Zero Carbon Act and establish the independent Climate Change Commission. And we encourage all parties to continue to build upon that consensus when taking action on climate change, as most of these policies and actions will take years if not decades to achieve their goals.

We are confident that by working together we can bend the emissions curve over the next decade which will put us on track to be a zero-carbon country by 2050. We look forward to playing our part and to working with Government and others to make this vision a reality.

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Executive Summary

1. This report has been prepared for the Sustainable Business Council (SBC) and Climate Leaders Coalition (CLC) and represents the combined view of the 150 companies they represent.

2. SBC and CLC members are implementing transition plans and working together to develop pathways that quantify the trade-offs and interdependencies that will be required for sectors and systems to decarbonise. This includes what it takes to adapt to our climate as it continues to change.

3. The report sets out 26 recommendations to the incoming government to accelerate our decarbonisation transition and prepare for more significant transformations before 2050. Its focus is on measures (policies and specific projects) that will accelerate decarbonisation in New Zealand.

4. Our **three key recommendations** are:

    a) **Invest in low carbon transport**. Develop a roadmap to accelerate transformation across the fleet (i.e. light and heavy transport), including introducing low carbon fuel standards. This will contribute to short term reductions and long-term benefits to New Zealand's carbon footprint.

    b) **On a $/t$CO_{2e}$ basis, the most cost effective and efficient change that we can make is in process heat**. The Energy Efficiency and Conservation Authority's programmes for energy efficiency should be enhanced, and the phase-out of coal-fuelled plants supported.

    c) **Create an accelerated pathway for the development and adoption of methane reduction technologies.** While the emission reductions outcomes may be some way away the R&D is urgent and the reward significant. If 30% of methane was taken out of the system that would be a reduction of approximately 11.3 Mt CO_{2e}. This represents 13% of the total national emissions and more than double the other reductions we are recommending in this paper.

5. Our full list of projects and policy actions is set out in the table below. We have split the recommendations into sectors and have distinguished between policies and projects that we consider 'enabling', which are prerequisites for significant projects in a 5-10 year horizon. Those projects with development costs indicated are ready for investment now. We have also indicated two initiatives for mobilising capital which could be enacted now, and which will have a lasting effect.

6. We are confident that the short-term projects outlined are sufficiently quantified and will have a meaningful impact on New Zealand's emissions. Across a 10-year implementation timeframe, these projects alone will deliver a 5.5% per cent emissions reduction with a total capital spend over this timeframe of $7.23B. (See Appendix A: Summary of financial tables for details). These are the 'low-hanging fruit' that we implore the government take seriously for investment.

7. A more detailed programme of work to develop these projects will follow this short piece of work later this year.

Recommendations

Sector	#	Recommendation	Time frame	Development Costs ($M)	Carbon Reductions (kT/yr)
ENERGY - TRANSPORT	1	Introduce a carbon intensity fuel standard	SHORT	POLICY RECOMMENDATION	
	2	Introduce a fuel efficiency standard for light passenger vehicles	SHORT	POLICY RECOMMENDATION	
	3	Reduce or remove the Fringe Benefit Tax (FBT) for corporate Battery Electric Vehicle (BEV) fleets	SHORT	$15	47
	4	Implement policies that reduce the number of light vehicles on the road	MEDIUM	$10	23
	5	Develop a roadmap to accelerate transformation across the fleet	LONG	ENABLING PROJECT	
	6	Develop a programme of work to decarbonise aviation fuel	LONG	ENABLING PROJECT	
	7	Accelerated asset transition plan for aviation	LONG	ENABLING PROJECT	
ENERGY - PROCESS HEAT	8	Enhance industrial energy efficiency support	SHORT	$660	639
	9	Support the phasing out of low-medium temperature coal process heat	SHORT	$2,400	3,195
	10	Support the development of biomass supply chains	MEDIUM	$30	
	11	Undertake a program to identify solutions to supply the North Island gas network with renewable gases	LONG	$20	
ENERGY – ELECTRICITY	12	Set a renewable target for all energy emissions	SHORT	POLICY RECOMMENDATION	
	13	Regulators to lower barriers to investment and activities that facilitate emissions reductions	SHORT	ENABLING PROJECT	
WASTE	14	National Environmental Standard for waste	SHORT	POLICY RECOMMENDATION	
	15	Centralised farm biomethane plants	MEDIUM	$100	27
AGRICULTURE	16	Invest in the extension and further development of models and databases to inform our understanding of catchments	SHORT	$10	
	17	Support existing knowledge sharing hubs focussed on pastoral climate change	SHORT	ENABLING PROJECT	
	18	Create an accelerated pathway for the development and adoption of methane reduction technologies	LONG	ENABLING PROJECT	
BUILT ENVIRONMENT	19	Expand the Warmer Kiwi Homes Programme	SHORT	$3,459	145
	20	NABERSNZ Ratings for Commercial Buildings	SHORT	$1	6
	21	Energy Performance Certificate (EPC) policy	MEDIUM	$25	TBD
GOVERNMENT ROLE IN DECARBONIS-ATION	22	Government to ensure it has its own decarbonisation plans in place that are comprehensive, coherent, and logical	SHORT	ENABLING PROJECT	
	23	Decarbonisation of state sector assets & ministries	SHORT	$600	240
	24	Environmental footprint disclosure	SHORT	POLICY RECOMMENDATION	
INVESTMENT	25	Establish a programme for emissions outcome-based procurement and financing.	SHORT	ENABLING PROJECT	
	26	Use proceeds from the Emissions Trading Scheme (ETS) for innovation or R&D targeted at emissions reductions	SHORT	ENABLING PROJECT	
TOTALS				**$7,230**	**4295**

1. Introduction

This paper has been prepared for the Sustainable Business Council (SBC) and Climate Leaders Coalition (CLC). Its focus is on measures (policies and specific projects) that will accelerate decarbonisation in New Zealand.

This paper has been developed following a discussion of an initial longlist at a workshop of SBC members and CLC signatories held on 7 September. SBC and CLC held a second workshop on 22 September to discuss a short list derived from the first workshop and a great deal of member feedback. The level of engagement is an indication to us of how importantly these issues are being taken by members.

This paper addresses two questions that have been well canvassed in this process. We were asked to run this process to identify:

i. priority recommendations on what the incoming government can do to make the transition to a net zero New Zealand by 2050 go faster, including policy

ii. a collective view on the projects that would qualify for the $12 billion stimulus package, and how this aligns with the Climate Change Commission's six principles.

We understand that SBC and CLC will step back from this process and formulate a more comprehensive and detailed view of the approach government and business should take to decarbonisation. That work will be used to make representations to the Climate Change Commission prior to the carbon budgets being set. That work will also be used as the basis for formal submissions to the Climate Change Commission.

2. Our understanding

Carbon budgets and plans to meet them

The budgets published by the Climate Change Commission under the provisions of the Act[1] will give some impetus to reducing emissions. The budgets are intended to provide greater predictability for all those affected, including households, businesses, and investors, by giving advance information on the emissions reductions and removals that will be required. The budgets will not, in and of themselves, reduce emissions. The Act also requires the Minister to: [2]

> prepare and make publicly available a plan setting out the policies and strategies for meeting the next emissions budget.

[1] Climate Change Response Act 2020 s 5W
[2] Climate Change Response Act 2020 s 5ZG

The plan is being prepared by Government. It will have to be a set of measures that will lead to all the decision-making required by the public sector, private firms and individuals to reduce emissions and, as a result, meet each carbon budget.

Decarbonisation is not a single project

While it may be tempting to focus on individual measures for reducing emissions, it will take many measures in each emissions category to reach our goal, and we will have to do all of them in each category eventually. In this paper we have reviewed a variety of published material that considered a broad range of measures, and we have tested these with the membership of SBC and signatories to CLC.

A methodical approach should conceptually be based on a list of everything that needs to be done (possibly thousands of different steps), ranked so that the easiest and cheapest can be identified and focused on in the first instance. The concept of a marginal abatement curve ranks actions solely by cost, but, given that everything has to be done, that is a bit simplistic. For everything on this notional list, we can also consider the role of government. There may be cost disparity, market failures or behavioural barriers to address, and the government needs a systematic way of choosing the steps where its efforts are best deployed. Table 1 sets out the actual 2018 emissions profile by category. This list provides a key indicator of where government should focus its attention.[3]

Table 1 New Zealand GHG emissions 2018 (Mt CO_2e)

	Sector totals (Mt CO_{2e} p.a.)	**% of total**
1. Energy		
1.A.1 Energy Industries (i.e. Electricity generation)	4.4	5.5%
1.A.2 Manufacturing Industries and Construction[4]	6.4	8.1%
1.A.3 Transport	16.6	21.1%
1.A.4 Other Sectors	2.8	3.5%
1.B Fugitive Emissions from Fuels	1.8	2.3%
2. Industrial Processes and Product Use	5.2	6.5%
3. Agriculture	37.7	47.8%
4. Land Use, Land-Use Change and Forestry	-23.4	
5. Waste	4.1	5.1%
Sectors/Totals (Gross, excluding LULUCF)	**78.9**	
Sectors/Totals (Net, with LULUCF)	**55.4**	

[3] Ministry for the Environment, New Zealand's Greenhouse Gas Inventory published in 2020
[4] Also known as "process heat"

This work is orientated towards action that can be taken by business and government in the near term. It includes potential projects and policies government can consider.

Work we have drawn on includes "Accelerated electrification: Evidence, analysis and recommendations", published by the Interim Climate Change Committee, and "Low-emissions economy", released by the Productivity Commission in 2018. We note also MFE's response to the Productivity Commission's work.

The Interim Climate Change Committee was asked to consider the viability of achieving 100 per cent renewable electricity in a normal hydrological year. Their lead recommendation from this work was:

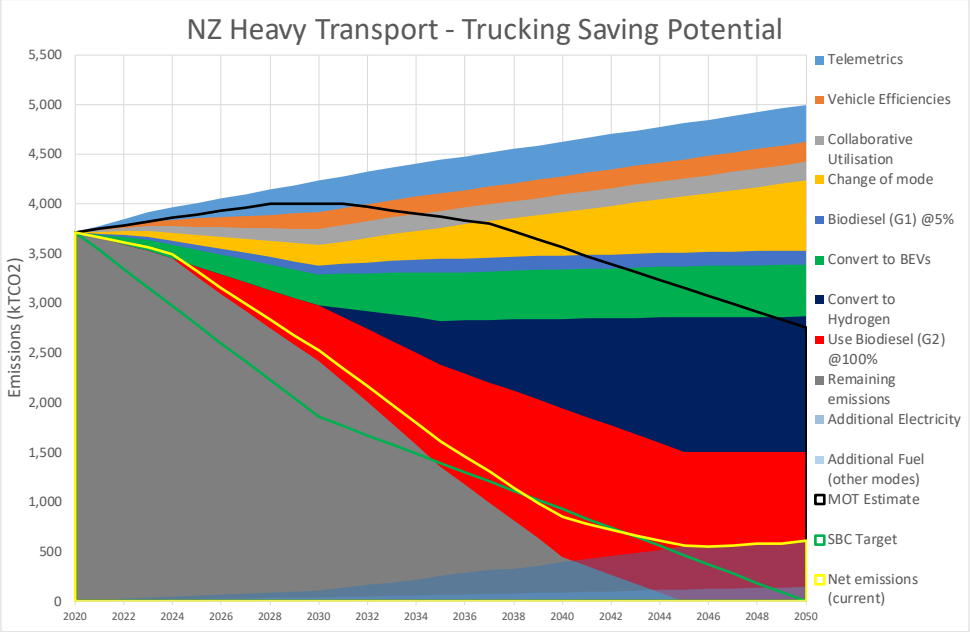
> The Committee recommends that the Government: a. Prioritises the accelerated electrification of transport and process heat over pursuing 100 per cent renewable electricity by 2035 in a normal hydrological year because this could result in greater greenhouse gas emissions savings while keeping electricity prices affordable.

We have followed the Committee's logic for our work. We note that often electricity is confused with energy. In terms of emissions, electricity generation accounts for only 5.5 per cent of annual emissions (4.4 Mt CO_{2e} p.a.) compared with the other categories of energy. Out of total national emissions, 21 per cent of energy emissions comes from transport (16.6 Mt CO_{2e} p.a.) and 8.1 per cent from process heat (6.4 Mt CO_{2e} p.a.). Emissions specifically from cars and light duty trucks are 16.9 per cent of total national (13.3 Mt CO_{2e} p.a.), and the cost of reducing this emissions source is cheaper than removing the last couple of percent of emissions from electricity. While removing emissions from process heat is challenging, there are a number of options, and with support from government, a great deal of progress can be made in this category as well.

We also cannot just ignore the agriculture sector because it is proving a tough problem to address. Agriculture is responsible for 47.8 per cent of emissions (37.7 Mt CO_{2e} p.a.), and this raises another conceptual issue for prioritising effort to reduce emissions. Some initiatives – such as displacing a fossil fuel-powered vehicle with an electric vehicle – reduce emissions immediately, so initiatives in this domain should be treated with urgency. However, the issue with agriculture or high-grade process heat or aviation transport is that it is R&D that should be conducted with urgency if there is to be hope for being able to reduce emissions in the future.

Example: the approach taken by the SBC Freight Group

The need for decarbonisation to be a multi-faceted push is illustrated by the work being done by the SBC Freight Group. Figure 2 below shows the emissions for heavy freight starting at of 3.7 Mt CO_{2e} in 2020, rising to 5.0 Mt CO_{2e} in 2050. In order to reduce emissions to zero by 2050, we consider there are eight initiatives required to be executed in some weighting or another. Some steps are in the hands of individual freight and logistics companies. Some require the sector to work together, and some require government to provide a more enabling environment, some R&D and assistance with funding, or they may never happen. The critical takeaway from this profile is that we either need to do everything on the list or do sufficiently more of some things to negate the need for others. We cannot just say, for example, hydrogen is the answer. It is not the answer; it is one of a number of answers, all of which have to be pursued. In fact, fuel substitution will be some combination of EVs for light trucks, with biodiesel as a transition fuel for medium and heavy trucks as the capacity for hydrogen is developed over the next 10 years.



3. Initiatives for the incoming Government to consider

3.1 Approach

Section 3 sets out the options that SBC/CLC recommends the government investigates on a sectorial basis. This will enable SBC/CLC to more effectively brief the specific ministry with actions most pertinent to their sphere of influence.

We arrived at options through a member-based process. We provided members a paper that canvased a wide range of ideas for all categories of emissions and relevant enabling processes. The source documents included the Productivity Commission's Low-emissions economy report, the Interim Climate Change Committee's Accelerated electrification: Evidence, analysis and recommendations report and a number of relevant sectoral reports. (The full list of inputs is in the references section.) We also received inputs from individual members and a survey of CLC signatories. The full paper was discussed at a workshop of members.

We rendered the first paper into a shorter version that reflected SBC and CLC members' responses to all the ideas we presented. A number of members provided additional material to inform this step. We conducted a second workshop of members to refine the recommendations to government. This paper is the result.

We have split the initiatives into the following categories:

- energy – transport
- energy – process heat
- energy – electricity
- waste
- agriculture
- built environment
- government's role in decarbonisation
- investment

3.2 Energy – transport

Headline: Invest in low carbon transport. Develop a pathway to accelerate transformation across the light and heavy transport fleets. This will contribute to short term reductions and long-term benefits to New Zealand's carbon footprint.

We make the following decarbonisation recommendations associated with transportation:

- Road transport
    - introduce a carbon intensity fuel standard
    - introduce a fuel efficiency standard for light passenger vehicles

- reduce or remove the Fringe Benefit Tax (FBT) for corporate Battery Electric Vehicle (BEV) fleets
- implement policies that reduce the number of light vehicles on the road
- develop a roadmap to accelerate transformation across the fleet.

- Aviation
  - develop a programme of work to decarbonise aviation fuel
  - adopt an accelerated asset transition plan for aviation.

3.2.1 Road transport

Recommendation 1: Introduce a carbon intensity fuel standard

To accelerate the decarbonisation of road transport, New Zealand needs a mechanism that would incentivise a more rapid reduction in the carbon content of fuels sold. The NZ ETS alone is not sufficient because the ETS impact on the total fuel price is bundled up with other price components, making the ETS signal weak.

A carbon intensity fuel standard would apply to all transport fuels and would consider all emissions associated with the production, transportation, and consumption of the fuel. The standard is a technology-neutral approach to decarbonisation, favouring those that offer the deepest decarbonisation for the least cost.

A number of jurisdictions have implemented such standards successfully. In California, the Low Carbon Fuel Standard (LCFS) uses a credit-based system, where credits are awarded to producers who reduce their carbon intensity below set targets. Fast charging of electric vehicles also generates credits under the scheme, with the standards steadily increasing over time. In Germany, the Climate Protection Quota set a target of 6 per cent reduction in GHG emissions from mineral oil industry products between 2010 and 2020.[5] In both jurisdictions, the policies have driven innovation in biofuels production, resulting in greater reduction in emissions from biofuels than from other fuels (e.g. ethanol).

We note that the nature of policy needs to account for the maturity of available competing technologies. Where available technologies can deliver emissions reductions over a short or medium timescale, carbon intensity-based policies are an effective solution because the mix of options available currently or in the immediate future enables decision-making based on marginal abatement costs of different options.

However, where a technology can provide decarbonisation potential but currently entails high investment and production costs, guaranteed demand volumes may still be necessary to de-risk industry investments and support market growth. For example, domestic production of biodiesel has stopped due to foreign competition for domestic tallow, which has increased the end-use price for biodiesel. Previous users of biodiesel have responded by eliminating their demand for this product in

[5] A similar target was set by the EU Fuel Quality Directive (FQD) implemented in Europe in 2009. The FQD set an obligation on fuel suppliers to reduce the GHG emissions intensity of automotive fuels in 2020 by 6 per cent compared with 2010.

order to retain their relative competitiveness. The Z plant could provide up to 20 million litres/year but needs surety of demand and capital investment to get it up to that—in the absence of this, the plant will remain mothballed.[6]

The government should consider biofuel sales obligation over the short term to help build up a domestic market for biofuels. The obligation would require oil companies to ensure that a predetermined share of total annual fuel sales is taken up by renewable fuels. Other countries have introduced similar policies to reduce investment risk associated with conventional biofuel production (e.g. Singapore). New Zealand needs to acknowledge the problem and act on it. To be clear, this sales obligation would act as an interim policy to build the market for alternative fuels that can deliver immediate emissions reductions. Over the long term, a technology-agnostic low-carbon fuel standard should be the primary policy.

In summary, we recommend that the government:

- introduces a low-carbon fuel standard, in line with MoT's conclusion.[7] Leveraging off the experience from overseas jurisdictions, a carbon intensity standard could be implemented as early as 2025 in New Zealand. This would provide fuel producers and distributors with enough lead-in time to meet new requirements. Renewable fuel subsidies could be aligned to the level of anticipated support required in the early stages of the standard.
- considers introducing a biofuel sales obligation as an interim policy over the short term.

Recommendation 2: Introduce a fuel efficiency standard for light passenger vehicles

Fuel efficiency refers to how much fuel a vehicle uses per km, and can be measured in terms of gCO_2/km. This is a preferred metric because it is fuel agnostic and provides a direct measure of the environmental impact.

Currently, New Zealand has no regulations to influence the fuel efficiency of light vehicles entering the fleet. New Zealand is one of only three OECD countries without vehicle fuel efficiency standards.[8] The consequence of inaction is that the light vehicles imported into New Zealand today are among the most fuel-inefficient across the OECD.

In 2019 the Ministry for Transport recommended that a Clean Car Standard be applied to new and used light vehicles entering the NZ fleet. We agree that the government should establish a fuel economy standard going forward, with reducing targets (supply side), fit for the NZ market, and including measures to mitigate impacts on low-income transport users. This echoes the Productivity Commission recommendation that

[6] There exists a biodiesel plant in Wiri, but it was mothballed in May due to international competition for tallow.
[7] (MoT, 2020)
[8] The other two OECD countries are Russia and Australia, although Australia has been considering introducing a vehicle fuel efficiency standard (MoT, 2019)

> The Government should introduce CO_2 emissions standards for light vehicles entering the New Zealand fleet, subject to detailed consideration of design issues (for example, the treatment of small traders).[9]

The initial benchmark should be set at a level that will incentivise changes in consumer behaviour, and we think that the proposed 150 gCO_2/km is a reasonable benchmark. The benchmark should be progressively lowered. However, this should by reference to actual weighted average of CO_2 emissions achieved rather than the target of 105 gCO_2/km by 2025 as proposed by the Clean Car Standard.

Our savings estimate is based on halving the emissions of the light vehicle fleet.

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years) [10]	Simple Marginal Abatement Cost of Carbon
$0	$0	4,730,000	25	0

Recommendation 3: Reduce or remove the FBT for corporate BEV fleets

The fringe benefit tax is currently calculated in proportion to the cost of the motor vehicle value.[11] This disadvantages BEVs because they are currently more expensive than Internal Combustion Engine (ICE) vehicles[12] with similar specifications. FBT exemptions only apply to utes, vans or trucks.[13]

We recommend that the government reduces or altogether removes the FBT for electric vehicles so that businesses can better justify the cost of transitioning a corporate fleet. Our figures are based on a 0.5 per cent reduction in nationwide emissions, while excluding the estimated cost of FBT on 0.5 per cent of the 3.8M cars in NZ at $40k per vehicle.

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple Marginal Abatement Cost of Carbon
$0	$15.2M	47,300	25	320

Recommendation 4: Implement policies that reduce the number of light vehicles on the road

Together, the Freight Connections and Climate Change strategic priorities in the 2021 Government Policy Statement are aiming to increase the availability of active modes and reduce pollution. We

[9] R12.4 from (Productivity Commission, 2018)

[10] Indicates the life of the low carbon asset. We have used to calculate the simple Marginal Abatement Cost of Carbon (value capital/ (carbon change x useful life) to make comparisons of the financial efficiency of each project.

[11] The motor vehicle value can be determined either using the cost price, or the tax value which is the cost price less accumulated depreciation.

[12] ICE = internal combustion engine

[13] https://www.business.govt.nz/news/fringe-benefit-tax-private-use-of-vehicles/

support this direction and urge the government to adopt a package of policies and regulations that reduce the number of light vehicles on the road.

We recommend that this package includes measures that:

- increase vehicle occupancy and system productivity (e.g. carpooling). This should leverage digital opportunities, e.g. intelligent transport systems (including safe rideshare apps) that enable better trip management.
- improve the pricing system for transport to better internalise the costs associated with private vehicle use, such as parking charges or congestion charges. A congestion charge would encourage desired behaviours (fewer cars on the road, more people per car, more EVs on the road), reduce transport-related emissions and bring the cost of EVs down. It would also provide a mechanism allowing investment into public transport infrastructure, innovation into cleaner fuels and improvements to existing assets. There are many examples around the world of such programmes working well.
- subsidise the purchase and use of e-bikes and scooters. There already exists an e-bike subsidy for government workers. Extend this for non-government businesses. Our figures are based on a car's average emission of 4.6t/year, 10,000 e-bikes a year, $1,000 subsidy.

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple MACC
$10,000,000	-	23,000	2	217

Recommendation 5: Develop a roadmap to accelerate transformation across the fleet

The 2021 Government Policy Statement on land transport has climate change (developing a low carbon transport system that supports emission reduction) as one of four strategic priorities.[14] We note that under one of the strategic priorities the primary outcome focuses on a "rapid transition" to a low-carbon transport system. The input we have received for this work shows strong support for a much bolder vision in transport. Transport emissions are 21.1 per cent of New Zealand's total emissions and 52 per cent of energy emissions. If emissions from this sector were halved, that would be a greater contribution than reducing any other sector (except agriculture) to zero.

The SBC Freight Group has developed a roadmap to zero emissions for freight. The group has established that there is scope for electrification, use of biofuels and adoption of hydrogen across the light and heavy fleets. A coherent emissions-orientated strategy would integrate road transport with land use, mode change, tax strategies, development of comprehensive biofuels strategy (coordinated across liquid fuels, electricity, biomass and forestry) and behavioural changes.

We recommend that the government develops an aggressive roadmap to accelerate the transformation of the transport asset make-up, with policies tailored to the type of vehicle (light,

[14] Government Policy Statement on land transport 2021/22–2030/31 https://bit.ly/2HGY1jM

medium or heavy) as necessary. As part of this roadmap, we recommend that the government makes a strong, aspirational commitment to the future state of the fleet—we anticipate that a complete transition to a low-emissions fleet by 2035, with a fully renewable fleet by 2045, would be appropriate.

For light vehicles, the priority should be getting older cars off the road, followed by getting electric vehicles into the fleets and making the choice between ICE and electric vehicles less challenging financially. This will require policy alterations also—there are existing government recommendations indicating that charging electric work vehicles at home is not recommended, which is not in agreeance with the direction we need to take.

We note that policies aimed at getting older vehicles off the road may place an unfair burden on low income households. The design of measures to achieve this should factor in a just transition.

For light vehicles, we recommend that the Government:

- adopts policies and regulations that ensure New Zealand does not become a dumping ground for fossil-fuelled vehicles.
- introduces a scheme that adjusts prices of new vehicles to reflect their emissions contribution to encourage significant changes in consumer behaviour—a demand-side response. The size and nature of new vehicles entering the national fleet is not simply a supply-side issue. They reflect the preferences of consumers, whose needs are determined by a range of considerations that may be unique to NZ. Our proposal echoes the Productivity Commission's recommendation that [15]

  > The Government should introduce a price feebate scheme for new and used vehicles entering the fleet, subject to identifying the most suitable design features for the New Zealand context (including features to limit the burden on low-income households).

- investigates opportunities to further incentivise the scrappage of older vehicles. This could include more stringent requirements for warrants of fitness and higher costs for annual licensing of older vehicles. We recognise that there are significant social issues to address in exiting older vehicles from the fleet and that the cost of scrappage and of upgrading to a newer vehicle will be prohibitive for many low-income households. The government should consider cash incentives that could be provided for scrappage or for low-income households to trade older vehicles and purchase more fuel-efficient cars.

For heavy vehicles, we recommend that the Government:

- invests in building up a domestic industry that can refurbish used high-emitting trucks with lower-emissions options. New trucks generally enter New Zealand as a cab and chassis and have freight bodies and other equipment fitted locally; this has created domestic skill base with expertise in truck assembly.

  We are aware of the barriers to such refurbishment on a scale, particularly the reluctance of truck manufacturers to provide warranties. We therefore support MoT's conclusion that[16]

  > Newer existing diesel trucks would need to be the target market for refurbishment as a result. These are the diesel trucks being brought in today and

[15] R12.1 in (Productivity Commission, 2018)
[16] (MoT, 2020)

over the last couple of years, and once they have been operating 6-7 years undertaking front-line freight tasks. These do not have deteriorated running gear and operate in the fleet longer than used trucks being purchased, and so can justify the investment.

3.2.2 Transport – Aviation

Domestic aviation emissions make up about 6 per cent of transport emissions (~1.1 Mt CO_{2e}/year). Emissions from international aviation are currently excluded from international commitments, as these emissions are more difficult to attribute. However, they are material—in 2015 these were estimated to be around 2.8 Mt CO_{2e}.[17] There are ways to decarbonise New Zealand's aviation in a way that both benefits domestic emissions reduction objectives, and de-risks New Zealand's ability to respond to a strengthening global policy action on aviation, as well as to a growing focus in export markets on emissions embodied in goods.

Decarbonising aviation is much more challenging than decarbonising other modes of transport. Internationally, through financial support and supportive policy, governments have played a key role in helping aviation to lean into this challenge. There are things that the New Zealand government can do now and things it can help develop over the next few years to support the low-carbon transition in aviation.

Recommendation 6: Develop a programme of work to decarbonise aviation fuel

Sustainable aviation fuel (SAF) has the "greatest potential for achieving carbon-neutral growth in aviation."[18] We expect that over the next decade SAF will be the primary tool utilised by the aviation industry to decarbonise. Currently, there is no commercially viable SAF supply in New Zealand, largely due to the lack of supportive policy. In offshore ports where SAF is being produced, it has been supported to market by public funding and policy. New Zealand needs to act rapidly to have any chance of catching up. This is also an example of an issue where the New Zealand government could usefully partner with other governments or international private sector research organisations.

We recommend that the government develops a programme of work to establish an SAF supply market in New Zealand. This programme of work could be part of an integrated approach to reducing emissions in the transport sector by targeting the carbon component of fuels. For example, we expect that SAF-focused research can provide market insights that would also be relevant for a biofuels market in road transport. An integrated approach would allow these co-benefits to be harnessed.

Specifically, for SAF, we propose that the programme of work:

- establishes a working group (with public and private participants) to determine policies required to support the development and commercial deployment of SAF.
- examines the option to introduce a blend and/or a production mandate on suppliers of aviation fuels.

[17] (Productivity Commission, 2018) analysis based on MBIE data on fuel supplied locally.
[18] (Productivity Commission, 2018) referencing the Carbon War Room.

- reviews NZ ETS rules to ensure they incentivise a switch from high-carbon to low-carbon aviation fuel.
- undertakes an initial feasibility study on making SAF in commercial quantities.
- based on the study outcomes, determines the funding required to support commercial facilities in New Zealand.

Recommendation 7: Adopt an accelerated asset transition plan for aviation

In addition to SAF, there are several other fuel options that airlines and airports can already implement to de-carbonise the sector—the technology is there.

For example, the use of aircraft Auxiliary Power Units (APUs) – the small gas turbine engines on-board jet aircrafts providing power on-ground for lighting, galleys and avionics systems – could be replaced with Ground Power Units (GPUs) that allow international aircrafts to plug into low-emissions electricity while preparing for the next flight. Such GPUs have been introduced at the Auckland and Christchurch Airports and can save up to 180kgs of aviation fuel per hour.[19] Because GPUs use mostly renewable electricity to power the aircraft, they also dramatically cut carbon emissions.[20]

However, GPUs also have a high upfront capital cost and require continued collaboration between airlines and airports to ensure airport infrastructure enables power and pre-conditioned air at all gates. As airlines are encouraged back after tight COVID-19 restrictions, and contracts are renegotiated between airports and airlines, there is an opportunity to mandate greater adoption of emission-saving technology, which can deliver both environment benefits and cost savings. If an A320 is plugged in to ground-power for five hours per day, then over 365 days of the year 730 tCO_{2e} can be saved per aircraft, with total annual cost savings of around $185k.

Other measures that could be implemented in the short to medium terms as part of the accelerated asset transition plan for aviation include:

- electrification of ground support equipment (GSE), which is used to service aircrafts between flights. Given that airport operations are within the confines of the airfield, many of these vehicles are ideally suited as electric vehicles, as they do not have long range requirements. Replacing diesel generator systems (producing heat, energy, and cooling) with clean, renewable energy alternatives.

The government needs to play a leading role in the transition to net zero for the aviation sector and in supporting the sector's de-coupling from fossil fuels. Decisions taken now over the direction of and investment in the industry will ultimately impact the resilience of the sector and thus aviation's future viability. At a time when the industry is facing significant losses, market-based solutions alone will not deliver the required aviation de-carbonisation targets.

We see the government's role as twofold. First, it needs to act as a convenor of stakeholders and take a climate action partnership approach to designing a pragmatic joint emissions reduction plan. This approach can be taken as part of the wider tourism sector (with the Tourism Futures Taskforce being

[19] (NZ Government, 2016)

[20] Every day when the Emirates A380 flies into Christchurch it plugs into a GPU. This saves around 1,000kg of fuel and 3,150kg of carbon emissions on each turnaround (Christchurch Airport, 2020).

well placed to progress this) or follow an approach similar to the way He Waka Eke Noa works for the agricultural sector.

The second role that the government needs to play is that of a co-investor in the projects included in the accelerated transition plan. Below we present indicative costs and emissions reductions that could be achieved through projects as discussed above.

Project	Value Capital ($)	Carbon Change
Ground Power to Gates	$300,000 per gate	730 tCO2e per A320 p.a.
Terminal Ground Source Heating System	$3.1m	1,000 tCO2e p.a.
Charging facilities for electric aviation	$20,000 for charging infrastructure / transformer box	80kg CO2e per 1h flight
Ground Support Equipment example, airport electric fire truck	$1.7m per truck	15,318kg CO2e per truck p.a.
10MW solar energy park	$10m	

3.3 Energy – process heat

Headline: On a $/tCO$_{2e}$ basis, the most cost effective and efficient change that we can make is in process heat. The Energy Efficiency and Conservation Authority's programmes for energy efficiency should be enhanced, and the phase-out of coal fuelled plants supported.

We make the following decarbonisation recommendations associated with Energy – process heat:

- Enhance industrial energy efficiency support.
- Support the phasing out of low-medium temperature coal process heat plant.
- Support the development of biomass supply chains.
- Undertake a program to identify solutions to 'green' the North Island gas network.

Recommendation 8: Enhance industrial energy efficiency support

There are existing government support programmes that focus on industry:

- gathering the right skills from both internal and external resources to develop and deliver decarbonisation projects.
- having support for technology demonstration projects.

We also note that a $70M fund has been announced for the private sector to utilise for decarbonisation. We are unclear if this fund will remain regardless of the election result.

Industry has challenges around investment due to two key reasons:

- Renewable energy operating costs (especially electricity) are much higher than incumbent fuels (coal, gas).

- Process heat plant have a long life, and many are only part-way through their operating lives. Writing off these assets has a significant impact on company accounts.

This idea is for the government to accelerate the adoption of renewable process heat technologies across industry by extending funding to the existing $70M private sector fund. We expect that this fund is continued to be managed by EECA. We suggest that the subsidy is tied to the level of carbon saving (more significant for conversion or efficiency projects associated with coal combustion, less so for consumers of diesel, gas, and Light Fuel Oil (LFO)) to accelerate conversion of those boilers that contribute more to New Zealand's carbon emissions. We expect that projects will initially be around delivering carbon reductions through energy efficiency improvements, with later projects providing replacement low or zero emission process heat plant. An indicative subsidy figure of $100/TCO$_2$ saved would equate to 20–25 per cent of the capital cost of a replacement boiler plant.

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple MACC
$660M	-	639,000	25	42

Recommendation 9: Support the phasing out of low-medium temperature coal process heat plant and prohibit the development of new fossil fuel consuming process heat plant

Many of the SBC and CLC member companies have made their own intentions clear about phasing out of coal heating systems and converting to electricity or biomass-fuelled options. There are numerous example plants for a range of low carbon technologies, including heat pumps, biomass boilers and electrode boiler options. And the economics of converting are being improved significantly as the ETS increases the local cost of carbon.

This idea is for the government to undertake the following:

- Prohibit the installation of any new coal boilers for stationary process heating energy.
- Support the phasing out of low temperature (less than 100°C operation) fossil fuel boilers operating in New Zealand. The timing of this phase out should align with the increased availability of alternative energy sources and the ability for the investment required to return the cost of capital.
- Develop a transition plan in conjunction with Government and Industry to phase out the operation of all process heat fossil fuel boilers operating in New Zealand by 2050.
- Provide additional support to businesses through EECA's existing programme to not only develop options and business cases but incentivise the purchase of boilers. We suggest that the incentive is tied to the level of carbon saving (more significant for coal conversion, less so for diesel, gas, and LFO conversions) to accelerate conversion of those boilers that contribute more to New Zealand's carbon emissions.

Note that we have excluded natural gas from this policy at present, on the assumption that there is a clear path forward to decarbonise the natural gas network (outlined below).

If all industry converts to a 100 per cent renewable alternative, this removes 6,390 kT CO_2 (8 per cent of national emissions). The alternative strategy would be to support the OPEX piece for business to

reach parity on fuel prices. However, we have maintained a simple capital contribution of an estimated 25 per cent for the purposes of this exercise, and this programme would deliver half of the sector's emissions) (therefore 3,195 kT CO_2).

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Yrs)	Simple MACC
$2.4B	-	3,195,000	20	37.5

Recommendation 10: Support the development of biomass supply chains

Biomass energy, or bioenergy, is the energy from plants and plant-derived materials. We propose that a nationwide survey is undertaken to ascertain current availability of sustainable biomass energy supply and project the forward demand for biomass across individual regions. This will require engagement with industry to ensure it reflects their business and decarbonisation strategies.

In conjunction with this survey, we propose that a nationwide sequestration model is developed. This will review:

- current planting levels across the country to estimate current, and 10–20-year biomass availability and planned investment in infrastructure to support a sustainable biomass energy network.
- an ecological review.
- a cost model, per hectare, for optimising planting to support land-owners choices and decision making for estimated biomass production and estimated carbon sequestration levels over the next 50 years.

The output from the demand survey and a sequestration model would have the potential to be used to develop a biomass roadmap. Many members have begun to investigate planting most beneficial to New Zealand's low carbon future (productive for biomass, sequestering native or exotic forest).

We estimate that this project will cost $30 million over a three-year period.

Recommendation 11: Undertake a programme to identify solutions to supply the North Island gas network with renewable gases

In the South Island, there is no easy centralised decarbonisation solution, relying on conversion towards electrification and biomass solutions for process heat. In the North Island, however, there is an existing gas network, and there is potential to convert the network instead of converting the end users.

There are a range of alternative gases that could be utilised in the existing network, including hydrogen, biomethane and biogas, or pyrolysis gases. These gases could be blended within the existing network and the ratio increased over time as part of a coordinated, comprehensive transition plan. This could also be converted at a much lower capital cost to New Zealand—rather than procuring more than 100 new boilers and fuelling these boilers with new sources of wood or electricity, several significant green gas generation assets could be developed. Such an approach could have multiple benefits across the decarbonisation transition, if it also assists with regional waste.

We propose that Government work with industry currently assessing this potential to investigate the feasibility of alternative gas supply options and to create a path forward for sensible investments towards a fully renewable gas network. Following this we propose that pilot plants are developed to prove the scalability of the recommended technologies.

We estimate that the development of this project will cost $20 million over a three-year period.

3.4 Energy – electricity generation

Headline: Augment the 100% renewable electricity goal with a renewable target for energy. Prioritise other, more carbon-intensive emitters (**transport, process heat)** over investment in 100% electricity generation and to ensure that the overall path to net zero carbon deploys the least cost options first.

We make the following decarbonisation recommendations associated with Energy – electricity:

- Set a renewable target for energy to encourage optimal decarbonisation decisions.
- Regulators to reduce barriers to investment and activities that factor decarbonisation.

The Energy – electricity generation category of emissions has already been the subject of a chapter in the Productivity Commission's low-emissions economy study and a complete study by the Interim Climate Change Committee. The Government's has a stated policy to aim for 100 per cent renewable electricity in a normal hydrological year by 2035 and that target date may be changed to 2030.

The Interim Climate Change Committee's modelling used gas storage, possibly expanded from current capacity, as the cheapest means of achieving security of supply in a nearly renewable electricity world:[21]

> The modelling shows that once base load thermal is retired and replaced with geothermal, wind/solar and batteries around 98 per cent renewable (on average) can be achieved by 2035 at relatively low cost.
>
> It is assumed there is a capital cost of $200m for upgrades to Ahuroa (to increase withdrawal capacity to 150TJ/d) and working capital costs of $10m/yr and fixed option fees of $22m/yr to secure access to 8PJ/yr of flexible gas priced at a variable cost of $9.6/GJ.

We also note that the Interim Climate Change Committee urged government to focus its decarbonisation efforts on the two larger emitting energy categories—process heat and transport. We have followed that thinking in this report.

Recommendation 12: Augment a 100% renewable electricity goal with a renewable target for energy (i.e. transport, process heat and electricity combined)

The group understands the imperative to add to the impetus to decarbonise electricity generation. However, as the Interim Climate Change Committee observed it will be expensive to achieve the last

[21] John Culy 2019

percent of renewable electricity to get to 100%. The group notes that renewable electricity is a means to an end i.e. supports the electrification of the two largest sectors transport and process heat. If those sectors were electrified at current renewable electricity percentages New Zealand's carbon footprint would be reduced significantly. Near 100% renewable electricity would be the icing on the cake. The group endorses the finding of the ICCC to prioritise other, more carbon-intensive emitters than electricity generation and to ensure that the overall path to net zero carbon deploys the least cost options first. It takes the view that a renewable target for the whole energy system would be more meaningful and more effective than a renewable target for electricity generation in encouraging investment and behavioural changes that prioritise decarbonisation.

Recommendation 13: Regulators to remove any barriers to investments that would facilitate emissions reductions

The contestable wholesale and retail electricity markets are regulated by a market regulator (the Electricity Authority) while monopoly network businesses are regulated by an economic regulator (the Commerce Commission). We understand that emissions reductions objectives are national, economy-wide objectives as expressed in the Climate Change Response Act, but those regulators have a role to play in the parts of the sector they regulate to support the purpose of the Act. They can reduce barriers to investment and behaviours that support emissions reductions.

We can see that Ofgem, the UK regulator for contestable and regulated activity, takes an active role in decarbonisation:[22]

> Ofgem, the energy regulator, has a crucial role to play in helping the UK decarbonise its economy – and in particular, to protect the consumers of today and tomorrow in this transition.

We note that the Electricity Authority has included low emissions energy as one of five sector ambitions in their statement of intent.[23]

> While the Electricity Authority's statutory objective, powers and functions have remained the same since 2010, the environment in which we operate has changed.
>
> Priority actions we will take
>
> - Ensure electricity market settings and conditions support an efficient transition to low-emissions energy, through competition, whilst maintaining reliability
>
> - Implement price signals that facilitate lowest overall cost to consumers, including through investment in and operation of energy technology and demand-side flexibility

[22] Ofgem decarbonisation action plan See: https://www.ofgem.gov.uk/system/files/docs/2020/02/ofg1190_decarbonisation_action_plan_revised.pdf

[23] Electricity Authority Statement of Intent 1 July 2020 – 30 June 2024 See; https://www.ea.govt.nz/about-us/strategic-planning-and-reporting/statement-of-intent/

We urge the Authority to follow through on this strategic intent and implement the recommendations of the Innovation and Participation Advisory Group under the Equal Access work stream.[24] That work identified options the Authority (and in some cases the Commission) could take to strengthen the equal access framework to further promote competition, reliability and efficiency in the provision of electricity and electricity related services, including network support services.

At present the Commerce Commission's statement of intent does not mention the environment, decarbonisation or GHG emissions at all.[25] We would like to see the Commerce Commission actively reflect Government policy and intent on GHG emissions while upholding its statutory remit. Steps would include prioritising work and making decisions that reflect the contribution the electricity system must inevitably make to the decarbonisation agenda.

3.5 Waste

Headline: Channel the proceeds of the Waste Minimisation Levy to reducing GHG emissions from waste. The operational cost of managing waste is usually the main challenge of establishing and maintaining the most fit for purpose waste management solutions. The Waste Management levy and fund should be focussed through a 'climate' lens where incentives are tied to the solutions that reduce emissions by virtue of their scale and operational emissions including transport as well as the impact of the tailored solution.

Waste collectively accounts for approximately 4.0 MT CO_{2e}/yr. Waste emissions are broadly split into landfill emissions (approximately 1.8% of total) and farming waste (approximately 3% of national emissions). This landfill component includes household and commercial waste disposed of at mostly managed municipal landfills. Farm waste largely comprises liquid waste streams from animals. Like other categories, some subcategories of emissions from waste are hard to address and others easier. For example, solid waste disposal on farms has a higher degree of difficulty to address than waste to landfills. However, there are a number of steps government can take that would change behaviour and reduce emissions.

The decision making around our waste practices and the consequential GHG emissions lies with district councils, regional councils, private firms, farmers and urban communities. A lot of decisions prioritise cost, commercial considerations and sometimes the most expedient form of disposal. The challenge for this sector is to incorporate and prioritise waste's contribution to GHG into all decision making.

Recommendation 14: National Environmental Standard for waste

A National Environmental Standard is a regulation that prescribe technical and non-technical standards, methods or other requirements for:

- land use and subdivision
- use of the coastal marine area and beds of lakes and rivers

[24] Innovation and Participation Advisory Group Advice on creating equal access to electricity networks April 2019 See https://www.ea.govt.nz/development/advisory-technical-groups/ipag/final-advice/

[25] Commerce Commission Statement of Intent Our Approach for 2020–2024. See https://comcom.govt.nz/__data/assets/pdf_file/0014/222305/Statement-of-Intent-20202024.PDF

- water take and use
- discharges
- noise

Each regional, city or district council must enforce the same standard. In some circumstances where specified in the NES, councils can impose stricter or more lenient standards. Ref: https://www.mfe.govt.nz/rma/rma-legislative-tools/national-environmental-standards

There is no National Environmental Standard for waste at present. There are National Environmental Standards for Air Quality (Air Quality NES) incorporated into the Resource Management Act 1991. Those regulations aim to set a guaranteed minimum level of health protection for all New Zealanders. The opportunity that arises in the context of the Zero Carbon Act is to establish a Waste NES that prioritises emissions from all treatment of waste. This would drive better decision making and better practices including a national approach. A Waste NES would:

- Include an emission consideration in decision making as the key criterion. Currently many councils have announced climate emergencies yet are making long term waste decisions that do not have a holistic climate lens applied to them.
- Account for total emissions in processes involving collection, processing and treatment of all waste streams e.g. include transport systems used to collect waste as part of the waste emissions, and/or emissions incurred processing waste streams, and/or treatment of the waste streams
- Aim to reduce the per capita waste being created
- Decouple waste from GDP growth by promoting circular economy principles.
- Standardise the kerbside household collection systems for recyclables and waste.

This standard is a key prerequisite for a number of other initiatives that are to deliver significant outcomes in the sector.

Following the development and adoption of the NES for waste, we propose a significant education programme is rolled out by government. This recognises that the impetus on waste reduction, and therefore carbon reduction, sits with those that are producing waste and utilising a waste network properly.

Recommendation 15: Centralised farm biomethane plants

A significant volume of carbon emissions categorised as waste are associated with the largest source of emissions coming from cattle belching (methane CH_4) and the addition of natural or synthetic fertilisers and wastes to soil (nitrous oxide N_2O) emissions. We propose to centralise farm liquid waste streams (wastes to soil) in a particular area to generate significant volumes of methane in a controlled manner, capture this, and therefore create green energy. For North Island installations, this methane could be pumped into the gas network to supplement natural gas, and potentially reduce forward green hydrogen need. For South Island installations green electricity could be generated, or alternatively these plants could be collocated next to facilities that require both electricity and heat for their production (meat processors, dairy processors for example). We foresee that the first piece of work is a study to identify those key areas with sufficient concentrations of liquid waste streams

(regional basis) scale and scope projects. From here specific projects can be developed. Figures below assume 4 projects @ 25M each collecting liquid waste in the form of effluent from 500k cows.

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple MACC Carbon Cost
$100M		26,600	25	96

The group identified several other items that could lead to lower emissions from waste:

Ensure the proceeds of the Waste Minimisation Levy support reduced GHG emissions from waste

With the implementation of increases to the Waste Disposal Levy, additional Waste Minimisation Funds will be available. It is critical that these funds are allocated to investments that consider the emissions impact of any solution, as well as the waste minimisation benefits. As with the Waste NES, fund allocation should assess all funding allocation though an emissions lens.

In addition, one of the challenges facing private and public parties involved in managing waste is the scale and ongoing cost (opex) of operations. Often local solutions are required which is a positive in terms of the transport component (both in terms of cost as well as emissions) but a barrier in terms of scale of operations. The Waste Minimisation Funds regulations could be amended to allow these funds to be used as opex to ensure suitable local solutions are financially sustainable, where required.

Strong support for composting solutions

Organic waste in particular makes up 40 per cent of household waste in New Zealand. Significantly improved separation and collection of domestic and commercial organic waste would improve the supply chain for composting. (It would also improve the supply change for anaerobic digestion plants as well.)

Composting extracts the nutrient potential from organics, which can provide additional beneficial reuse to New Zealand in terms of soils degradation. For composting activities to be low emitters they tend to have to be close to source thus reducing the transport component. Experience in composting with commercial operators is that it sells at a discount to cost even though it would compete with fossil fuel-based fertilizer in terms of its impact on farming and horticultural land.

Recycling and packaging

Reduce the volume of single use packaging in all forms, continue to support the harmonisation of plastic use types and recycling capacity onshore that ensures materials can be sustainably recovered for reuse.

3.6 Agriculture

<u>Headline</u>: Create an accelerated pathway for the development and adoption of methane reduction technologies. While the emission reductions outcomes may be some way away the R&D is urgent and the reward significant. If 30% of methane was taken out of the system that would be a reduction of approximately 11.3 MT CO_{2e} (13% of the total national emissions, and more than double the reductions that we are recommending in this paper).

We make the following decarbonisation recommendations associated with Agriculture:

- Create an accelerated pathway for the development and adoption of methane reduction technologies.
- Invest in the extension and further development of models and databases that inform our understanding of catchments.
- Support knowledge sharing hubs focussed on pastoral climate change.
- Undertake a land use modelling survey to inform sequestration and biomass supply chains.

Recommendation 16: Invest in the extension and further development of models and databases that inform our understanding of catchments

Farmers manage their land using appropriate levels of science, requiring inputs including farms types, soil characteristics, and water efficiency and management.

There needs to be work undertaken to refine and improve the existing models to reflect the benefits to a farm of improving soil and planting sequestration. As a result of this work we foresee that the level of data available to farmers to understand both their own carbon footprint, and the actions required to make tangible reductions and offset via farm planting, will have increased significantly.

Recommendation 17: Support existing knowledge sharing hubs focussed on pastoral climate change

Knowledge hubs such as AgMatters[26] provides landowners with tools and resources to measure and manage carbon. Some landowners may require support to bring the scenarios provided by these tools to fruition. Unlocking the mitigation opportunities will support biomass and sequestration and has the additional benefits of providing shelter and shade for livestock, addressing soil erosion and improving biodiversity outcomes.

Recommendation 18: Create an accelerated pathway for the development and adoption of methane reduction technologies

The most significant contributor to New Zealand's carbon emissions is associated with the emission of biological methane – almost 43.5% of our national emissions. This is well recognised, but there is no clear path or solution towards a lower carbon solution in this sector while maintain existing

[26] https://www.agmatters.nz/

production levels. In part, this is the key reason why there is a 2050 reduction target, not a net zero target, associated with biological methane.

There are a number of promising potential options to reduce the emissions from biological methane these are

- Vaccines – we understand that there are many options available for further research that may provide up to a 30% reduction in emissions
- Inhibitors to reduce emissions within cattle and sheep, without reducing productivity. We understand that this could reduce emissions by up to 20%.
- Breeding – we understand that there are existing programs to develop breeds of animals to produce less methane.

The New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) has some work underway however this work needs to be more aggressively funded. We have concerns that the funding is not tied to the seasonality of this work, and given the long timeframe required for research to be undertaken we need to start this accelerated work now, so that we have a solution in 15 years and can roll this out appropriately.

Undertake a land use modelling survey to inform sequestration and biomass supply chains

Refer to Process Heat section 3.3.

4. Built environment

Headline: Expand the Warmer Kiwi Homes Programme to deliver an additional 200,000 homes. Energy reductions from the residential load will largely offset fossil fuel electricity production. The initiative also supports a just transition as it addresses fuel poverty, creates jobs and delivers significant health benefits.

The built environment contributes a significant amount of carbon emissions however is not attributable to its own sector. Decisions around our built environment impact all sectors in a multitude of ways – locations of development impact our transportation footprint, the efficiency of buildings impacts our heating footprint, and the choice of heating technologies impacts our electricity footprint.

We make the following decarbonisation recommendations associated with built environment:

- Expand the Warmer Kiwi Homes Programme.
- NABERSNZ Ratings for Commercial Buildings.
- Create an Energy Performance Certificate (EPC) policy.

Recommendation 19: Expand the Warmer Kiwi Homes Programme

In 2009 the government launched a "warm up NZ" scheme that provided subsidies to the retrofit of insulation and/or installing clean heating for pre-2000 houses. From this scheme the cost benefits, energy savings, health benefits and industry and employment impacts were analysed.[27] Benefits from this scheme included:

- six per cent electricity savings and 4 per cent energy savings (electricity and gas) for metered energy used in space heating. One per cent and 0.66 per cent respectively for total metered energy used for a household.
- net cost benefits are measured conservatively at $950 million with $330 million invested. Cost benefits are dominated by health benefits at 99 per cent and energy savings benefits at 1 per cent.
- 50–380 additional FTE jobs.

The current programme is called "Warmer Kiwi Homes" and subsidises 90 per cent of the cost of ceiling and roof insulation and also 90 per cent of the cost of an approved centralised heater. This is only available to low-income areas and community services card holders. Programmes such as Warmer Kiwi Homes offer large benefits; therefore, it will be beneficial to explore similar programmes to this.

[27] Energy Savings - http://www.healthyhousing.org.nz/wp-content/uploads/2012/03/NZIF_Energy_report-Final.pdf
Cost Benefits - http://www.healthyhousing.org.nz/wp-content/uploads/2012/05/NZIF_CBA_report-Final-Revised-0612.pdf
Health Benefits - http://www.healthyhousing.org.nz/wp-content/uploads/2012/03/NZIF_Health_report-Final.pdf
Industry and Employment Impacts - http://www.healthyhousing.org.nz/wp-content/uploads/2012/03/NZIF_Producers_report-Final.pdf

This idea proposes that the Warmer Kiwi Homes programme is expanded to cover an additional 200,000 homes and additional energy users (such as LED lighting).

Type	Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple MACC
Insulation	$1,040,000,000	-	20,200	50	$1,030
LED Lighting	$10,900,000	-	9,900	10	$110
Water Heating	$2,400,000,000	-	115,600	25	$830

Residential load contributes to peaking in the electricity supply. Therefore, any energy reductions largely offset fossil fuel electricity production. Carbon reductions were calculated using normal electricity emission factors; therefore, they are on the conservative side.

Insulation does not offer large carbon reduction opportunities. However, its benefits come in the form of health savings. Research commissioned by EECA showed that homes that had been retrofit to a healthy standard accounted for a 43 per cent drop in hospital admissions for respiratory conditions, 23 per cent fewer days off school and 39 per cent fewer days off work. Accounting for these other benefits, this scheme has a cost to benefit ratio of 6:1, meaning for every $1 spent, $6 is gained.[28]

Recommendation 20: NABERSNZ ratings for commercial buildings

NABERSNZ is a system for rating the energy efficiency of commercial buildings. Ratings range from 0 to 6 stars and are valid for one year, so each year a new assessment is done to track progress and benchmark against other similar buildings. NABERSNZ ratings allow tenants to understand the operating expenses and the carbon footprint associated with the leased building while it also puts more onus on the owner to invest into energy efficiency to attract higher-value tenants. In Australia, this rating scheme has been mandated since 2010 and has seen energy savings of around $1 billion and 7 million tons of carbon emissions saved.

Currently, a NABERSNZ rating is voluntary, and there has been a slow uptake for commercial buildings. Last July, Minister Parker announced that the government would require NABERSNZ ratings on all new buildings for government occupation. This is yet to be extended to existing tenanted and owned buildings.

This idea is for NABERSNZ ratings to be made mandatory for commercial buildings over the size of 2,000m^2, and tax depreciation benefits are offered to the landlords for energy efficiency improvements that they have made to their office buildings.

Once established, NABERSNZ ratings are ideally self-funded as they become a necessity for building owners. In order to establish NABERSNZ ratings, it is recommended that:

- all government buildings assessed to provide an example to other commercial buildings
- government offers a $2,500 subsidy on the initial assessment for the first 500 buildings to speed up the uptake of NABERSNZ ratings.

[28] https://12253-console.memberconnex.com/Attachment?Action=Download&Attachment_id=3118

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple MACC
$1,250,000		6,400	10	20

Overseas studies have shown that more energy-efficient buildings may lead to increases in the productivity of workers within these buildings. A review in Australia estimated productivity benefits ranged from A$110m–$168m.[29] Other significant benefits that have been found include reduced staff turnover and staff sickness.

Recommendation 21: Create an Energy Performance Certificate (EPC) policy

An EPC contains information about a residential property's energy use and typical energy costs and also recommends how to reduce energy use and save money. In the UK, EPCs are needed whenever a property is built, sold or rented and show an energy efficiency rating estimated on fuel costs and an environmental rating based on CO_2 emissions. An EPC can be used to promote uptake of energy-efficient technology such as solar PV, insulation or efficient appliances, as it generates external pressure to increase a poorly rated home. An EPC can also be used to provide subsidies for the likes of solar PV, provided the houses already meet a minimum healthy home standard—going from the idea of increasing the energy efficiency of the house first and then looking at renewable energy generation initiatives.

This programme will develop further the government's healthy homes requirements, which are currently geared toward improving the health outcomes of tenants in poor quality housing. This idea is to mandate EPCs for residential properties that are built, sold and rented out. Allow for the EPC to encompass the typical energy costs and carbon emissions associated with the house and offer energy efficiency advice to improve rating. Incorporated into the policy are the lessons learned from the UK EPC programme and how it can be improved and tailored to NZ.

New builds need to show a high grade and properties to be rented need to have a minimum level of compliance. Research shows that proven energy-efficient homes tend to fetch 3–9 per cent higher sale prices; therefore, it will encourage owners to invest in energy efficient measures, stimulating local contractors and employment. Other benefits include healthier homes and jobs for assessors.

We propose that the programme will prove free assessments for the first 20,000 inspections, before rolling out legislation to enforce this requirement of all rented properties (by 2025) and then all properties sold (2028).

Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Yrs)	Simple MACC
$25M	-	-	-	-

[29] *Commercial Building Disclosure Program Review ACIL Allen 2015, p 57*

5. Government role in decarbonisation

Headline: Establish a cross-government agency working group to develop a decarbonisation plan for the public sector. The plan should be comprehensive, coherent, and logical, i.e. prioritising spend on the lowest cost per tonne CO_2 equivalent projects and leveraging the procurement process.

We make the following decarbonisation recommendations associated with Government's role in accelerating decarbonisation:

- Government to ensure it has its own decarbonisation plans in place that are comprehensive, coherent, and logical.
- Enforce decarbonisation of state sector assets and ministries.

Recommendation 22: Government to ensure it has its own decarbonisation plans in place that are comprehensive, coherent, and logical.

When the Climate Change Commission presents its carbon budget, government is required to produce a plan that will ensure participants in the economy meet the budgeted reductions in emissions. There are several ways in which government can show leadership in this process:

i. Re-introduce the Carbon Neutral Public Service Programme, introduced in 2007 and suspended in 2009. The programme was a world-leading demonstration of public service leadership. The programme moved the 34 public service departments towards carbon neutrality, through a three-step process involving:

   a) measurement of the greenhouse gas emissions associated with an agency's activities (these emissions mostly come from burning fossil fuels to generate electricity or as transport fuel),
   b) reducing those emissions, and
   c) undertaking 'offset' projects to remove an equivalent amount of carbon dioxide from the atmosphere or prevent it being released.

   The programme would allow New Zealand-based options to offset those greenhouse gas emissions that cannot be avoided after emissions reduction measures are put in place.

ii. Recent data has shown that only eight government departments are currently recording and reporting on their carbon emissions. We would assert that the public sector has a responsibility to meaningfully contribute on this issue, particularly as it plans to set national climate targets.

iii. Government to take an integrated end-to-end view of supply chains for the purpose of assessing individual projects and policy interventions.

iv. Government to ensure its decarbonisation plan is comprehensive, coherent, and logical, i.e. prioritising it spend on the lowest cost per tonne CO_2 equivalent, progressing to the harder and harder ideas.

v. Government to encourage the adoption of sustainability principles through the entire education system (including primary, secondary and tertiary learning). Universities should be encouraged to introduce sustainability principles into all courses (from social sciences to engineering) as well as courses focused specifically on sustainability practices.

vi. If sustainability criteria were embedded into all government (including local) procurement that would very quickly cascade through suppliers. Government should instil the principles of decarbonisation into its own activities, for all ministries and departments, including:

   a) take account of the value of decarbonising in procurement decisions (i.e. include the values of the externality in financial decisions.) The most often cited example by members is that not only should the public sector move to EVs where it can, but it should require suppliers to do the same.
   b) measure carbon footprint and have plans available for each entity's path to zero net emissions
   c) introduce carbon-reducing attitudes and behaviour at all levels and in all activities undertaken by the public service.

Recommendation 23: Enforce decarbonisation of state sector assets and ministries.

An example of government "walking the talk" in healthcare and the public sector would be to enforce decarbonisation of public sector institutions (schools, hospitals, corrections). Existing funding in place for $200 million to convert DHB and schools, which will require an extension. There are 86 hospitals across New Zealand, which might cost $10 million each to decarbonise on average (by the time you remove steam, remote sterilisation), reduce site load capacity (improve facade, insulation, building upgrades) and install heat pumps, or biomass alternatives.

Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple MACC
$600M	$10M	240,000	50	51

Recommendation 24: Environmental footprint disclosure

In addition to a recommendation that Government should instil the principles of decarbonisation into its own activities, for all ministries and departments (procurement practices, projects to de-carbonise healthcare and public sector) the group recommends Government articulate the standards they are using in the procurement and that this practice is adopted widely.

This recommendation is that Government lead a programme of work to relook at what it means to report and disclose product embedded emissions (e.g. in retail, building material, fuel). This is integral to pushing system change and influencing behaviour. Consistent methodology of reporting is important. Government has made some moves in the building sector but emissions reporting should be available for a range of products. For consumer products, information disclosed needs to be as accessible as current food labelling.

6. Investment

Headline: Government plays an important role to support business to bridge the gap between activity that is GHG-emitting and equivalent activity that reduces GHG emissions by monetising the value of the emission reduction outcomes. Several models to address this are discussed.

We make the following recommendations regarding investment:

- Government to establish a programme for (emissions) based procurement and/or financing.
- Recycle the proceeds from the ETS into innovation or R&D work targeted specifically at emissions reductions.

Recommendation 25: Mobilising capital to target emissions outcomes

At the heart of the decarbonisation challenge lies the issue of either capital requirements or increased OPEX incurred as a result of switching from fossil fuels to low carbon "green" energy sources. Government can assist in increasing the pool of capital for reduced emissions projects by using public funding to mobilise private finance.

In many instances, externalities (benefits) of decarbonisation are not directly quantifiable in dollar terms – despite clear benefits to intergenerational wellbeing and hence to the economy – so there is a case for governments to meet that gap so investment proceeds. The ETS imposes obligations on some emitters and monetises emissions reductions, principally carbon sequestration from forestry. However, the effective ETS price does not completely reflect the full cost of carbon, nor does it monetise the mitigation of risk associated with climate adaptation.

There are also market failures such as lack of information or high transaction costs holding up potential decarbonisation projects that, again, governments can play a role in compensating for. The Green Investment Fund is an example of government assisting in this case.

This idea is for government to bridge the gap between activity that is GHG-emitting and equivalent activity that reduces GHG emissions by monetising the value of the emission reduction outcomes. The assistance could take several forms, and these would be project specific.

One approach government could take for this idea is results-based procurement or financing. This would see the Crown pay for the delivery of a service that delivered an agreed emissions outcome but would not pay the full amount if pre-agreed outcomes are not achieved. The same would apply to an outcome-based financing arrangement. For example, an environmental impact bond could be used to fund biodiversity improvements that both sequester carbon and enhance land resilience. It could also be linked to employment outcomes to ensure the projects help grow permanent jobs.

The benefits to the Crown of taking this and other such approaches include increasing the ability to:

- mobilise capital to drive impactful change.
- innovate and let private capital take the risk, with the Crown securing long term benefits.
- obtain data from pilot projects that enable success to be scaled up nationally.
- avoid approaches that prove to be unsuccessful (learn from mistakes) with the benefit that private capital has funded it, rather than the Crown.

Recommendation 26: Use proceeds from the ETS for innovation or R&D targeted at emissions reductions

Government is currently thinking about what course to take with the proceeds from the New Zealand Emissions Trading Scheme. A Cabinet paper on the matter is currently under consideration.[30]

SBC and CLC are of the view that the proceeds should be recycled into innovation or R&D work targeted specifically at emissions reductions.

Climate related financial disclosures

The Government plans to make climate-related financial disclosures mandatory for some organisations. The requirement would apply to publicly listed companies and large insurers, banks and investment managers. Government consulted on the proposal in 2019, Cabinet made decisions in August 2020 and regulation are currently under development. Climate related financial disclosures are often referred to as TCFD obligations reflecting the recommendations of the international Task Force on Climate-related Financial Disclosures (TCFD). During this project we heard a lot of support for "TCFD reporting" from business and SOEs from SBC and CLC members. However, it has not translated into a specific recommendation in the context of this work.

[30] See: https://www.mfe.govt.nz/sites/default/files/media/Legislation/2020-B-06919_proceeds_from_the_nzets_cabinet_paper.pdf

Glossary

Terms

BEV – Battery Electric Vehicle.

ETS – Emissions Trading Scheme.

FBT – Fringe Benefit Tax.

GWP – Global Warming Potential. The impact that particular greenhouse gases have on greenhouse gas emissions, using a factor of 1 for CO_2. Releasing 1 kg of methane into the atmosphere is about equivalent to releasing 84 kg of CO_2 in the short term (10 years). Methane's 100-year GWP is about 28x CO_2 – but as it only persists in the atmosphere for a little more than a decade and is eventually converted to CO_2, The 100 year GWP is less than 84.

Greenhouse Gas Emissions – the emission of greenhouse gases (largely carbon dioxide and methane) that absorb and emit radiant energy and warm the planet. Most of New Zealand's emissions come from the burning of fossil fuels, and agricultural methane.

ICE – Internal Combustion Engine.

Low Carbon Fuel Standard – a rule designed to assign a maximum level of carbon emissions for liquid fuels.

MACC – Marginal Abatement Cost of Carbon. In this case, it identifies the carbon price when particular projects make economic sense.

Process Heat – the generation and application of heat for industrial processes.

Sustainable Aviation Fuel – fuel derived in whole or in part from non-petroleum sources.

TCFD - Task Force on Climate-Related Financial Disclosures. TCFD has published a set of voluntary climate-related financial risk disclosures which can be adopted by companies so that those companies can inform investors and other members of the public about the risks they face related to climate change.

Useful life – our estimate of how long the asset will be in place before replacement. Used to calculate the Marginal Abatement Cost of Carbon.

Units

tCO_{2e} – tonnes of carbon equivalent

$ktCO_{2e}$ – kilo tonne of carbon equivalent, or 1,000 tCO_{2e}

$MtCO_{2e}$ – mega tonne of carbon equivalent, or 1,000,000 tCO_{2e}

Giga Joule (GJ) – equivalent to one million joules, or around 280kWh

Appendix A: Summary of financial tables

Recommendation	Value Capital ($)	Opex Change ($)	Carbon Change (T/yr)	Useful Life (Years)	Simple MACC
Introduce a fuel efficiency standard for light passenger vehicles	$0	$0	4,730,000	25	-
Implement policies that reduce the number of light vehicles on the road	$10M	-	23,000	2	217
Reduce or remove the FBT for corporate BEV fleets	$0	$15.2M	47,300	25	320
Prohibit the development of new fossil fuel consuming process heat plant and incentivise the phasing out of low-medium temperature coal process heat plant by 2030	$2.4B	-	3,195,000	20	38
Enhance industrial energy efficiency support	$660M	-	639,000	25	42
Expand the Warmer Kiwi Homes Programme	$3.45B	$0	145,700	50	1,970
NABERSNZ Ratings for Commercial Buildings	1.25M		6,400	10	20
Create an Energy Performance Certificate (EPC) policy	$25M	-	-	-	-
Enforce decarbonisation of state sector assets and ministries	$600M	$10M	240,000	50	51

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About Sustainable Business Council

The Sustainable Business Council (SBC) is a CEO-led membership organisation with over 100 businesses from all sectors, ambitious for a sustainable New Zealand. Members represent more than $87 billion of collective turnover, 28% of GDP, and nearly 160,000 full-time jobs. Our network gives members the ability to take large-scale collective action. SBC is part of the BusinessNZ network and is the New Zealand Global Network partner to the World Business Council for Sustainable Development. www.sbc.org.nz/about/our-members/sbc-members

About Climate Leaders Coalition

The Climate Leaders Coalition (CLC) was launched in July 2018 with 60 original signatories to promote business leadership and collective action on climate change. With now over 100 signatories, they account for around 43% of New Zealand's gross emissions, around $86 billion of collective turnover and employ almost 200,000 people. Signatory commitments include measuring and publicly reporting their greenhouse gas emissions, setting a public emissions reduction target, and working with suppliers to reduce their emissions. www.climateleaderscoalition.org.nz/who

About Sapere

Sapere is one of the largest expert consulting firms in Australasia, and a leader in the provision of independent economic, forensic accounting and public policy services. We provide independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

'Sapere' comes from Latin (to be wise) and the phrase 'sapere aude' (dare to be wise). The phrase is associated with German philosopher Immanuel Kant, who promoted the use of reason as a tool of thought; an approach that underpins all Sapere's practice groups.

We build and maintain effective relationships as demonstrated by the volume of repeat work. Many of our experts have held leadership and senior management positions and are experienced in navigating complex relationships in government, industry, and academic settings.

We adopt a collaborative approach to our work and routinely partner with specialist firms in other fields, such as social research, IT design and architecture, and survey design. This enables us to deliver a comprehensive product and to ensure value for money.

About DETA

DETA Consulting is your leading optimisation and project delivery partner. We analyse the impact of our solutions on the client's operation as a whole – we consider practicality, health and safety, business and environmental concerns. We ensure our analysis is "real" and that clients can make informed decisions about their projects. Together with our clients we deliver quality strategic results.

We were born out of energy efficiency but have grown and evolved to deliver services across the wider engineering optimisation and sustainability spectrum from process optimisation, to water and wastewater reduction, through to carbon footprinting. We also have a dedicated project delivery team with expertise to provide as much support as you require from business case through to completion, or to adding value where required through the addition of a skilled resource to strengthen an existing delivery team. Our team have a passion for improving performance.

Awards

DETA has won a range of industry awards for our industrial productivity and project delivery work. Our client ANZCO Foods was awarded the 2016 EECA Energy Management award, in large part due to the energy management programme that we have managed for them since 2012.

We are at the forefront of industrial energy technology having rolled out several New Zealand 'First-in-Country' projects in the refrigeration and energy generation space. These have led to two EECA Innovation Awards: in 2016 for the Hellers high temperature heat pump project, and in 2018 for the Hanmer Springs geothermal methane turbine generator project.

DETA are members of both the SBC and CLC and consult to many SBC and CLC members to decarbonise their operations.

Sustainable Business Council

wbcsd Global Network Partner

CLIMATE LEADERS COALITION

ON A MISSION TO REDUCE EMISSIONS IN NEW ZEALAND